Renu Agarwal · Willem Selen
Göran Roos · Roy Green *Editors*

The Handbook of Service Innovation

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Endorsements

Bringing together the wide and diverse field of service innovation into a single, comprehensive and insightful text is a daunting challenge. Yet this is exactly what the Handbook of Service Innovation does. A great and compelling read, which I wholeheartedly recommend.

Professor Andy Neely
Director, Cambridge Service Alliance
University of Cambridge, UK

This is a hugely important topic and this handbook containing chapters from some of the leading academics and practitioner in the field. Service innovation encapsulates much of the work on management practices and productivity. As the modern world increasingly focuses on services long-run growth is going to come from innovation in their delivery, both product and process innovation. This book provides an ideal map for researchers to get up to speed on the latest work and thinking.

Professor Nicholas Bloom
Professor of Economics, Stanford University, California, USA

Senior Associate of the Centre for Economic Performance
London School of Economics, London, UK

The nature of service innovation continues to evolve as service offerings dominate over product offerings in developed economies around the world. Today making sense of service innovation is a top priority in industry, academia, government, and

the social sectors. *The Handbook of Service Innovation* provides a up-to-date set of concepts, examples, and perspectives on this intellectual deep and economic significant area of research, practice, education, and policy.

Dr. James ("Jim") C. Spohrer
Director, IBM University Programs (IBM UP) and Cognitive Systems Institute
IBM Research—Almaden, San Jose, USA

The mechanisms by which services can innovate seem almost as numerous as the array of services themselves. And, the numbers of each are destined to grow as the percent of the workforce in service jobs continues to increase. The editors of this volume have ranged far and wide to provide us with some of the best current thinking on service innovation—how it happens, where it happens, and how it can be managed most appropriately. These articles illustrate the many ways in which services interact with our lives and the ways our lives interact with services—to change them and to improve them.

Professor Roger W. Schmenner
Professor Emeritus of Operations Management
Kelley School of Business, Indiana University, USA

In this era of unparalleled service innovation, it is more vital than ever that we understand how to innovate and what makes service innovations successful. From high-tech services to hospitality to industrial and mass services, innovation is the key to competitive success, and this book is testimony to its importance and complexity. This collection of interesting new research provides many compelling insights and managerial prescriptions that should help both academic and practitioner audiences better appreciate the design, development, and management of service innovation, and improvement of service businesses and processes.

Professor Craig Froehle
Professor, Operations & Business Analytics
University of Cincinnati, Ohio, USA

In many economies, the service sector accounts for the majority of economic value added today. And while services' economic importance is growing, the number of settings in which they are delivered is increasing as well. This means that no longer only pure service firms have to think about their capabilities for service innovation, but also government agencies and many industrial firms that are developing explicit service offerings and product service bundles. In addition, services are increasingly created and offered within complex networks and "eco-systems"—often across industry borders and applying advanced information and

communication technology. This adds additional challenges and complexity for today's service managers. A key strength of the 'Handbook of Service Innovation' is its integration of numerous perspectives and backgrounds in the discussion of service innovation. Aspects covered include managerial challenges and capability building, the interplay of service innovation and technology, the roles of design and creativity, and collaborative innovation. This integrative and practice-oriented approach make the handbook an important asset for managers in any kind of service organisation.

Dr. Gerhard Satzger
Director, Karlsruhe Service Research Institute
Karlsruhe Institute of Technology (KIT)
Englerstrasse, Karlsruhe, Germany

This Handbook deals with a most elusive yet real and important issue of innovation in services. It covers a wide array of issues and topical themes, not least open innovation, servitisation, frugal service innovation and co-creation. It looks at a wide variety of sectors in the private sphere but also at the public sector and Universities. It combines theory, practice, prescription, capability requirements and design. Despite its apparent diversity, the volume is coherent and well integrated. Overall this is quite impressive feat, in general and given the importance of services and intangible assets in today's semi-global economy, in particular. A must read for students, scholars and practitioners alike, the editors are to be congratulated for making this happen.

Professor Chris Pitelis
University of Bath, and Queens' College
University of Cambridge, UK

As a product developer, and as an educator of future product developers, I'm truly delighted to learn about the Handbook of Service Innovation. Service design and innovation aspects have become more and more important component of any new product development initiative. Without exception, our partners in manufacturing industry with B2B products are showing strong interest in services. The Handbook of Service Innovation will be warmly welcomed by a wide audience.

Professor Ekman Kalevi
Director, Design Factory and Professor
Aalto University School of Science and Technology
Finland

Services innovation is an important field of study. This Handbook contributes to the growing literature that explains innovation in services, its nature, processes and outcomes.

Professor Mark Dodgson
Director, Technology and Innovation Management Centre
University of Queensland Business School
Brisbane, Australia

This is a comprehensive and stimulating compilation devoted to service innovation. It gives an excellent overview of the current state of underpinning Service Innovation for global economy.

Professor Haluk Demirkan
Professor of Digital Service Innovation & Business Analytics
Founder & Executive Director of Center for Information Based Management
Milgard School of Business
University of Washington—Tacoma, USA

Co-Founder & Board of Director
International Society of Service Innovation Professionals
(www.issip.org);

Track Chair for Analytics
Mobile & Service Science at HICSS
(www.hicss.hawaii.edu/)

The field of service innovation and services sciences is expanding at a rapid rate. The academic work and research is helping bring clarity to the new economic logic of a services based economy. This new logic is proving to be dramatically different from a product and consumption based economy. The Handbook of Service Innovation is an excellent collection of the latest thinking in the field. The diverse and cross-discipline nature of the topics covered in the handbooks reflects the expanding scope and breadth of service innovation.

Greg Oxton
Executive Director, Consortium for Service Innovation
California, USA

The Australian Services Roundtable (ASR) applauds the creation of the Handbook of Service Innovation which provides a comprehensive update and set of insights around the very important issue of driving higher levels of innovative outcomes in the services economy. ASR notes that service industries account for 70 % of world

gross domestic product (GDP) and employ about 3.2 billion people. The detailed study of innovation in services has historically been lacking and this Handbook is a highly significant resource for private and public sector services professionals alike.

Services is ultimately a "people-to-people" endeavour and this important dimension is explored extensively in the Handbook. ASR is very pleased to endorse this important work and hopes that it provides a springboard for further research developments and improved outcomes.

Ian Birks
CEO, Australian Services Roundtable
Canberra, Australia

The Handbook of Service Innovation is a must read for service managers and senior executives. It provides a comprehensive perspective on the challenge of service innovation. The book carefully addresses each aspect of service innovation. It addresses the true import of service innovation, provides an extensive literature review, identifies the skills and capabilities underpinning service innovation, explores governance and organizational structure that impinge on this challenge, and presents novel thinking on designing and managing service innovation. For the astute reader, this book will also open up new avenues for thinking about the application for service innovation thinking. The book spans organizational settings in both the public and private sectors, while also drawing on international experience.

Professor Aditya Ghose
FIEAust, President, Service Science Society of Australia

Director, Decision Systems Lab
School of Computer Science and Software Engineering
University of Wollongong
Wollongong, Australia

Productivity growth in the service sector has lagged far behind manufacturing despite its growing dominance in terms of GDP and employment in a vast many of the leading national economies. It is well understood that the key to service productivity growth is innovation and new models of designing, implementing, and delivering services. This handbook of service innovation edited by Dr. Agarwal, and Professor Selen, Roos, and Green is put together in this spirit. It addresses a range of important themes that bear strongly on service innovation. These include open innovation and crowdsourcing, servitization, semantic and service web, sustainable and frugal service design, and creativity and community engagement,

among others. The chapters in this volume taken together provide an original perspective on service innovation and offer useful guidelines for promoting greater innovativeness at every stage of the service life cycle.

Professor Joseph G. Davis
Professor of Information Systems and Services
The University of Sydney
Sydney, Australia

In this book, Agarwal, Selen, Roos and Green present a breadth of diverse topics necessary to gain practical insight into designing, managing and growing complex innovative services that benefits businesses and society. Drawing on latest research, and best practices, The Handbook of Service Innovation is a must read for those seeking to learn more about skills and capabilities needed to stay competitive in our growing service economy in the 21st century.

Yassi Moghaddam
Executive Director, International Society of Service Innovation Professionals
California, USA

Preface

Service innovation is about more than the technical or mechanical processes that drive the creation of new ways of fulfilling the demands and needs of society as a whole. It incorporates that elusive element that Carl Jung refers to, where "The creation of something new is not accomplished by the intellect, but by the play instinct arising from inner necessity. The creative mind plays with the object it loves".[1] This, in a succinct manner, encompasses the kernel at work in service innovation—that it is driven by the implicit process to improve, create, and utilize both tactile and intangible processes, services, and products. Aligned with the instinct, passion, and drive to improve what we as human beings come across, service innovation is an inherent part of life. To this end the collection of chapters here explore this in all its dimensions.

With services creating most of the wealth and employment in most emergent and advanced economies, fostering and managing service innovation exhibits unique challenges. This is particularly true if productivity improvement in services is to keep up with the long-lasting productivity improvement in manufacturing. These challenges pose new and interesting phenomena and call for new perspectives to be brought into focus. Service innovation is not limited to the service innovative process itself, but also involves our subtle responses and unspoken practices that accommodate, facilitate, and accelerate it. This multitude of perspectives and meanings shaping service innovation is what this Handbook explores in greater depth. *The Handbook of Service Innovation* takes the reader into deeper terrain to create insights into how we can explore some of these intricate aspects that define different forms of innovation, from the prosaic and beyond. Inexorably, this entails examining the specific nature of service innovation in order to unravel its complexities. By covering a breadth of topics, the Handbook provides an overview of how to build skills and capabilities to better design innovative services. An important facet of this process includes the

[1] Hillman J (1997) The myth of analysis. Northwestern University Press, Evanston, IL, p. 48.

challenges faced by management related to the new ways in which service innovation is undertaken, including its international dimensions.

The Handbook brings together the latest academic research and management practice on innovation in services, with contributions from leading researchers, practitioners, and thought leaders in the field, who provide in depth and practical insights into designing and managing innovation in services. This is achieved through cutting-edge research contributions, practical examples and implementations, and select cases. The Handbook takes the reader into alternative and varied views of innovation, while introducing recent and emerging technological developments, both in private and public service settings.

The Handbook is organized into seven parts that draw together the critical themes, or backbone, of service innovation. These parts cover a range of topics, both emergent and traditional. Our aim is to highlight core issues in service innovation as well as explore the novel approaches, integration, and understanding within specific contextual frameworks. In doing so, the Handbook provides a pragmatic approach to understanding service innovation on many different levels.

The Handbook starts with the theme *Innovation Definitions, Governance Structure, and Literature* in Part I. Before one can effectively and efficiently design and manage service innovations, it is paramount to first get an understanding of different types of innovation and degree of innovativeness.

In "Innovation: A Critical Assessment of the Concept and Scope of Literature" Baunsgaard and Clegg put forward the argument that service innovation is not taken up in the literature in a consistent manner, and inherent issues with defining innovation results in noncumulative and noncomparable studies that affect how innovation is researched. This is a critical concept in understanding the disparate nature of service innovation studies, and the Handbook takes the reader on a journey to align themes and concepts around the topic through the subsequent chapters.

In "Service Innovation: A Review of the Literature", Randhawa and Scerri outline a literature review that takes a significant step into integrating some of the streams of service innovation, showing its multidisciplinary aspects. In "Open Service Innovation: Literature Review and Directions for Future Research", Alexiev et al. explore how prospective research can encompass antecedents at the alliance-, alliance portfolio-, and alliance-network levels to enhance our understanding of service innovation. They call for an integrative model to propel future research, and provide a basis for developing such a model.

The Handbook then turns to co-creation and its relationship to service innovation in "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation", with Edwards et al. comparing existing open innovation frameworks, and proposing a co-creation approach to open service innovation.

Highlighting the complexities inherent in service innovation, Janssen et al. discuss a multidimensional approach in "Exploring a Multidimensional Approach to Service Innovation". By using survey-data from over 300 firms, the authors operationalize a multidimensional conceptualization of service innovation.

In "Innovation, Service Types, and Performance in Knowledge Intensive Business Services", Campagnolo and Cabigiosu explore Knowledge-Intensive Business Services (KIBS), and argue that not only innovation and customization are complementary in KIBS, but also that replication via standard and modular services determines a KIBS firm's performance. This chapter completes Part I by gathering the strands around the literature and structures providing a firm foundation for the key themes to be explored in the Handbook.

The second theme the Handbook explores relates to *Skills and Capability Building in Service Innovation,* discussed in Part II.

Roth develops a conceptual framework that helps firms to evolve crucial competences for a systematic service innovation process in "On the Way to a Systematic Service Innovation Competency Framework". The service-dominant logic and the competence-based perspective are used as theoretical foundations for this competency-based framework.

"Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches" provides an overview of the concept of idea assessment in services research. Here, Feldman and Kohler explore a case study of a German financial service provider, and introduce the concepts of serious games and crowdfunding as approaches to tease out issues of assessing service ideas.

Hasu et al. cover the topic of integration of user-based and employee-driven perspectives in innovation in "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework". The authors suggest a new integrated approach by analyzing the user–employee interaction in innovation, both theoretically and in two empirical cases.

In "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", Ojasalo et al. take up the concept of futures thinking and design thinking, and how these facilitate service innovation from the dynamic capabilities point-of-view. This chapter provides a valuable conceptual framework for service innovation that is grounded on concepts of foresight and service design.

The Handbook then returns to the topic of KIBS in "Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis", where Consoli et al. explore the topic from an alternative angle. This chapter offers a review of scholarly perspectives on the growth trajectory of KIBS, and elaborates on an empirical analysis to explore in detail commonalities and differences across a diverse group of sectors.

In "Dynamic Capabilities for Service Innovation in Service Systems" Agarwal and Selen explore the significance of the tangible and intangible aspects of service innovation. They demonstrate the relevance of the more implicit motivators of innovation to do with social and human capital, the more elusive aspects that play a dominant role in productivity.

The third major theme encompasses *Technological Developments in Service Innovation,* and is covered in Part III.

Nayar opens this part with a dynamic paper on the role of the emergent technology Web 3.0, or Semantic Web, in service innovation in "Role of Web 3.0 in Service Innovation". The semantic characteristic of Web 3.0, coupled in particular

with the ability to harness explosive amounts of data available today, make emerging Web 3.0 a key enabler for service innovation on a scale not seen before.

In "Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility", Luthria and Rabhi examine the conduits through which Service-Oriented Architectures (SOAs) may exert influence on dynamic capabilities within firms, and then empirically investigate this relationship in the context of organizations.

The topic of healthcare is critical in economies that deal with more efficient ways of administrating and providing services in this sector. Jung and Padman explore innovative, disruptive models of health care delivery in "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations". This framework provides a large departure from previous ways of understanding the health system, and hints at a massively improved system through patient engagement.

In the concluding chapter for this part, "Technology-Driven Service Innovation in the Banking Industry", Bajada and Trayler present an overview of the banking industry and examine the landscape of service innovation as shaped through the arrival of new technologies and deregulation of the Australian banking sector in the 1980s. The authors outline a number of changes in the industry that fuelled remarkable transformation in the way consumers and businesses approach banking through innovative services.

The Handbook goes into a fourth major theme with a focus on *Designing Service Innovation,* covered in Part IV.

In "Systemic Development of Service Innovation", Hautamäki and Oksanen explore the intrinsic characteristics of services and service systems, and present a systemic approach to produce service innovations.This chapter also provides insights into design thinking and its implications to service development and radical service innovation.

Ceschin demonstrates how Product-Service System (PSS) innovations represent a promising approach to sustainability in "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations". Building on insights from transition studies and through an action research project, the chapter investigates the role of design in sustainable radical service innovations.

Roos provides an overview of relevant literature on servitization in "Servitization as Innovation in Manufacturing—A Review of the Literature", exploring its dynamic nature. More and more servitization is becoming an essential part of strategy for manufacturing firms. The literature shows that the transformation process into a servitized manufacturing firm is a multifaceted, complex, but fertile terrain.

In "The Architecture of Service Innovation", Moustafellos discusses the field of service design through an architectural approach, where the reader is taken through architectural lessons from the classic Greeks and Romans, demonstrating how service design of classic infrastructures provide useful criteria for approaching and assessing services today.

In "Innovation or Resuscitation? A Review of Design Integration Programs in Australia", Cys and Andrew explore how design-integration programs have been established and supported by governments of nations around the world. This chapter reviews four government-supported programs in Australia, aiming to integrate design capabilities to stimulate business innovation and contribute to economic growth.

Chew in his "Service Innovation Through an Integrative Design Framework" outlines how at its core customer-centric service innovation in an increasingly digital world, is simultaneously technology-enabled, human-centered, and process-oriented. Chew argues that service innovation requires a cross-disciplinary, holistic, and end-to-end approach to New Service Design and Development (NSD).

The emerging concept of circular economy and its relevance to service innovation is a topic covered by Roos and Agarwal in "Services Innovation in a Circular Economy". An in depth literature review highlights the significance of the circular economy which shows how revisiting this concept first developed in the 1960s could assist in addressing complex global challenges. This chapter provides a new focus to service innovation as it necessitates the development of an appropriate business model framework for firms engaging in service innovation and delivery within a circular economy framework.

The fifth theme of the Handbook draws together papers on *Management Issues in Service Innovation,* discussed in Part V.

In "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation", Menor highlights how the pursuit and achievement of success in service innovation constitutes a critical strategic imperative for many organizations. The author takes the reader through empirical findings, obtained through field-based examination of innovative initiatives of North American symphony orchestras.

Holmlid et al. explore the intricate mechanism of co-creative practices that can be used for the purpose of service innovation in "Co-creative Practices in Service Innovation". The authors highlight the open-ended exploration practices familiar to designers, in which the practice of identifying problems goes hand in hand with creating solutions. The basis for exploration in this chapter is the engagement of people in reflective and creative dialogs, and to situate activities in order to set frames for reflection.

In "Managing Online User Co-creation in Service Innovation", Bengtsson and Ryzhkova present a framework of capabilities and related management practices to the effective management of different types of online service innovation tools. In "Practices for Involving Organizational Customers in Service Innovation", Korhonen and Kaarela apply previous research into Service-Dominant (S-D) logic and open innovation in order to study the practices for involving organizational customers in service innovation. The authors look at empirical research, based on case studies on six globally operating technology companies known for their innovativeness and service-oriented business with their organizational customers.

The Handbook turns to the international arena in its sixth theme, with a unique set of papers focussing on the *International Dimensions of Service Innovation,* covered in Part VI.

In "Services Offshoring: Location Choice and Subnational Regional Advantages in China", Tan and Chen examine the patterns of distribution of offshoring activities and determinants of the location selection at the city level. The chapter describes an empirical study that confirmed that the location of offshoring of services firms in China is highly influenced by location-specific factors, in particular the presence of a large educated workforce in the city.

"Innovative Strategies in Servicing International Markets from Ireland" explores the innovative evolution of Ireland's internationally traded services sector in the context of the increased significance of servicing international markets by foreign companies in Ireland. Grimes and Collins highlight in this chapter how innovative tax policies, together with innovative managerial practices such as transfer pricing, have enabled multinational subsidiaries in Ireland to evolve their operation more globally, as well as remain profitable in a relatively high-cost location.

In "Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets", Jack describes an exploratory case study of four Australian firms, operating in industrial markets, to assess the use of service innovative technologies in the delivery of supplementary services to international clients.

Since the outbreak of the Global Financial Crisis (GFC), businesses and governments in developed economies are more focused on sustainable affordability. In "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments", Sivaprakasam and Srinivasan provide a framework based on lessons in frugal innovations derived from emerging market experiences. Such lessons from emerging countries are important to foster a continuous and sustainable innovation approach, and also help businesses and governments in developed economies stay relevant to their stakeholders.

In the concluding theme, the Handbook focusses on *Service Innovation in the Government Sector,* discussed in Part VII.

Jappinen addresses the management of the service innovation process in the public sector in "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production". This chapter explores how the local government sector can use change management to better benefit from user-driven innovation in public sector renewal. Empirical data were drawn from the Finnish Customer-oriented Service Network Project in Helsinki, referred to as the Lauttasaari Project, which is discussed in detail in terms of change management, decision making, and innovation management.

In "Innovating Universities: Technocratic Reform and Beyond", Reiger et al. critically examine innovations and 'reforms' in university service provision and their management, focusing on Australia as illustrative of broader global trends associated with the integration of higher education into the international market economy. The authors suggest that dominant approaches to university 'reform' risk

to diminish the creativity and critical investigation skills required for these institutions to advance service innovation and emerging forms of society, beyond popular beliefs of becoming a 'knowledge-based' and 'service-oriented' economy.

In "Business Model Approach to Public Service Innovation" Katsigiannis et al. present a dynamic approach for the public sector to incorporate a new 'business model'. This chapter creates dialog around the challenges facing public sector decision makers, and allows for a better understanding in how to manage public service innovations.

"Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation" concludes the Handbook, where Andrew explores the tangle of academic discourse, policy rhetoric, and government programs aimed to support innovation through a case study of South Australia's strategic plan, and the agencies charged with fostering and supporting innovation in the state.

As discussed above, the Handbook draws from a large tract of information and knowledge on service innovation, and targets many audiences because of its comprehensive coverage of the subject area. Managers, public sector officials, and practitioners may benefit from the many practical examples and case studies, as well as management frameworks based on a well-covered theoretical background, reinforced by empirical results from industry and public sectors.

Researchers and academics may refer to the vast literature exposed on the topic of service innovation, as well as the discussion of numerous areas for further investigation as future research topics. Finally, students can use this Handbook to familiarize themselves about the nature, complexities, and opportunities of well-designed innovations in services, in both private industry and public sector settings.

In an era where technological advances propel the facilitation of improvements and fast absorption of not only the service, but also our inherent beliefs around what service signifies, this Handbook serves as a guide. After all, service in itself encompasses the complexities of the human psyche and its placement in vaster societal backdrops.

In the end of the Handbook, the *Epilog* provides a current status of the latest thinking in service innovation, and sets out a blue print for understanding service innovation to a more attuned level. We wish you a productive journey in your reading through the various themes covered in this text.

Renu Agarwal
Willem Selen
Göran Roos
Roy Green

Acknowledgment

We wish to acknowledge the substantial contribution made by Dr. Alex Pitsis and Ms. Carolyn Stonham in reviewing, providing helpful comments and suggestions, and editing the chapters of this book. We are grateful to our colleagues who provided feedback for the development of this handbook and also to the UTS Business School, University of Technology Sydney, and the School of Business, University of the Sunshine Coast, Australia for their overall support.

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Authors' Biography

Renu Agarwal is a Senior Lecturer in Innovation and Service Operations Management at UTS Business. Renu has extensive industry experience and in her current faculty position, Renu provides leadership in the disciplinary fields of service innovation, service value networks, supply chain management, dynamic capability building, management practices, management education, and innovation and productivity. She has been instrumental in managing several federal and state government project grants on management practices for both Australia and New Zealand working in collaboration with London School of Economics, McKinsey and Stanford University. Currently, Renu is involved in the Australian Leadership capability Standard and the Regional High Performance Networks Programs, Centre for Workplace leadership, as well as Service Innovation: developing business models for future Value Chains theme, part of the Wealth from Waste CSIRO Flagship Cluster project. Renu has published in top tier international journals which include the *Decision Sciences, International Journal of Production Economics, Education + Training Journal, International Journal of Operations Management, and International Journal of Production Research*.

Alexander Alexiev is Assistant Professor in Strategic Management and Innovation at VU University Amsterdam and fellow of the Amsterdam Centre for Service Innovation (AMSI). At VU University he teaches courses on services management and behavioral strategy. His main research focus is on the organizational and management aspects of the use of advice in strategic decision making. He studies service innovation in the contexts of professional service firms, cultural organizations and new ventures. He obtained his Ph.D. from the Rotterdam School of Management, Erasmus University.

Jane Andrew is an educator and researcher working at the University of South Australia's School of Art, Architecture, and Design. Jane's research and practice focus on collaborative practice, implementing trans-disciplinary projects and research in which artists, architects and designers are considered more than aesthetic afterthought in addressing environmental, social, economic and cultural issues faced by individuals communities and governments. It is this philosophy and

ability to work across the praxis of teaching and learning, research, and industry that Jane seeks to instil through her industry and community engagement activity, as well as in her teaching.

Marc Bahlmann is Assistant Professor at VU University Amsterdam, Faculty of Economics and Business Administration. Dr. Bahlmann received his Ph.D. from the Faculty of Social Sciences (VU University), for a study on knowledge dynamics among IT-entrepreneurs located in the Amsterdam-based IT and new media-cluster. His current research interests include alliance portfolio's, innovation and regional innovation, with a specific interest in ego-centric network configuration.

Christopher Bajada is an Associate Professor of Economics and Associate Dean (Teaching and Learning). He started his teaching career at the University of New South Wales, from which he holds a Ph.D. He has taught economics in a variety of undergraduate and postgraduate courses, with his most recent teaching experience being in applied microeconomics. In recognition of his teaching, Chris was awarded the University of Technology Teaching Excellence Award and Team Teaching Award as well as the Carrick Institute (now the Office of Learning and Teaching) *Teaching Award for Outstanding Contributions to Student Learning in Higher Education*. Chris's research is primarily in applied macroeconomics, with a special interest in tax compliance. He has worked with the Australian Taxation Office as a member of the Cash Economy Task Force, as a member of the Economics Society of Australia and more recently on the expert advisory panel on the development of the Economics Learning Standards for Australian Higher Education.

Vibeke Vad Baunsgaard is an Honorary Research Associate at the Centre for Management and Organisation Studies, University of Technology Sydney. She holds a Ph.D. from Copenhagen Business School and a Master of Science in Sociology from the University of Copenhagen. She has formerly done research in the area of political sociology. In recent years she has researched social practice in innovation and management processes and developed a theory of Dominant Ideological Modes of Rationality-concerning power relations, professional identities and rationalities. She has published on these issues in *Organization Studies* and in *Research in the Sociology of Organizations* with co-author Stewart Clegg.

Lars Bengtsson is a Professor of Industrial Engineering and Management at Lund University and at the Blekinge Institute of Technology, Sweden. He holds a Ph.D. from the School of Economics and Management, Lund University, Sweden. He has published some 70 books, book chapters and journal articles on innovation, academic entrepreneurship, internationalization and strategic management issues. Journal articles have been published in journals such as European Management Journal, International Journal of Information Management, Journal of Technology Transfer, International Studies of Management and Organization, Organization Science, and Scandinavian Journal of Management.

Anna Cabigiosu is Assistant Professor at the Department of Management, Ca' Foscari University of Venice, where she teaches Strategy and Business management. She is the executive director of the CAMI center (Center for the Automotive and Mobility Innovation) and the director of the IOS research center (Innovation Organization and Strategy) of the Ca' Foscari University. Her research areas include innovation, strategy and organization design with a specific focus on the organization of innovation in manufacturing and service firms and on the architecture of products/services. Her articles appeared in international journals such as Organization Science and Strategic Management Journal.

Diego Campagnolo is Assistant Professor of Strategy and Business Organization at the Department of Economics and Management "M. Fanno" of the University of Padova, where he teaches Corporate strategy, Intercultural Management (in the program ISPM-China at Guangzhou University) and Organization Design. He also teaches Organization Design at Bocconi University. His research interests include internationalization and business model evolution, organizational modularity and innovation in knowledge intensive business services. His research appeared in journals such as International Journal of Management Reviews and Industry & Innovation and in books published by Edward Elgar and Palgrave Macmillan.

Carolina Castaldi is Assistant Professor at the School of Innovation Sciences, Eindhoven University of Technology. Her research spans the economics and management of innovation and she is particularly interested in service innovation. Herein, her research deals mostly with the conceptualization and measurement of service innovation.

Fabrizio Ceschin is a *Lecturer in Design for Sustainability* and member of the *Sustainable Design* research group within the School of Engineering and Design, Brunel University. He holds a B.Sc. and M.Sc. degrees in Industrial Design. After graduation, in 2006, he joined the "*Design and Innovation for Sustainability*" research group at Politecnico di Milano as research assistant. In 2012 he obtained his Ph.D. degree with a dissertation on sustainable Product-Service Systems. He was research fellow at Politecnico di Milano before joining Brunel University in September 2012. He took part in several national and international research projects, funded by the European Commission, national institutions, small and medium enterprises, and multinational enterprises.

Stephen Chen is Professor of International Business at the University of Newcastle. He obtained his MBA from Cranfield School of Management and his Ph.D. in Management from Imperial College, London. He previously has taught at City University Business School (now Cass Business School), Manchester Business School, Henley Management College, Open University (UK), UCLA, Australian National University and Macquarie University. His research interests include the

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Part I
Innovation Definitions, Governance Structure, and Literature

Innovation: A Critical Assessment of the Concept and Scope of Literature

The scope of the innovation literature is vast, the variety of definitions too great and the agreement on central issues and concepts too little to review it all adequately. Literature reviews on the concept of innovation cover various *specific* areas of the innovation literature and this approach lends itself as the only probable and pragmatic way of confronting material of this magnitude unless one is content to speak of *tendencies* in innovation research. This chapter makes sense of all the converging notions of innovation.

Highlight *Urry (2007) argues that the car marked a radical departure from the train, which was the great 19th century transport invention. The train was public and followed a time regime set by the railway companies: it disciplined its users in terms of their adhering to schedules, timetables, platform changes etc. In contrast, the car embodied the opposite: it created and meant freedom (I can go where I want), privacy (the car as living room on wheels) and individuality (from choice of model to tuning or 'pimping' up the car).*

Service Innovation: A Review of the Literature

Services are increasingly dominating the world economy, contributing over 70 % of employment in OECD countries and 58 % of worldwide gross national product (Baltacioglu et al. 2007). The move from agriculture- and manufacturing-based to service- and knowledge-based economies has been pronounced in nations and all future forecasts show no signs of this trend abating (McCredie et al. 2010). This chapter reviews service innovation literature and brings to light different aspects of service innovation pertinent to service- and knowledge-based economies.

Highlight *Organizations are embedded in service value networks that comprise of a system of entities which include suppliers, intermediaries, customers and partners that combine core capabilities to co-create service offerings for the consumer. According to Hacklin et al. (2005), networks are multi-layered which enhances opportunities to co-innovate and create systemic value in operations through horizontal, vertical, diagonal and complementary networks. Connections through the networks may be human to human, technical to technical or human to technical; highlighting the importance of both human-centricity and technology in service innovation.*

Open Service Innovation: Literature Review and Directions for Future Research

Open service innovation enables business service firms to realize service innovations through engaging in external partnerships. The results of a review of studies investigating open innovation in a business service context indicate that prior work (1) primarily drew on a learning lens to explain service innovation and (2) adopted three levels of analysis, that is, *alliance*, *alliance portfolio* and *network*, resulting in three disconnected research streams.

Highlight *Studies adopting a network view suggest that the breadth and range of the network may lead to different service innovation outcomes. According to a study by De Vries (2006), radical service innovation results from service firms and customers interacting with a broad network of multiple providers. Syson and Perks (2004) showed that more radical innovations require the combination of complex and valuable resources, which can be facilitated in networks with a wider range of actors.*

Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation

An increasingly global and connected market environment sees many service providers struggling to find a competitive position. The shift from a product-dominant logic to a service-dominant market logic pressures businesses to look for new and effective ways of engaging with the innovation process. Managers are seeking more creative problem solving and lateral thinking in corporate innovation practices.

Highlight *According to Grönroos 2007, services now account for: "77 % of the value added in the United States and 73 % of the value added in the United Kingdom" (Aas and Pedersen 2010). Aas and Pederson (2010) notes that this figure could be significantly higher if 'hidden services' were included, such as those which are associated with manufacturing and primary industries, but which*

incorporate a service element. As the manufacturing sector is driven by technologies such as 'lean manufacturing', we can expect to see a growth in 'hidden services' as companies seek to incorporate manufacturing and reconditioning of manufactured goods into their business models (Aas and Pederson 2010).

Exploring a Multidimensional Approach to Service Innovation

Given the fuzzy nature of services, it proves challenging to describe precisely what element of a renewed service offering can be regarded as innovative. Many existing characterizations are criticized for being too limited to capture distinctive features of new services accurately. Highlighting the complexities inherent in service innovation, this chapter operationalizes a multidimensional conceptualization of service innovation.

Highlight *Using survey-data from 341 firms, the authors operationalize a multidimensional conceptualization of service innovation and show that firms renewing a higher number of dimensions indeed tend to yield a higher percentage of their turnover from new services. Further implications of treating services as multidimensional systems are discussed.*

Innovation, Service Types, and Performance in Knowledge Intensive Business Services

Among business services, Knowledge Intensive Business Services or KIBS represent a particular domain, and the literature discussing service innovation in KIBS has strongly emphasized their customized nature and, to some extent, their superimposed service innovation on service customization (Bettencourt et al. 2002). This may lead to possible misunderstandings with regard to the relationship between service innovation, different types of services (e.g. customized and standard services), and KIBS firms' economic performances.

Highlight *Using fuzzy sets qualitative comparative analysis (fs/QCA) on a sample of 319 KIBS firms, the authors explored the best performing configurations resulting from a combination of different service innovations with different service types. In doing so, the authors separately considered product and process innovations and four different types of services (customized, standard, standard with minor customizations, and modular). The results emphasize the complementarity between process innovations and service standardization on a firm's profitability, while highlighting the complementarity between process innovations, service customization, and modularity of a firm's growth.*

Innovation: A Critical Assessment of the Concept and Scope of Literature

Vibeke Vad Baunsgaard and Stewart R. Clegg

Abstract We begin by asking: what is innovation, and note the problems of defining both context and novelty in the usual essentialist answers. Within the literature, nonetheless, a range of types of innovation is identified, which we delineate. One way of trying to address the critique of innovation as essentialist is to try and demarcate degrees and dimensions of innovativeness. Given the specificity of this Handbook with service innovation, we next consider this particular type of innovation, looking especially at the literature associated with the view that *profit* is increasingly to be found in what is termed Service-Dominant (S-D) logic. We conclude the chapter by reiterating some problems in innovation research that any further extension of the term to "service innovation" will have to contend with.

Keywords Innovation · Product · Process · Service innovation · Types of innovation · Degrees of innovation · Dimensions of innovation · Service-Dominant (S-D) logic · Essentialism

1 Introduction

The scope of the innovation literature is vast, the variety of definitions too great and the agreement on central issues and concepts too little to review it all adequately. In other words, literature reviews on the concept of innovation cover various *specific* areas of the innovation literature and this approach lends itself as the only probable and pragmatic way of confronting material of this magnitude unless one is content

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to speak of *tendencies* in innovation research. One of the earlier handbooks of innovation puts it this way: "Two decades ago, it was still possible for a hard-working student to get a fairly good overview of the scholarly work on innovation by devoting a few years of intensive study to the subject. Not any more. Today, the literature on innovation is so large and diverse that even keeping up-to-date with one specific field of research is very challenging" (Fagerberg 2005, p. 4)—or as Poole and Van de Ven plainly state: "Though impressive, the sheer volume of research is also daunting. It is difficult to get the big picture" (2004, p. xii).

What follows is an introduction to the concept of innovation, its different nuances in general, as well as problems concerning the diversity and use of the concept. Thus, the aim is not to cover different theoretical takes on innovation or contribute an exhaustive literature review. Instead this introduction aims to create a general overall understanding of the nuances of 'innovation' by looking to the substance of definitions and problems therewith, types of innovation, scaling degrees characterizing innovations, levels of analysis for innovations, its antecedents, and finally problems of investigation are summarized.

2 What Is Innovation?

Innovation is usually defined as the creation of novelty that provides economic value through the creation of new products and services. Less often, given the origins of a great deal of innovation scholarship in a concern with new products and to a lesser extent, services, it may entail a focus on organizational changes, including the establishment of new work practices (Marceau 2008, p. 670). Although this is a good general purpose definition, the diversity in innovation definitions is enormous, including factors, elements, theories, and thoughts on technology, process, product, service, ||||organisation, market, consumer, creativity, knowledge, learning, culture, etc., and thereto the categorization of *degrees* of innovation; radical, incremental, or discontinuous innovation etc., adds even further complexity. Innovation therefore is difficult to grasp per se, since it potentially includes all kinds of "newness". At its broadest, the following definition, drawn from an extensive literature review, is useful: "An innovation can be a new product or service, a new production process technology, a new structure or administrative system, or a new plan or program pertaining to organization members" (Keupp et al. 2012, p. 367). The problem with such a definition is that the scope is almost all encompassing.

There are two further problems, however. The first of these is that there is no accounting for context. In one context a set of practices might constitute an innovation whilst in some other context the very same practices might be very 'old hat' or established indeed. The contextual nature of innovation is a problem that is rarely addressed in the innovation literature. The second problem is the definition of what constitutes novelty or the *new*. The new is produced historically; there is no timeless truth that announces it. Novelty is historically produced and socially

constructed – it does not inhere in the essence of things but in their reception. Hence, there is no guarantee of the nature of innovation. Above all it depends on social construction, which in most contemporary contexts, means *what the market acknowledges* where the market is a construct of social constructs expressed in consumption decisions. Seen thus, innovation is constituted in the opprobrium or reception that expresses the market; thus, Apple's innovations such as the smart phone or the iPad are innovations because of what consumers see them as offering as much as for what they actually offer.

Innovation should not be confused with or mistaken for invention, the discovery of something previously not known. Such a definition would hardly be strategic: it would not allow us to grasp the innovation that accompanied whole ways of working and living attendant on innovative developments of existing products, for instance, mobile phones, MP3 players or other digital devices. The phone and music players have been around since the nineteenth century; the mobile phone and the MP3 player are not new inventions that were discovered from scratch but they are innovations because they represent a new way of delivering existing products and services—phone calls and music—in ways that create value for people using them and companies complementing and manufacturing them.

We can try to reduce the scope of meaning of innovation by referring to types of innovation such as *product* or *process* innovation and then further confine it by degree: for example *radical* or *incremental* innovation. For instance, Porter (1996) differentiates between product and process innovation: product innovation means doing new things while process innovation is about doing things differently. Further, product and process innovations may be radical or incremental, where radical innovation fundamentally changes the products offered while incremental innovation makes small and continuous improvements to an existing product.

Newness is equivalent to each new product launch or generation in products, while process innovation would occur when the same things are new things were produced differently. It is evident that there are strong assumptions about the nature of change and the nature of non-change lurking in these approaches. Change is clearly conceived as an event that changes the state of non-change or stasis in products or processes. It is not conceived as a process that is always ongoing, whose meaningfulness is constituted only when attended to as something discrete. As approaches to innovation move closer to this latter reasoning then innovation becomes ever more incremental, embedded, and disorganized. Consequently it is harder to identify in its essence.

There is a lively debate in the literature around these points. A body of work identified in the literature as demarcation research has argued that the essence of service innovation is its intangibility and interactive nature. Thus, service innovation is difficult to record and often inscrutable to casual inspection or survey. Service innovation can emerge from simple variation introduced in response to a client or customer's requirements or be a result of working closely with end users and thus be lost to the gaze of researchers in the intricacies of co-production

(Gadrey et al. 1995). Perhaps not surprisingly there are critics of this approach who question whether something so subtle, liquid and hard to grasp can actually count as innovation proper (Drejer 2004).

One consequence of the relative neglect of service innovation is a bias in innovation studies towards hierarchically recorded, formalized and recognized changes as constituting innovation. Process innovation in the ways that things are put together or delivered in an everyday context of mundane learning is often missed, yet process innovation tends to be much more usual than product innovation—in part because, once significant investments have been made in ways of doing things, they tend to stay on the same tracks. Otherwise sunk costs are liquidated, existing systems made redundant, and well-honed competencies disabled.

Porter (1996) argued that the strategic advantage of product innovation is that no one else can offer what you offer. An example would be Toyota's Prius car—a new product that represents innovation and is of strategic value for Toyota. Process innovation, on the other hand, focuses on innovative ways of assembling and/or delivering products and services. Think of Dell computers. Cutting out the retailers, Dell and its customers shared the savings. Dell's innovation was process innovation because it redefined the way products were sold. Here, the strategy was based on a new way of delivering a product. Of course, the two categories cannot always be neatly separated. Consider the example of the online telephone service Skype, whose innovation challenged the business model of telephony. Skype is free of charge when used online from computer to computer. Skype does not pay for the network as users are already connected to the Internet. Marketing costs are very low as one convinced user encourages their friends and family to join Skype so they can talk with each other. Skype's business model relies on additional services that extend beyond the free computer-to-computer telephony. For a small fee, you can call mobile phones or landlines in foreign countries via the Internet.

Excluding what a concept does not cover can be helpful in limiting its possible meanings and in this regard the literature often distinguishes between *invention* versus *innovation.* According to this distinction an invention has to be taken to the market in order to become an innovation. The thought originates in Schumpeter's (1942) innovation studies carried out at a time when the main bulk of research focussed narrowly on either product innovation or process innovation. As other types of innovation studies have flourished since then, for example organizational innovation or marketing innovation, the original condition of *entering the market* is often altered to conditions of implementation or the condition of being put into practise. The definition of innovation in the Oslo manual, of OECD, which seeks a standard definition for European innovation studies, can serve to illustrate this: "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (OECD 2005, p. 46).

According to Roberts, an: "Innovation is composed of two parts: (1) the generation of idea or invention, and (2) the conversion of that invention in a business or other useful application" (2007, p. 1). While the invention can arise anywhere, the innovation often takes place in a company searching to combine different types of

knowledge, capabilities, skills and resources etc. necessary for the innovation to be implemented (Fagerberg 2005, p. 5). The *inventor* and the *innovator (the entrepreneur)* are therefore seldom the same, whether referring to persons or firms. As the invention and innovation can have different spatial locations, a time lag between the two is common. Although invention and innovation may occur almost simultaneously, it is very possible years might pass in order to find the right materials, market demand, skills, and resources etc. This time lag is often perceived as an iterative process where, for example, a product undergoes continual improvement and upgrading. Such continual processes persist subsequent to an invention being commercialized as seen, for example, in the development of transport in trains, airplanes automobiles or with the development of the computer. An *innovation* therefore, may be a 'blend' of many "smaller" innovations, where a change in just one of these smaller innovations can revolutionize the innovation as a whole.

The literature is divided whether an innovation from one context can be called an innovation when put into another context. The same invention can occur simultaneously at two different locations. Nonetheless, it might be preferable to leave the term *innovator* for the individual, or the unit that implements the invention or takes it to market, and call an adopter of a new technology, product, or service an *imitator* or *adopter* (Fagerberg 2005, p. 21). Although this is the common use of the concepts in economics, other disciplines such as sociology have used the terms differently. The debate on use of terminology includes thoughts on procedural differences with regard to processes of innovation contra the imitation of an innovation. For instance, an innovator is expected to spend more money on research than the imitator. The extensive literature on institutional entrepreneurship blurs the distinctions considerably: imitation of one field of activity in another field may well constitute institutional entrepreneurship, where the entrepreneurial element is regarded as innovative. Institutional entrepreneurs not only play the role of traditional entrepreneurs but also help establish new (and sometimes challenge old) institutions in the process of their activities (see DiMaggio 1988 and special issue on *institutional entrepreneurship* in *Organization Studies*, July 2007). They do so by leveraging resources to create new institutions or to transform existing ones, according to Maguire, Hardy and Lawrence (2004, p. 657). In doing so, some innovation scholars regard such entrepreneurs as involved in the implementation process (Cooley and Yorukogly 2003, p. 408).

3 Type of Innovation

Searching the literature, a plethora of innovation types surfaces. One type of innovation will require different resources and management to another, depending on the type of innovation (Darroch and McNaughton 2002, p. 211). Although product and process innovation still cover the major bulk of innovation research (Simpson et al. 2006, p. 1133), scholars have identified a variety of innovation types, including organizational innovation, marketing innovation, service innovation, supply chain

innovation, and business model innovation. The term technological innovation is usually correlated with that of product and process innovation (Schumpeter naming these product technology and production technology correspondingly) though these are furthermore difficult to distinguish from other terms such as product development or technological development etc.

There is no single view of product innovation. In a literature review, by Garcia and Calantone (2002), 15 constructs of new product development were found across 21 articles with the same article at times referring to several constructs. Take the example of product innovation: within the realm of business studies alone, related areas of research include marketing, quality management, operations management, strategic management, and product design, etc. "There is a need for integration across fields and for cross-fertilization of theories" (Poole and Van de Ven 2004, p. xii). Although product and process innovation are most studied, researchers regularly organize their studies into groups of *significant* types of innovation. Schumpeter, for instance, as one of the first researchers in the field, differentiated five types of innovation: new products, new methods of production, new sources of supply, the exploitation of new markets, and new ways to organize business (Fagerberg 2005, p. 6). Schumpeter argued that new ideas rarely come into being because firms innovate and transform themselves; rather, capitalism develops through a process of creative destruction. Schumpeter (1942, p. 83) defined the notion of creative destruction as a "process of industrial mutation that incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one." For Schumpeter, extremely significant innovations begin with the creative destruction of existing fields.

Evolutionary economists focus on *creative destruction*, Schumpeter's (1942) key term (Freeman and Soete 1979). As consumers favour new technologies and products some firms will prosper whereas others, locked into past and diminishing preferences, will die. The key role in creative destruction is reserved for technological innovations that can outflank existing products, designs and processes. Over time these form a dominant paradigm within which processes of production become highly efficient and there seem to be few opportunities for radical innovation within the existing paradigm. These industries are most susceptible to creative destruction by incremental innovation, often from competitors elsewhere in the world who have been more attuned to improving the product that they are competing against.

The complexity is added to as these constructs were further characterized by a great number of diverse scale items indicating degree of innovations. The term innovation or innovativeness seemingly is allocated meaning depending on the type of innovation, as well as the perspective of innovation in question. A brief illustration of this can simultaneously serve to illustrate the variation in substance of definitions. A review paper on product innovation suggests innovativeness is most often used as "a measure of the degree of 'newness' of an innovation" (Garcia and Calantone 2002, p. 112). Keeping in mind the reference to product innovation, one may argue it is only fair to expect other domains of innovation studies, such as for example those of organizational innovation, to utilize other definitions of 'innovativeness'. For example, another understanding of 'innovativeness', in the context

of 'innovation orientation' research, is as follows: "Innovativeness is defined […] as the capacity to introduce some new process, product or idea in the organization" (Hult et al. 2004, p. 430). Some studies also emphasize that for instance product innovativeness does not equate to firm innovativeness, the following referring to the first: "We […] maintain that product innovativeness is a measure of the potential discontinuity a product (process or service) can generate in the marketing and/or technological process" and the latter: "Firm or organizational innovativeness has been defined as the propensity for a firm to innovate or develop new products. It has also been defined as the propensity for a firm to adopt innovations" (Garcia and Calantone 2002, p. 113). Finally, the substance of the innovation term may also differ as perceived from either a macro or micro perspective. In a macro perspective "innovativeness is the capacity of a new innovation to create a paradigm shift in the science and technology and/or market structure in and industry" while from a micro perspective point of view "innovativeness is the capacity of a new innovation to influence the firm's existing marketing resources, technological resources, skills, knowledge, capabilities or strategy" (Garcia and Calantone 2002, p. 113). These are just a few examples that illustrate the diversity of substantive definitions according to innovation types and perspectives on innovation—adding to the understanding of complexity in innovation research in general.

Cusumano and Gawer (2002) argue that successful firms do not simply develop new products and services and compete with others in open markets. Rather, leading firms establish a platform on which new products emerge. A platform is defined as an evolving eco-system that is created from many interconnected pieces. Importantly, innovations have to build on other pieces to make sense to customers. Platform leaders are those companies who control or at least shape the structure of overarching systems architecture. Platform leaders define the rules of the game, the size of the playing field, and the entry conditions for players. Of course, to be able to control the platform is a powerful position that leads to a significant competitive advantage. Platforms are important arenas in which ideas can turn into marketable products and services. Platforms manage and control demand. They create 'lock-in' paths that make it hard for customers to change their minds and for competitors to enter the game. But platforms do not always have to be designed and border-patrolled by corporate organizations.

Some platforms emerge as a part of a more general institutional environment. For instance, Rao (2009) argues that one key element that made the car a culturally accepted object was reliability tests. In these tests cars competed against each other to demonstrate that they were trustworthy:

> Reliability contests were credible because each race was an event that could be interpreted as evidence of the dependability of cars by the public. Since reliability contests were public spectacles, they were emotionally charged events. Finally, reliability contests had 'narrative fidelity' because they combined the logic of testing with the practice of racing and created a compelling story (Rao 2009, p. 32)

The institutional environment within which the invention of the car could become a commercial success did not stop with reliability contests. The car

represented an entirely new way of being and being free—it promised mobility as a freedom rather than a constraint, because one had to adapt to rigid timetables. Urry (2007) argues that the car marked a radical departure from the train, which was the great nineteenth century transport invention. The train was public and followed a time regime set by the railway companies: it disciplined its users in terms of their adhering to schedules, timetables, platform changes, etc. In contrast, the car embodied the opposite: it created and meant *freedom* (I can go where I want), *privacy* (the car as living room on wheels), and *individuality* (from choice of model to tuning or 'pimping' up the car). These were the real innovative qualities of the car from which Ford benefited and which manufacturers exploited, starting a social movement that paved the way for a society in which the car would take on the status of a cultural object—sometimes even a cult object.

As well as requiring cultural legitimacy to become institutionalized, the car required a huge infrastructure to become useful: roads, highway networks, petrol stations, repair workshops, public licensing authorities, police, legal framework, insurance, and so on. In the twentieth century, entire cities have been modelled to accommodate the car—Los Angeles is the most often quoted example. Once such a system takes shape, innovations against the grain of the established ecology are hard to implement because so many players benefit from the status quo. The politics of the present situation prevail: in Los Angeles they were enough to stymie any public transport rapid transit ideas for decades because of the entrenched power of the petroleum and related products lobby (Whitt 1982). Thus, a platform producing innovation can lock in strategies to focus on process and incremental innovation—which is the story of the automobile. Cars have a negative impact on the environment and make our cities dysfunctional; each and every year roads produce 1.2 million dead and more than 20–50 million injured people, at an estimated cost of $518 billion, yet the car is still *the* preferred means of transportation. The power and diffusion of the car involved a whole network of actors who had to collaborate to create appropriate cultural and physical conditions. Successful innovation needs the active shaping of a platform in which to grow and create traction.

4 Degree of Innovativeness

Much research on innovation seeks to convey different *degrees* of innovation by referring to a continuum of *incremental* versus *radical* innovation (Prajogo and Sohal 2001, p. 540). The list of terms stating a variant degree of innovation is long, including systematic, new improvements, minor, major, moderate innovativeness, high innovativeness, incremental, radical, revolutionary, evolutionary, modular, architectural, regular, breakthrough, fusion, disruptive, discontinuous, continuous, routine, true, adoption, original, reformulated, instrumental, ultimate and the list goes on. The scaling degrees are applied in various ways. Some choose to use binary concepts such as "discontinuous" versus "continuous", "original" versus "reformulated" and so forth. Others use a triadic categorization, applying

a "middle" scaling item as in "low innovativeness", "moderate innovativeness" and "high innovativeness". Four or five degree-terms may be used in the same way and sometimes the notion of *degrees* is applied in a much less systematic manner (Garcia and Calantone 2002, p. 117). Terms such as adoption and adaption are also used to convey degree, where, for instance, "considerable adaption" refers to a marginal innovation (Fagerberg 2005, p. 6), to use yet another term of degree.

When a review paper shows (Garcia and Calantone 2002, p. 110) how 51 distinct scale items are utilized concerning one type of innovation alone (product innovation), together with 15 constructs (defining types of newness) in just 21 articles, many will lose the big picture, especially keeping in mind that these 21 articles are just a drop in the ocean in the context of the general scope of innovation literature. Innovation research suffers from inconsistencies not just in its definitions but also in its operationalization (Wolfe 1994; Garcia and Calantone 2002). Different labelling of the same innovation afflicts operationalization of innovativeness in the empirical literature (Garcia and Calantone 2002, p. 117) and should be a genuine concern for researchers of innovation.

5 Dimensions: Individual—Group—Network

Research of innovation at the individual level include studies of how the entrepreneur, champion or 'knowledge worker' can enhance the innovative process in a firm, studies which are typically covered by the field of Innovation Management. With reference to invention versus innovation, studies of the inventor and imitator/adopter/adapter of an innovation may also be carried out at the individual level. Studies at the individual level however fall short in many respects, as they often exclude, as valuable research, the dynamics of the environment, in which the individual is situated.

At the group or organizational-level interaction processes are included as relevant factors of innovation. Wolfe explains, in a historical perspective, how an inappropriate'anthropomorphizing' of organizational characteristics took place as organizations were viewed as the adaptors, rather than individuals within them (1994, p. 408). Today, a large body of organizational literature exists on innovation and organizational change in general and this anthropomorphizing is taken-for-granted. The literature has focussed on "the influence of organizational structure, perhaps because it has been argued that structural variables are the primary determinants of organizational innovation" (Wolfe 1994, p. 409). Innovation by the assembly of heterogeneous groups is another way to manage and provoke innovations, perhaps popular due to its pragmatic character, in the light of its easier implementation and praxis contra theoretical constructs such as introducing an "open culture" in the organization.

Research on innovation at the interorganizational level encompass studies of, for instance, industrial clusters, knowledge sharing and monitoring of other firms in search of new ideas, skills, resources, inputs and sources of inspiration

(Fagerberg et al. 2005, pp. 10–11). "Innovation is by its very nature a systemic phenomenon, since it results from continuing interaction between different actors and organization" (Fagerberg et al. 2005, p. 4).

Management and organization theorists focus on processes of innovation not only within organizations but also at the inter-organizational level, especially around phenomena such as supply chains, networks and clusters. Recent changes in the field of information and communication technology (ICT), suggest that innovation can neither be managed nor contained inside organization. Rather, innovations that allow organizations to develop differentiation strategies co-evolve with the environment. The reasons for the shift to co-creation are threefold, and all three reasons have to do with the rise of the Internet and ICT (Prahalad 2004).

1. Consumers are more connected than before through social networking sites such as Facebook.
2. Consumers are more informed because of the Internet.
3. Consumers feel more empowered and are more active. Think of communities such as Linux where people produce, share and discuss how to solve problems.

In the words of Tapscott and Williams, the '[o]ld 'plan and push economy' will give way to the new 'engage and co-create economy' (Tapscott and Williams 2008, p. 31). Take the example of eBay whose strategy relies on creating interaction and transaction between people—and this idea has made it the second largest retailer in the world. Or think of Wikipedia, the online knowledge bank written by users. Wikipedia's strategy is to provide a genuine co-creation experience for its users. The most common argument against Wikipedia is the lack of accuracy. According to a study by the prestigious science journal *Nature*, a typical Wikipedia article contained four errors but on average an article in *Encyclopedia Britannica* contains three errors. It simply cannot keep up with the breadth and speed of new entries and improvements of old ones that Wikipedia's open source model allows. Increasingly self-organized, distributed, and collaborative human capital networks are augmenting and in some cases displacing the firm as an envelope of competencies. Zander and Zander (2005) argue that customers are strategic resources contributing to company growth, agreeing with Penrose's (1959) notion of customers being an 'insider track' in terms of problem solving.

The notion of the learning network (Bessant and Tsekouras 2001) has been introduced to focus on the development of industry clusters. In this concept, learning is understood as cyclical and social process of experimenting, experiencing, reflecting and conceptualizing. Clusters of firms can be found in examples such as Silicon Valley and its high-tech computer industry, Bangalore in India for outsourcing, furniture design in Northern Italy, or the British Midlands as home to the so-called Motorsport Valley, where many Formula 1 teams and crucial suppliers have development facilities. Such clusters are critical for innovation as they enable learning processes that transcend the capabilities of an isolated firm. Whereas learning occurs in regional clusters as consequence of product development, learning networks are formally set up with the purpose to increase knowledge (Bessant and Tsekouras 2001). Examples of such learning networks include professional

institutions, trade or supplier associations, collaborative labs (co-labs), and communities of practice, and so on. Of course, the advent of the Internet and information communication technology is a massive catalyst in the development of such innovation networks.

Bessant et al. (2003) conducted a case study of the South African forestry industry. *Saligna*, a species of eucalyptus hardwood that was traditionally used for mining, was re-discovered as environmentally sustainable raw material for the furniture industry. But in order to realize this opportunity, the whole value chain of the industry needed to learn and innovate. For instance, to work with *saligna* firms had to adapt their operations; furniture production requires consistent quality which means the raw materials have to be improved; new designs that were suitable to *salinga* wood needed to be developed and, finally, new markets from furniture to doors, industrial products, and toys emerged with the new material and competencies

Birkinshaw et al. (2007) argue that innovation networks evolve through three steps of finding, forming and performing. The key challenges that firms face are twofold: choosing the right partner (finding), and learning how to work with them (forming). Performing, the third steps, follows if one and two have been completed successfully. Of course, this sounds easier than it is. Keys for the performance of the innovation network are the engagement of partners, trust and reciprocity across the network, a good understanding of one's own position with the network (as opposed to attempting to control it) and, finally, learning when to let go and set your partners (and yourself) free.

Open innovation networks represent the radicalized version of the inter-organizational, co-creative innovation approach. In an *Academy of Management Review* article, Birkinshaw et al. argue that management innovation is an important yet still relatively unexplored topic (2008: see also Hamel 2006). Management innovation is the creation of a new management practice, process, or structure that changes the state of the art. An example would be Taylor's scientific management, the divisional M-form, or teamwork: they are new ways of managing and organizing work.

If we were to think of a management innovation that rivalled these earlier examples, such as scientific management, in innovation, it would probably be open source innovation, and its impact on strategic innovation inside organizations. Chesbrough (2006) talks about a paradigm shift from closed to open innovation. The paradigm of closed innovation assumes that successful innovation requires tight organizational control. According to this model, firms must create ideas, develop them, finance them, and bring them all the way to market themselves. In return, they retain the intellectual property rights. Open innovation is premised on allowing companies and multiple stakeholders to interact and co-create. Networks, eco-systems and innovation communities become important strategic resources because they allow co-creation.

Chesbrough and Appleyard argue that organizations need not only to co-create but also to capture part of the value that is created. In other words, open innovation needs to enhance business value. The term open strategy describes this balance

between creation and capture of value. Chesbrough and Appleyard (2007, pp. 65–66) differentiate between four 'open strategies' organizations can employ to benefit from open innovation:

1. *Deployment* innovation increases the user experience and they are willing to pay for the enhanced service. IBM, for instance, makes money from training and consulting on open source software applications.
2. *Hybridization* firms invest in add-ons to products developed in the open and remain in control of the IP of the add-on.
3. *Complements* a firm sells a product or service that is related to the use of the open source content. The example in case would be a mobile phone seller who benefits from free software for the mobile.
4. *Self-service* in this model, the community develops a service for its own needs; no one monetizes its value.

For Chesbrough and Appleyard, all but the last model represent viable business models in an open source environment. While self-service will produce value in general, it will not produce a profit. Open source helps to de-bug programs and allows for lots of trial-and-error experiments where three assumptions are in place: participants do not have to coordinate their tasks closely; they work for free, hence little is known about how efficient resource allocation works in the open model, and open models are not as democratic and open as they seem: Linux, for instance, has an inner core of programmers who safeguard the system. If there is no quality assurance, you might have to face the consequences.

6 Antecedents of Innovation

It is a fact that there are some nations that are undoubtedly more innovative than others: the United States and Israel are usually ranked as the most innovative; thus, the study of co-creation at the firm level needs to be supplemented by co-creation in the national environment. The likelihood of innovation emerging increases when there is an appropriate national innovation system in place. National innovation systems are composed of different patterns of institutions and organizational relationships (Coriat and Weinstein 2002). It is the specific configuration of relations and institutions that are important in framing the national innovation system. What matters are institutions such as the legal system, especially concerning the ownership and control of intellectual property relations, how national education and training systems are configured, the industry structure of key industries, competitor and surrounding organizations, the efficiency of capital markets in providing venture capital for innovation, the development of national innovation policies related to science and technology and the crucial role of universities and research centres, as well as national innovation policies related to investments, taxation and other determinants of the 'rules of the game' that shape both public and private sector decision-making (Nelson 2005). Much of the innovation literature aims to discover

antecedents of innovation—a "how-to" approach at more specific levels than that of the nation. This is the case in general holistic approaches to innovation studies, such as those of "innovation orientation", "market orientation", or "entrepreneurial orientation", etc. (see Hult et al. 2004; Siguaw et al. 2006; Hurley and Hult 1998; Simpson et al. 2006), as in studies of more specific variables as antecedents, such as company size or age of business (see Brouwer et al. 1999).

Extended focus on antecedents of innovation is not surprising as it is well established that innovative firms perform better. Although literature reviews such as Fagerberg (2005, p. 20) and Hult et al. (2004, p. 429) illustrate how studies of antecedents as factors of innovation success are inconsistent and/or inconclusive, there is some agreement on factors "such as firm culture, experience with innovation, the multidisciplinary character of the R&D team and explicit recognition of the collective character of the innovation process or the advantages of the matrix organization" (van der Panne et al. 2003, p. 309). The pertinent point, in a research perspective, is how articles need to be critically scrutinized and more importantly, compared to other findings, before adopted predictors of success factors in innovation. As van der Panne et al. state in their review paper: "While some studies claim a certain group of factors being crucial, other studies ignore the very same factors and claim very different factors to be decisive" (2003, p. 310). The problem in innovation research, in this respect, is the vast amount of research on antecedents, where numerous articles pinpoint factors behind success of innovation—factors nevertheless ignored in other studies or even stated as factors failing to lead to innovation. Finally, as researchers, according to van der Panne et al., do not strive to compare research, due to difficulties therewith, results seem to suffer the persistent faith of being inconclusive and inconsistent such that "none tried to compare, except to themselves" (2003, p. 310).

Different research approaches and contexts can potentially explain some predicaments in innovation research. Studies often differ in methods, some being qualitative others quantitative. Studies of antecedents are often scaled along the line of "degree of success" facing similar problems as addressed above in relation to "degrees of innovation", i.e. multiple degree-variables applied. Further, differences in context have an impact as some scholars research a particular industry and others a number of industries (van der Panne et al. 2003, p. 310). As a warning, van der Panne et al. note that it is possibly easier to report and take credit for a successful project rather than an unsuccessful one and correspondingly interviewers might not get the "whole story", leaving them with a fuzzy picture that over-samples "success" and under-samples "failure" (2003, p. 310).

7 The Specificity of Service Innovation

In the research literature, "relatively few articles focus on the strategic management of process innovations, administrative innovations and service innovations" (Keupp et al. 2012, p. 377). In an extensive bibliometric study, the authors found very few

articles explicitly addressing service innovation in the strategic management literature. The formal economics derived work of Gallouj and Weinsten (1997) is an early attempt to explain service innovation theoretically, the paper by Tether (2005) outlines descriptive accounts of service innovation in the European Community, while a small number of papers seek to synthesize accounts of service and manufacturing innovation (Coombs and Miles 2000; Drejer 2004; Gallouj and Weinstein 1997).

Vargo and Lusch provide a definition of services as "the application of specialized competencies (knowledge and skills) through deeds, processes and performances for the benefit of another entity or the entity itself" (Vargo and Lusch 2004, p. 2). In a service-centered view, Vargo and Lusch argue that the role of firms is "not to make and sell units of output but to provide customized services" (Vargo and Lusch 2004, p. 13). For Vargo and Lusch, the shift to an increasing component of service in the production and distribution of activities offered for profit in the market means that a Service-Dominant (S-D) logic of marketing is replacing a Goods-Dominant (G-D) logic. By defining a service as an interactive process of 'doing something for someone' that is valued, they suggest that goods ultimately are part of service and acquire what they call a 'value-in-use' and complements a more recent focus on service as co-creation (e.g. Bitner et al. 2008). The central proposition is that all economic exchanges are service exchanges and, even when goods are involved, they are incidental or, perhaps, simply enablers for the exchange. The argument is reflective of a time when manufacturers were focusing on specialization and, through "unbundling", (Normann 2001), began to subcontract or outsource those activities which were not considered core competencies for the business.

According to Prahalad and Bettis (1986, p. 490; see also Bettis and Prahalad 1995), a dominant logic represents "a mind set or a world view", or the way in which managers conceptualize the business, where structures and frames of reference form the key aspects of a dominant logic. Drawing on Weick (1979), they view a dominant logic in terms of a schema "which provides the vehicle for (the manager's) concept of the social construction (or enactment) of a firm's environment" (Prahalad and Bettis 1986, p. 490). As Grant (1988) observes, a dominant logic is first of all related to a strategic level of thinking, although this has implications for practice: "More broadly the dominant logic can be considered as both a knowledge structure and a set of elicited management processes" (Prahalad and Bettis 1986, p. 490).

The first fundamental premise of the S-D logic claims that service is the fundamental basis of business and that service is exchanged for service (Vargo and Lusch 2004). This statement is based on the theory of economic decision making developed by the French nineteenth century economist Frédéric Bastiat (1848), who claimed that economic decisions have to be made with the customers' interest in mind, and that in return for service received from a firm, customers provide service to the firm. However, service is only a mediating factor, a means to an end.

Applying S-D logic offers an integrated understanding of the purpose and nature of organisations, markets and society as primarily concerned with exchange of

services. In S-D logic, the service being offered becomes the common denominator of exchange. From an S-D logic point of view, all firms are service providers and service receivers; markets focus on the exchange of service, and economies and societies are service-based. As a result, a service-based logic should embrace the idea of the value-in-use and co-creation of value rather than the value-in-exchange and embedded-value concepts of traditional G-D logic.

Service, when nurtured effectively, can enable or support an organisation to outperform its rivals, an assumption commonly grounded in resource and capability related views (e.g. Wernerfelt 1984; Teece et al. 1997; Barney 1991). S-D logic has the ability to explain and unify the service role of interacting partners and boundary objects, such as goods being co-produced, and has already led to new ways of looking at strategic innovation in theoretical as well as practical terms. The eight premises of the initial article (Vargo and Lusch 2004) centred on the notion that "the customer is always a co-producer of value" (Vargo and Lusch 2004, p. 1), have subsequently been expanded to ten (Vargo and Lusch 2008). In the 2008 paper the authors rephrased their central proposition to read "the customer is always a co-creator of value" (Vargo and Lusch 2008, p. 1). Since Vargo and Lusch made this re-formulation, almost every publication on S-D logic, without criticism or without even questioning, repeats this statement (Sánchez-Fernández et al. 2007; Grönroos 2008). Empirical evidence within the article is distinctly lacking (Pels and Saren 2006). Subsequent discussion has taken place on a conspicuously conceptual plane (Gummesson 2006). Empirical support for the S-D logic is somewhat lacking (Blazevic and Lievens 2008; Brodie et al. 2006).

Generally in publications on S-D logic, innovative value creation seems to mean an all-encompassing process. The concept of resources in S-D logic has been shaped by the resource-based view (RBV) of the firm, which conceives of the firm as a unique bundle of asymmetric resources to be stewarded wisely towards competitive advantage by management (Wernerfelt 1984), seen by Vargo and Lusch as the backbone to their framework (2008). The RBV has more recently begun to stress the importance of having dynamic capabilities that focus on innovation, (Helfat et al. 2007; Menguc and Auh 2006; Teece et al. 1997).

Innovation occurs in the framework when value is created. Typically, in the literature value concepts imply some form of an assessment of benefits against sacrifices (see Sánchez-Fernández and Iniesta-Bonillo 2007; Sánchez-Fernández et al. 2009; Zeithaml 1988; Day 1990; Woodruff and Gardial 1996), means-ends-models (Rokeach 1973; Gutman, 1982; Peter and Olson 1987; de Chernatony et al. 2000). Value creation is a process through which the user becomes better off in some respect (Grönroos 2008) or which increases the customer's well being (Vargo et al. 2008). However, as most customer practices are mundane, everyday activities performed in a spontaneous, more or less unconscious manner (Schatzki 1996, p. 58), it is debatable whether the process of creating value is best described as innovation: these have elsewhere been researched through the constructs of customer engagement, collaborative agility, entrepreneurial alertness, and collaborative innovative capabilities (Agarwal and Selen 2009).

The notion of a dominant logic is problematic. First, it is not evident whose logic it is: the analysts or the actors. Second, if it is the actors then it assumes a singular and unitary consciousness pervades the organization. In Grant's (1988) terms it assumes that what gets to be thought strategically flows effortlessly, without resistance, through the consciousness of all the corporation's employees. Such an assumption is preposterous: empirically, it assumes a degree of organizational brainwashing. Were it empirically probable, which it is not, it would be absolutely inimical to innovation. Third, if the logic is that of the analyst, then it is prescriptive rather than empirically descriptive. Rather than assume logic or impose one it is better to talk of diverse modes of rationality as the analytical construction of what it is that the actors are doing knowledgably. According to Baunsgaard and Clegg, a dominant ideological mode of rationality describes "an overwhelming mentality that penetrates an organization or parts of it, and provides meaning in a more or less conscious manner to its members so vigorously that social practice is primarily based on it" (Baunsgaard and Clegg 2012, p. 206, 2013). Dominant ideological modes of rationality interlink social practices in general and strategic management practices in specific. As service is perceived as 'doing', it is to be considered both in terms of an existing knowledge structure as well as elicited management processes.

8 Problems in Innovation Research

A consistent use of terminology is paramount in ascertaining cumulative and comparable innovation research. Accordingly the substantial evidence of great irregularities in innovation definitions and typologies have immense consequences for research, leading to a poor understanding of innovation considering the vast amount of research invested (see for example, Adams et al. 2006; van der Panne et al. 2003; Becheikh et al. 2006; Garcia and Calantone 2002; Fagerberg et al. 2005; Prajogo and Sohal 2001).

The problems are many. First, there is a general lack of consistency in definitions and use of innovation as a concept; types of innovation and their areas of reference, and finally scaling degrees of innovation. Second, this inconsistency results in non-cumulative and non-comparable studies diminishing *re*-search. Third, too much research is unknowingly repeated as researchers ignore similar research using different labels. For similar reasons, research from other communities and academic disciplines are often overlooked (see Henard and Szymanski in Garcia and Calantone 2002). Conducting dissimilar research under the same name is likewise a problem. Fourth, there are too seldom links between different fields of research within a single discipline as well as across disciplines (Hauser et al. 2006, p. 1). Fifth, innovation studies suffer from inconsistencies in the operationalization of central concepts. Sixth, the majority of innovation research being in the area of product and process innovation can potentially escalate as it becomes further difficult to engage in comparable research in other areas of innovation research not the least difficult to make historical investigations. Seventh, theory development is

inhibited by the production of non-comparable and non-cumulative research. Poole and Van de Ven hint at this, looking back at their search through the literature of organizational change and innovation: "A number of useful and powerful theories had evolved, but they had often developed in relative isolation. It was difficult to see the bigger picture that showed relationships among theories and possibilities for integrations" (2004, p. vi). Eighth, due to lack of consistency in labelling and defining innovations, practitioners encounter great difficulty attempting to draw on research that is often confusing and conflicting (Garcia and Calantone 2002, p. 111).

One would expect it would be possible, despite differences in paradigmatic schools, to establish some commonalities and well-accepted points of reference indicating important relations in the field of innovation and entrepreneurship. However, there is even a lack of consensus as to what central concepts are (Teztscner 2005, p. 106), which makes it increasingly difficult to communicate across research communities. Some scholars nonetheless, have worked on integrative studies as well as offered guidance for future studies in general and thereto created a framework for upcoming studies of innovation to benefit researcher from all disciplines (Hauser et al. 2006; Siguaw et al. 2006; Simpson et al. 2006; Wolfe 1994; Garcia and Calantone 2002). However, such frameworks refer to the specific rather than the general areas of innovation and their utilization may prove difficult for other researchers. Wolfe (1994, pp. 405–406) advises the importance of context-dependent analysis since a narrow focus on causality between few selected variables overlooks contextual complexity. As with complicated phenomena, it can be easier to state what it *is not* rather than what it *is*, and following this logic innovation is not a linear process. Innovation is complex, uncertain, somewhat disorderly, and subject to changes of many sorts. Innovation is also difficult to measure and demands close coordination of adequate technical knowledge and excellent market judgment in order to satisfy economic, technological, and other types of constraints—all simultaneously. The process of innovation must be viewed as a series of changes in a complete system not only of hardware, but also of market environment; production facilities and knowledge, and the social context of the innovation organization (Kline and Rosenberg, 1986, p. 275).

9 Conclusion

In summary, it is hard to imagine that any one definition or even a small group of definitions of innovation, type of innovation and degrees of innovation, etc., will ever penetrate as central to all studies of innovation, within and across fields and disciplines (see also Chesbrough 2011). Its complexity appears too vast and too complicated to narrow down to a few sentences of substance. The phenomenon is inherently complicated, equivocal and 'large'. Simplifying, specifying and making small help us to hold on to parts of the problems. But, it does not solve the problem. Innovation resists reduction to simplisms (Tetzschner 2005, p. 107). For the future

we would recommend that research focus is based on actual rationalities as actors use these to struggle, dominate, resist and innovate with each other, with suppliers, and with customers.

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Service Innovation: A Review of the Literature

Krithika Randhawa and Moira Scerri

Abstract Services are fast overtaking manufacturing to form a dominant proportion of the world economy. Service innovation is increasingly seen as a vector of sustainable growth and competitive advantage at the firm-, industry- and economy-level. Innovation started evolving as a key discipline of research over the twentieth century. Initially, innovation research was predominantly focused on science and technology and the new product development approach for commercializing ideas and inventions mainly in the manufacturing industry. With the increasing growth of services in today's organizations and economy, the importance of understanding service innovation concepts and practices has been on the rise. Over the last two decades, researchers have hence been directing attention to innovation in the context of services. Today, service innovation has evolved into a vast field encompassing the study of intangible processes and dynamic interactions among technological and human systems that lead to managerial and organizational change in services. The literature on service innovation is expanding into a diverse and cross-disciplinary body of knowledge scattered across economics, marketing, organizational science, and management perspectives. The purpose of this chapter is to cut through this complexity and diversity in the streams of extant service innovation literature, and provide a holistic overview of the literature in this rapidly growing field. Organized across three broad themes: Overview of Service Innovation, The Dynamic and Systemic Process of Service Innovation, and Management of Service Innovation; this chapter presents a consolidated guide to the service innovation concepts and practices.

Keywords Service innovation · Dynamic and systemic process · Value co-creation · Servitization · New service delivery · Service value networks · Innovation diffusion · Dynamic capabilities

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1 Background

Services are increasingly dominating the world economy, contributing over 70 % of employment in OECD countries and 58 % of worldwide gross national product (Baltacioglu et al. 2007). The move from agriculture- and manufacturing-based to service- and knowledge-based economies has been pronounced in nations, and all future forecasts show no signs of this trend abating (McCredie et al. 2010). Activities of successful companies also reflect this shift from manufacturing to services. Examples include International Business Machines (IBM), General Electric, and Hewlett Packard all of which have transformed themselves from being predominantly manufacturing organizations to service-based organizations (Mills and Snyder 2010). Historically, the concept of value has been associated with economic productivity gained through the production and delivery of tangible goods. The transition toward a service-based economy, however, calls for a revised understanding of value creation within organizations (Pitelis 2009).

Value in service-based organizations is created through the integration of intangible resources and capabilities such as knowledge, competences, cognitive-centric workforce, and customer collaboration (Vargo and Lusch 2008; Michel et al. 2008; Lusch et al. 2009; Agarwal and Selen 2009, 2014). Service employees are increasingly required to understand complex ideas and process large volumes of information in generating novel solutions to customer priorities (Mills and Snyder 2010), and this calls for interaction with customers and other knowledge workers across a network of stakeholders (Leonard-Barton 1995; Sampson and Froehle 2006; Chesbrough 2006, 2011; Moeller et al. 2008). This process of value co-creation provides organizations with an enhanced opportunity and ability to deliver elevated service offerings resulting in service innovation (Agarwal and Selen 2011a).

Innovation is seen as a persuasive avenue for organizations to create value and competitive advantage (Pitelis 2009). Widely recognized as an engine of economic and social progress, innovation started evolving as a key discipline of research over the twentieth century. Initially, innovation was a topic of interest among economics scholars and researchers interested in technological change; therefore early innovation research predominantly focused on science and technology and its link with economic productivity, and the new product development approach for commercialising ideas and inventions (Schumpeter 1942; Griliches 1998; Cainelli et al. 2004). The common theme of these bodies of innovation research is their focus on the manufacturing sector. The study of technical change in the service sector was largely neglected as services were viewed as low technology users (Cainelli et al. 2004; Ferreira Lopes and Godinho 2005).

With the growth of services in organizations and economy, attention has been focussed on innovation in the context of services over the last two decades (Chan et al. 1998; den Hertog 2000; Castellaci 2008; Miles 1993, 2005; Spohrer and Maglio 2008). Today, service innovation is evolving into a vast field encompassing the study of dynamic interactions among technological and human systems driving managerial and organizational change in services. The literature on service

innovation is burgeoning into a diverse and multidisciplinary body of knowledge spanning economics, marketing, organizational science, and management perspectives (Rubalcaba et al. 2012; Ostrom et al. 2010; Miles 2005, 2010).

With this backdrop, the purpose of this chapter is to cut through the complexity and diversity in the streams of extant service innovation literature and provide a holistic overview of the literature in this rapidly expanding field. This chapter aims to present a consolidated guide to service innovation concepts and practices, and is organized across three broad themes: Overview of Service Innovation; The Dynamic and Systemic Process of Service Innovation; and Management of Service Innovation.

2 Service Innovation: An Overview

2.1 Service Innovation and Its Characteristics

The service sector encompasses a wide variety of activities and markets ranging from consumer services such as hotels and banks to business services such as IT and legal, and large-scale public sector services such as health and education. The usage of technology is equally diverse; personal services like hairdressing involve basic technologies, while financial services are more knowledge-intensive and use advanced information technologies. As a result of this diversity, innovation in services involves transformation in a variety of aspects ranging from how the service is designed and developed to how it is delivered and managed (Miles 2005, 2010; Trott 2012). Service innovation can be said to be an amalgamation of product innovation, that is, "the introduction of a new product, or a significant qualitative change in an existing product," and process innovation, that is, "the introduction of a new process for making or delivering goods and services" (Greenhalgh and Rogers 2007, p. 4). Innovation in services is an interplay of service concepts, service delivery systems, client interfaces, and technologies (den Hertog 2000), and often entails new ways in which customers view and use the service. Agarwal and Selen (2011a, p. 1172) conceptualize service innovation as an "elevated service offering" that is made up of "new client interface/customer encounter; new service delivery system; new organizational architecture or marketing proposition; and/or improvements in productivity and performance through human resource management", further highlighting its multidimensional aspects.

Innovation in services is different from innovation in manufacturing essentially because services are characterized by intangibility, heterogeneity, perishability, increased customer interactivity, and simultaneity between production and consumption (Sampson 2001, 2007; Sampson and Spring 2012). The intangibility of services makes service innovation relatively more difficult to make inimitable through patent protection (Trott 2012; Miles 2005) and to measure as its performance is mostly evaluated on the basis of user perception (Bessant and Tidd 2007). As a result, a new service innovation is generally tested in the actual market rather than in

R&D laboratories (Easingwood 1986; Tidd and Hull 2003). The heterogeneity in services means that innovative activities need to be tailored to different service contexts calling for a more dynamic approach to organizing innovation in services as compared to manufacturing. Some service firms such as fast food restaurants have used innovations around application of technology at the customer interface to reduce heterogeneity and achieve standardization of processes. As services are perishable, that is, they cannot be stored and resold as tangible products can, service innovation also entails technology and processes to better manage demand and plan capacity (Trott 2012). Research has shown that both heterogeneity and perishability of services have a positive impact on service innovation (Jaw et al. 2010).

Services are produced, delivered, and consumed simultaneously making it harder to distinguish between service product innovation (what is produced, delivered, and consumed), and service process innovation (how it is produced, delivered, and consumed) (Bessant and Tidd 2007; Trott 2012). The service innovation process involves a high degree of interactivity between the service supplier and customer (Zeithaml and Bitner 2003). This implies that service innovations can focus as much on these interactions as on the actual service product or process, and this is termed as "servuction" in the service innovation literature (Miles 2005). There is a scope to innovate across a variety of service interactions ranging from those that involve the exchange of intangibles like information as in education and consultancy services, to tangible elements as in transportation and logistics services. The customer inputs into the simultaneous creation of services, referred to as Customer–Supplier Duality (Sampson 2001; Sampson and Froehle 2006) makes service innovation complex and multidimensional in nature (Goldstein et al. 2002; Voss and Zomerdijk 2007; Agarwal and Selen 2011a). For example, the extent of customer interaction in the service innovation process results in a high degree of customization in services that in turn increase their heterogeneity. The intangible nature of services, relative to products, makes these open and collaborative customer–supplier exchanges even more challenging to manage. The emerging Service Science research (Spohrer and Maglio 2008; Gruhl et al. 2007; Hefley and Murphy 2008) focuses on these networked and interactive aspects of innovation in services by studying service systems-value-co-creation configurations of people, technology, shared information and value propositions—as the basis for systematic service innovation. The service-dominant (S-D) logic (Vargo and Lusch 2004, 2008, 2011; Vargo et al. 2008), premised on the notions of service centricity and value co-creation among an interrelated network of suppliers and customers, is viewed as a useful perspective in understanding service innovation across service systems (Chandler and Wieland 2010; Gummesson 2008; Gummesson and Mele 2010; Vargo et al. 2012).

Innovation in manufacturing is more product and technology-oriented and relies on technical expertise and professional capabilities, while the role of cultural capabilities (Ettlie and Rosenthal 2012) and human capital capabilities such as person-to-person skills (Johne and Storey 1988) and customer interface and communication skills (Baines et al. 2010) is more significant in service innovation. Also, manufacturing innovation tends to involve a high degree of expenditure on R&D activities around product and technology (Artz et al. 2010; Enkel et al. 2009).

On the other hand, such R&D expenditure is relatively lesser when innovating services (Ettlie and Rosenthal 2011). While service innovation is no doubt distinct from innovation in manufacturing, the service sector has also applied manufacturing practices in undertaking innovation. Many years ago, Levitt (1972) called for the "industrialization" of service through the adoption of standardized, technology-intensive processes as found in manufacturing. The "modularization" of services, that is, the breaking down of services into various modules, for example, has allowed mass customization to go hand-in-hand with standardization by recombining service modules in many ways (Miles 2005; Seite et al. 2010; Tuunanen and Cassab 2011). This has resulted in a variety of service innovations as seen in fast food chains and call centers emanating from productization of services. At the same time, the "servitization" of manufacturing, that is, manufacturers offering services to customers, is also on the rise adding a new dimension to service innovation (Santamaria et al. 2012).

Technology plays a key role in enabling service innovations; for example refrigeration technology has driven innovations in food retail as has genetic engineering in biotechnology and medical services (Miles 2005). However, among all technologies, information technology (IT) has been said to be the most significant enabler of service innovation. Barras (1986, 1990) perceives the IT revolution to be the core of the industrialization of services with the application of IT enabling mass improvements in quality and efficiency in services. Miles (2005) further likens the pervasiveness of IT-based service innovation to the power of energy-based technology such as steam engine or electric power to manufacturing innovation. Historically, however, the service sector has been slow to adopt IT and other technology as compared to manufacturing. This may be attributed to the greater heterogeneity and dynamism in services as a result of which service innovation cannot be organized as a standardized R&D model as in manufacturing (Trott 2012; Ozyilmaz and Berg 2009). A generic technology needs to be reconfigured and tailored before applying for innovation across the service sector, which is particularly challenging given the intangible and dynamic nature of services. This has led to the rise of the knowledge-intensive business services (KIBS) in recent years that provide specialist technical services to enterprises to ensure they are equipped to keep up with the rapid growth of IT and other technology (den Hertog 2000; Shunzhong 2009). Despite the increasing role of technology in service innovation, the extant literature has largely overlooked addressing this aspect (Menor et al. 2002; Boone 2000).

2.2 Classification of Service Innovation

The current understanding of service innovation has evolved through diverse disciplines such as services marketing (Grönroos 2007; Lovelock and Wirtz 2007), service management (Heskett et al. 1997; Quinn et al. 1994) and operations management (Cook et al. 1999; Johnston and Clark 2005). The varied foci of these disciplines have led to different dimensions of service innovation including user

involvement and collaboration (Magnusson 2003; Matthing et al. 2004), technology- and service-oriented innovation styles (Gallouj and Savona 2009), bundling service innovations in manufacturing (Normann 2002), service-logic innovation (Lusch and Nambisan 2012; Vargo et al. 2008), and service design model innovation (Teixeira et al. 2012). The four key dimensions of service innovation identified by den Hertog (2000)—Service Concept, Client Interface, Service Delivery System and Technological options—provides a useful frame work to classify different types of service innovation. The concept of creating customer experience or service solution forming a core dimension of service innovation is widely discussed in the literature (den Hertog et al. 2010; Goldstein et al. 2002; Grönroos 2007). Accordingly, studies have classified service innovation on the basis of their extent of standardization versus specialization to specific customers (Hipp et al. 2000, 2003). Schmenner's (1986) characterization of services on the basis of degree of labour intensity versus degree of customer interaction or customization also provides a basis for identifying the dimensions for innovation in services. In similar vein, Johnston and Clark's (2005) classification of service processes on the basis of volume versus variety also provides a framework for understanding the scope of service innovation. For example, innovation in high-volume, low-variety services such as fast-food restaurants tends to focus on efficiency and standardization. On the other hand, innovation in low-volume, high-variety, capability-based services such as management consultancies tends to revolve around client-based customization and specialization (Trott 2012).

Service innovation can also be classified based on the type of service that is innovated—physical services, human services, and information services (Miles 1993). Innovation in physical services such as transportation and restaurants involve physical transformation often through the adoption of new technologies, for example, radio-frequency identification (RFID) and refrigeration equipment. Innovation in human services takes the form of improvements in administrative data processing in public sector services and customized IT systems in medical services. Information services are mainly characterised by innovations in IT such as online banking in financial services and interactive digital media in entertainment (Miles 2005). Innovation in services is often differentiated based on whether changes occur in what is offered, that is, product innovation, or how these offerings are produced and delivered, that is, process innovation. In addition, the type of service innovation also differs based on their level of newness or the degree of change, ranging from major service innovations for radically new markets, to relatively minor innovations such as service line extensions and improvements to existing services (Francis and Bessant 2005; Lovelock 1984). Another distinctive aspect of service innovation is that it has the potential to create new business models that can revolutionize an industry sector, and this can also form a basis for classifying different types of innovation in services. For example, the online auction concept like eBay introduced a radically new way of buying and selling, while internet search engine companies like Google revolutionized the way to search for information. The contemporary phenomenon of crowdsourcing (Howe 2006; Surowiecki 2004) where a firm's innovative activities are outsourced to a large

crowd of people is also an example of a radical service business model innovation. Crowdsourcing is being increasingly applied by a variety of firms both in B-C (Threadless, Dell, Starbucks) as well as B-B contexts (InnoCentive, Quirky) (Roser and DeFillippi 2013). Technology, and in particular IT, has been both a key driver and component of such service business model innovations. Some other revolutionary IT-based service innovations include e-commerce through online retailers (Amazon), and innovation in entertainment services, through gaming (Xbox), online music (iTunes), online videos (YouTube) and social networking (Facebook).

3 The Dynamic and Systemic Process of Service Innovation

3.1 Service Design and New Service Development

Service innovation is delivered through the process of new service development (NSD) that encompasses stages from idea generation to market launch of new service offerings (Goldstein et al. 2002). In developing a new service, attention needs to be paid not only to designing the core service features and attributes, but also to the service delivery processes that augment the value for its consumers (Papastathopoulou et al. 2001; Trott 2012). It is whilst services are being delivered that opportunities for collaboration arise giving employees the chance to learn, innovate and co-create value with customers (Agarwal and Selen 2011a, b; Voss and Zomerdijk 2007). Customer interface and technological options has been recognized as significant factors to service design and delivery (Sampson and Spring 2012; Sampson and Froehle 2006; den Hertog et al. 2010). Synergy between all these elements is critical to successful service innovation. For example, a mere technology adoption approach to service design fails to identify key service elements and attributes (Venkatesh and Davis 1996). In the past, the design approach has failed to give consideration to quality as defined by the customer, resulting in poor design, user dissatisfaction, poor take-up rates and low levels of usage (Venkatesh et al. 2010). This furthers the call for behavioral science to be used to learn from customers and co-design services, and thus improve service design and user experience (Cook et al. 2002; Stewart and Tax 2004). According to Venkatesh et al. (2010), service providers can exploit customer differences rather than continually focusing on customer similarities in seeking a variety of ideas and inputs for service innovation. Customers providing input into the service design and delivery process extend the notion of co-production to co-creation of services (Lusch et al. 2009; Sampson and Chase 2010). As the focus of business models move from transactional ownership exchange to relational service-in-use, firms are looking to engage the customer in processes pre-, during and post-service delivery, and extend the time the customer spends at each encounter. This allows firms to respond better to changes in customer behavior with innovative services. Sampson and Froehle's (2006) Unified Service Theory elaborates on this process of exchange between customers and service providers.

Service organizations also make decisions on whether to reduce or accommodate customer-related variability. Given that service delivery and consumption occur simultaneously in services, reducing variability is not always possible as customers may disrupt core operations with their unpredictable behavior. This has significant implications for the service design and the NSD process, which must consider appropriate strategies to minimize variability without trading-off efficiency or quality of the customer experience (Frei 2006). Technology has been used in the past to reduce customer variability. For example, quality assurance checks at the point of online data entry "force customers" to enter correctly formatted information before being able to proceed to the next stage of service delivery (Boyer et al. 2002). On the other hand, technology has also enabled organizations to accommodate customer variability and offer a wider range of customized services that meet the needs of individual customers. Exploring new ways of determining how services can be tailored (involve customers from all backgrounds), delivered equitably (treat customers fairly) and personalized (provide customers with a choice) present opportunities for innovation.

To date, NSD models have been mainly derived from new product development (NPD) models that were intended for the manufacturing sector (Fitzsimmons and Fitzsimmons 2000). Researchers have argued that the sequential NPD approach (Booz and Hamilton 1982) and stage-gate NPD models (Cooper 1990; Stevens and Dimitriadis 2005) that have informed NSD models in the past do not fully capture the dynamic and iterative processes of customer-supplier interactions that are characteristic to service innovation (Tidd and Hull 2003; Menor et al. 2002). Some efforts have been made to overcome this limitation. For example, Johnson et al. (2000) developed a spiral or interactive model that accounts for the iterative processes of NSD, providing more opportunity to incorporate feedback loops (Bullinger et al. 2003). Concurrent service development models have also been suggested that are more flexible and efficient than the sequential models (Vermeulen and Dankbaar 2002). There is further scope to tailor NSD processes that steer away from linear NPD models and better incorporate characteristics that distinguish services from products.

3.2 Open and Collaborative Processes of Service Innovation

Theorists such as Porter (1985) have previously viewed services as occurring at the end of a linear value chain considering them to be a support function for products. Today's service-led and dynamic environment has evoked a revised understanding of value creation through services; shifting value chains from being linear to hybrid (Rabelo et al. 2007; Sabat 2002) comprising of a network of stakeholders such as suppliers, customers, partners and intermediaries (Lusch et al. 2009; Vargo et al. 2008; Norman and Ramirez 1993). This transition has led to the development of the concept of open innovation which views innovation as the outcome of interactive and iterative processes across the value network where customers and other

stakeholders are often invited to co-innovate (Chesbrough 2003, 2006, 2011; Enkel et al. 2009; Gassmann et al. 2006, 2010). This process of open collaboration encompasses dynamic knowledge exchange across all value network entities to synergise internal and external resources for innovation (Prahalad and Ramaswamy 2004; von Hippel 2005; Lusch et al. 2007). Russo-Spena and Mele (2012) develop a process of five 'Co-s': co-ideation, co-valuation, co-design, co-test and co-launch, through which the network lead users, customers, partners and intermediaries co-innovate. Chesbrough (2011) refers to two types of openness in the open service innovation model: 'outside in', where firms incorporate external ideas and technologies within their business, and 'inside out', where firms open their ideas and technologies for other business to use. For example, Amazon displays 'outside in' openness whilst engaging customer feedback for creating new services, and 'inside out' openness when allowing a third party to use Amazon as a channel to sell products (Chesbrough 2011).

The collaborative and distributed processes of open service innovation that combine ideas, knowledge, and resources among a network of actors can be challenging as it calls for a balance between multiple aspects such as: (1) identification of the rationale for co-innovation; (2) coordination of the processes and mechanisms of co-innovation; (3) maintenance of policies to deal with conflicts between collaborating entities; and (4) maintenance of service quality and consistency (Bughin et al. 2008). Chesbrough (2011) suggests that placing customers as the core of the value network, and working closely with all stakeholders to develop new solutions that focus on utility rather than product features are core strategies to foster open service innovation within organizations. Facilitating the necessary knowledge exchange and collaborative learning processes across the value network is the key to co-innovate offerings in the most efficient and effective manner.

One effective way of embracing the open and collaborative processes of service innovation is through the approach of design thinking. Comprising of overlapping phases of inspiration, ideation, prototyping and implementation, design thinking is a creative and integrated process of problem-solving that is inherently human-centered resulting in the development of new service offerings that intuitively fit with user needs (Brown 2008; Leavy 2010). Design thinking, primarily based on the principles, tools and models that have long served the design function, are being increasingly used by businesses and institutions to find radically new solutions to complex service issues such as the provision of low-cost healthcare services (Bessant and Maher 2009).

3.3 Customer as a Co-creator of Service Innovation

Service innovation is centered on dynamic and relational interactions between suppliers and customers, with customers being regarded as co-creators of innovation through these interactions (Chesbrough 2011; Moeller et al. 2008; Edvardsson et al. 2010). From this perspective, the role of customers is extended to that of

innovators, value chain collaborators and resource integrators (Edvardsson et al. 2011; Vargo et al. 2008). Services with higher proximity and interactivity with its customers are said to present more opportunities for service innovation (Mathieu 2001) as the enhanced knowledge-sharing and learning processes feed into the discovery, development and delivery of new service offerings (Hipp and Grupp 2005; Kale and Singh 2007; Fuller 2010). With the focus increasingly shifting from "selling" toward "helping" customers (Prahalad and Ramaswamy 2000), customer feedback and involvement is critical for co-design and co-development of services (Franke and Shah 2003; Piller et al. 2004). Nambisan (2002) suggests that customers can be involved in the innovation process in three different ways—as a resource, as co-producers and as users. Allam and Perry (2002) extend this by elaborating the various roles and activities that customers can perform in providing inputs across all stages of the service innovation process. These inputs range from strategic planning and idea generation to service testing and commercialization. Scholars have also focussed on leveraging the social wisdom of communal platforms (Nambisan and Nambisan 2008; Nambisan and Baron 2009, 2010) to interact with their customers and generate ideas for service innovation (Surowiecki 2004; Howe 2008).

Effectively engaging customers in the service innovation process is, however, not easy (Trott 2001; Hamel and Prahalad 1994). The insights gained through customer involvement are sometimes not useful as customers are unable to articulate their needs in a way that can be applied (von Hippel 1986). In recent years, firms have found a novel means to overcome this limitation, and are engaging customers in the innovation process through 'user toolkits' that provide customers the freedom to design and develop their own customized product or service (von Hippel 2001; Franke and Piller 2004). This is particularly valuable in markets where customers are increasingly seeking personalized offerings (Thomke and von Hippel 2002; Franke and Piller 2004). Customers also play active roles as users of new service offerings. Software firms such as Microsoft have leveraged online user communities for testing prototypes of new software and seeking inputs to refine them. Cisco provides its customers open source access to its systems through an online forum (Trott 2012). Bessant and Tidd (2007) indicate that it is more advantageous to involve customers, and in particular lead users, in the innovation process of high-novelty services rather than low-novelty ones. It is also important to engage lead users across all stages of service innovation rather than just at the end of the process (Athanassopoulou and Johne 2004).

3.4 Systemic Diffusion of Innovation Through Service Value Networks

Service innovation in today's networked world is highly interactive and systemic in nature. Organizations are embedded in service value networks that comprise of a system of entities which include suppliers, intermediaries, customers and partners

that combine core capabilities to co-create service offerings for the consumer. According to Hacklin et al. (2005), networks are multi-layered which enhances opportunities to co-innovate and create systemic value in operations through horizontal, vertical, diagonal and complementary networks. Connections through the networks may be human to human, technical to technical or human to technical; highlighting the importance of both human-centricity and technology in service innovation. Service innovation across value networks are thus far from being a linear transactional process; rather they are a multidimensional systemic phenomenon involving relational interactions between the network entities that result in the co-creation of innovation.

Systemic diffusion of innovation, characterized by the spread and adoption of new ideas and knowledge (Cohen and Levinthal 1990), is critical to the success of any innovation including service innovation. The diffusion of innovation literature has studied the phenomenon of how new products, services and processes spread (Rogers 1962). Based on McGuire's (1989) 'Hierarchy of effects' and Prochaska's (1992) 'Stages of change' models, a five-stage process has been derived to understand how innovation diffuses:

Stage 1 Knowledge stage—comprehension of knowledge or skill for effective adoption of innovation;
Stage 2 Persuasion stage—contemplation on new behavior required for adopting innovation;
Stage 3 Decision stage—preparation to try the innovation;
Stage 4 Implementation stage—action required for continued use of innovation; and
Stage 5 Confirmation stage—maintenance of the benefits resulting from innovation through integration into ongoing routines.

Major and Cordey-Hayes (2000) categorize the models of innovation diffusion into two streams; a node model which describes nodes and discrete steps that occur throughout the diffusion process, and the process model which describes diffusion as separate processes that are deliberately undertaken in a certain pattern. The economics and management literature examine the productivity and business benefits of the diffusion of innovation. Marshall (1890) claims that geographic proximity aids agglomeration and the diffusion process resulting in productivity gains to the speed in which new ideas become known and adopted. Porter (1985, 2000) also places importance on locational factors claiming that clustering of firms affect the competiveness of a firm and region; first, by increasing productivity; second, by driving innovation in a particular field; and third, by stimulating new businesses in the field. Potts (2009), on the other hand, attributes innovation through a community to the creative process rather than geography and consequently stresses the importance of creative industries to the diffusion of ideas.

A variety of systemic frameworks of innovation have emerged that encompass technological, institutional, infrastructural and economic drivers that support diffusion of innovation to occur on a sectoral, regional and national scale (Malerba 2005; Edquist 2005). This has led to the concept of "systems of innovation" where

firms such as suppliers, customers, competitors; and non-firm entities consisting of universities, schools and government institutions collaborate to create and sustain innovation. National systems of innovations involve the collaboration within the network of institutions in both public and private sectors for development, diffusion and use of innovation (Freeman 1987), and include wider economic, social, political and institutional factors (Edquist 1997). In the context of the increasing role of services in today's economy, studying service value network as a system that promotes diffusion of service innovation in services is indeed topical. Often, the entities in a service value network belong to different industries that come together to create value through supplier-intermediary-customer relationships. The systemic and relational nature of service innovation implies that innovation within one industry diffuses and flows across to other industries through the open and interactive exchange occurring between organizations in the value network. These interactions that span industries connecting two or more network nodes lead to cross-industry innovation.

4 Management of Service Innovation

4.1 Dynamic Capability Building for Service Innovation

In their seminal paper, Teece et al. (1997, p. 515) define dynamic capabilities as "the capacity to renew competences so as to achieve congruence with the changing business environment". This calls for organizations to focus on aligning internal structures with their capabilities, while also seeking a fit between their dynamic capabilities and the external environment (Wilden et al. 2013). Teece (2007) identifies organizational decision rules, knowledge management practices and governance mechanisms to manage assets and resources as some of the micro-foundations of dynamic capabilities. Dynamic capability building is critical for implementing service innovation, and invokes the organization's ability to sense, seize and shape opportunities, and to create and reconfigure its resource base (Teece 2007, 2007; Helfat 2007) in developing and delivering new service offerings.

The dynamic capabilities required to sustain service innovation has been an area of recent research. Kandampully (2002) identifies the creation of business networks, technological capability, customer engagement and knowledge management as the building blocks of service innovation. Pavlou and Sawy (2011) outline the importance of intra-organizational communication between teams across different organizational units as being critical to service innovation. Agarwal and Selen (2009, 2014) provide empirical evidence that innovation in services is made possible not only through technical capabilities; rather it is the contribution of soft skills such as collaboration and relationship management that enable the realization of such innovation. In addition, dynamic capabilities such as entrepreneurial alertness, co-evolutionary learning, collaborative agility, collaborative innovative capacity and customer engagement contribute to a firm's ability to deliver elevated service

offerings. Tsekouras et al. (2011) reiterate the importance of inter-organizational collaboration and knowledge-sharing to build dynamic capabilities for service innovation. According to de Brentani (2001), other than service-design and delivery factors, the strategic alignment between organizational resources and capabilities and the new service offerings is a critical aspect of service innovation strategy.

den Hertog et al. (2010) adopt a dynamic capability view to develop a six-dimensional framework for service innovation strategy:

1. signalling user needs and promising technological options—identifying unmet user needs, dominant trends and new technology configurations;
2. conceptualizing—codifying the fuzzy types of service innovations by creating service blueprints;
3. (un-)bundling capability—making smart service combinations;
4. co-producing and orchestrating—organizing and acting in open service systems;
5. scaling and stretching—diffusing service innovation through branding and communicating service offerings; and
6. learning—adapting service innovation processes.

In a similar vein, Agarwal and Selen (2011b) use Mathews (2006) RARE strategic framework (**R**esources, **A**ctivities and **R**outines configured and reconfigured through **E**ntrepreneurial actions) to unravel the complexity of strategic decision making in service networks. Through collaboration between customers, suppliers, and other stakeholders that aids a co-evolutionary process of organizational learning and dynamic capability building, organizations can launch a variety of competitive actions to innovate services. Matching internal structures and dynamic capabilities across organizations in the service network in response to a dynamic business environment is an effective strategy to enable enhanced performance through service innovation (Wilden et al. 2013).

4.2 Managing Organizational Knowledge and Learning for Service Innovation

Managing organizational knowledge is viewed as a key driving force behind innovation of any kind (von Hippel 1978; Nelson and Winter 1982; Malerba 2005). Organizational learning achieved through learning-by-doing (Nonaka 1991; Nonaka and Toyama 2005), experimentation (Schrange 2000; Thomke 2003), knowledge sharing (Lin and Wu 2010; Otto 2012), codification of knowledge (Zollo and Winter 2002; Nonaka and Takeuchi 1995), and absorptive capacity (Cohen and Levinthal 1990) is critical to knowledge creation, which in turn drives innovation. The highly networked and interactive nature of service innovation demands different approaches to managing the knowledge exchange and dynamic learning processes. While the importance of knowledge and learning in the context of services is widely discussed (Khatibian and Jafari 2010; Lee et al. 2011; Matthing et al. 2004), research focusing

on the processes of organizational knowledge and learning for service innovation is relatively scarce. A recent work in this space by Storey and Kahn (2010) finds that firms that manage knowledge by combining the strategy of codification exemplified by processes of documentation, with the strategy of personalization through interpersonal communication mechanisms are best able to build a sustainable competitive advantage through service innovation.

Organizations need to develop systems and processes for managing the knowledge exchange between the human and non-human entities, integrating knowledge from past innovation projects to current knowledge (De Luca and Atuahene-Gima 2007; Zahra and Nielsen 2002), and co-evolving their knowledge base toward generating new ideas on an ongoing basis (Lam 2005; Storey and Kahn 2010). The collaborative learning processes that ensue provide opportunities for service innovation (Agarwal and Selen 2009, 2014). To enable this, service innovation is usually developed and deployed through project management teams that cater for flexible and collaborative knowledge exchange (Subramaniam and Venkatraman 2001) rather than the standardized linear R&D model applied in manufacturing. Successful service innovation calls for structures to promote better inter-organizational collaboration to stimulate knowledge sharing and knowledge recombination processes across the entities involved (Chesbrough 2003; Delbridge and Mariotti 2009). Miles (2005) further indicates that better coordination is required to allow for transfer of knowledge across the service sector so as to replicate or leverage the innovations in other project networks.

It is difficult to overlook the role of knowledge-intensive business services (KIBS) in managing organizational knowledge and learning for service innovation. KIBS—businesses that apply specialized knowledge ranging from technical, market and institutional knowledge to specific requirements of enterprises—are said to form core knowledge sources and intermediaries in the innovation system (Miles 2005; Paallysaho and Kuusisto 2008). KIBS enable organizational innovation by providing inputs to other organizations through their knowledge exchange and learning processes (Kautonen 2001; Miles 1999). The literature also highlights some of the knowledge-related risks associated with the involvement of KIBS. The potential of leakage of commercially sensitive information to competitors acts as a trade-off to gaining access to cutting edge knowledge and expertise through KIBS (Hoechst and Trott 2006). To control this risk, there is a need for organizations to go beyond traditional legal contracting approaches, and develop social control mechanisms, in particular, trust between the collaborating parties.

4.3 Creating an Organizational Culture for Service Innovation

The role of organizational culture as a driver of service innovation is being increasingly recognized (Boedker et al. 2011; Alam 2010). Service innovation encompasses novel ways for businesses to create new service concepts or

experiences, and in most cases this is achieved through collaboration with customers and other stakeholders in the value network. Thus, service innovation is affected by the socio-cultural dynamics such as norms, values and ethical standards of all actors that form part of the innovation system (Edvardsson et al. 2011), and the co-evolutionary social and political interactions that occur between them. Researchers are acknowledging that the dynamic and complex nature of service innovation warrants a culture that fosters collaborative routines and co-evolutionary learning mechanisms resulting from customer involvement across the service innovation cycle (Simutupang and Sridharan 2005; Bitner and Brown 2008). An innovative culture fosters creativity among employees within and across organizations through informal communication, positive work environment and collaborative working arrangements that promote knowledge sharing and learning required to generate new ideas on an ongoing basis (Hipp and Grupp 2005; Simpson et al. 2004, 2006). Such a culture is imperative to maintain an ecosystem that supports and sustains service innovation.

Tidd and Hull (2005) present four types of structures that create a culture that supports service innovation: client-project orientation, mechanistic customization, hybrid knowledge-sharing, and integrated innovative. The client-project orientation takes a project management approach delivering an agile and flexible setting for service innovation to meet dynamic customer requirements. On the other hand, mechanistic customization is underpinned by standardization and cost reduction through the involvement of customers and suppliers in the service innovation processes. Hybrid knowledge-sharing achieves collaborative group identity, team work and knowledge exchange practices to balance service innovation with efficiency. Integrated innovative organizations foster service innovation through organic cross-functional teams and a flat hierarchy that facilitate communication and collaboration although at increased costs and time. Given the heterogeneity of services, the most ideal structure among these four is contingent on the type and context of the service organization. Irrespective, all the four configurations promote service innovation by fostering a culture of dynamism and flexibility, collaboration and knowledge-sharing, as well as customer involvement and engagement (Tidd et al. 2005; Tidd and Hull 2005). A culture suited to service innovation promotes R&D investment for both service product and process innovation, with an equal focus on achieving effectiveness through identifying customer target markets and efficiency by streamlining the supplier base (Bessant and Tidd 2007).

4.4 Measurement of Service Innovation and Its Outcomes

Measurement of service innovation is critical for its effective management. Innovation in manufacturing and services differ. Therefore, the way innovation is measured should also be different. The extant innovation literature predominantly covers the expenditure on R&D activities (Barreto and Kypreos 2004; Cassiman 2006; Enkel et al. 2009) as well as the number of patents (Artz et al. 2010; Hidalgo

and Molero 2009) as the key measures of innovation. This is pertinent for the manufacturing sector, as innovation here mainly revolves around product and technology (Coombs and Bierly 2006). This measurement approach, however, may skew results while assessing innovations within the service sector as the proportion of R&D and patent-related activity is far less in service innovation (Hipp and Grupp 2005). Innovation in services is mainly reliant on novelty created through intangible resources and processes such as knowledge and learning. Therefore, new approaches are required for evaluating and measuring these intangible innovation-related activities in services. Trademarks and copyrights are newly identified tools to protect intangible assets such as brand and intellectual property (IP) involved in sustaining service innovation (Gotsch and Hipp 2012). Recently, progression has been made to develop more measures that reflect the intangible aspects of service innovation. Agarwal and Selen (2011a) develop a multidimensional framework to measure service innovation, and particularly identify the need to measure relational capital that drives network collaboration as a key lead indicator of service innovation. External forces linked with institutional, regulatory and market competition dimensions are also key aspects to be included in the measurement of service innovation (Lee et al. 2009).

Service innovation is gaining prominence as a key contributor to service productivity and performance (Miles 2010). Innovation is recognized as one of the five key drivers of firm-level productivity along with investment, skills, enterprise, and competition (Camus 2007). Firm-level innovation on aggregate is seen as the driver for economic growth and prosperity at a regional and national level. Measuring the effects that innovative activities have on productivity and growth is an area of active research (Hall et al. 2009; Tether and Howells 2007). However, due to the variability and uncertainty inherent in innovation, determining the magnitude of the effect remains elusive. Studies by Van Leeuwen and Klomp (2006), Janz et al. (2004) and Parisi et al. (2006) use R&D as a proxy for innovation and show positive effects on productivity. Majority of other studies use a production function approach with R&D or other innovation measures as an input into production. The result in an underestimation of the impact innovation has on productivity largely because innovation occurs through channels other than R&D that are not captured. Studies have since moved to examining innovation activities as outputs. For example R&D investment, training, technology adoption and sales of products to new markets are seen as the successful outcomes from innovative efforts (Hall et al. 2009). Studies linking innovation, in particular service innovation, to firm-level and economic productivity and growth is currently sparse. The lack of appropriate indicators and measures have been a key factor limiting studies in measuring the impact of service innovation on performance and productivity (Cainelli et al. 2004; Ferreira et al. 2005). Complexity is also introduced where dynamic human-to-human interactions take place between customers, employees and suppliers, as they provide input and share resources to deploy service innovation. These interactions in turn are determining factors of service productivity and performance. Studying the linkage between service innovation and firm-and economy-level growth and productivity therefore remains a topical and fertile area of future research.

5 Conclusion

Services are fast overtaking manufacturing to form a dominant proportion of the world economy. Service innovation is increasingly seen as a vector of sustainable growth and competitive advantage at the firm-, industry- and economy-level. With the increasing growth of services in today's organizations and economy, the importance of understanding the service innovation concepts and practices is also on the rise. As a result, the literature on service innovation is expanding into a scattered body of knowledge. This chapter aims to integrate the many streams of service innovation literature and provide a synthesized view of this rapidly growing field.

To provide a structured account, this chapter is organized across three broad themes: Overview of Service Innovation; The Dynamic and Systemic Process of Service Innovation; and Management of Service Innovation. Through these themes, this chapter presents the distinguishing characteristics and dimensions of service innovation. The key concept of service design and NSD is reviewed, as are the complex and dynamic routines involved in collaborating with customers and other stakeholders for service innovation. A systemic perspective of service innovation is used to study systems of innovation in the service economy, and how innovation diffuses across service value networks. This chapter also explores the alignment of appropriate strategies and capabilities to sustain service innovation; and the aspect of managing organizational knowledge, learning and culture for service innovation. The different approaches to measure service innovation and its impact on firm-level productivity and performance, as well as economy-wide growth and prosperity are also reviewed. In all, this chapter presents an aerial view of the service innovation literature by bringing together its complex and diverse aspects emanating from a multidisciplinary body of knowledge.

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Open Service Innovation: Literature Review and Directions for Future Research

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Abstract Open service innovation enables business service firms to realize service innovations through engaging in external partnerships. The results of a review of studies investigating open innovation in a business service context indicate that prior work (1) primarily drew on a learning lens to explain service innovation and (2) adopted three levels of analysis, that is, *alliance*, *alliance portfolio*, and *network*, resulting in three disconnected research streams. In this chapter, we review each research stream and suggest future research opportunities. In addition, we suggest that factors tied to the three analysis levels directly and interactively influence service innovation. Therefore, we propose a multi-level open service innovation framework that can guide future research.

Keywords Business services · Open innovation · Alliance · Alliance portfolio · Network · Learning

1 Introduction

Service innovation has become an important instrument in firms' competitive arsenal (Salter and Tether 2006; Agarwal and Selen 2009). However, as service innovation is clearly distinct from product innovation (Tether 2005; Sundbo 1997), insights developed in product innovation literature cannot be easily transposed to a business service context. Services are characterised by intangibility, heterogeneity and simultaneity in production and consumption (Johne and Storey 1998); therefore, they cannot easily be developed within the boundaries of a research laboratory. Furthermore, the service innovation prerequisite of close client interactions (Van der Aa and Elfring 2002) reveals the importance of external relationships involving (tacit) knowledge transfer (Vence and Trigo 2009). Building on these

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distinct characteristics, prior service innovation research has investigated a broad range of antecedents (Droege et al. 2009).

With a focus on service firm internal organisation as a driver of innovation, prior studies examined organisational structure and strategy (Kelly and Storey 2000), internal learning processes (Blazevic and Lievens 2004; Lenfle and Midler 2009), market and cultural orientations (Atuahene-Gima 1996; Jaw et al. 2010), and innovative capabilities (Avlonitis et al. 2001). At the same time, these studies also tended to neglect that external partnerships constitute a critical service innovation driver (Tether and Tajar 2008b; Salter and Tether 2006).

More recently, open innovation research (Chesbrough 2003) has focused on internally developed and externally acquired resources. Building on this, business service researchers have suggested that external partnerships are critical to integrating and exploiting external knowledge through multiple channels (West and Gallagher 2006). External partnership studies have diverged into three streams. One stream examines *alliance partnerships* and shows that service innovation results from alliance design and management (Smedlund 2008; Blazevic and Lievens 2004; Athanassopoulou 2006). Another stream focuses on the *alliance portfolio*, that is, a firm's set of all alliances; results indicate that portfolio configuration and management influence service innovation (Agarwal and Selen 2009). A third set of studies focusing on the *alliance network*—a firm's set of direct *and* indirect relationships—report that a firm's network position affects its service innovation ability (Grøtnes 2009; De Vries 2006).

This chapter reviews the business service innovation literature, and takes into account antecedents associated with the alliance, alliance portfolio, and network levels of analysis. Based on these insights, future research may need to address questions pertaining to distinct analysis levels, as well as to explore how antecedents across levels may reinforce or mitigate one another's effect on service innovation. To this end, we develop a multi-level framework of open service innovation that can guide future research.

2 Alliances and Service Innovation

Business services ally with external parties to achieve innovation objectives (Armistead and Pettigrew 2008). This is often because they require resources that they do not possess, or they lack an ability to develop desired resources internally. Alternatively, external resources are accessed through relationships in which partners collaborate to achieve complementary objectives. Studies investigating service innovation view alliances as learning vehicles. Although extant studies examined the relationship between alliance arrangements and service innovation, the results within this stream of research tend to be fragmented. While the majority of studies generated insights on managing customer alliance relationships, they adopted different definitions of service innovation, focused on various antecedents, and used both quantitative and qualitative methodological approaches. Despite these advances, several topics warrant further exploration, as detailed in Table 1.

Table 1 Gaps in the *alliance* service innovation literature

	Findings	Gaps
Landscape of the field	Broad range of different industry and national settings	Lack of integrative research reconciling inductive exploration with deductive testing
	Mixture of qualitative and quantitative approaches	Lack of research transposing insights from other fields, including strategic management and organisational learning
Innovation outcomes	Incremental and radical innovation	Lack of research on alternative innovation processes and outcomes
	Multi-dimensional approach	
Alliance structure	Factors explain governance form	Lack of research that focuses on supportive governance form elements, such as contracts and coordination mechanisms
	Performance implications of governance form	Lack of research that accounts for relational governance
Partner characteristics	Variety of partners are considered, including customers, competitors, suppliers, and research institutes	Lack of research on specific functions partners may fulfil in an alliance
		Lack of research on different roles customers may fulfil in an alliance, including lead user or ordinary user
Partner interaction	Knowledge practices between partners and relational quality constitute critical elements	Lack of research on opportunism, conflicts, and relational norms
		Lack of research on partner interaction as dynamic process subject to continuous change
Active innovation management	Structured proactive and goal-oriented approach	Lack of research on how different innovation management practices are used during the alliance life-cycle
	The effectiveness of different innovation management practices varies over time	Lack of research on how different alliance management practices are used during the innovation life-cycle
		Lack of research on different combinations of governance forms, partner characteristics, and partner interactions

2.1 Innovation Outcomes

Previous studies investigating alliance relationships in a business service setting adopted different conceptual and operational definitions of innovation. Several studies distinguished between incremental and radical innovation. While Athanassopoulou (2006) focused on product line extensions (that is, incremental), Kristensson et al. (2008) focused on new service development (that is, radical), while Gottfridsson (2010) incorporated both existing service refinement and new service

development. Other studies conceptualised service innovation as a multi-dimensional construct. For example, Carbonell et al. (2009) employed a multi-dimensional perspective on new service development, capturing an operational dimension with technical quality and innovation speed, and a market dimension with competitive superiority and sales performance. Although these studies elucidated what service innovation constitutes, future research may explore other dimensions, including innovation processes and administrative innovation, to reconcile explanations.

2.2 Alliance Structure

Alliance structure pertains to the governance form adopted by the partners that provides them with incentives to act consistently with alliance goals, while simultaneously providing them with sufficient rewards, and safeguarding them against opportunistic behavior. In the context of business services, only a few studies investigated the interrelatedness of governance form and service innovation. Investigating collaboration between universities, research institutes and industry, Koschatzky and Stahlecker (2009) found that the nature of governance forms is contingent upon regional, political, technological, and personnel context. Un et al. (2009) showed that service firms are likely to engage in R&D collaboration when they undertake and protect process and outcome innovation, receive public funding, expect incoming knowledge spill-over from suppliers and institutional partners (not competitors and customers), and are able to subcontract their technology development. Service firms that engage in research and development activities and seek to avoid spill-overs to competitors are less likely to collaborate and seek to prevent other companies from imitating or taking their competitive advantage. The case study of Bader (2008), which examined a large insurance company, showed that by establishing a patent department, a firm can successfully protect its intellectual property (IP) through a diversified patent portfolio. Thus, with respect to open innovation, both partners must be open in order to maximise benefits (Ordanini and Pasini 2008); however, service suppliers that retain more control of their IP benefit more from their own innovations (Leiponen 2008; Bader 2008).

Another set of alliance studies examined the effect of distinct governance forms on new service development (Van Den Ende et al. 2008; Van Den Ende 2003; Linnarson 2005). For example, Van Den Ende (2003) demonstrated that integrated governance modes foster service innovation, as they reduce uncertainty, increase a sense of urgency, and allow for intensified communication. Linarsson (2005) showed that alliance structure and innovation performance are interrelated, such that renegotiations are necessary to shift from horizontal orientation (that is, development) to a vertical orientation to commercialise innovations.

Taken together, extant studies exploring alliance structure suggest that intensified governance forms foster (radical) service innovation. Nevertheless, future research may explore in more detail how distinct governance elements, such as alliance contracts and coordination mechanisms, affect knowledge streams, and,

thus, service innovation. In addition, future research may explore how formal governance interacts with informal (relational) governance in explaining service innovation.

2.3 Partner Characteristics

The nature of partner characteristics has been identified as a pivotal service innovation driver. More specifically, to access knowledge, service firms ally with various parties (Theoharakis et al. 2009; Van Den Ende 2003), including customers (Blazevic and Lievens 2008), suppliers (Van Den Ende et al. 2008), competitors (e.g. Leiponen 2005; Linnarson 2005), universities (Lööf and Broström 2008), and research institutes (e.g. Koschatzky and Stahlecker 2009; Lööf and Broström 2008; Segarra-Blasco and Arauzo-Carod 2008). Suppliers (i.e. vertical relationships) have been identified as a particularly strong knowledge source, as they tend to be more aware of new technological developments (Van Den Ende et al. 2008). Competitors (that is, horizontal relationships) also function as an important knowledge source (e.g. Leiponen 2005; Love and Mansury 2007) because these collaborations allow partners to develop new services, while sharing investments and risks. Research seems to diverge with respect to industry–university collaborations; whereas select studies demonstrated that universities and research institutes are beneficial co-operators with respect to radical (i.e. new to the market) innovations (Segarra-Blasco and Arauzo-Carod 2008), other studies showed that these institutes have no significant effect on outcomes (Lööf and Broström 2008; Leiponen 2005). Among these sets of partners, customers have been identified as a special type of partner.

Customer co-production alliance studies consistently show that customer involvement positively influences service innovation (e.g. Blazevic and Lievens 2004; Kristensson et al. 2008; Matthing et al. 2004). Customers provide diverse and original ideas by sharing experiences, which firms can use to introduce future products and services (Melton and Hartline 2010; Carbonell et al. 2009; Kristensson et al. 2008; Matthing et al. 2006). The degree of customer involvement, however, differentially impacts service innovation. Blazevic and Lievens (2008) examined electronic interaction channels and identified three roles with varying degrees of customer involvement: passive user, active informer, and bi-directional creator. Nicolasjsen and Scupola (2011) conducted a case study of an engineering consultancy firm and found that a customer partnership characterised by ongoing learning, common goals, shared responsibility, personal trust, customer expertise, and personal engagement fosters radical innovation. Thus, while low customer involvement is sufficient to foster incremental innovation, high involvement is required to stimulate radical innovation. In the latter situation, customers act as value co-creators instead of passive buyers, because their involvement reduces technological uncertainty surrounding new services (Carbonell et al. 2009).

Despite these advances, future research may pursue topics that warrant further exploration. First, studies may focus on how and under what conditions different

partners, other than customers, contribute to service innovation. Second, as customer involvement is critical for service innovation, more research is required about the effectiveness of different types of customer partnerships i.e. lead users and ordinary users). Third, future research may investigate how customer partnerships develop over time.

2.4 Partner Interaction

Partner interaction pertains to maintaining relationship quality via knowledge management. Knowledge co-production pertains to the degree to which partners create new knowledge through mutual interactions (Blazevic and Lievens 2008). Through (informal) knowledge sharing with partners (including customers), new products and service are developed (Gottfridsson 2010; Smedlund 2008; Taminiau et al. 2009; He and Wong 2009). Learning has shown to be an iterative and continuous process where various pieces of knowledge are collected, interpreted, and integrated in new service offerings (Gottfridsson 2010). For example, Kristensson et al. (2008) detailed the conditions needed to successfully integrate customers in the development process, which, among others, included ensuring that users do not possess too much knowledge of underlying technology, and ensuring customer heterogeneity. Thus, partners (and customers) may be involved to different degrees in service innovation. Low involvement to the end of service innovation may occur through face-to-face meetings, interviews, focus groups and surveys. More sophisticated approaches involve providing customers with toolkits to create their own innovations (Von Hippel and Katz 2002), self-service technologies, virtual communities, and talking to lead users during the innovation process to better understand early adopters (Lilien et al. 2002).

Previous research indicated that informal management is important in the service innovation process. Van De Vrande et al. (2009) showed that organisation and corporate-culture-related issues, such as the division of tasks and responsibility and communication problems within and between organisations, can hamper management. Informal management may overcome this adversity. Managing the relationship quality with partners is key in the service innovation process, as the exchange of information and knowledge requires a considerable amount of trust (as confidential information is provided) and commitment (Smedlund 2008; Athanassopoulou 2006). Moreover, companies that posit strong relational capabilities provide their services faster, are more responsive in solving their customers' problems, and are more innovative (Theoharakis et al. 2009). Taken together, learning, trust, common goals, expertise, engagement and motivation are of great importance, though of varying degrees across the different types of partners, the service provider involved, and the type of service innovation.

Despite these advances, future research may further explore the role relational governance plays, such as under what conditions opportunistic behavior is likely to emerge, the antecedents and consequences of functional and dysfunctional conflicts,

and the development of norms. In addition, future research that adopts a dynamic approach on relational governance would be able to disentangle how knowledge flows change over time, how they are caused, and what their impact is.

2.5 Active Innovation Management

Service innovation in a business service context by means of alliance relationships requires a structured and goal-oriented approach. Partners learn from and with each other by sharing knowledge informally, often through strong relationship ties. Due to innovation contingencies, the structure of the partnership can change, making management critical to organising knowledge flows. This also implies, however, that contracts or other mechanisms to protect knowledge assets can be potentially problematic. It also suggests that the risk of transferring incomplete knowledge increases, which in turn creates information asymmetry; that is, a driver of opportunistic behavior.

Nevertheless, some topics warrant further investigation. First, the ways in which alliance structure and management interact in explaining service innovation remains unexplored. Second, a better understanding is required about the effectiveness of different alliance management practices during the innovation life-cycle. Third, innovation management requires a comprehensive understanding about governance form, partner characteristics, and partner interactions. Future research may explore these relationships.

3 Alliance Portfolio and Service Innovation

An alliance portfolio refers to all alliances of a focal firm. Firms build alliance portfolios to potentially enjoy access to a great variety of resources and markets. Portfolios are then viewed as learning vehicles, with prior studies identifying conditions under which learning occurs. At the same time, alliance interdependencies put a heavy burden on the focal firm's management. Despite advances in explaining the configuration and coordination of alliance portfolios, this part of the literature is still in an embryonic stage and several areas warrant further exploration (see Table 2 for an overview).

3.1 Innovation Outcomes

Studies investigating alliance portfolios in a business service setting primarily focussed on a combination of incremental and radical service innovation. For example, in their investigations of the telecommunication industry, Agarwal and

Table 2 Gaps in the *alliance portfolio* service innovation literature

	Findings	Gaps
Landscape of the field	Broad range of different industry and national settings	Lack of integrative research reconciling inductive exploration with deductive testing
	Mixture of qualitative and quantitative approaches	Lack of research transposing insights from other fields, including strategic management and organisation learning
Innovation outcomes	Incremental and radical innovation	Lack of research on alternative innovation outcomes
Portfolio configuration	Portfolio diversity influences innovation, such that homogenous diversity affects incremental innovation and heterogeneous diversity affects radical innovation	Lack of research that correlates different alliance portfolios configures with different types of innovation outcomes
		Lack of research that accounts for innovation development stages
Partner characteristics	Various types of partners, including customers, competitors, suppliers, and research institutes	Lack of research on impact alternative partners, such as governments and foreign partners
Partner interaction	Knowledge transfer mechanisms and relational governance	Lack of research on different knowledge sourcing practices across and between partners
Active innovation management	Portfolio coordination constitute a critical source of leveraging knowledge	Lack of research on portfolio coordination mechanisms required to realise service innovation, while accounting for portfolio configuration and distinct innovation outcomes
	The effectiveness of different innovation management practices varies over time	Lack of research on knowledge interactions within an alliance portfolio in the different innovation stages

Selen (2009) distinguished between new service offerings, new operating structures, new service delivery processes, and extensions of existing service offers. Leiponen (2005) explored the impact on service innovation of vertical and horizontal relationships in Finnish knowledge-intensive business services, and distinguished between changes in the existing service delivery process, and the development of new kinds of services. Although these studies provided insights into service innovation, future research may explore other portfolio performance dimensions, including knowledge creation, knowledge sharing, process innovation and market performance. This would enable researchers to contrast and reconcile explanations.

3.2 Portfolio Configuration

Portfolio configuration is defined as the structural characteristics of a focal firm's set of partnerships, and may pertain to partner diversity and tie strength (Wassmer 2010). Purposively configuring an alliance portfolio enhances learning and knowledge sharing (Agarwal and Selen 2009; Leiponen 2005; Chen et al. 2009); for example, Døving and Gooderham (2008) showed that the greater the range of strategic alliances, the greater the scope of services a firm can offer, and it is through building dynamic capabilities that such heterogeneous alliances are developed.

The literature review suggests that, depending on their objective and context, studies included or excluded different partners and types of ties, resulting in more homogenous or heterogeneous portfolio configurations. Agarwal and Selen (2009) conducted a case study of a service provider and found service innovation originated in combining customer engagement, collaborative agility, and a portfolio consisting of customers, suppliers and other stakeholders. Eisingerich et al. (2009) showed that portfolio diversity reduces the positive influence of service innovation orientation on firm performance. In a 2007 survey, Knudsen found that portfolio diversity i.e. customers, universities, and competitors) negatively influences innovation. Tether and Tajar (2008a) showed that external sourcing through knowledge providers complements, rather than substitutes, a firm's internal innovation. Tödtling et al. (2009) investigated knowledge-intensive business service firms, and found that radical innovations stem from collaboration with research institutes, whereas incremental innovations result from alliances with other service firms.

Studies thus confirm that alliance portfolios constitute a critical knowledge creation and exchange source. However, while prior work indicates that alliance portfolios can be configured in terms of homogenous/heterogeneous sets of partners and ties, future research may further explore which configurations drive incremental or radical service innovation. In addition, obtaining a better understanding of how different partners create facilitative and constraining interdependencies would advance the field.

3.3 Partner Characteristics

The results of the review indicate that business service alliance portfolios are configured with different partners. These include not only customers, suppliers and competitors (Agarwal and Selen 2009; Leiponen 2005), but also universities (public and private), research institutes and labs (e.g. Chen et al. 2009; Knudsen 2007), and consultancies (e.g. Doloreux and Mattson 2008; Døving and Gooderham 2008).

However, though it is recognised that portfolios matter, limited research has addressed how different configurations influence service innovation. An exception exists, as two studies show that different knowledge sources interact; contingent on the study selected, this effect is positive or negative. The results of Tether and Tajar

(2008a) indicated that the knowledge of "specialist knowledge providers" (consultancies, private research organisations, universities and government research laboratories) complements, rather than acts as a substitute for, the information sourcing from customers, suppliers and competitors. By contrast, Knudsen (2007) showed that combining customers with both universities and competitors impede the innovation performance; moreover, the study shows no significant importance in the collaborations with competitors. This suggests that collaborations with research institutes may enhance, but also impede, a firm's absorptive capacity and network abilities.

To advance understanding about the impact of partner characteristics, future research may extend the definition of portfolio partners and include alternative partners and ties, such as informal relationships, to provide a more fine-grained explanation.

3.4 Partner Interaction

Management of the alliance portfolio may accelerate, or inhibit, learning across partners and with the business service. To create new capabilities, acquire new resources, and add competences through different collaborations, a set of relationships needs to be managed (Agarwal and Selen 2009; Bygstad and Lanestedt 2009; Eisingerich et al. 2009). Learning may occur on both sides of an alliance; for example, whereas customers may increase their implicit knowledge of the service offering, employees are able to explore and exploit opportunities to deliver new service offerings (Agarwal and Selen 2009). However, in addition to managing a bilateral learning process, inter-partner relationship commitment enhances the transfer of tacit knowledge and other resources, enabling firms to develop new services and processes (Eisingerich et al. 2009).

Dealing with a set of diverse exchange partners leaves firms with less time to focus on developing and implementing of new service offerings. Eisingerich et al. (2009) showed that diverse inter-organisational relationships reduce positive innovation, because of the associated management difficulties. However, a diverse set of partners is desirable for service firms to achieve radical innovations (e.g. Tether and Tajar 2008a; Tödtling et al. 2009). Thus, managing the portfolio is important, as innovative capabilities are built through knowledge exchange, and the creation of new competences. Thus, future research may focus on the required processes of knowledge sourcing from different partners simultaneously.

3.5 Active Innovation Management

From a portfolio perspective, active innovation management entails coordinating activities, including leveraging interdependencies between partners, facilitating knowledge flows, proactively seeking new partnering opportunities, and moderating

conflicting interests. However, depending on individual portfolio configurations, it remains unclear which coordination mechanisms are required to realise service innovation. Furthermore, obtaining a better understanding about alliance portfolio knowledge interactions in the different innovation stages (idea, development, commercialisation) is warranted. In addition, the ways in which portfolio configuration and coordination interact in explaining service innovation remains an unexplored area.

4 Alliance Network and Service Innovation

Firms are embedded in networks, which are constellations of direct and indirect relationships; by leveraging their network position, they may accelerate their innovation (Ahuja 2000). Business services by virtue of their activities can play a central role in these processes. Despite several interesting insights, this part of the literature is still nascent and several areas warrant further exploration (see Table 3 for an overview).

4.1 Innovation Outcomes

When discussing innovation from an alliance network viewpoint, the unit of analysis is important as outcomes that an individual firm is pursuing might not coincide with the goals of the network as a whole, or the objectives of third parties, such as governmental institutions. At the network level, researchers have examined the magnitude of service innovation—incremental or radical; however, whether the magnitude concerns an individual firm or the network as a whole has not been fully explored (De Vries 2006). In addition, service innovation is discussed much more often as an outcome that supports networked collaboration in the context of product innovation (Hine et al. 2009; Zhang and Li 2010; Muller and Zenker 2001), while many fewer studies take service innovation as a central investigation object. How business service firms innovate in a network environment can be a worthwhile pursuit for future research.

In addition to the unit of analysis issue, no deliberate effort has been directed to explaining service innovation outcomes with the help of network antecedents. Considering the growth of theory and evidence about the importance of networks in innovation, the lack of corresponding research is a missed opportunity. Innovation outcomes deserve to be discussed also in the context of broader firm outcomes, such as firm performance. This is another avenue for future research.

Table 3 Gaps in the *network* service innovation literature

	Findings	Gaps
Landscape of the field	Broad range of different industry and national settings	Lack of integrative research reconciling inductive exploration with deductive testing
	Qualitative/quantitative	Lack of research transposing insights from other fields, including strategic management and organisation learning
Innovation outcomes	Service firm's incremental and radical innovation	Lack of research linking innovation outcomes with network antecedents
	Services innovation intended to support collaboration in product innovation	Lack of research embedding service innovation outcomes in the context of firm and network performance
Network structure	Multiple partner types serving as sources of new knowledge Importance of the breadth in the range of partnerships established	Lack of research on the role of structural network characteristics (e.g. network range, direct and indirect ties, small worlds, structural holes) on service innovation outcomes
	Role of hub-and-spoke structures for disseminating service and management innovations	
Partner characteristics	Service profiles of the central players in a network and their role for innovation in firms	Lack of research on the role of absorptive capacities of network members in the knowledge exchange
	Patterns of complementarity, substitutability and independence among capabilities	
Partner interaction	Knowledge exchange patterns within the network	Lack of research on triggers for interaction, barriers for effective knowledge transfer, advantages of knowledge access versus transfer, role of business service firms in co-production
	Government-led dissemination of knowledge in a network	
Active innovation management	Partnership forms, temporal organisation, knowledge flows, administrative and learning costs, negotiation strategies between types of partners	Lack of research on openness, selective revealing, mechanisms for effective knowledge protection in service firms (versus manufacturing)
	Knowledge protection and imitation threat in service innovation	Lack of research on the role of business service intermediaries in the management of networks
	Standardisation as technological platforms that enable further service innovation	

4.2 Network Structure

A firm's network position is defined as the structural properties of its direct and indirect alliance relationships. A favourable network position can allow the firm to become a repository of knowledge (De Vries 2006; Hurmelinna-Laukkanen and Ritala 2010). Service innovations can then result from combined resources from multiple actors, often spanning multiple industries (Syson and Perks 2004; Hurmelinna-Laukkanen and Ritala 2010; Grøtnes 2009; De Vries 2006; West and Gallagher 2006).

Studies adopting a network view suggest that the breadth and range of the network may lead to different service innovation outcomes. According to a study by De Vries (2006), radical service innovation results from service firms and customers interacting with a broad network of multiple providers. Syson and Perks (2004) showed that more radical innovations require the combination of complex and valuable resources, which can be facilitated in networks with a wider range of actors.

Hub-and-spoke systems can very effectively facilitate knowledge exchange and innovation (Grøtnes 2009; Hine et al. 2009; Koschatzky and Stahlecker 2009). The central service firms act as brokers by spanning different structural holes and diffusing knowledge and ideas throughout the network (e.g. Hine et al. 2009; Den Hertog 2000; Salter and Tether 2006). Firms on the periphery get access to knowledge that is often difficult to develop internally. The service intermediaries occupying the central position can disseminate various service, technological, or management innovations to periphery firms (Zhang and Li 2010; Muller and Zenker 2001).

Future research can complement studies in manufacturing and technology by investigating other structural dimensions beyond the hub-and-spoke configuration, including the role of direct ties, indirect ties and structural holes (Ahuja 2000). Although network range seems important for radical innovation, studies could also investigate how a broad range of ties can interact with the degree of network cohesion (Reagans and McEvily 2003). It is worthwhile to study how service players balance between building trusted, long-term relationships and crossing network boundaries. Another possible avenue for future research is how "small worlds", a measure of the overall network density, may impact innovation (Uzzi and Spiro 2005).

4.3 Partner Characteristics

Some of the network studies have focused on describing the service profiles of the central actors in hub-and-spoke configurations, including governments and public service providers. Camisón (2008) studied how a government-supported virtual network can provide small and medium enterprises (SMEs) with knowledge related

to environmental practices. Governmental partners can develop comprehensive service profiles that go beyond their traditional function of subsidy providers, and act as facilitators, consultants, and active network members in such knowledge exchanges. Hine et al. (2009) provided a case example from the Australian technology commercialisation programme, a governmental intermediary attuned to technology transfer needs that occurs between fundamental research and commercialisation.

The patterns of complementarity, substitutability and independence of the roles and characteristics of the network partners have also emerged as important themes. Amara et al. (2010) suggested that network resources predispose the contributions that partners can make to the outcomes. Technological capabilities have been prominently discussed in this context. Existing client competences allow them to use their own technology to co-produce, and to get access to the technology and competences of a provider network (De Vries 2006).

More research needs to be done to explore the absorptive capacities of network members in the knowledge exchange (Zahra and George 2002). High relative absorptive capacity influences the network members' ability to access and appropriate new knowledge from their partners.

4.4 Partner Interaction

Much of the business services network literature focuses on partner interaction from an inter-organisational learning perspective. The patterns of partner characteristics outlined above promote interaction and knowledge exchange among the network members. In business services, the focus on networks has been discussed along with the increased use and developments in the IT industry that may facilitate partner interactions. These include, for instance, the public network for diffusion of sustainability practices described by Camisón (2008), or the online platforms to pool R&D or other technologies, and establish standards for collaboration as discussed by Grøtnes (2009).

Next to the mechanisms through which service innovations emerge in a network context (De Vries 2006), existing literature has discussed firms' motivations to do so. These are often a function of the costs and benefits firms would accrue by engaging in network collaboration. Business service firms have been studied for their unique role as service intermediaries in that respect. Government-supported business service firms are often established in order to, for instance, make knowledge more accessible and less costly (Hine et al. 2009; Camisón 2008; Koschatzky and Stahlecker 2009). Using service intermediaries can reduce search costs for new knowledge and broaden the search scope (Zhang and Li 2010; Syson and Perks 2004).

Although these suggestions are important, we know little about service intermediaries' effect on innovation costs and benefits. Opportunities for future research exist in studying the triggers of interaction, the barriers for effective knowledge

transfer, advantages of knowledge access versus transfer (Grant and Baden-Fuller 2004), and the role of business service firms in the production of new services.

4.5 Active Innovation Management

Network management pertains to a firm's ability to extend control beyond its set of direct relationships to indirect relationships. Including indirect relationships has important implications for protecting intellectual property (IP), because, within open networks, innovation knowledge flows easily reach potential rivals (e.g. Hurmelinna-Laukkanen and Ritala 2010; Grøtnes 2009; West and Gallagher 2006). Firms should possess some IP for effective open innovation, either to trade with other firms or to let other firms exploit their innovations (West and Gallagher 2006; Grøtnes 2009). However, Bader (2008) and Hurmelinna-Laukanen and Ritala (2010) showed that traditional manufacturing knowledge protection mechanisms, such as patents and IP, become obsolete. Rather, human resources management, lead time, secrecy and bilateral contracts become important protection mechanisms.

In network management, standardisation is a principle for organising multiple firms' activities in the form of platforms aimed at enabling further service innovations (Grøtnes 2009). Such platforms allow companies to organise their relations with other firms according to outside-in, inside-out, or coupled open processes (West and Gallagher 2006). Network players also agree on the terms of allowing other parties to become members—open or by invitation only—which can be used as a lever for balancing the access to new knowledge with appropriate control, protection and trust development. Other topics pertaining to network management discussed in the literature include partnership forms, temporal organisation, administrative and learning costs, and negotiation strategies between different partner types (Koschatzky and Stahlecker 2009).

Research on network management is in its early stages and there are considerable opportunities for further exploration. One of the largest theory gaps is bridged through studies that test the degree to which certain management mechanisms affect innovation outcomes. In addition to exemplary case studies, quantitative studies should reveal certain management techniques' effectiveness. The issue of intellectual property received attention in the literature; however, it remains unclear how business service firms can protect knowledge and prevent spill-overs to competitors. Studies may also look further into the principles of selective revealing, where firms actively manage access to their knowledge base with regard to other network partners (Henkel 2006). Future studies should look into service intermediaries' role as creator and defender of the rules by which a network is organised, as well as their coordinating role with regard to knowledge protection.

5 Discussion and Conclusion

The results of the literature review indicate that service innovation increasingly depends on collaborations with external organisations. Moreover, it suggests that service innovations are not merely the results of knowledge outflows and inflows (e.g. technologies), but depend on a firm's ability to participate in a wide range of alliance arrangements, as well as leverage knowledge within and across portfolio partners, and capitalise on alliance network opportunities. To integrate the findings of our review, we offer a multi-level framework of open service innovation and suggestions for future research.

5.1 A Multi-level Framework of Open Service Innovation

Little effort has been devoted to synthesising the insights developed in separate studies from the alliance, portfolio, and network perspectives; as a result, theory development has stalled. Existing studies are often very narrowly focused. Service innovation differentials between firms can be explained by considering interactions taking place among and within the three levels (Moliterno and Mahony 2011; Hagedoorn 2006). That is, we propose a nested view in which bilateral alliances are nested in an alliance portfolio, whereas the portfolio of relationships in turn is nested in a broader alliance network, as is illustrated in Fig. 1. This view suggests that embeddedness and interactions of multiple mechanisms can take place at different levels, each affecting the other. Such potential interactions can be derived from both the structural and the process views traced in the review.

Taking a structural view, by means of alliance formation and termination, a firm can regulate knowledge flows to and from the firm. In doing so, a firm can increase or decrease its portfolio diversity, while also leveraging its network position. For example, allying with a competitor may enable jointly developing a new service; however, this promising relationship may negatively impact service innovation efforts due to increased constraining interdependencies i.e. more rivals in the portfolio), and distort the firms' network position i.e. creating a competitive block may invoke retaliation by other rivals). Future research may explore how, and under what conditions, this cascading effect—that is, alliance, portfolio, network, and vice versa—positively or negatively impacts a firm's service innovation capacity.

Taking a process view, by means of active management at the alliance level, a firm can increase or decrease learning in its portfolio, while also obtaining influence over information exchange within its network. For example, actively exchanging knowledge via an alliance with a competitor may enable jointly commercialising a new service; however, this promising relationship may negatively impact service innovation due to knowledge leakage, and distort the firm's network management i.e. widespread diffusion of critical knowledge). Once again, future research may explore the mechanisms for this cascading effect across the three levels to positively or negatively impact a firm's service innovation capacity.

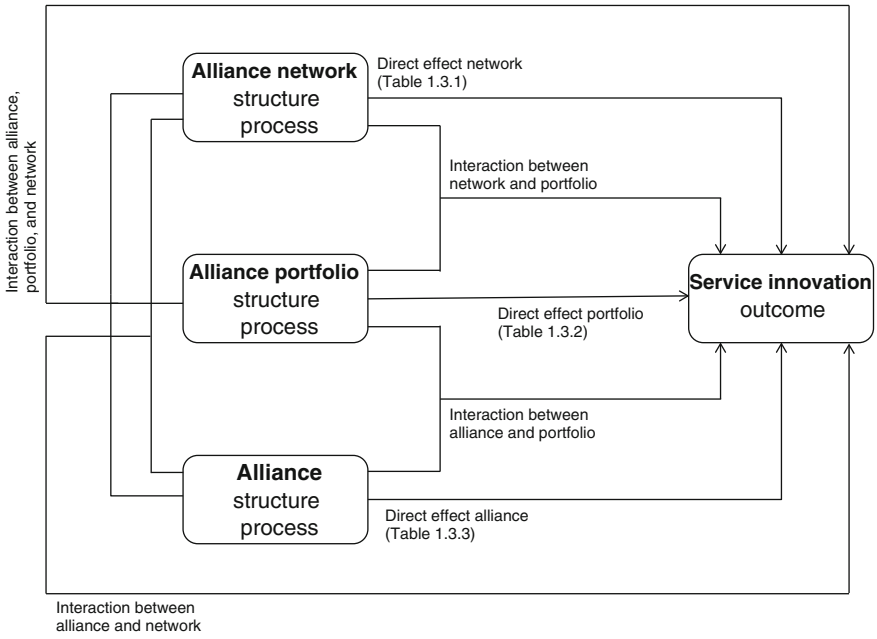

Fig. 1 A multi-level framework of open service innovation

To advance open service innovation theorising, it is critical to distinguish between innovation types (cf. Janssen et al. this volume). For example, it matters whether an innovation is new to the firm, or new to the market, or whether an innovation constitutes an incremental or radical contribution. For example, innovations that are new to a firm may require buyer/supplier collaborations. Producing an innovation for the market, or a radical innovation requires different collaborations with a wider range of partners, including, for instance, universities. The same applies when a business service innovates for its clients: it will co-produce the innovation, but will search for missing resources or knowledge in its own network.

5.2 Future Research Topics

The multi-level framework put forward in this chapter offers tentative explanations and insights about service innovation. Whereas future studies may explore direct and interactive effects of antecedents at the alliance, portfolio, and network analysis levels, future research may also use the framework to explore three other salient topics: service innovation evolution, servitisation and learning.

Future studies may use the framework to investigate service innovation's development over time. In line with recent insights generated within the alliance

portfolio literature (Bahlmann et al. 2014), open service innovation could result from path-dependent and co-evolutionary processes. Path-dependency, for example resulting from pre-existing relationships, may impact managerial decision making such that future decisions are constrained by past commitments. Additionally, co-evolutionary processes may impact a service firms' innovative capacity, such that (unforeseen) changes in network, portfolio, and alliance relationships affect its strategising and organising processes. Enhancing the multi-level framework of open service innovation by integrating an evolutionary dynamic perspective across analysis levels would result in more fine-grained explanations.

Recent studies coined the term servitisation (e.g. Baines et al. 2009; Vandermerwe and Rada 1989), suggesting that manufacturing firms increasingly augment product offerings with service components. However, service innovation is clearly distinct from product innovation (Tether 2005; Sundbo 1997) and insights developed in the product innovation literature cannot be easily transposed to a business service context. The multi-level framework can be used to compare and contrast business services and manufacturing contexts. For example, customer involvement in innovation processes tend to vary between business services i.e. high) and manufacturers (i.e. low), which in turn may impact organisational processes and decisions at the portfolio and network levels. In addition, the transition toward services may require manufacturers to adapt their internal organisation to accommodate open service innovation. Thus, guided by the framework, future research may investigate these issues.

The majority of the studies reviewed focused on learning either by adopting an inter-organisational learning perspective (e.g. Gottfridsson 2010; Leiponen 2005) and/or a knowledge-based view (e.g. Agarwal and Selen 2009; He and Wong 2009). Within these perspectives, alliances function as learning vehicles, whereas alliance portfolios and networks constitute knowledge repositories. Future research may explore how learning motives and processes can be aligned with other theoretical perspectives to better explain service innovation. Transaction cost theory (Van den Ende 2003), property control rights theory (Hurmelinna-Laukkanen and Ritala 2010), and dynamic capability view (e.g. Døving and Gooderham 2008) are candidates for theoretical integration. For example, whereas forging alliance relationships enables firms to assess, acquire, and exploit external knowledge, an increase in transaction costs may not outweigh potential benefits, property rights may not be sufficient to protect new knowledge, and a firm may lack alliance and learning capabilities. The framework can be used to pursue integration with other theoretical perspectives and explore these topics.

5.3 Conclusion

Our review revealed that open innovation in business services is a dynamic phenomenon, comprising different levels. Although we are aware of the potential criticism that generalisations within the service sector are problematic due to their

heterogeneity and inter-sector differences, it was our main objective to give as complete as possible an overview of the literature of open innovation in business services. The results indicate that, with the exception of alliance studies, the area is underdeveloped, which is surprising given the rapid proliferation of open innovation. We suggest that there is a need to further explain, understand, and develop the open service innovation model. Future research should take into account an array of antecedents at the alliance, alliance portfolio, and alliance network levels. Moreover, an integrative model that explains service innovation, taking into account a multi-level model, may guide future research. We provided a foundation for developing such a model when we discussed research opportunities for each level separately, as well as for a nested model. In doing so, future empirical research may employ a mixture of case studies, surveys, and longitudinal studies.

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Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation

Melissa Edwards, Danielle Logue and Jochen Schweitzer

Abstract An increasingly global and connected market environment sees many service providers struggling to find a competitive position and to grow their business sustainably. The shift from a product-dominant logic to a service-dominant market logic pressures businesses to look for new and effective ways of engaging with customers throughout the innovation process. At the same time, managers are faced with so called 'wicked problems' that call for more creative problem solving and lateral thinking in corporate innovation practices. In this chapter we discuss how recent developments of open innovation and design thinking can be applied to services and assist in service innovation. We explore how the co-creation of value is itself a service innovation, and the simultaneous impact of such co-creation practices through relational conversations with customers and a broad range of stakeholders. Co-creation becomes an element of the service offering, drawing customers into the value web and blurring the boundaries of the firm. We do this by discussing three cases as examples of open co-created innovation, and reflect on implications for service innovation, especially where propriety of the service innovation may be ambiguous. In comparison with existing open innovation frameworks, we propose a co-creation approach to open service innovation that goes beyond common 'inside out' or 'outside in' dichotomies.

Keywords Open service innovation · Co-creation · Relational approach

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1 Introduction

An increasingly global and connected market environment sees many service providers struggling to find a competitive position. The shift from a product-dominant logic to a service-dominant market logic pressures businesses to look for new and effective ways of engaging with the innovation process. Managers are seeking more creative problem solving and lateral thinking in corporate innovation practices.

While examining the context that is driving attention to processes of open innovation and open service innovation, we argue that the broader trends are representative of a growing understanding that firms may be able to create and capture value by engaging in relational approaches where value is created 'in action'. One such approach to this understanding of value is design thinking, whereby a problem-centred and human-centred approach draws stakeholders together.

In this chapter, we review the literature with regard to service trends, before examining existing frameworks that analyse the nature of the shifting field. Subsequently, through a comparative analysis of published cases we outline a spectrum of co-innovation practices along several dimensions relating to the degree to which value-in-action is shared, the locus of power, and the degree of community interaction and participation.

1.1 Service Trends

Two major developments are currently driving change in global economies: first, a move towards service-driven markets; and second, the increasing complexity of competitive environments. In combination, they provide the context for an open approach to service innovation that incorporates a broader range of stakeholders within service design. We argue that service innovation is inherently intertwined with complex social issues and that a *Service-Dominant (S-D)* logic can be enhanced through open processes that incorporate stakeholders in the service innovation process by using techniques and a mind-set that are inspired by design thinking.

Services, as a sector, have significantly expanded as a proportion of the global economy. According to Grönroos, services now account for: "77 % of the value added in the United States, and 73 % of the value added in the United Kingdom" (in Aas and Pedersen 2010). Aas and Pederson (2010) notes that this figure could be significantly higher if 'hidden services' were included, such as those which are associated with manufacturing and primary industries, but which incorporate a service element. As the manufacturing sector is driven by technologies such as 'lean manufacturing', we can expect to see a growth in 'hidden services' as companies seek to incorporate manufacturing and reconditioning of manufactured goods into their business models (Aas and Pederson 2010). In a *Goods-Dominant (G-D)* logic,

such business activity is not classified as 'service'. Grönroos (2008) defines a process-based interpretation of business activity where the service is the interactive processes that support the customer processes. Similarly, Vargo and Lusch (2004) overcome this distinction between product and service by defining a service as an interactive process of "doing something for someone" that is valued. They also suggest that goods ultimately provide service and hold, what they call, a "value-in-use". The rationale is that customers often do not value the product itself, but rather want what the product produces. That is, for example, customers do not want a drill; they want the holes that the drill will make (Christensen et al. 2005).

Building on this idea, a S-D logic provides an integrated understanding of the purpose and nature of organisations, markets and society, where the basic assumption is that organisations, markets, and society are primarily concerned with exchange of service—that is, the use of capabilities like, for example, the knowledge of operating a machine (like a drill), or the skill of selling. In S-D logic the service becomes the common denominator of exchange. Hence, all firms are service providers and service receivers, and in taking this perspective managers should then follow a service-based logic that embraces the ideas of the value-in-use and co-creation of value, rather than the value-in-exchange and embedded-value concepts of traditional G-D logic. Co-created value is relational and prioritises our understanding of innovation as processes embedded in networks (Hsueh et al. 2010). Hence, understanding and affecting how socially embedded networks can be used to create value-in-use is at the heart of driving service-innovation.

1.2 Complex Environments and Wicked Problems

The shift to a S-D logic in understanding markets and competitive environments coincides with the increasing complexity of the market environment that is best captured by the notion of '*wicked problems*' (Rittel and Webber 1973). Churchman (1967, p. 72) described wicked problems as "a class of social system problems, which are ill-formulated; where the information is confusing; where there are many clients and decision makers with conflicting values; and where the ramifications in the whole system are thoroughly confusing". Wicked problems are difficult to define, ambiguous, unstable, do not have one solution, and are beyond the realm or mandate of any one department or discipline. The business environment is "wicked territory", where challenging complex social problems are inherently intertwined with business challenges and opportunities. In contrast to traditional methods of problem solving and idea generation, trying to define the wicked problem is a never-ending task, the amount of information one could gather is endless, and usual planning techniques are limited in generating new ideas to respond to such problems. Therefore, stakeholder salience is enhanced and this in turn challenges existing business processes. One such business process is innovation, which for the majority of today's organisations has been based on linear, rational approaches that

are increasingly insufficient in addressing the nature of wicked problems and strategic challenges (Camillus 2008). Contemporary innovation processes entail foreseeing the future of an organisation, and finding partial solutions for wicked problems in regards to markets, customers, organisational culture, structure and processes and all aspects of creating and positioning services. Hence, both S-D logic and the rise of wicked problems constitute a challenging and new competitive environment for service innovation.

2 Service Innovation and the Design Thinking Process

2.1 Service Innovation in a Relational Value Network

Aas and Pederson (2010) outline the diversity of views on service innovation. These can be categorised as internal or external innovations, whereby internal service innovations are new ideas or practices within an organisation, and external service innovations are the addition of, or changes to, a firm's service offering to a consumer segment. Den Hertog (2000) adds to this binary distinction and classifies service innovation in four dimensions: (1) new service concept, (2) new client interface, (3) new service delivery system and (4) new technological options. Innovation looked at from a S-D logic perspective offers a final form of innovation as it re-conceives the traditional value chain. Services are simultaneously product and process (De Jong and Vermeulen 2003), and changes in services inherently involves innovation throughout the value chain (Chesbrough 2011). In fact, co-creation of value is itself a service innovation through the simultaneous impact of value-in use, and relational conversations with stakeholders. While co-created services may fall into any of the four dimensions outlined by Den Hertog (2000), the more vexing question is how such service innovation would enable firms to engage stakeholders to navigate 'wicked territories' in the business environment?

Lusch et al. (2006) argue that operating successfully under a S-D logic requires businesses to develop two new capabilities: 'collaborative' and the 'absorptive' capability. These new capabilities demand greater integration between the firm, the operating environment and the stakeholders who—in addition—need to apply a different 'mindset' to business processes like strategic planning and service innovation. S-D logic is not only 'customer-centric', but also responsive to stakeholders through a relational approach centred on 'conversation', rather than 'propaganda'. Chesbrough (2011) refers to such a model as a 'services value web' and he outlines two main ways in which more open innovation may occur through 'outside in', or 'inside out'. The difference between 'outside in' versus 'inside out'- innovation is the difference between the firm and the customer as the source of innovative, creative thinking. Yet from a S-D logic perspective, innovation occurs through interactivity amongst stakeholders—including the firm, and going beyond it to also include customers through open innovation processes. Strict dichotomies are too

narrow to describe the true interactivity and emerging co-creation of 'value in use'. Hence, there is a 'mixed' level of 'inside-in and outside-in' co-creation that occurs as an intentionally facilitated 'innovation activity'. We need to better understand the processes and mind-set that facilitate the creation of such jointly developed 'value-in-use'. The market is not just a customer interacting with a firm, but a co-creator of the service innovation ultimately provided by a firm. Hence, we examine design thinking as a possible way to explain how value-in-use is being created in open co-innovation processes.

2.2 Service Innovation Through a Design Thinking Process

'*Design Thinking*' can be considered as a process that enables open service innovation. Over the last few years, design thinking has become a buzzword in the business world. While the practice and application of design thinking by business has evolved over time (Buchanan 1992; Rowe 1987; Vogel 2009), the explicit use of the term to describe the process of enabling innovation and solving broad problems within the business context is relatively new. Design thinking is human-centred, integrative, optimistic, and collaborative. It is a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible, and what a viable business strategy can convert into customer value and market opportunity (Brown and Katz 2009).

Design disciplines have been dealing with open, complex, dynamic and networked (i.e. wicked) problems for a very long time, such that a specific set of problem solving practices has been developed and professionalised, particularly around the way designers deal with the collaborative framing and reframing of problem situations, as well as their approach to generate, prototype and test alternative solutions iteratively. Design thinking is more about unwrapping the problem solving process: it suggests that the creative process is not sequential, but overlapping and iterative; it requires input from people with different disciplines and backgrounds; it is argumentative, and requires integrative thinking. It's about 'failing forward', rapid prototyping, and using the wisdom of crowds (Jakovich et al. 2012).

It is in this sense that we suggest design thinking as a method for open service innovation, where the innovation process entails a deep engagement with the customer, either through an open-ended inquiry about his or her needs, or by extending a particular service offering. During such deep engagement the customer (or user) is usually invited to co-create the service. In the process of engagement and co-creation, tacit knowledge is elicited from the customer (and similarly the customer often learns tacit knowledge from the service provider). The service provider may use this additional knowledge to design or refine experience points, where the customer directly encounters outputs from the service. With those experience points identified, the service offering is then made to the customer (or an existing offer is further developed). A customer experience is produced from this

web of activities that, in an iterative fashion, also cover phases of prototyping, testing and on-going re-framing of the problem scope.

Design Thinking offers a way to facilitate the open service innovation processes that are needed to tackle wicked innovation challenges. It enables us to better understand the service web, and to conceptualise how the provider need not provide all of the service itself; rather, the provider can coordinate the delivery of both internal and external services with the customer. Thus we argue, making it necessary to engage in 'open service innovation'.

3 Open Service Innovation—A Conceptual Framework for Services Innovation Co-creation

3.1 Open Innovation

In the last decade open innovation practices have increasingly attracted research interest. Chesbrough (2003) first defined the term *open innovation* as innovation that occurs as outside-in and inside-out processes, whereby inflows integrate external information into the firm, and outflows where the firm makes information available for the expansion of markets.

Dahlander and Gann (2010) conducted an extensive literature review and conceptual mapping of open innovation research. Dividing the studies between pecuniary and non-pecuniary interactions, they developed a typology based on the outbound and inbound nature of the market-to-firm relationship. The four types derived from outbound being either 'revealing' or 'selling' to the market, and the inbound being either 'sourcing' or 'acquiring' from the market. In comparing the relative advantages and disadvantages of the four types, they draw several main areas promising for future research on open innovation. One of these relates to the process of sourcing information as "external knowledge" is considered to be 'out there' ready to be harnessed by firms, and we have limited understanding of the process of sourcing this into corporations (Dahlander and Gann 2010). Furthermore, the literature so far does not yet provide a sufficiently clear picture of when and how open innovation is superior to closed or more traditional ways of innovation, and at what stage in the evolutionary process between conception to commercialisation. Finally, we observe that this typology is premised on a unidirectional flow, rather than a dialectic or relational one that might be more typically found in cases of open innovation in value webs.

Various empirical studies that have demonstrated the relevance of open innovation techniques (e.g. Huston and Sakkab 2006; Rohrbeck et al. 2009; Dodgson and Gann 2006; Chesbrough and Crowther 2006), others have found varied results regarding the relationship between open innovation and firm performance, thereby concluding that evidence is inconclusive regarding the effectiveness of open innovation techniques.

Essentially in the open innovation model, there are *two complementary kinds of openness*. One is "*outside in*", where a company makes greater use of external ideas and technologies in its own business. Openness in this context means overcoming the "not invented here" syndrome, where the company monopolises the source of its innovations, and instead welcomes new external contributions. The other kind of openness is "*inside out*", in which a company allows some of its own ideas, technologies or processes to be used by other businesses. Openness here means overcoming the "not sold here" syndrome, in which the company monopolises the use of its innovations, prohibiting use outside of its own business. Opening up the inside means that revenues from external use of a company's ideas are welcomed. Below we consider each kind of openness in turn, as it applies to service innovation.

Huizingh (2011) further distinguishes between openness as outcome, and openness as process. This schema enables us to understand three different framings of openness defined as: 'Private Open Innovation', where the process is open, but the outcome is closed; 'Public innovation', where the outcome is open, but the innovation process is closed; and, 'Open source innovation' where both the outcome and process are open. Whilst Huizingh (2011) was primarily concerned with open innovation broadly defined, this categorisation enables us to understand when the service innovation is considered 'open'.

3.2 Open Service Innovation

Given the shift from linear value chains to integrated value nets in the services industry, the potential for open service innovation is heightened. In this context, the service dimension is often co-created outside of the boundary of the firm through the customer experience. Conceptually, the boundaries between the firms and the market are less delineated due to the relational aspect of 'value in action' within the S-D logic. Therefore, the application of open innovation in the services context may provide deeper insights regarding how and when open innovation processes can engage stakeholders in the co-creation of value-in-action in networks.

Chen et al. (2011) examine co-production between businesses, and including customers to identify 'the role co-production plays to influence service innovation', such that service innovations and new service offerings are strategically enhanced. Based on a sample of Taiwanese firms, they considered how businesses should integrate partners and customers as co-producers in the service innovation process? They found that co-production with customers has a strong impact on service innovation. Similarly, they concluded there was a good fit between partner co-production and innovation orientation, in the light of three main antecedents: partner match, partner expertise and affective commitment.

However, other studies have found weaker connections between open innovation practices and innovation in services. Mention (2011) specifically examined the practices of co-operation and co-opetition practices to determine their influence on firms introducing innovation novelty to the services market. Both of these are

relational practices, whereby firms strategically engage with market stakeholders or competitors. This study, based on service firms in Luxembourg, showed that, while sourcing market information (from customers and suppliers) increased the probability of introducing new to the market innovations by 3 %, market based co-operation was not found to have a similar influence. Furthermore, the study found no significant relationship between co-opetition, firms and innovation novelty. Both sourcing information from intra-group co-operation and co-operating with science partners showed a positive influence on bringing novel innovations to the services sector.

Despite contradictory findings, we extend the open innovation and consider how this technique may apply within the S-D logic. While open innovation blurs the boundaries of the firm, it maintains the firm as the source of innovation through the formulation of a business model, and propriety of the service remaining within the firm. We argue that, when combined with the characteristics of the S-D logic and design thinking, open service innovation extends the relational processes

Table 1 Closed and open innovation, and open service co-innovation principles adapted from Chesbrough (2003, 2011); Lee et al. (2012); Chen et al. (2011)

Closed innovation principles	Open innovation principles	Open service co-innovation
The smart people in our field work for us	Not all the smart people work for us, so we must find and tap the knowledge and expertise of individuals outside our organization	As services are intangible, must focus on the customer experience
To profit from R&D, we must discover, develop and ship it ourselves	External R&D can create significant value; internal R&D can only capture part of that value	Consider building service platforms, from which other products can be built or wrapped around (e.g. Apple enabling developers to create applications but on Apple platform)
If we discover it ourselves, we will get it to market first	We don't have to originate the research in order to profit from it	Be mindful that its harder to measure the services that are delivered
If we are the first to commercialise an innovation, we will win	Building a better business model is better than getting to market first	Be mindful that customers might experience the same service differently
If we create the most and bets ideas in the industry, we will win	If we make the best use of our internal and external ideas we will win	Use design thinking methodology to have a user-centred measurement and experience focus
We should control our IP so our competitors do not profit from our ideas	We should profit from other's use of our IP, and we should buy others IP whenever it advances our own business model	Engage 'crowds' in design thinking process to generate ideas

between the firm and environment, thus enabling stakeholders to co-create innovation with firms. Such a shift fundamentally challenges the propriety of the innovation. When applied to S-D logic, design thinking processes enable innovation that does not occur through outflow and inflows, but rather in the space in between the firm and the environment as a collaborative process with stakeholders. In this space, the distinctions between business and customer are blurred, and in some cases businesses co-create service in networks through the creation of shared value-in-action. Furthermore, as Chen et al. (2011) outline, the shift towards openness fundamentally changes value creation in the business model, and radically shifts our conceptual framing form value chain to network. Value is *co-created and relational* in a service web.

These types of open innovation and open co-innovation challenge some of the basic tenets of traditional business innovation strategy, especially the need to have ownership over the resources that are applied to create new value (Chesbrough and Appleyard 2007). In Table 1, we build on the existing literature, and summarise the main tenets of these different framings.

4 Cases of Service Innovation Co-creation

We build on this conceptual framework, and specifically that outlined by Chen et al. (2011), in providing examples of open service co-innovation. Chen et al. (2011) identified four types of co-innovation 'models', and in this section we look through several published examples of co-creation through the S-D lens.

4.1 Competitive Co-creation

In competitive co-creation, the firm or organisation has significant control over the creative process. The company seeks to innovate services through input from stakeholders during the co-creation process. One method of doing so which has received particular attention is through the generation of ideas through competitions, often labelled "crowdsourcing" (Howe 2008). This model involves soliciting ideas or solutions from a wide range of contributors (Afuah and Tucci 2012; Jeppesen and Lakhani 2010). Generally, firms set a prize amount, provide a remit or problem to solve, and select the best solutions generated by the competition, providing a very efficient way for firms to generate possible solutions and ideas to problems (Jeppesen and Lakhani 2010). This form of open innovation enables firms to engage with a wide range of contributors with varying backgrounds and skills bases, and at very low costs. The locus of control rests with the business. Models range from large established companies who set their own platform, such as GEs Ecoimagination, and OpenIDEO; through to web based intermediary platforms that facilitate the

competition on behalf of the business, such as www.innovationexchange.com, and www.99designs.com.au. Here, the firm provides a service platform for participants, and participants may create (or innovate) firm products and services.

4.1.1 Open IDEO: Co-created Professional Services

OpenIDEO is an online platform created and managed by the famous design firm, IDEO. IDEO, now renowned for its design thinking process, has developed OpenIDEO as an online platform to address social problems and issues. The concept was initially created by David Hulme in 2007, who had been observing the success of open innovation processes with Linux, and Mozilla Firefox. We also observe the successful online competition platforms, such as Innocentive, that host competitions on behalf of firms such as Procter & Gamble to generate solutions for product development challenges. Processes of innovation and development that were traditionally done inside a firm, are now able to be reorganised and opened up for anyone, not only employees, to participate and contribute, leading to the launch of Open IDEO in August 2010 (Lakhani et al. 2012).

Using the online platform, Open IDEO leverages IDEO's innovative design process, and an online community to create solutions for social issues (Lakhani et al. 2012). Different to other crowd sourced competitions, instead of prize money, Open IDEO offers recognition. OpenIDEO provides statistics on each individual through a badge of honour (a Design Quotient or DQ). The more a community member participated and contributed, the higher their DQ would be—valuing every unit of engagement on the site. Paulini et al. (2011) describes how OpenIDEO uses both "professionals and amateurs to varying degrees, favouring a hybrid approach where experts guide the design process and tap into the crowd's contributions for ideas and feedback". In the case of OpenIDEO, financial sponsors (such as Oxfam and Unilever) set the project brief (such as clean water solutions in Ghana). The platform draws on its crowd of contributors to provide background research, suggest ideas, and applaud and evaluate proposed solutions (Paulini et al. 2011). The top concepts as voted by the crowd are then evaluated by a panel of experts for business viability and technological feasibility, before a winner is announced (Paulini et al. 2011). "The hybrid model these platforms employ uses communication tools to bring out the strengths of the in-house team of experts, and the crowd, in order to bring ideas to fruition in a viable way (Paulini et al. 2011).

4.2 Community-Based Competition Co-creation

In contrast to competition based open innovation models, where contributors are unknown to each other and do not typically collaborate on solutions, another form of open innovation is what is known as *community-based competition models*

(Langer and Seidel 2012). Here the value-in-action may occur in exchange between customers, facilitated through a business or online open platform—a co-created service that produces a new product.

4.2.1 Threadless Case: Co-created Product Design

We include Threadless as an example of a crowd-controlled, community-based, open innovation platform. Threadless is an interesting example in its management of community-based competition in open innovation. In such a model, the balance of power between the firm and the community shifts, with the firm actively needing to manage the motivations and satisfaction of the community, given the community is the firm's key resource/core competency (Langer and Seidel 2012).

Threadless was started from inspiration and experience of winning a t-shirt design competition. Founders Jake Nickalls and Jacob DeHart took this experience and developed an online community that designs and markets t-shirts, with winning designs being produced. Anyone can join the community, and visitors to the site vote for their favourite designs. To help the artists with the design process, Threadless sent digital submission kits—complete with HTML code and graphics—to each potential submitter; enabling submitters to produce professional advertisements, and produce links to their designs on websites (e.g. blogs) outside of Threadless (Afuah 2009). In 2012, successful contributors initially received $2,000, and $500 for every reprint of their designs; since its beginning, two million people have registered on the Threadless community (Langer and Seidel 2012). Threadless retains the rights to the design. In short, Threadless prints the winning designs and sells them to the very community that has competed to create the designs and voted to decide the winning design.

In this form of open service innovation, the firm provides the online platform and tools to enable members of a community to interact. This provides opportunities for community members to present concepts, share ideas, receive feedback, discuss techniques, as well as a social place that fosters friendships. However, Langer and Seidel (2012) note that, as the community is the only source of new products, significant effort is put into developing and maintaining the community—which is expensive and time consuming. This community-controlled example of open innovation notes the changing and conflicting norms of community and competitions in some models of open innovation (Langer and Seidel 2012). These community-based competition platforms are increasing across sectors; for example, Local Motors for automobiles, and Quirky for consumer electronics (Boudreau and Lakhani 2009).

4.3 Open Source Co-innovation

Open source co-innovation is the 'ideal type' of co-created value-in-use. Here, the service is created by the users for the users. It is both open in the process of the creation of the service, and open in the outcome. Examples of open source co-innovation, the

most open of the open-innovation approaches include Linux operating system, and also Wikipedia (Boudreau and Lakhani 2009). This is far more community-based open innovation, centred around norms of sharing and joint production (O'Mahony and Ferraro 2007). The value of openness is enhanced with every user—as they directly contribute ideas and content to improve the variety and quality of the product.

4.3.1 Wikipedia Case

Wikipedia was originally created to complement an online professional encyclopaedia, and as a way to more rapidly create content for this encyclopaedia, and ended up rapidly growing, taking over the professional version. It relies on users for both data entry and editing (Chesbrough and Appleyard 2007). This open co-innovation from Wikipedia (and other firms such as MySpace, YouTube and Linux) relies primarily on external, volunteer contributors. As described by Chesbrough and Appleyard (2007), Wikipedia relies on its user base to continually refine the product—to guarantee transparency of the open innovation process. Wikipedia has a formalised paper trail whereby the Wikipedia Foundation maintains a log of all of the data entries and the editors of those entries, so that the community can see the origins of entries and the history of subsequent edits to those entries. According to Wikipedia, as of April 2013, Wikipedia includes over 26 million freely usable articles in 285 languages, written by over 39 million registered users and numerous anonymous contributors worldwide. The original founders were focused on hands-off executive management, supporting open-collaboration and the self-management of the community of editors.

4.4 Service Exchange as Open-Creation

We include this emerging example of service exchange where value is created through relational exchange and reputation in the service web. Stakeholders can simultaneously be both customer and business. The value-in-action is co-created through the service exchange. Both the outcome and the process are open. According to Botsman and Rogers (2010) the collaborative consumption model facilitates the transformation of products into services as consumers shift towards the utility mind-set. For example, various peer to peer exchange models connected to the collaborative consumption model also challenges the tenet of having to own assets to be able to access their value. "Collaborative consumption describes the shift in consumer values from ownership to access. Together, entire communities and cities around the world are using network technologies to do more with less, by renting, lending, swapping, bartering, gifting and sharing products on a scale never before possible" (www.collaborativeconsumption.com). Examples of collaborative consumption models include car sharing services (Zipcar), accommodation sharing services (AirBnB), and asset sharing services (Airtasker). Common with other

models of open innovation, is the rating and reviewing of contributions (or in this case, those active in the community). Such a rating system, similar to EBay buyer and seller ratings, enables participants to reduce the potential risk in transactions.

5 Dimensions of Co-creation Services and Implications for Firm Performance

If we take a S-D logic, we see across these examples that firms are using co-creation processes to:

- innovate their internal services and processes (e.g. platform for Threadless participants);
- innovate on the services they offer to customers and society (e.g. sponsors of Open IDEO; the millions of people that access Wikipedia);
- innovate on the services they offer to suppliers (e.g. designers in Threadless) and finally
- co-create value through the very action of the service (e.g. in collaborative consumption).

Across these examples of co-created services (inside, outside, with and across firm boundaries), we see the integral role of the consumer in the innovation process, i.e. a process of co-innovation (beyond notions of open innovation as outlined in Table 1). Based on these public examples and from reviewing the literature on open innovation more broadly, we identify several dimensions of co-created open service innovation, as stated in Table 2.

Table 2 Dimensions of co-created open service innovation

	Open IDEO	Threadless	Wikipedia	Collaborative consumption
Level of competition	High	High	N/a	Medium
Level of community	Medium	High	Low	Medium
Locus of power	Platform and competition sponsor	Platform (ownership of IP)	Community	Participants (owners)
Locus of value-in-use	Competition sponsor	Members	Community and public	Participants
Degree of stakeholder engagement	High	High	High	High
Client interface (means of interaction)	Online platform	Online platform	Online platform	Online platform

These dimensions highlight the level of company control of the co-creation process (level of competition), and also how the relationships amongst participants (level of community) influence the co-creation process. The balance between competition and community directly impacts on where the power sits in the co-creation process (locus of power). In thinking of where firms create and capture value, the construction and management of the co-creation process then shifts to who gains most (value) in the process (locus of value-in-use). The means of interaction, common in many open innovation processes, seems to be facilitated most easily by online platforms. Central to co-creation processes is the centrality of the stakeholder.

6 Conclusion

In this chapter, we have explored how the *co-creation of value* is itself a service innovation and the simultaneous impact of *value-in use* through relational conversations with stakeholders. We suggest moving beyond the boundaries of the firm when innovating services to consider service innovation as relational and embedded in networks of users, or rather co-innovators.

However, in working more on relationships and community, the balance of power may shift among the firm and the contributors (community members), as open co-innovation diffuses the boundary between business and customer, and business and business. As Langer and Seidel (2012) note, through the community, contributors organise themselves, which means the firm is dealing with an organisation that can amplify problems (see also O'Mahony and Ferraro 2007). In this model of co-innovation, the issue of ownership of ideas becomes one that organisations need to carefully manage—in being able to have a sustainable model of innovation, as well as maintaining, engaging and motivating their network of co-creators.

Co-innovation, and especially service co-innovation, is the latest stage in the evolution of innovation (Lee et al. 2012). Building a co-innovation firm is not simple and requires putting the customer at the centre of the business model—as a supplier, a producer, a tester, a marketer, participant and a consumer.

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Exploring a Multidimensional Approach to Service Innovation

Matthijs Janssen, Carolina Castaldi, Alexander Alexiev and Pim Den Hertog

Abstract Given the fuzzy nature of services, it proves challenging to describe precisely what element of a renewed service offering can be regarded as innovative. Many existing characterizations are criticized for being too limited to capture distinctive features of new services accurately. This chapter describes the possibilities offered by a multidimensional approach to service innovation. Adhering to differentiated frameworks of where novelty can occur allows for comprehensive measurement and comparative analyses across sectors. Additionally, a multidimensional approach provides a basis for the application of system and complexity theory to service innovation. The rich but largely unexploited potential of this perspective is illustrated by testing a hypothesis regarding the relation between radicalness and innovation performance. Using survey-data from 341 firms, we operationalize a multidimensional conceptualization of service innovation and show that firms

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renewing a higher number of dimensions indeed tend to yield a higher percentage of their turnover from innovation. Further implications of treating services as multi-dimensional systems are discussed.

Keywords Multidimensionality · Complexity theory · Measurement scale

1 Introduction

Due to their immaterial and 'fuzzy' nature, (new) service offerings are hard to characterize precisely (Gallouj and Weinstein 1997; Gallouj and Savona 2009). Compared to physical goods, intangible products tend to rely on a high share of tacit rather than codified knowledge. As a result, describing in detail how a technical artefact should behave is commonly thought to be easier than defining accurately how a front office employee should act (Djellal and Gallouj 2008). Listing specifications, for instance, is far more common in the domain of goods than in the domain of services: the more a product is intangible, up to a 'pure service', the more one experiences difficulties in giving a comprehensive description of what the product exactly entails (Shostack 1977). However, identifying what exactly makes a new or improved service innovative is an important prerequisite for studying service innovation. In absence of a comprehensive overview of the possible ways services can be renewed, scholars will be limited in their ability to engage in in-depth studies of the phenomenon (Toivonen and Tuominen 2009).

Currently, there is a general consensus that the novelty of new offerings cannot be described sufficiently using narrow classification schemes, indicating to what extent newness concerns product versus process innovation (Djellal and Gallouj 2001; Hauknes 1998), or service- versus goods-based innovation (Drejer 2004) or a combination of both elements added with strategic aspects of service innovation (Forfas 2006; Voss and Zomerdijk 2007; Agarwal and Selen 2011). Given the frequently expressed criticism that these types of characterizations are too limited for capturing adequately the distinctive features that make services innovative, the last 5 years have been coined as the "multidimensional phase" of service innovation research (Carlborg et al. 2013).

Adhering to a more differentiated representation of what services are, allows for deeper insights in where and how novelty can be introduced when engaging in the design of new services (den Hertog 2000). Moreover, the use of conceptualizations relying on abstract dimensions opens the way to comparative analyses. Due to the apparent heterogeneity of services, opportunities for interorganizational and cross-sectoral learning remain largely unexploited. So far, only few authors attempted to develop multidimensional conceptualizations fitting these purposes (Agarwal and Selen 2011; Salunke et al. 2011; Droege et al. 2009; Bryson et al. 2012).

In this chapter, we describe how scholars approached the challenge of characterizing typical properties of specific service innovations. Besides discussing the empirical benefits of a multidimensional approach to service innovation, we also introduce some theoretical implications of regarding dimensions as part of a system of interrelated elements (Kauffman 1993; Levinthal 1997; Porter and Siggelkow 2008; Chae 2012). We argue that such a perspective enhances our understanding of when a service is truly novel. Radical innovation, from a systems view, requires simultaneous changes in multiple loci or dimensions of the service. Commercializing rare combinations of service elements, in turn, allows firms to benefit from comparative advantage. Using survey-data from 341 firms, we show that firms renewing a higher number of dimensions indeed tend to yield a higher percentage of their turnover from innovation.

2 The Challenge of Characterizing Service Innovation

Innovation, according to commonly accepted definitions, is the successful diffusion of new or improved processes or products: be it in the domain of goods, services or a combination thereof. It is evident that services differ in many respects from purely material goods (Miles 1993). An essential property of services is that they concern the delivery of an actual experience or solution, rather than an intermediate artefact with which users themselves can produce the fulfilment of their needs (den Hertog et al. 2010). Since many types of services are delivered by personnel like front office employees, the involvement of professionals is one of the aspects driving service production. The importance of the individual also holds for the customer side, as services tend to be coproduced by their consumers. Service particularities, notably inseparability (production and consumption occur simultaneously), heterogeneity, perishability and intangibility, make it difficult to signal changes in the final output or even the delivery (Parasuraman et al. 1985; Sampson and Froehle 2006). How can we determine if innovation took place, if it involves more than just clearly perceivable transformations in physical objects?

Due to the fuzzy nature of services, defining service innovation has proven to be quite a challenge (Gallouj and Savona 2009). Commonly, a service innovation is considered to be a new or significantly improved service concept that is effectively taken into practice. Aiming to give a comprehensive account of the forms a service offering can take, a wide range of service typologies has been proposed over the past decennia (Cook et al. 1999). These typologies, however, tend to focus entirely on the proposition that is finally offered. Just like in the case of physical goods, it is possible that the functional properties of a product (i.e. the service experiences it renders) remain equal while aspects of the delivery or cost-structure are largely improved. A traditional way to identify the specific elements of novelty in an innovative service, therefore, draws on adaptation of the notions of product and process innovation. This well-known distinction forms the basis for Barras' (1986) Reverse Product Cycle theory, stating that in services, product innovation often

follows process innovation. Some scholars have tried to examine the relationship between the two empirically (Boone 2000; Nijssen et al. 2006). Others, however, question the validity of this basis for characterizing where novelty occurs (Hauknes 1998; Djellal and Gallouj 2001; Aa and Elfring 2002; Tether 2005), arguing that the act of service delivery is both a product and process at the same time. Moreover, even if one could state accurately whether novelty concerns the service offering or its delivery process, it would still say little about what is really new.

A related and a very contemporary debate relying on a unidimensional conceptualization of innovation concerns the relation between services and goods, both of them forming the extremes of a continuum between tangible and intangible products (Shostack 1977). Decades of research on service innovation have been devoted to how renewal in particularly 'pure' services differs from innovation in the domain of technology and goods. However, in their initial attempt to apply Lancasterian thinking to services, Gallouj and Weinstein (1997) already emphasized that material artefacts and services are often hard to distinguish from each other. Indeed, it is increasingly acknowledged that many new products contain features of both goods and services (Drejer 2004), as evidence by the fact that value added of manufactured goods increasingly relies on service activity (OECD 2012). This trend is driven, inter alia, by manufacturers realizing they can better compete on selling their knowledge through consultancy, rather than on the price of labour or natural resources (Chesbrough 2011). Another influential development is the ever-continuing rise of ICTs, which enables many new forms of service delivery (Cainelli et al. 2004). Inspired by these observations, scholars and policy makers have started to devote attention to all-encompassing topics ranging from 'product service systems' (Rapaccini et al. 2013; Baines et al. 2007), 'service value networks' (Agarwal and Selen 2009), 'integrated solutions' (Davies 2004) and 'service systems' (Ng and Andreu 2012) to 'large-scale demonstrator projects' (Expert Panel on Service Innovation in the EU 2011). These terms relate to theories, debates or policies in which both services and technologies are regarded as elements of integrated offerings.

Especially over the past few years, scholars have increasingly acknowledged the multidimensional and varied nature of service innovation (Agarwal and Selen 2011). In the currently emerging holistic perspective on innovation, known as the 'synthesis' approach, narrow distinctions as discussed above are no longer valid (Rubalcaba et al. 2012). Instead, scholars of service innovation search for conceptualizations that embrace not only the 'pure' service aspects of an innovation, such as the final offering (the solution or experience) or how it is delivered, but also give room to the technology it involves (Gallouj and Savona 2009; Windrum and García-Goñi 2008). By stressing the relevance of previously neglected topics (besides the concept itself), a 'multidimensional phase' of service innovation research has emerged (Carlborg et al. 2013).

Despite a growing consensus with respect to the limitations of traditional definitions, service innovation remains a poorly conceptualized phenomenon (Salunke et al. 2011). Current academic studies, innovation surveys (such as the European Community Innovation Survey) and policy reports keep focusing on different types

of innovation rather than investigating in detail the various elements constituting a single innovation (Gallouj and Djellal 2010). Albeit increasingly differentiated (e.g. Trigo 2013; Amara et al. 2009), most measurements concern an extension of traditional measures rather than a reconceptualization of service innovation itself. A plausible explanation lies in the observation that only few authors attempted to capture the entire 'dimensionality of service innovation' in a single framework (Salunke et al. 2011 p. 1253). Indeed, the fact that service innovation is multidimensional has been stressed extensively, but *how* these dimensions could look like remains largely unaddressed (Carlborg et al. 2013; Droege et al. 2009; Bryson et al. 2012). Uncovering the exact modifications determining the novelty of a service thus requires the availability of differentiated conceptualizations for precisely describing which elements of a service offering are new in comparison to existing services (Toivonen and Tuominen 2009).

2.1 A Multidimensional Approach to Services

A first class of frameworks allowing for detailed descriptions of where novelty occurs, concerns the set of tools commonly used in service management. For instance, a framework for characterizing distinct service aspects could be recognized in studies concerning the design of the service encounter (Tansik and Smith 2000), or tools such as the service innovation triangle (Cuthbertson and Furseth 2012). Similarly, for characterizing the novelty of an innovative service, one could use practices like 'service mapping' and 'service blueprinting' (Bitner et al. 2008), both originating in service operations management. Since these perspectives aim to provide a basis for detailing and balancing the organizational processes associated with the delivery of a (new) service, they are also useful for indicating in which respect a new service differs from existing offerings. Other lines of literature, devoted to innovation in general, proposed frameworks for characterizing products as well (possibly in the domain of services). For instance, the nine dimensions of business models, developed by Osterwalder and Pigneur (2010), have inspired many scholars and managers dealing with the holistic redesign of their (service) offer. These dimensions can be regarded as an alternative for representing the generally recognizable dimensions of a product (good or service). However, a limitation of these frameworks is that they are commonly associated with highly context-specific applications, which limits their usefulness for comparing innovation in different types of services.[1]

Addressing this weakness, a second way to locate novelty in services draws on differentiated frameworks of a more conceptual nature. Attempts to capture the

[1] For instance, there is not much to learn from comparing the service blueprints from a restaurant visit with the service blueprint of consulting a financial advisor. Only within these specific contexts, detailed mappings can point out differences and similarities that might lead to improvements.

dimensionality of services with conceptualizations containing common elements (of services in general) allow for a rare type of comparative analysis. Characteristic for services, indeed, is that their intangible and heterogeneous nature makes it hard to learn from similarities (den Hertog 2010). Compared to the domain of goods and technologies, service-based products possess relatively few characteristics that facilitate the observation and exploitation of communalities. Take, for example, artefacts containing common elements such as an energy source, transmission system or electric circuit. Knowledge about these aspects can be used in the contexts of widely differing products. A certain level of comparability, enabled by abstraction from specific domains, allows for learning to occur. In services, possible common elements are less clearly pronounced (Nelson 2003). This is reflected, for instance, in the fact that goods tend to be associated with standardization, contrary to the variability of intangible products (Anderson et al. 1997). By describing a wide range of services on the basis of the same set of dimensions, the limited possibilities for observing similarities (and benefitting from associated learning opportunities) can be overcome (Gallouj and Djellal 2010). As such, a multidimensional conceptualization of services could deliver substantial contributions to the increasingly dominant synthesis approach, which tries to analyze innovation in highly different sectors with the same tools and frameworks (Rubalcaba et al. 2012; Carlborg et al. 2013).

With their adaptation of the Lancasterian approach (Saviotti and Metcalfe 1984), Gallouj and Weinstein (1997) were one of the first trying to characterize in an abstract way different common elements of a (service) product. In their pioneering contribution, the authors describe any type of product as a system of provider competencies, client competencies, outcome characteristics and provider technology. Vectors of these four types of characteristics accordingly provide a basis for describing what aspect of a new product is innovative. In later adoptions of this representation, which is particularly used in service innovation literature, the original dimensions have been modified or supplemented (Djellal and Gallouj 2001, 2008; De Vries 2006; Gallouj and Toivonen 2011/2012). Windrum and García-Goñi (2008) demonstrate how the model by Gallouj and Weinstein provides a suitable basis for developing a neo-Schumpeterian account of innovation, in which all forms through which innovation can manifest itself are represented.

Although often not referring explicitly to (vectors of) characteristics, also other approaches for conceptualizing properties of services, and changes therein, have been proposed. In line with the urge by Salunke et al. (2011), many of these alternatives rely on a discrete number of dimensions as well. An excellent overview is provided by Droege et al. (2009, p. 138), who list the service innovation dimensions mentioned in more than ten innovation classification frameworks. Amongst them, we find Sundbo (2003), discriminating product innovation, process innovation, market innovation, organizational innovation, later supplemented with technological innovation and widened service (Sundbo et al. 2007).[2] A differentiating perspective

[2] Here, one could argue that these aspects pertain to types of innovations rather than dimensions of an individual service innovation.

is also clearly present in the work by Edvardsson and Olsson (1996), who conceptualize service innovation as comprising a service concept, service process and service system.

One framework explicitly devoted to disentangling the multidimensional nature of service innovation, is the 4-dimensional conceptualization by den Hertog (2000). In the 4D-model, a service innovation is regarded as a change in the service concepts, service delivery practices, client interfaces and service delivery technologies. By discriminating these various elements where renewal can take place, the model provides a fruitful basis for a multidimensional conceptualization of services. The operationalization of the multidimensional Elevated Service Offering construct (Agarwal and Selen 2011), for instance, is largely based on the four dimensions by den Hertog (2000). In this operationalization, the dimension of technological options was amended to reflect the wider management and organizational aspects of strategic and operational innovation in services (Agarwal and Selen 2011). Building on new insights, partially originating from applications by other scholars, the original model was recently broadened with the dimensions 'new value system/business partners' and 'new revenue model' (den Hertog et al. 2010). By relying on this ensemble of dimensions, a service innovation can be defined as "a new service experience of service solution that consists of a new (or considerably changed) service concept, new customer interaction, new value system, new revenue model, or new organizational or technological service delivery system". Although the extended framework and associated definition is starting to spread throughout particularly service innovation literature (D'Alvano and Hidalgo 2011; Salunke et al. 2011), more empirical illustration is still required (Droege et al. 2009; den Hertog et al. 2010).

2.2 *Unexploited Potential of a Multidimensional Approach to Service Innovation: An Hypothesis About Radical Change*

Most conceptualizations discussed before define various common classes of properties. This facilitates comprehensive empirical research in which the broad nature of services is reflected (Carlborg et al. 2013), thereby paving the way for comparative analyses across firms and sectors. However, besides providing a basis for identifying where change occurs, a multidimensional approach can also be regarded as the basis for looking at services as systems of interrelated elements (den Hertog 2000; den Hertog et al. 2010; Chae 2012).[3] Such a perspective has

[3] Also the characteristics-based approach by Gallouj and Weinstein (1997) has been represented as a system of interrelated elements (Windrum and García-Goñi 2008). However, although noting that "the model is helpful for describing the various ways in which service innovations can produced", it has been criticized for not being "very helpful if we want to describe more concretely the possible loci of innovation, i.e. all those elements of the service which can be changed" (Toivonen and Tuominen, 2009, p. 891).

important theoretical implications, as we will argue below. Here we focus on developing one specific hypothesis about radical change, but our general point is that the multidimensional approach has a large unexploited potential in terms of theory development, something we will discuss in the last section as well.

Within innovation studies, applying system-theory is a popular way for understanding how new products come about (Kauffman 1993; Levinthal 1997; Porter and Siggelkow 2008). Essential is that a product, be it a good or service, is conceived as a system of elements that are to a certain extent related to each other. When searching for a new or improved product, firms can decide to change one or multiple elements of products that are currently available. In absence of any interdependencies, it is relatively easy to examine the success of an individual change. Provided with sufficient resources, firms can experiment with changes in each element, and finally pick the most successful one. Therefore, it is likely that firms providing a type of product without any interdependencies all end up in the same configuration (Frenken 2006). This so-called global optimum is the combination of elements that firms in a given market will deploy, until market circumstances change.

In more complex systems, a change in one element triggers a change in other elements in turn. Because of this complexity, it is hard to assess ex ante how successful a certain change will be (Beinhocker 2006). As a result, firms adhering to a successful combination of elements do not know if their combination is optimal, or whether other combinations exist that are even more feasible in the current market circumstances. In complex systems, a combination dominant at a certain moment might be a local rather than global optimum. As long as firms only experiment with marginal changes, covering a small number of elements, no new optimum will be reached.

The uncertainty of experimentation in a complex system makes the innovation process more costly. However, the fact that firms have to change multiple activities in order to escape from a locally optimal configuration also reduces the chance that others got there first, or will imitate the configuration corresponding with the new optimum. As a result, innovations that are more radical in the extent of required reconfigurations provide a basis for achieving competitive advantage (Rivkin 2000; Porter and Siggelkow 2008).

By relying on a multidimensional conceptualization, theory concerning complex systems can be translated to the domain of service innovation. Although the elements within a system are commonly associated with individual components (Frenken 2006), functions, routines (Nelson and Winter 1982) or activities (Porter and Siggelkow 2008), the complexity principles hold for more abstract dimensions as well. In the case of services, scholars did express the expectation that prompting a change in one dimension is likely to require changes in other dimensions (den Hertog et al. 2010; Van Riel et al. 2013; Cook et al. 1999; Chae 2012). Essentially, the dimensions introduced by den Hertog et al. (2010), being key elements of service offerings (Agarwal and Selen 2011), all cover a distinct set of activities or routines. According to the arguments provided above, introducing changes in multiple of these dimensions is likely to lead to innovations that are relatively

novel. Innovations consisting of various simultaneously aligned dimensions, in turn, might result in competitive advantage over firms stuck in local optima (Porter and Siggelkow 2008). Therefore, we hypothesize that radicalness, in terms of a high number of affected dimensions, corresponds with the commercial success of service innovations.

3 An Empirical Assessment of Radical Multi-dimensional Changes

3.1 Measuring Service Innovation Dimensions

The quantitative study described here is based on data collected through a survey conducted amongst Dutch firms. Our sampling profile only contains managers of firms having more than 10 employees. Although distributed amongst a multi-industry sample, warranting sufficient variance, about 80 % of the responding firms indicate that most of their turnover stems from services.[4] From 341 firms, we obtained complete data for all variables in our model.

Testing our hypothesis required the measurement of service innovation dimensions. As measurement scales for these dimensions were not available (Droege et al. 2009),[5] we proceeded by developing multi-item scales for each of them based on the conceptualization proposed by den Hertog et al. (2010). We generated a pool of items that covered the domain of each dimension building on a wide range of theoretical reflections and empirical applications. Striving for optimal content validity, we ensured that our interpretation of the dimensions corresponds with the available contributions (Churchill 1979). From the pool of items, we selected unique items for inclusion in initial scales. We interviewed fellow researchers and respondents from different types of firms, asking them to complete the scales and indicate any ambiguity regarding the phrasing of the items. After these pre-tests, we further enhanced the phrasing which resulted in the final version of the scales (Table 1). Using a 7-point Likert scale ranging from "strongly disagree" to "strongly agree", participants were requested to answer to what extent each statement was relevant for the service innovations developed in their firm over the preceding 3 years.

We conducted confirmatory factor analysis (CFA) to assess the quality of our measurement scale in terms of validity and reliability. Several tests revealed that our six factor congeneric model fits the data structure reasonably well: $\chi^2/df = 2.7$;

[4] This calculation is based on respondent evaluation of the question: "Our turnover mainly stems from services". Using a7-point Likert-scale, we counted firms with a response of 4 or higher as service providers.

[5] An exception is the measurement scale for Elevated Service Offerings (Agarwal and Selen 2011). However, being based on the older 4D-model and focused on collaboratively developed services, it is less suitable than the enhanced 6D-model by den Hertog et al. (2010).

Table 1 Scales and items of service innovation dimensions[a]

Construct with underlying items
New service concept (NSD)
Our organization developed new (service) experiences or solutions for customers We combined existing services into a new formula We developed a new way of creating value for ourselves and our customers
New customer interaction (NCI)
Our organization developed new channels for communicating with her customers The way we have contact with our customers is renewed We changed the task distribution between ourselves and our customers
New value system/business partners (NBP)
The role of external parties in producing our services is renewed We involved new partners in the delivery of our services
New revenue model (NRM)
By introducing new services we changed the way we generate revenues The way we get paid (financial construction) is altered
New organizational delivery system (NODS)
We changed our organization in order to produce our new services Our production of new services requires new skills from our employees
New technological delivery system (NTDS)
Technology plays an important role in the renewed production of our services We renewed our service offerings by new or different use of ICTs

GFI = 0.937; TLI = 0.923; NFI = 0.920; RMSEA = 0.071 (Hair et al. 1998). Also with respect to reliability, as indicated by a Cronbach's alpha value of at least 0.6 and preferably 0.7 (Nunally 1978), all constructs surpass the critical thresholds. With regard to the results for discriminant validity, for three out of six constructs, the square root of the average variance explained was just below the absolute value of the correlation with another dimension.[6] This finding confirmed the general expectation that the dimensions tend to be strongly correlated with each other (Table 2).

3.2 Dimensionality Versus Market Success

We then examined whether firms pursuing innovation in multiple dimensions enjoy more benefits. In Sect. 2.2, we argued that only by experimenting with changes in multiple dimensions, firms can achieve configurations that are likely to be uncommon. Of course, combinations might be original because they are simply unfeasible. This requires us to look at innovations that are actually introduced to the

[6] Additional tests reveal that removing item 4B enhances the discriminant validity of two constructs sufficiently, also leading to a better model fit (χ^2/df = 1.7; RMSEA = 0.045).

Table 2 Results for confirmatory factor analysis[a]

	CR	AVE	NSC	NCI	NBP	NRM	NODS	NTDS
NSC	0.851	0.656	*0.810*					
NCI	0.734	0.503	0.527	*0.709*				
NBP	0.667	0.501	0.625	0.448	*0.708*			
NRM	0.714	0.558	0.591	0.484	0.745	*0.747*		
NODS	0.733	0.578	0.586	0.421	0.741	0.813	*0.761*	
NTDS	0.814	0.687	0.558	0.411	0.553	0.471	0.698	*0.829*

[a] Construct reliability (CR), average variance extracted (AVE), standardized correlations matrix and square root of variance extracted (on diagonal)

market, rather than ideas that might be killed during the development process. Possibly, some of the original recombinations that a firm realizes turn out to be offerings highly valued by new or existing customers. In that case, firms are likely to yield a relatively high percentage of turnover from the innovations they introduced. Reversely, if a firm only changes a few dimensions, it is expected to arrive to solutions already explored by competitors as well. Because of being less original and easy to imitate, this type of innovation is relatively limited in creating competitive advantage. Therefore, new services stretching over a low number of dimensions might lead to a relatively modest share of turnover stemming from this specific innovation.

Using a Tobit-regression model, which is common for the type of dependent variable we try to predict, we tested the hypothesized relationship between the number of dimensions affected by changes in the service system on the one hand, and revenues from innovation on the other hand.

Dependent variable Using the share of turnover from new goods or services, one of the items in the Eurostat Community Innovation Survey (CIS), is a common way for assessing the success of a firm's innovative efforts (e.g. Leiponen 2006). Since we are not interested in success as the balance between the costs and benefits associated with innovation, but simply whether realized innovations yielded extra turnover for the firm, this measure is suitable for our purposes.

Independent variable The measurement scale developed in Sect. 3.1 provided a basis for computing an indicator for the number of dimensions in which novelty is introduced. First, we calculated the average score for each dimension (see Table 3).[7] Second, we used a threshold for determining whether a dimension is sufficiently affected. Given that 4 was only the middle of our Likert-scale, we counted dimensions as clearly affected when their average score was above 5.[8]

[7] Exception here is the dimension New Value System, which relies on just a single item.

[8] Robustness of our tests is warranted by using other thresholds (2, 6) as well. Results remain largely equal.

Table 3 Descriptive variables average scores for individual dimensions

	Mean	Std. deviation	% with score above 5 (%)
New service concept	4.78	1.418	41
New customer interaction	4.34	1.259	25
New value system/business partner	3.86	1.524	22
New revenue model	3.55	1.530	16
New organizational delivery system	4.14	1.526	26
New technological delivery system	4.75	1.713	46

Control variables Firm size is introduced in our analysis in order to correct for the possibility that larger firms innovate more, which might increase the number of affected dimensions as well as the turnover stemming from innovation. We operationalized firm size by taking the natural log of the number of employees.

Additionally, we included a control variable for sectors. Again, it might be the case that firms in some sectors tend to engage much more in innovation. Acknowledging that service innovation activities occur throughout the entire economy, we followed studies in which the existence of various types of service innovators is demonstrated. A useful basis is provided by Castellacci (2008), distinguishing supplier dominated services (SDS), knowledge intensive business services (KIBS), physical networks (PN) and information networks (IN). Relying on the operationalization by Castaldi (2009), we assigned firms to one of these types. Respondents belonging to any of the manufacturing-based sectoral categories (Pavitt 1984; Miozzo and Soete 2001) are included in the category against which we test our sector dummies.

The descriptive statistics of the variables included in our statistical analysis, described below, are shown in Table 4.

The results of our regression analysis (Table 5) confirmed the expected relation between dimensionality and turnover stemming from innovations. The positive significant coefficient for the number of affected dimensions suggests that firms experimenting with multiple simultaneous changes arrive at offerings that are sufficiently original (in comparison to services offered earlier or by others) for generating new streams of revenues. Remarkable is the weakly significant coefficient for firm size, having a negative direction. One explanation for this finding is that larger firms might include incumbents relying on the products they have been providing successfully, whereas smaller firms are relatively often new-comers looking for new ways to generate revenues.

4 The Future of Multidimensional Conceptualizations

In the preceding sections, we discussed attempts to describe what aspect of a service is novel. In the context of a specific type of service, renewal can be identified by characterizing a service using tools such as service blueprinting or service mapping.

Table 4 Descriptives of variables in model[a]

	Mean	Std. deviation	% of turnover from new goods or services	Dimensions	Size (log_fte)	Sector: KIBS	Sector: SDS	Sector: IN	Sector: PN	Sector: Other
% of turnover from new goods or services	11.9	12.423								
Dimensions	1.75	1.697	−0.111							
Size (log_fte)	3.52	1.254	0.187**	0.11						
Sector: KIBS	0.16	0.368	−0.043	0.033	0.04					
Sector: SDS	0.14	0.348	0.067	−0.035	−0.066	−0.177**				
Sector: IN	0.16	0.371	−0.018	0.011	0.036	−0.194**	−0.179**			
Sector: PN	0.29	0.458	0.041	−0.046	−0.015	−0.286**	−0.264**	−0.290**		
Sector: Other	0.23	0.424	−0.047	0.041	0.003	−0.243**	−0.224**	−0.245**	−0.362**	

[a] Mean, standard deviation and correlations

* = p < .05; ** = p < .01

Table 5 Results for Tobit regression on percentage of turnover from new goods or services

	Estimate	Std. error	z-value	p-value
(Intercept):1	13.764	2.670	5.156	0.000
(Intercept):2	2.562	0.048	53.076	0.000
Size (log_fte)	−1.291	0.643	−2.007	0.045
Sector: PN	−1.601	2.343	−0.683	0.495
Sector: IN	−3.393	2.416	−1.404	0.161
Sector: SDS	−1.619	2.136	−0.758	0.449
Sector: KIBS	1.506	2.451	0.614	0.539
Dimensions	1.523	0.481	3.169	0.002

Those instruments are especially suitable for understanding what aspect of service production is improved, and how that might affect other elements of the service in question.

When looking at services that differ highly in their nature, the tools mentioned before are too limited or context-specific to allow for comparative analyses. A solution provided over the past years of service innovation research, is adhering to a framework of common dimensions. The dimensions in the multidimensional conceptualization by den Hertog et al. (2010) can be regarded as different 'places' or loci (cf. Toivonen and Tuominen 2009) where changes can occur when engaging in innovation. Using empirical data from 341 Dutch firms, we measured the extent to which their innovations covered the various dimensions. Until now, measurement scales capturing the dimensionality of services have been scarce (Agarwal and Selen 2011; Droege et al. 2009; Salunke et al. 2011).

By treating dimensions as the constituent elements of service systems, we provided a basis for applying system-thinking. From such a perspective, dimensions are not just classes of characteristics; they reflect bundles of activities or routines required for delivering a service. Service innovations are then to be seen as outcomes of search processes in which firms experiment with introducing changes in one or more dimensions. When interdependencies between the dimensions exist, it is relatively hard to foresee the success of new configurations. We demonstrated that firms that are able to modify a high number of dimensions tend to capture a higher share of turnover from their innovations than firms having a low-dimensional innovation portfolio. A possible limitation of this study is that only innovation portfolios are examined, rather than individual innovations (in so far separate innovations are distinguishable in services).

The results of an empirical validation of a multidimensional conceptualization have several implications for future research. First of all, adhering to a more differentiated representation of service innovation contributes to attempts of developing indicators for service innovativeness. Despite various attempts in this regard (e.g. NESTA 2009; EPISIS 2011), no consensus was reached so far: improving measurement of service innovation remains a key issue (OECD 2012). Whereas

renewal in the service concept is relatively well perceivable, changes in other elements of the service elements might be easily overlooked. Operationalization of a multidimensional conceptualization, if sufficiently illustrated with qualitative evidence as well, provides fertile grounds for capturing a high variety of changes that can be considered as novel. As such, it also allows for research on success factors other than the final offering itself (Droege et al. 2009).

According to our first statistics, changes in the dimension New Service Concept are found to occur relatively often. Whether a change in just this (or any other) single dimension is sufficient for service innovation to be perceived remains unclear. It also begs the question whether changes within individual service innovations can cover other dimensions without affecting the concept as perceived by the final customer. The other dimension frequently involved in innovation is New Technological Delivery System. A simple statistical count does not reveal whether involvement of technology causes changes in other parts of the system (Barras 1986; Windrum and García-Goñi 2008), or whether they get involved as a modification initiated in another dimension starts to induce further changes. The encountered weak discriminant validity between the measured dimensions suggests that some dimensions tend to co-occur often. Some hypotheses for which combinations are likely to be common are provided by den Hertog (2010). However, so far the existence and explanation for certain dimensional patterns has not been explored empirically. Before pursuing additional statistical analysis, further investigation into all of these questions (regarding the interdependencies between changes in multiple dimensions) requires the qualitative evidence of multiple case studies (Porter and Siggelkow 2008). Such evidence could also shed light on the question whether different actors within a firm are responsible for changes in different dimensions. Recently, the notion of open innovation (Chesbrough 2011) renewed attention for the distributed nature of service innovation (Gallouj and Weinstein 1997; Consoli 2007; Rubalcaba et al. 2012; Bryson et al. 2012).

5 Conclusion

In sum, our contribution illustrates a fruitful way to develop novel theoretical propositions to expand research results stemming from the ‘multidimensional phase’ of service innovation research (Carlborg et al. 2013). Building on system-thinking, we argue that our understanding of service innovation efforts could be further enhanced by regarding new services as the outcome of a search process within multidimensional systems (Chae 2012). Such a perspective can shed light on the actual complexity services innovators are facing, as well as the relative role of issues like interdependencies and modularity in service innovation. Whereas a multidimensional conceptualization seems the end of the quest for the nature of service innovation, it also is a promising beginning for more insight in how novel services come about.

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Innovation, Service Types, and Performance in Knowledge Intensive Business Services

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Abstract Knowledge Intensive Business Services or KIBS are defined as customized and innovative business services. In this chapter, we argue that not only innovation and customization are complementary in KIBS, but also that replication via standard and modular services determines a KIBS firm's performance. Using fuzzy sets qualitative comparative analysis (fs/QCA) on a sample of 319 KIBS firms, we explored the best-performing configurations resulting from a combination of different service innovations with different service types. In doing so, we separately considered product and process innovations and four different types of services (customized, standard, standard with minor customizations, and modular). Our results emphasize the complementarity between process innovations and service standardization on a firm's profitability, while highlighting the complementarity between process innovations, service customization, and modularity of a firm's growth. The work described in this chapter contributes to the KIBS literature and provides deeper insights into the interaction between innovation and service types.

Keywords Knowledge intensive business services · Modularity · Innovation · Service types · Performance

1 Introduction

Among business services, Knowledge Intensive Business Services or KIBS represent a particular domain, and the literature discussing service innovation in KIBS has strongly emphasized their customized nature and, to some extent, their

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superimposed service innovation on service customization (Bettencourt et al. 2002). This may lead to possible misunderstandings with regard to the relationship between service innovation, different types of services (e.g., customized and standard services), and KIBS firms' economic performances. Indeed, recent contributions have demonstrated that KIBS firms provide standard and modular services, in addition to customized ones (Cabigiosu et al. 2012; Miozzo and Grimshaw 2005; Pekkarinen and Ulkuniemi 2008; Voss and Hsuan 2009), and that firms providing customized services do not generally innovate more than firms providing standard services. This evidence suggests that service firms may innovate even when providing standard services, and that service innovation does not necessarily imply service customization (Hipp et al. 2000; Tether et al. 2001). Furthermore, the literature has also largely neglected the distinction between product and process innovations in services and their influence on a firm's performance. Yet, the combination of different service types (*customized*, *standard*, *standard with minor customizations*, and *modular*) and innovation types (*product* and *process* innovations) can lead to different configurations of a service firm, and eventually different business models. Is there any configuration that leads to superior performance? What are the core and peripheral elements of the "superior" configuration?

As such, KIBS firms' growth and profitability may depend on the overall configuration resulting from the combination of service innovation and service types. This chapter aims to provide a deeper understanding of how service innovation and different types of services interact among each other and with a KIBS firm's performance.

2 Service Innovation in KIBS

KIBS firms are enterprises whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customized service (Bettencourt et al. 2002; Miles 2005). Innovation in KIBS firms has been studied from various perspectives, one of which (and the most often studied) is how KIBS firms produce and circulate knowledge and foster innovation processes at the client level (den Hertog 2000; Doloreux and Shearmur 2011; Doloreux et al. 2010; Freel 2006; Gallouj 2002; Strambach 2001). Research findings indicate that KIBS firms' innovation processes are triggered by their clients' requirements: innovation in KIBS is fed by a client's needs and implemented through recursive loops of client–supplier interaction and knowledge sharing (den Hertog et al. 2010; Hipp and Grupp 2005; Larsen 2000; Tether and Metcalfe 2004).

The innovation process usually focuses on two distinct aspects, i.e., *product* (service) innovation, and *process* innovation (Hipp and Grupp 2005; Sirilli and Evangelista 1998; Tidd 2001). Other conditions being equal, product innovations, when compared to process innovations, demand a greater organizational and learning effort on the part of the KIBS firm. Indeed, product innovation alters both the service content and the procedures involved in its production and delivery

(Hipp and Grupp 2005; Sirilli and Evangelista 1998). By contrast, process innovations introduce changes only at the production and delivery procedure levels (not at the service level).

Moreover, the distinction between product and process innovations is also usually associated with different performance objectives. Product innovation in services is aimed at introducing new markets, while process innovation is tailored to increase a firm's efficiency (Garcia and Calantone 2002). In line with the above, as the innovation process in KIBS is triggered by specific clients' requirements, a KIBS firm capable of introducing (product) innovations to serve specific clients' requirements is likely to experience positive returns on its market share, because it gains a reputation for being customer-oriented and flexible (Cabigiosu et al. 2012; Skjølsvik et al. 2007). On the other hand, the primary focus of process innovations (that do not alter the content of the service) for the KIBS firm is to be more competitive from a cost perspective, thus improving efficiency (Garcia and Calantone 2002; Sirilli and Evangelista 1998).

Therefore, product and process innovations have specific characteristics and effects that can potentially be controversial. Theoretically speaking, combining product innovations with process innovations is a desirable objective that poses several challenges from a managerial perspective.

3 The Relationship Between Service Innovation and Service Types

Scholars have so far considered service customization as a distinctive feature and a source of competitive advantage of KIBS (Bettencourt et al. 2002; Corrocher et al. 2009). The customized nature of these services resides in the key role that KIBS' clients have in the development and delivery of services. To provide their services, KIBS firms need, first, to delve deep into the organizational and operational processes of their clients, and second, interpret and adapt KIBS services to each client's requirements. As far as the client–supplier interaction is concerned, KIBS are often the outcome of a joint effort by the service provider and the client as clients possess much of the knowledge and competence relevant to their business/industry in order for a KIBS firm to effectively design and deliver its service (Bettencourt et al. 2002; Sundbo 2002; Skjølsvik et al. 2007).

Building on the argument that KIBS are customized, several scholars claimed that innovative KIBS are also customized (Hipp et al. 2000). KIBS firms employ a market-pull approach and develop new services based on the knowledge they acquire by collaborating with clients during service development and delivery. Consequently, customization processes enable KIBS firms to identify and develop fruitful innovations, and innovations are hence reflected in customized services. Yet, interestingly enough, other research has shown that KIBS firms also provide other types of services, such as standard and modular services, and that the

relationship between service innovation and service customization is not that simple. Customized service providers are no more likely to innovate than standardized service providers (Tether et al. 2001). In addition, firms may deliver services that are only perceived as customized by their customers, as in the case of: (a) modular services that mix and match standard modules of the client's choice or that are added to a standard platform and (b) standard services that are only slightly customized (Chesbrough 2012; Davies et al. 2012).

We can distinguish four service types: *customized services*, *standard services*, *standard services with minor customizations*, and *modular services* (Sundbo 1994; Hipp et al. 2000; Tether et al. 2001). *Customized services* are produced to meet particular customer needs, and the outputs are fully adapted to them. *Standard services* are undifferentiated between customers, and are thus provided without any customer-specific change. *Standard service with minor customizations* allows for the inclusion of some customer-specific changes that usually do not change the attributes of the standard service. Finally, *Modular services* represent an alternative pattern that combines standardization and customization as it achieves customization by mixing and matching standard elements, i.e., the modules (Pekkarinen and Ulkuniemi 2008; Voss and Hsuan 2009). All services types, except customized services, include some levels of standardization.

When KIBS firms develop customized services, they have an opportunity to exchange significant amounts of data and information with clients about their needs and industries, and may thus identify new business opportunities (Cabigiosu et al. 2012). Service customization drives the firm's ability to successfully innovate by identifying new services or new ways to satisfy existing requirements. Therefore, service customization on the one hand, and innovation on the other hand, may be complementary choices. As such, one can argue that new services can be either customized or standard, and that innovation is not necessarily customized. Customization processes enable, and are the antecedents of, innovation, but they do not necessarily constitute the top-performing type of innovation.

KIBS can codify and exploit, in several supply relationships, the knowledge they acquire by developing customized services through service types that embody some levels of standardization and replication, such as standard and modular services. Therefore, standardization in KIBS allows for the full exploitation of efforts expended during customization processes. In addition, replication processes via standardized services may increase the firm's level of productivity. Human resources would be employed in repetitive delivery processes through which they increase their experience and efficiency. In addition, when services are customized, relevant resources should be allocated to unique and unrepeatable development activities that display lower experience effects. Moreover, if KIBS are able to replicate their services, given other things equal, they can more rapidly spread their services, thus increasing their client base and market share.

The complementarity between KIBS customization and standardization/modularization is elaborated in the following section.

4 The Complementarity Between KIBS Customization and Standardization/Modularization

Innovative and standard/modular services may increase the KIBS's service portfolio equilibrium. While standardized/modular services may play the role of cash cows, innovative services may be either stars or question marks (Ghemawat 2002). KIBS can leverage on the cash flows generated by existing standard/modular services in the short term, while building opportunities to retain their competitive position in the longer term through investments in service innovation.

Moreover, if the KIBS firm is able to replicate its innovation, it makes the innovation available to other clients, thereby increasing potential market share from its innovation, as well as positively affecting its economic performance through higher revenues and lower costs. In other words, the KIBS firm that is able to replicate its innovation can exploit its original effort and investment in service innovation more effectively by replicating its procedures and service solutions, so standardization/modularization and innovation may become complementary strategies (Muller and Zenker 2001). The replication logic is consistently associated with opportunities for gaining economies of scale and scope. Therefore, a KIBS firm that innovates while simultaneously producing standard/modular services has the opportunity to reinforce the positive effects of innovation on both its sales and profitability. Coupling innovation and replication, KIBS may become ambidextrous, balancing exploration and exploitation efforts (March 1991).

Earlier in this chapter, we distinguished between modular services, standard services, and standard services with minor customizations. Even if they all allow the replication of KIBS' services, the underlying theoretical mechanisms are different. Consistently with the mainstream literature on modularity, the modularization of products or services is strongly associated with the opportunity to gain several benefits (Baldwin and Clark 2000; Voss and Hsuan 2009), including the ability to solve the trade-off between standardization and customization (Garud and Kumaraswamy 1995). Modular services are built by mixing and matching a closed set of standard service modules that the KIBS firm assembles according to a particular client's needs. Thus, modular services may be perceived as personalized with a positive effect on the KIBS firm's growth, while they derive from the combination of standard services whose replication increases the firm's productivity (Voss and Hsuan 2009). Modular architectures facilitate and speed up the introduction of new services. In modular service architectures, modular and incremental innovations do not require changes in the other service modules, thus reducing their development lead time and costs (Baldwin and Clark 2000; Sanchez and Mahoney 1996).

Besides, fully standard services, on one hand, emphasize a firm's efficiency, but on the other hand, limit the firm's ability to adapt its offer. One may expect that standard services will have a higher impact on the firm's economic performance because they maximize the potential gain from experience curves while modularity, increasing the clients' perception of receiving a somehow dedicated service, may play a more prominent role in the firm's increase in market share.

Finally, standard services with minor customizations may have strategic implications positioned in between fully standardized and modular services.

Overall, the above arguments suggest that the top-performing firms interlink some levels of customization, standardization, and innovation: Customization enhances innovations that can be replicated via standard services in a number of supply relationships. This approach maximizes the potential of innovative services, and increases the firm's efficiency and the balance of its service portfolio. In this scenario, with product innovations being potentially more disruptive than process innovations, one expects to observe a higher impact of process innovations on the firm's economic performance as compared to the impact from product innovations, at least in the short term. On the contrary, KIBS firms may be product innovation driven through clients' requirements in order to grow market share.

5 Causality Redefinition Through the Configurational Approach

Consistent with the above discussion on the complementarities between service innovation and service types, this chapter highlights how diverse attributes of service innovation and service types combine into different configurations, and how those configurations are causally associated with the growth and profitability of KIBS firms. In so doing, we draw from the *configurational approach*.

The *configurational approach* has occupied a central role in organization and strategic research (Bensaou and Venkatraman 1995; Doty et al. 1993; Ketchen et al. 1993; Miller 1986, 1990, 1996; Mintzberg 1979). Overall, the configurational approach is based "on the fundamental premise that patterns of attributes will exhibit different features and lead to different outcomes depending on how they are arranged" (Fiss 2007, p. 1181). It assumes complex causality and nonlinear relationships, and that variables that are causally related in one configuration may be differently related or even unrelated in other configurations (Meyer et al. 1993). Consequently, relationships between elements of a configuration are not necessarily symmetric and can involve synergistic effects. The configurational approach also places emphasis on the argument of equifinality, i.e., the situation where "a system can reach the same final state (e.g., the same level of organizational effectiveness) from differing initial conditions and by a variety of different paths" (Katz and Kahn 1978, p. 30). In other words, there is no optimal configuration, but different configurations can be equally successful.

Overall, by adopting a configurational approach, we are able to understand how product and process innovations and different service types causally interact with each other, and lead to different performance outcomes. Specifically, the configurational approach permits us to point out whether relationships among causal elements are characterized by complementarity, additive, substitution, or suppression effects.

In this scenario, we use fuzzy set Qualitative Comparative Analysis (fs/QCA), which explicitly handles observations as combinations of different causal conditions (Ragin 1987, 2000, 2008, 2009). In other words, each observation becomes a member of a subpopulation identified by a particular configuration of the quantified causal attributes (independent measures). This enables a redefinition of the causal pattern to the outcome in conjunctural and multiple terms (Kogut 2010). Indeed, although the effect of each causal condition on the outcome is directly dependent on the effect of the other causal conditions included in the configuration (interaction effects), several different configurations can lead to the same outcome (equifinality). Furthermore, equifinality allows us to also consider substitution effects. For example, equifinality can help clarify which causal elements are particularly persistent across different configurations leading to the same outcome. At the same time, it considers varying components and their substitution patterns within different solutions for the outcome. As a whole, fs/QCA allows us to grasp causal complexity: causal patterns in which a single causal condition is neither necessary, nor sufficient, for an outcome to occur (Ragin 2000).

6 Outcomes from a Fuzzy Set Qualitative Comparative Analysis (fs/QCA)

fs/QCA is an analytic technique that studies how different causal conditions combine to contribute to a certain outcome of interest (Ragin 1987, 2000, 2008, 2009). Causal patterns are investigated through set-subset relationships between degree of membership in the outcome set and membership in the set of a particular combination of causal conditions through Boolean algebra. Single memberships and membership scores in each causal condition are defined through the fuzzy sets approach. Measurement occurs both in terms of presence/absence (1/0, crisp sets) of the causal condition and in terms of the degree of membership in the set, i.e., values between 0 and 1 (Ragin 2000). While it is not our intention to dwell on the fuzzy set technique as such, we rather highlight some interesting findings from a 2009 study of KIBS firms conducted in the Veneto region of northeast Italy, one of the most highly developed regions in Italy and Europe in terms of the employment rate and per capita GDP (Unioncamere 2010). Two primary outcomes, a KIBS firm's profitability and growth were studied in relation to innovation, types of services, and other measures related to the size of the KIBS firms and the quality of their human resources.

Table 1 presents the main results of the statistical analysis using fs/QCA. We use the notation for solution tables introduced by Ragin and Fiss (2008) and used also by Fiss (2011). According to this notation, black circles (●) indicate the presence of a condition, and circles with a cross-out (⊗) indicate its absence. Furthermore, large circles indicate core conditions, and small circles refer to peripheral conditions. Blank spaces in a solution indicate a "don't care" situation in which the causal

Table 1 Configurations for achieving higher profitability (ROI) and higher growth (Market share)

	ROI	Market share			
Configuration	1	2a	2b	3	4
INNOVATION					
PROD.INNOVATION	⊗	•	⊗	⊗	●
PROC.INNOVATION	●	●	●	●	•
TYPES OF SERVICES					
CUSTOMIZED	•	●	●	●	⊗
STANDARD	●	⊗	⊗	•	⊗
STANDARD.CUSTOM	⊗	⊗	⊗	⊗	•
MODULAR	⊗	●	●	⊗	⊗
OTHER VARIABLES					
GRADUATES	•	⊗	•	●	⊗
SIZE	•	•	•	●	⊗

(●) indicate the presence of a condition
(⊗) indicate absence of a condition
Large circles indicate core conditions
Small circles refer to peripheral conditions

condition may be either present or absent. Table 1 lists only those configurations that consistently led to the outcomes of interest (ROI and MARKET SHARE).

Table 1 shows the presence of both core and peripheral conditions, but no situation in which a causal condition may be either present or absent. Solution 1 is the only configuration leading to a *superior profitability* of KIBS firms. It shows both core and peripheral conditions and combines both the presence and the absence of causal conditions. Regarding core conditions, it combines the presence of process innovations, the absence of product innovations, and the presence of a larger share of standard services in the portfolio of the KIBS firm. These core conditions are combined with several peripheral conditions: the presence of customized services, the absence of modular services and of standard services with minor customizations, and the size and quality of human resources that is greater than average.

Solutions 2, 3, and 4 show the configurations leading to an increase in a KIBS firm's market share *(growth)*. Solutions 2a and 2b combine the following core conditions: the presence of process innovations with a portfolio of customized and modular services. Solution 2a combines the above core conditions with the following peripheral ones: the presence of product innovations, the absence of standard services (both fully standard and standard with minor customizations), a larger size, and the absence of graduates. Solution 2b combines the core conditions with the following peripheral conditions: the absence of product innovations, the absence of standard services (both fully standard and standard with minor customizations), and a larger size and share of graduates. Interestingly, Solutions 2a and 2b differ from each other only regarding the presence (and absence) of product innovations and larger-than-average share of graduates. Specifically, product innovations and graduates are in a trade-off, with product innovations and graduates substituting for each other.

Solution 3 combines the absence of product innovations with the presence of process innovations, the presence of customized services, and size and graduates larger than average as core conditions. It indicates the presence of standard services and the absence of modular and standard services with minor customizations as peripheral conditions.

Solution 4 leads to the sole configuration that shows the presence of product innovations as a core condition. It is combined with the absence of customized services and with the absence of a larger size and share of graduates. Peripheral conditions of Solution 4 are the presence of process innovations, the presence of standard services with minor customizations, and the absence of modular and standard services.

Even if we considered two distinct outcomes, it is interesting to note that there are recurring causal conditions across all the models, independent from the outcome considered. The models in Table 1 show two substitution effects. Product innovations and a share of graduates larger than average, substitute for each other, and customized services and standard services with minor customizations substitute for each other.

7 Managerial Implications

In this chapter, we have argued that a key challenge for the service theory relates to understanding how different service innovations and service types combine with each other, and with different performance outcomes. In particularly, we discussed *several complementarity effects* that may arise between *different types of service innovations* (namely product and process innovations) and *different types of services* (namely customized, standard, standard with minor customizations, and modular).

Results from the study summarized in Table 1 indicate that there exists a variety of paths toward increasing profitability and growth for KIBS firms. As such, it is difficult to indicate a unique best way that KIBS firms can rely on. Moreover, different configurations emerge for profitability and for growth leading us to think that growth and profitability are two potentially conflicting objectives. For the sake of the argument, model 1 and model 3 of our results share the presence and the absence of the same elements, even if there is only one element of the configuration (i.e., process innovations) that is common in the two models as a core casual condition. Again, in contrast to the variety of configurations that are indicated as leading to growth, there emerges only one configuration leading to profitability. This result points also to the idea that *KIBS firms*, aimed at increasing their economic performances, *have fewer degrees of freedom when designing their strategy for innovation and their portfolio of services*.

Common to all the models (independent of the performance outcome considered), is the role played by the variable "innovation." However, as suggested in our earlier theoretical discussion, product and process innovations behave differently. *While the role of process innovations is clear* (i.e., process innovation emerges as a

necessary, but not sufficient, condition for both growth and profitability), *the role of product innovation is more controversial*. Results seem to confirm that product innovation has a more disruptive effect than process innovation on profitability, because it makes resources and processes obsolete, both at the supplier and at the customer levels (Mansury and Love 2008). Avoidance of product innovation is a core condition for improving profitability and in one model on growth (see models 1 and 3). Moreover, in both models, product innovation is the only core condition of absence, thus showing a strong causal effect on the outcomes.

Even if process innovation plays a relevant role in all the models, interestingly enough, they all show complex causal relationships that involve at least three core elements and several peripheral elements. The presence of three to four core conditions makes the "useful" configurations strictly defined and confirms the *existence of complex relationships of complementarity between innovation and types of services* (and for some configurations with the size of the KIBS firm and the quality of the human resources it employs).

Results also show the importance of being able to *combine the trade-off between service customization and service standardization*. In three models, the presence of customized services combine with types of services that introduce some level of standardization through standard services or modular services (models 1, 2, and 3). In all these models, process innovations combine with service customization, somehow confirming that *in KIBS service, innovation is actually associated with service customization, but service innovation and customization combine also with standard or modular services*. This provides empirical evidence in support of the idea that the *best-performing firms are those that successfully combine exploration activities* (through service innovation and, to some extent, through service customization) *with exploitation activities* (through service standardization or modularization).

Balancing a portfolio of different service types is thus an *important capability for KIBS firms*. Our results, however, suggest that high-performing firms do not balance all the types of services (customized, standard, standard with minor customizations, and modular). The best-performing configurations focus on customized and modular services or on customized and standard services. Particularly, the *combination of process innovations and fully standardized services increases a firm's efficiency*, while *process innovations coupled with customized and modular services increases a firm's market share*.

In summary, main findings can be encapsulated as:

(a) innovation and customization are complementary in that customization allows a better understanding of customers' requirements, thus fostering innovation processes
(b) customization and standardization/modularization are complementary, as they permit to exploit in multiple supply relationships the efforts associated with service customization; and
(c) standardization/modularization and innovation are complementary as they increase the firm's portfolio equilibrium, and the market share of innovations through their replication.

8 Conclusion

Drawing from the configurational approach and from recent innovative statistical tools (fs/QCA), we investigated how service innovation and types of services affect each other and the performance outcomes of KIBS firms, both on profitability and growth. We showed that process innovation, service customization, and service standardization/modularization present complementarity effects. Standard and modular services do play a prominent role in the best-performing KIBS firms as much as customization does. Moreover, we find that configurations depend on the performance outcome considered, i.e., configurations leading to superior profitability are different from configurations leading to superior growth.

The study findings also open interesting areas for further research. The fact that configurations for profitability and for growth are different and presents the opportunity to empirically investigate what is the relationship that links profitability and growth in the short term, and in the long term. We showed that innovation and service types complement each other. Future study might want to include other elements of the KIBS firm's business model, such as collaborations with partners or strategic intents of the firm (e.g., cost or differentiation strategies), to explore the most important elements causally associated with high performance. This may eventually result in a typology of KIBS firms based on the configurations of their business model.

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Part II
Skills and Capability Building in Service Innovation

On the Way to a Systematic Service Innovation Competence Framework

Services dominate our societies, and for many firms, concentrating on services is a method to cope with the challenges of price-based competition. This is especially true for manufacturing firms that decide to become more service-oriented. In this context, service innovation or new service development is a highly important task. Whereas the process of new service development itself has already been researched extensively, there is still limited research on the kinds of *competences needed to foster successful service innovation*.

Highlight *This chapter develops a conceptual framework that helps firms to evolve crucial competences for a systematic service innovation process. As theoretical foundation, the service-dominant-logic and the competence-based perspective are used. The chapter is either meant for firms that want to systematize or check their service innovation processes; as well as for manufacturing firms that want to servitize and are "newcomers" in the field of service innovation and the relevant competences. Both are given a guideline how to evolve the most crucial competences in their specific firm's environment, and how to establish a competence-based systematic service innovation process.*

Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches

The importance of innovation for companies to gain competitive advantage is widely acknowledged. While earlier studies have emphasized the critical importance of idea assessment as part of the new product and new services development process, the topic has been under-represented in academic research recently.

Highlight *By reporting on a case study with a German financial services provider, the authors introduce serious games and enterprise crowdfunding as two novel approaches for assessing service ideas.*

Employees and Users as Resource Integrators in Service Innovation: A Learning Framework

In order to make innovation more efficient and effective, two developments are particularly important: the opening and the democratizing of innovation. The former is a result from the insight that organizations do not possess all the valuable knowledge in-house, but the utilization of external sources is necessary (Chesbrough 2006, 2011). The latter highlights that innovations do not emerge from expert groups only, but also emanate from 'non-experts' in communities of practice (Lave and Wenger 1991). In these communities, people learn with others while engaging collectively in creative efforts (John-Steiner 2000). Both views emphasize users, i.e. citizens, communal members, or service customers, as active agents (von Hippel 2005).

Highlight *This chapter provides two in-depth case studies from the Finnish public sector to illustrate the developmental dynamics of the resource-integrator roles of employees and users in a resource-constrained environment. The authors apply the framework developed above and highlight these groups as 'practical bricoleurs'. Both case studies, Elderly day club and Forest pre-school, come from a middle-sized city in the southern part of Finland.*

Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation

The interdisciplinary fields of futures thinking and design thinking are both about sensing and seizing new opportunities. Thus, they support each other (e.g. Evans and Sommerville 2007) and provide essential approaches needed in service innovation. They also offer practical processes and concrete methods that are useful for gaining relevant insights, ideating and imagining the unthinkable in uncertain environments, and anticipating and conceptualizing novel value.

Highlight *The methods of foresight and service design complement each other in innovation process. Foresight offers means for imagining and creating alternative futures. Service design brings customers and other stakeholders and their needs into these future contexts and ideates and visualizes potential new solutions in creating desired futures. The typical foresight (F) and service design (SD) methods that can be used in understanding customers' future needs and in mapping trends and weak signals in business environments are listed and explained in this chapter.*

Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis

Knowledge Intensive Business Services (KIBS) are specialized suppliers of intermediate inputs with expertise in locating, developing, combining and applying generic knowledge to specific needs. The sectors in which these firms operate have experienced extraordinary growth over the last two decades both in terms of employment share and of value added, and are often referred to as key hubs within the modern knowledge-based society.

Highlight *This chapter offers a review of scholarly perspectives on the growth trajectory of KIBS, and elaborates an empirical analysis to explore in detail commonalities and differences across this diverse group of sectors.*

Dynamic Capabilities for Service Innovation in Service Systems

Scholars have enunciated that innovation in services is brought to market through collaboration, asset orchestration, technological adoption, and knowledge based competencies. To this effect, the role of human capital in promoting service innovation is identified in the innovation literature.

Highlight *This chapter highlights an entire suite of dynamic capabilities which are made up of higher order competencies, such as relationship capital, organizational learning, collaborative agility, entrepreneurial alertness, innovative capacity, and customer engagement that are instrumental to service firms to innovate.*

On the Way to a Systematic Service Innovation Competence Framework

Angela Roth

Abstract Services dominate our societies, and for many firms, concentrating on services is a method to cope with the challenges of price-based competition. This is especially true for manufacturing firms that decide to become more service-oriented. In this context, service innovation or new service development is a highly important task. Whereas the process of new service development itself has already been researched extensively, there is still limited research on the kinds of *competences needed to foster successful service innovation*. This chapter develops a conceptual framework that helps firms to evolve crucial competences for a systematic service innovation process. The service-dominant logic and the competence-based perspective are used as theoretical foundations for this competence framework. The framework distinguishes between *employee*, *organizational*, *network*, and *community competences*. It provides both a structure for firms to systematically analyze and improve crucial competences for service innovation, as well as a research roadmap for future work on service innovation competences.

Keywords Service innovation · Service innovation competences · New service development (NSD)

1 The Relevance of Service Innovation Competences

Today, services play a major role in highly developed societies. In many firms, services account for a recognizable part of value creation and are increasingly crucial for success (Francois and Hoeckman 2010). By focusing on services, many firms take the chance to overcome the challenges of a price-based competition (Porter and Ketels 2003; Vandermerwe and Rada 1988). Moreover, services are a

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means to meet the problem that tangible goods are often noticed only as commodities in the eyes of the customer (Neu and Brown 2006).

But services need not be only an "add-on part" on products, but they are also part of the value chain and have varying influence on value creation, depending on their portion of total turnover. In the past, firms could be either classified as goods manufacturer, or as a service provider (Vanderme and Rada 1988). Today, firms can be placed on a "product service continuum" (Oliva and Kallenberg 2003). This continuum polarizes between traditional manufacturers and service firms. Whereas the former only offer services as add-ons, for the latter services are the foundation of their business activities (Oliva and Kallenberg 2003). Intentionally, each firm has to determine its strategic position within this continuum. Given that customer needs show a broad range and competitiveness is very high, future trends implicate a shift toward services (Gebauer et al. 2008). In fact, a lot of manufacturing firms stick to the form of after-sales or other add-on services. Services are not seen as a crucial part of the value creation process. But there is also a rising number of firms that decide to "servitize" strategically.

In the literature, the process for manufacturing firms to increasingly embrace services is termed "servitization" (Vandermerwe and Rada 1988, p. 315).

There exist various definitions of the term "servitization" (Baines et al. 2009). Slack (2005), for instance, focuses on the change of the core product's delivery mode, enabling manufacturers to offer their outputs as services. Thus, "servitization is the generic (if somewhat unattractive) term that has come to mean any strategy that seeks to change the way in which product functionality is delivered to its markets" (Slack 2005, p. 326). Baines et al. (2007, 2009), on the other hand, emphasize the concept of Product Service Systems (PSS). There servitization is understood as the innovation of an organization's capabilities and processes to better create mutual value through a shift from selling products to selling integrated product and services offerings that deliver value-in-use (Baines et al. 2009).

Hence, selling Product Service Systems can be understood as a special case of servitization, focusing on performance of the respective (intangible) asset (Baines et al. 2007). Nevertheless, in this chapter, a broader perspective is taken. The corporate reorientation toward services itself is highlighted as it is fostering mutual value creations. Consequently, the working definition of the University of Cambridge's Institute for Manufacturing offers the most suitable definition for this work. "Servitization is a change process wherein manufacturing firms embrace service orientation and/or develop more and better services, with the aim to satisfy customer needs, achieve competitive advantages and enhance firm performance" (Ren and Gregory 2007, p. 25).

As main drivers behind servitization, marketing, financial, and strategic issues are discussed (Corti et al. 2010; Oliva and Kallenberg 2003). Regarding the marketing perspective, services can influence the purchasing decision (Gebauer and Fleisch 2007) and strengthen the corporate image (Malleret 2006). With respect to the financial issues, manufacturing firms offering services can generate new, sustainable revenue flows as well as higher profit margins (Wise and Baumgartner 1999; Frambach et al. 1997). Finally, strategic opportunities include the generation

of considerable competitive advantages via the differentiation from competitors' offerings (Mathieu 2001) and help to create competitive barriers (Vanderme and Rada 1988).

However, becoming a service-oriented firm is not a trivial issue. Acting as a service-oriented firm implies completely different challenges, requirements, and frame conditions in comparison to a traditional manufacturing firm. This reveals new technological and organizational competences as well as individual human competences (den Hertog et al. 2010). Additionally, also standard processes and the corporate structure itself can be concerned (Ettlie and Rosenthal 2011).

Thereby, both the service delivery process itself, and the development process of service innovations are relevant (Ordanini and Parasuraman 2010; Ettlie and Rosenthal 2011). In this chapter, the development of service innovation is fostered, rather than the service delivery process.

Service innovations are new service experiences or new service solutions (den Hertog et al. 2010; Gadrey et al. 1995; Goldstein et al. 2002; Grönroos 2007), and they are of high relevance for service-oriented firms to survive in a competitive environment (den Hertog et al. 2010; Smith et al. 2007).

To have a lasting effect, firms must on the one hand provide processes to enable an organization to continuously create reliable advancements and incremental innovations. On the other hand, radical innovations in services are necessary to attract customers' attention and keep up in the market. Firms have to find an appropriate balance between incremental and radical service innovations.

This chapter develops a *conceptual framework that helps firms to evolve crucial competences for a systematic service innovation process*. As theoretical foundation, the *service-dominant-logic* and the *competence-based perspective* are used. This chapter is either meant for firms that want to systematize or check their service innovation processes; as well as for manufacturing firms that want to servitize and are "newcomers" in the field of service innovation and the relevant competences. Both are given a guideline how to evolve the most crucial competences in their specific firm's environment, and how to establish a competence-based systematic service innovation process.

Students can learn how to structure a firm's competences with respect to service innovation processes and researchers might use this framework to argue further studies.

2 Service Innovation Competences and Systematic Service Innovation

Referring to the topic of service innovation, the term "new service development" plays an important role (Johnson et al. 2000). There has already been done a lot of research on this topic. Most authors refer to a certain way to structure and standardize the process of new service development within a company. In doing so, different phases are distinguished and filled with detailed actions. Some authors

developed models to visualize the new service development process (e.g., Alam and Chad 2002; Scheuing and Johnson 1993; Tax and Stuart 1997).

Although the two terms "service innovation" and "new service development" are often used synonymously, some authors see a difference between the terms: according to Bettencourt, Cooper and Edgett service innovation is the "process of devising a new or improved service concept…" and "service development refers to all the activities involved in bringing that concept to market" (Bettencourt 2010, p. XIX; Cooper and Edgett 1999, p. 72). It can therefore be interpreted as a subsequent process to service innovation.

In this chapter, we decided to use both terms synonymously. However, it is not possible to decide on one single term to be used in the following discussion, because literature on the "process" of innovation in services mainly uses the term "new service development," whereas literature on competences, etc., mainly uses the term "service innovation." Therefore, we use the terms as mentioned in the literature, that means the whole concept of innovating in services, respectively, the competence issues, are emphasized when using "service innovation;" and the structural process issues are emphasized when using "service development."

In the following, the model of Johnson et al. was selected to describe the new service development process (Johnson et al. 2000) as it summarizes the often more detailed steps of the other authors' models. It consists of four main phases that describe all relevant parts of a service development process and is therefore suitable to structure crucial competences for service innovation in firms (see Johnson et al. 2000).

Johnson et al. (2000) mention the "design phase," the "analysis phase," the "development phase," and the "phase of full launch." The first two phases can be summarized as planning phases, whereas both last phases constitute the execution phase. In addition to the four phases, several so-called enablers like tools, teams, and organizational context, support the analysis of the new service development process. This is illustrated in Fig. 1 below.

If service innovation is based on a planned and systematic new service development process, new services are more likely to be successful (Froehle et al. 2000;

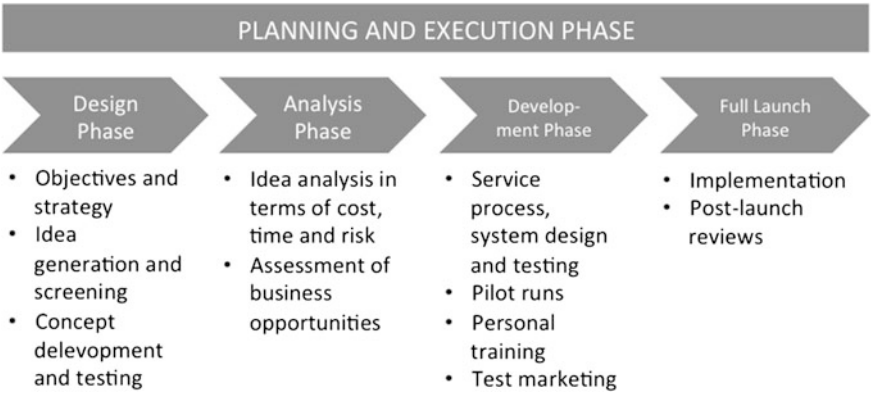

Fig. 1 New service development process (according to Johnson et al. 2000)

Buganza and Verganti 2006; Gebauer 2007; Menor and Roth 2007). In consequence, about half of unsystematically developed service innovations fail during the first year and must be taken off the market (BMBF 2011). This is especially true for servitizing manufacturing firms. Therefore, the new service development process must be considered in the framework to be developed as one basic foundation.

As this process should be the foundation of successful service innovation, it makes sense to structure crucial competences along the different phases of this process. Doing so ensures completeness in gaining an overview on necessary competences, while simultaneously emphasizing the differences of crucial competences within the different phases of the process.

However, whereas the process of new service development itself has already been researched extensively, there is still limited research on the kinds of competences which actually foster service innovation within such a process.

3 Developing a Service Innovation Competence Framework

3.1 Necessity of Developing a Framework

As mentioned above, the step of becoming a service oriented firm is not trivial, especially for manufacturing firms that used to offer services mainly as an add-on feature. This is not only true for the process of service delivery itself, but also for the process of developing new services. Normally, many areas of the firm are involved, and often a totally new mentality has to be created to change the way of thinking and to enable the establishment of a new service-oriented mind-set. Also, service-oriented firms suffer already high complexity when developing new services throughout the firm, or when developing innovative alternatives for the process of service delivery itself.

On the one hand, the new service development process involves different phases, and on the other hand, there exist different categories of competences that must be handled by the firm to succeed in service innovation processes. Therefore, it is important to develop a clear structure for crucial competences that enables firms to systematically establish, improve, control, and optimize any necessary assumptions for successful service innovation. Ideally, these should be embedded in a framework that considers also the different phases of the new service development process.

3.2 Theoretical Foundation

This chapter is founded on two main theories in business administration. First, the *resource-based view* (RBV) is applied. Herewith, the link is taken to the more detailed competence-based perspective, and competences are seen as central

resources for new service development. Second, the *service-dominant (S-D) logic* is used to conceptualize services from the perspective of operant and operand resources in service development. In the following, literature on competences in the context of service innovation and new service development is revealed, before the influence of the S-D logic perspective on the development of a competence framework for service innovation is discussed.

3.2.1 Resource-Based View and Competence-Based Perspective

Competences are crucial to deliver services, and they are also judged to play an important role for being innovative. This is true for both innovation in products and innovation in services (Tidd 2001; Lokshin et al. 2009; Ordanini and Parasuraman, 2010).

The (*RBV*) of the firm is one of the most widely used theoretical frameworks in management literature for deriving competitive advantages and has been further developed over the last two decades (Penrose 1955; Barney 1991; Wernerfelt 1984; Powell 2001; Kraaijenbrink et al. 2010). The basic assumption is that firms need to use and manage valuable, rare, imperfectly imitable, and not substitutable resources in order to develop long-term competitive advantages (Barney 1991). Amongst others, the key challenges of the (RBV) include the nonfalsifiability of fundamental assumptions (Priem and Butler 2001), the limited empirical support (Newbert 2007), and the definition of resources (Kraaijenbrink et al. 2010; Wade and Hulland 2004). Barney (1991, 101) states that resources include "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled by a firm that enable the firm to conceive and implement strategies that improve its efficiency and effectiveness." This definition suggests that innovation competences are seen as a part of a firm's resource base. But this encompassing understanding is constraint in providing clear statements as it neither illustrates the competitive role of distinct resources, nor the interdependencies between them (Kraaijenbrink et al. 2010). Therefore, another further enhanced theoretical approach has to be considered: the competence-based perspective.

The perspective of *competence-based* competition integrates concepts of resources (Penrose 1959; Wernerfelt 1984; Barney 1986, 1991; Dierickx and Cool 1989), dynamic capabilities (Amit and Schoemaker 1993; Nelson and Winter 1982; Teece et al. 1997), as well as assumptions of works on core competences (Prahalad and Hamel 1990; Hamel 1991). Thereby, firms' strategy building components can be captured more encompassing (Sanchez 2001). The competence-based perspective clarifies the link between a firm's performance and its resource endowment. It is argued that a firm needs to possess specific competences in order to exploit its resources in a goal-oriented manner (Freiling 2004).

Resources are specific assets, which can be applied in order to appropriately react to a firm's environment. Competences actually refer to the application of these resources. Sanchez et al. (1996, 8) define competences as "[…] the ability of a firm

to sustain the coordinated deployment of assets in ways that help a firm achieve its goals." As firms' achievements cannot be the result of luck (Barney 1986), it is important to stress that competences only encompass activities which are intentionally exerted in an organized manner and help to reach a determined objective (Sanchez et al. 1996).

According to Gallouj et al. (1997), a service innovation can be understood as any new combination within a respective service system. This new combination can refer to the final service features (e.g., usability), to technical items (e.g., logistical technologies), or the service delivery process itself. In line with this understanding and the competence-based perspective, service innovation competences shall be defined as follows. On the *macro level*, *service innovation competence* refers to *a firm's ability to purposively combine assets enabling new combinations of tangible and/or intangible service elements resulting in a new service offering*, whereas on the *micro level* it refers to *an employee's knowledge, skills, and aptitudes to serve these changes* (Gallouj and Weinstein 1997; Nordhaug 1998; Sanchez et al. 1996; Roth et al. 2013). To be able to manage service innovation competences, at least two different categories of competences have to be distinguished. Whereas the competence-based perspective considers the firm level (Hunt and Lambre 2000), the previously given definition relates to employee competences as value part of a firm. To terminologically distinguish the individual micro level competences from the macro level, the former can be conceived as the "composite of human knowledge, skills, and aptitudes that can serve productive purposes in firms" (Nordhaug 1998, 8), whereas the latter refers to the organizational issues of a firm.

Summarizing, crucial competences for service innovation can initially be distinguished in employee competences on an individual micro level and organizational competences on a macro level.

There is already some literature that examined competences in the context of service innovation (Menor and Roth 2007; Awuah 2007; den Hertog et al. 2010; Skaates and Seppänen 2002). Menor and Roth (2007) detected that new service development success is a result of building a competence by managing service development resources and routines. For them "new service development competence" is a multidimensional construct that is represented by four interrelated, as well as complementary, dimensions: formalized new service development process, market acuity, new service development strategy, and information technology use and experience.

Den Hertog et al. (2010) propose six dynamic service innovation capabilities to manage service innovation. This research is based on the dynamic capability perspective. The six identified dynamic service innovation capabilities are: signaling user needs and technological options, conceptualizing, (un-)bundling, coproducing and orchestrating, scaling and stretching, and learning and adapting.

Awuah (2007) conducted two in-depth case studies to identify factors that influence a professional service firm's competence development over time. A main finding is that competence development over time is to a high extent influenced by the firm's close and regular interaction with their immediate customers, as well as some third parties in their network of exchange relationships.

3.2.2 The Service-Dominant-Logic Perspective

Vargo and Lusch (2004) presented the so-called *service-dominant (S-D) logic* perspective in contrast to the so far mainly product-oriented perspective in business science. Whereas the goods-dominant (G-D) mind-set is rooted in the classic economic doctrine as suggested by Smith (1776/1904), the S-D logic introduces a totally new way of thinking. The focus in a G-D world is on discrete transactions of primarily tangible units of output. Value is added by producing output throughout the production process. Hereby, the product itself and its competitive features are of interest, rather than value in use (Vargo and Lusch 2004). The customer is merely seen as a consumer of value, whereas value creation is limited to the firm (Prahalad and Ramaswamy 2004). Profitability can be optimized by internal measures that are regarded isolated within the firm (Vargo and Lusch 2004).

S-D logic on the contrary stresses the importance of dynamic value-in-use, which is created during consumption. Thus, value is no longer part of a good, but is always collaboratively cocreated with the customer (Vargo and Lusch 2004). With respect to different kinds of resources, moving to S-D logic requires a shift of mind-set. Whereas G-D logic is focused on the exchange of static, tangible operand resources (e.g., raw materials), in the S-D logic the interaction of operant resources is crucial. These intangible and dynamic resources (e.g., knowledge and skills) are able to act upon operand resources to create value.

Still being in evolution (Williams and Aitken 2011), SDL is currently based on ten foundational premises (denoted as FP's) (Vargo and Lusch 2008). The first and most basic foundational premise (FP 1) is that the application of specialized skills and knowledge is the fundamental basis of exchange (Vargo and Lusch 2008). S-D logic assumes that it is not goods, but specialized competences (operant resources), which are actually exchanged in markets, making the typical distinction between goods and services superfluous (Karpen et al. 2012). FP 2 says that the indirect exchange of specialized competences via products often masks the fundamental unit of exchange. Following this conception, goods are seen as instruments for service distribution (FP 3). Being embodiment of specialized competences, they only generate value-in-use, i.e. when providing services (Vargo and Lusch 2004). FP 4 implies that knowledge, as well as physical and mental skills (operant resources), are the basis for building competitive advantages. FP 5 is a very fundamental premise that states that all economies are service economies. FP 6 argues that value cannot be produced for, but is always interactively cocreated with the customer (Vargo and Lusch 2008). Furthermore, whereas FP 7 points out that "the enterprise can only make value propositions", FP 8 states that "all social and economic actors are resource integrators" (Vargo and Lusch 2008, p. 7). Hence for the creation of value the resources of market, public and private networks have to be combined (Vargo et al. 2008). FP 9 complements that a service-centerd view is inherently customer-oriented and relational. Finally, FP 10 stresses that "value is always uniquely and phenomenological determined by the beneficiary" (Vargo and Lusch 2008, p. 7). Consequently, firms have to gain deep insights into customers' needs to be able to create appropriate value propositions. In the following, S-D

logic will be considered in its originally defined way, as "[…] a mind-set, a lens through which to look at social and economic exchange phenomena so they can potentially be seen more clearly" (Vargo and Lusch 2008, p. 9).

3.2.3 Developing Crucial Categories of Competences

Summarizing, the two theoretical perspectives deliver three categories of competences to be considered in a framework for crucial *service innovation competences*. From a competence-based perspective, *employee-based competences* that rather occur on an individual level have to be distinguished from the *organizational competences*, which can be found rather on a macro level.

The S-D logic complements this perspective by taking the *customers' competences* into account. It is stated that these have a significant influence on the new service development process, as services are always cocreated between a firm's staff and customers. Therefore, this kind of competence has to be added as a third crucial competence category to be considered.

3.3 Empirical Findings: A Pilot Case Study

To get first empirical insights to verify and enhance a framework, a pilot case study was conducted (Eisenhardt 1989; Yin 2003). In doing so, a semi-structured, explorative interview with the CEO of a specialized innovation intermediary, operating a successful crowdsourcing platform, was arranged. The results of the interview were merged with insights from former interviews and observations, conducted in the firm (Hallerstede et al. 2012). The firm was chosen for several reasons. Firstly, the author's affiliation provided scientific support since the foundation of the intermediary, leading to a high level of trust between the parties and allowing for in-depth insights to be gained. Secondly, the intermediary closely cooperates with its clients and consults them throughout the whole innovation process. The latter stem from a broad range of industries, such as fast consumer goods, insurance or tourism and seek support regarding various innovation projects. Moreover, as an innovative service provider, the firm has already continuously innovated its own business model and service offerings. Consequently, the firm has gained extensive experience and is capable to distinguish specific and general requirements regarding competences for product and service innovation. In the interview, the main question was to describe all necessary competences firms need in doing new service development. The interviewee was asked to answer this question with respect to her experience throughout the many projects with firms from different industries. Given the relevance of a systematic new service development process in successful service innovation projects, the interviewee should structure the mentioned competences along the phases of the new service development process as suggested by Johnson (Johnson et al. 2000). Additionally, she

was asked to divide between employee, organizational, and customer competences as derived from theory and literature. Herewith, we focused especially on competences mentioned that could not be subsumed to these three categories of competences, and therefore create a need for further categories.

The transcript of the interview was independently coded, and results of the interview were confirmed and enriched with intern firm material referring to innovation projects, as well as further observations and insights the author's organization gained by accompanying the foundation process of the firm.

The empirical study revealed that for building a framework for crucial competences for service innovation, it is appropriate to distinguish employee, organizational, and customer competences. So the literature and theory derived structure of competences could be confirmed.

But the study also showed that these three categories of competences are not sufficient. There are additional categories of crucial competences along a new service development process that have to be considered in order to be successful. One category was mentioned analogical to customer competences, and referred to suppliers and competitors. This means that during a new service development process, also suppliers or even competitors could be integrated. For this cocreation process it is important to know their competences to be able to judge on ideas and make the process controlled. Also freight forwarders, or other service providers, could be included in this constellation. This means that competences for service innovation must not only be focused on the customer site, but also consider actors and partners throughout the whole supply chain.

Referring to a competence framework, customer and supplier competences can be subsumed to the superior so-called network competences.

Moreover, community competences were mentioned within the case study. These could be referred to online or offline communities. This means that communities are an important means to foster innovation processes, and that competence of such communities play a meaningful role. Online innovation communities can be initiated by the respective firm seeking to develop a service innovation or by an intermediary. Whereas their practical relevance for product innovation is increasing, implementations for service innovation are still in the early stages. Nevertheless, the interviewee sees high potential for service innovation purposes, and hence this dimension of community competences is added to the framework.

Another result from the case study is that the mentioned competences are on the one hand suitable to provide a structure for firms to create or improve necessary and crucial competences systematically. Yet, on the other hand, not the competences itself must be the point of discussion, but rather the management of these. That means that first of all firms have to know about the existing competences, referring to the different categories of competences. But subsequently the focus lies on the management of the latter, such as: which competences have to be improved, which could be combined, which must be established at all. These are questions firms have to deal with when creating a stable foundation for successful service innovation.

In summary, the categories of crucial competences in service innovation as derived from the case study emerge as:

- Employee competences
- Organizational competences
- Network competences (customers/suppliers and competitors)
- (Online-) Community competences

3.4 Developing a Framework for Crucial Service Innovation Competences

To develop the framework for crucial service innovation competences, an appropriate structure is built by combining the four phases of the new service development process according to Johnson (Johnson et al. 2000), and the categories of competences as derived from theory, literature and the case study (Roth and Daiberl 2012; Roth et al. 2013). Following, the four main competence categories are detailed, referring to the different phases of the new service development process, and based on the results of the case study:

1. Category of *employee competences*
2. Category of *organizational competences*
3. Category of *network competences*
4. Category of *community competences*

3.4.1 Category of Employee Competences

In the *design phase*, it is an important competence for the employees to be able to interconnect with other employees. Ideally, these do not only stem from the same department, but from all over the firm. Moreover, employees should understand chances and possibilities for new services. This assumes that employees get a feeling for customers' needs, and reflect on trends and technological options.

In the *analysis phase*, employees should leverage analysis tools. This can also be realized by consultants. For this purpose, it is also important to be linked in networks, both internally and externally from the firm.

For the *development phase*, employees must be flexible and should have wide spread competences in project management. Service innovation projects might have a broad range within a firm, and include numerous people within the service delivery process. A tight structure and organization of the project is therefore essential.

For the *full launch phase*, employees should have enough capacity for enthusiasm, as the road from the first idea for a new service to full launch is often very long, exhausting, and full of barriers. Implementation requires power of endurance and enthusiasm until the end that helps to gain a successful launch. For team

leaders, this can be translated in the competence to motivate others to fulfill all necessary steps until full launch is reached.

As for the firm, the management of the mentioned competences is crucial, decision on education measures, trainings, and a careful staff recruiting must gain strategic importance and be part of systematic management efforts within the firm.

3.4.2 Category of Organizational Competences

In the *design phase*, firms must prepare an environment that fosters communication and collaboration. For this purpose, processes have to be established that allow employees and other stakeholders to interact with each other and design together. This also implies that necessary time for the development of new services is provided within the organization. Another means to prepare the appropriate environment could be platforms that foster the cooperative design of new services, and that are integrated within the organizational structure of the firm.

For the *analysis phase*, the competence of a firm to prepare the appropriate environment for assessment of service innovations is crucial. This requires the knowledge of different methods and tools, and implies selection decision strategies to be in place. Additionally, the process of assessment itself needs to be accepted as part of the value-creating procedure of service innovation, and be implemented as such within the organization.

In the *development phase*, it is important that the organization allows the implementation of new processes. Especially in manufacturing firms, this would require new competences, as the organization is not aligned to intangible and interactive service processes.

For the *full launch*, organizations have to provide adequate recruitment and retraining. Furthermore, firms should also provide the competence to implement and brand externally generated services. This would be necessary if the new developed services are delivered in cooperation with other service providers, or if the service delivery requires competences the firm does not want to establish in house, and want to outsource.

3.4.3 Category of Network Competences

The network competences are composed of customer competences, and suppliers or competitors competences. Competences that customers bring to the design phase are creativity and the aptitude to precisely express their ideas. Often customers have just a vague feeling of what they would like to have, or of which service ideas could be promising. For firms this means that they have to find ways as to how to extract customers' ideas, e.g., with tools, or in workshops to be able to manage customers' competences.

For the *analysis phase*, customer competences do not seem to be so relevant, as it is supposed that the assessment of new service ideas is done internally.

In the *development phase*, customers should bring play instinct. For firms this means that they have to manage customers' competences and actions. Therefore, it is important to know customers' abilities and knowledge to be able to judge on suitable methods of how best to integrate them.

For the *full launch*, social skills are required. In the full launch phase, customers are involved directly via the service delivery process, and it is therefore important that they can adapt to new services, and are open minded for changes in the delivery process.

Referring to suppliers and competitors, up to now there cannot be made any differentiation between the different phases of the new service development process. Instead, a general competence of assessing possibilities and leveraging the network could be stated. So, network actors must be prepared to be involved in different phases of new service development, and adapt to necessary communication processes.

3.4.4 Category of Community Competences

Last but not least, the management of community competences is judged to be crucial. Communities can be used to foster in particular idea generation during the service design phase. One way is to organize idea contests. Another way could be to create platforms with different kinds of incentives to keep members discussing and developing ideas. An important competence here is that the community members are familiar with their tasks, and understand the procedures in such communities. Additionally, members must be creative and able to accurately express their ideas. For firms this means that, on the one hand, they have to manage the mixture of different members in the community and decide whether it should be open or closed. On the other hand, the degree to which members understand the procedures and tasks can be highly influenced by the layout of platforms, or different training activities.

For the *analysis phase*, it was mentioned that the community members must be able to build linkages with others, and be able to assess potentials. Firms must decide on the application of different tools.

In our case study, it turned out that the *development phase* is rather offline. This can be traced back to the fact that services are intangible and cannot be worked on like classical prototypes. Instead, to be able to manage the development of new services via communities, service development parts have to be made visible. Additionally, the transfer of a service idea into concrete service delivery procedures is predominantly an internal issue.

In the *full launch phase*, again as for the network competences, social skills are crucial.

Figure 2 shows the framework for crucial competences in service innovation as derived from our case study, and founded in the competence-based and service-dominant logic perspectives.

Phases of Service Development	Management of: Employee Competences	Organizational Competences	Network Competences: Customers	Network Competences: Suppliers/ Competitors	(Online-) Community Competences
1. Design Phase	• Interconnection with other employees (E/1) • Understand chances and possibilities (E/1)	• Prepare surrounding which fosters communication, and collaboration (e.g. platforms/processes)	• Aptitude to precisely express ideas • Creativity	• Assess possibilities and leverage network	• Familiarity with/understanding of task and procedures • Member's aptitude to precisely express ideas • Creativity
2. Analysis Phase	• Leverage analysis tools (e.g. by consultants)	• Prepare surrounding for assessment of service innovation (O/2)			• Ability to build linkages and asses potentials
3. Development Phase	• Flexibility • Project management skills	• Ability to implement new processes	• Play instinct		*Rather offline*
4. Full Launch	• Capacity for enthusiasm • Team leader's ability to motivate	• Adequate recruitment and retraining • Implementation and branding of externally generated services	• Social skills		• Social skills

Fig. 2 Framework for service innovation competences derived from case study

4 Practical Implications

The framework of service development competences derived and empirically tested in this chapter provides several practical implications:

First of all, it shows that a systematic approach of service innovation helps to plan, control, and implement successful new services, and that it is recommended for firms to use a tight structure in managing service innovation. This is especially true for servitizing firms.

Next, different phases in the new service development process can be distinguished. Referring to the four phases suggested by Johnson et al. (2000) (design, analysis, development, and full launch phase), each phase requires different competences and must be analyzed and managed separately.

Furthermore, different competences must be differentiated when looking at crucial competences for service innovation. According to the case study, these are employee, organization, network, and community competences.

The framework provides a structure for firms to systematically adapt their internal environment to the requirements of successful service innovation. Firms are recommended to analyze their structures and required crucial competences to see where action is needed.

Another implication is that the focus is on the management of competences. Any activity planned within firms with respect to improving service innovation as a process should highlight the management of competences in different categories. To do so, a broad knowledge base of currently existing competences in the different categories is required.

A final practical implication is that competences are relevant, and should also be part of education programs on service innovation. This chapter highlighted that

there are a lot of different levels and items, and that it is not trivial to implement a structured process to manage all of them. Therefore education, training, and study programs should be created to foster this process.

5 Conclusion

5.1 Implications for Further Research

Results presented in this chapter are limited to the insights gained from the case study. As the interview within the case study was conducted on the basis of theoretical and literature-based premises, the derived categories of competences can be supposed to be reasonable. Yet, we were able to only provide a first insight into detailed competences within the identified broader categories. Still, the developed framework offers a good foundation for a future research agenda on service innovation competences, as each dimension must be detailed and proved by extensive empirical data.

The following future research agenda is suggested:

More empirical work should be done on the framework construction itself, especially on the categories of competences. It should be examined if there are additional competence issues to the ones identified thus far, including the "management of competences."

Further empirical work must be done to get deeper insights in both the status quo of competences in firms, as well as the crucial status of competences that should be reached in order to achieve successful service innovations.

Additional empirical work may also distinguish among different industries and/or different types of firms (e.g., small-and-medium enterprises).

Furthermore, research should be done to identify the roadmap from existing competences in a firm to creating an environment that allows for successful service innovations, in particular for servitizing firms.

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Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches

Niels Feldmann and Marc Kohler

Abstract The importance of innovation for companies to gain competitive advantage is widely acknowledged. While earlier studies have emphasised the critical importance of idea assessment as part of the new product and new services development process, the topic has been under-represented in academic research recently. In this paper, we aim to provide an overview on the depiction of idea assessment in services research. For this, we start by exploring the representation of the topic in question in recent service innovation capability frameworks. On a more operational level we reflect service-related publications on criteria, information sources, group compositions and approaches for idea assessment. Finally, by reporting on a case study with a German financial services provider, we introduce serious games and enterprise crowdfunding as two novel approaches for assessing service ideas. Overall, we find that internal, service providing staff should play a major role in the assessment of service ideas. Surprisingly, classical portfolio management approaches making use of deliberation in small management boards seem to be the predominant method discussed in the literature and applied in practice. Mechanisms which are designed to involve larger crowds into idea assessment exist, however, are not yet widespread. The two novel approaches show promising avenues for involving service providing staff into idea assessment in a motivating way.

Keywords Service innovation capabilities · Idea assessment · Idea evaluation · Serious games · Enterprise crowdfunding

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1 Introduction

In 2011, Starbucks surprised the banking industry by introducing its own mobile payment programme: In January of the same year, the payment functionality of the already existing loyalty card got integrated into the 'Starbucks App' (Starbucks Coffee Company 2011a). For this, the individual card's barcode got stored in the application in order to provide convenient and fast checkout by making use of available scanners. On December 6, 2011 Starbucks declared that the programme had been rolled out to 9,000 stores in the US, including 2,000 outlets operated by the major supermarket chains Target and Safeway. Subsequently, 26 million mobile transactions had been processed within under a year, allowing Starbucks to claim to have the "nation's largest mobile payment program" (Starbucks Coffee Company 2011b). The mobile payment volume has been growing ever since (Tode 2012). To further strengthen its mobile payment business, Starbucks invested in San Francisco-based mobile payment start-up Square, Inc. in August 2012 (Starbucks Coffee Company 2012). The partnership includes the processing of credit and debit card payments at US Starbucks-outlets by Square—at the charge of established transaction providers.

This example reveals some key characteristics of innovation in services (Vermeulen and van der Aa 2003): Many novelties are new combinations of existing concepts and resources, named architectural innovation (Gadrey et al. 1995), and are often developed with limited involvement of a research and development (R&D) unit (Sundbo 1992, 1997). For instance, in the Starbucks mobile payment case, with loyalty card, mobile apps, barcodes and scanner check-outs all key concepts had been existent. Inspired by the use of barcodes in airlines' mobile boarding passes, anybody could have come up with the idea of a mobile payment app as outlined above. Expert knowledge or R&D departments were not indispensable. Consequently, the wider staff is considered to be a powerful and quite accessible source for innovative ideas (IBM 2006). However, utilising employees in the innovation process often raises a challenge typical to service organisations, known as ambidexterity, i.e. allocating staffs' time to daily business ('exploitation') versus contributions to innovation management ('exploration') (O'Reilly and Tushman 2004).

Beyond the example given above, employees of service firms who carry out services interactively with customers, e.g. professional services, do provide great insight into their demand and potential areas of innovation. As Grönroos demonstrated, during this interaction, customers contribute to the service delivered by the provider, hence, the co-creation of value (Grönroos 2006). Consequently, Chesbrough makes a strong case for utilising open innovation in services to build on the creative power of external sources (Chesbrough 2010, 2011). Nevertheless, the internal service providing staff may serve as an approachable proxy for these external views.

Finally, in recent years, services have been created more and more in business networks, i.e. as an outcome of collaborations amongst partners in such networks. The challenge of realising innovation initiatives in such an environment begs for research on corresponding organisational capabilities (Agarwal and Selen 2009).

An example of such a challenge includes mobility services, in particular e-mobility services, which are changing urban transportation. Automotive companies, energy providers, mass transportation providers and many more are collaboratively creating new service offerings to customers.

Given these characteristics and challenges of service innovation, service firms strive for more systematic and proactive approaches to innovation in services, i.e. approaches consolidated under the term *service innovation management* (Tidd and Hull 2006; Maglio and Spohrer 2008). Recently, a stream has emerged in service innovation research, focussing on the concept of organisational capabilities that enable continuous service innovation, termed *service innovation capabilities*, as part of a firm's sustained competitive advantage. Several frameworks of such service innovation capabilities were developed based on this research (Essmann and du Preez 2009; den Hertog et al. 2010; CMMI Product Team 2010). These capabilities are represented by a number of firm-specific resources, such as processes, competences, tools, knowledge (Kohler et al. 2013). As a whole, they contribute to all major phases of an innovation process. According to Hansen and Birkinshaw (2007), these major phases are idea generation, conversion and diffusion.

In a recent review of open innovation-related research, West and Bogers point out that primarily the idea generation phase has been addressed by the scientific community and suggest to focus further research on the later phases. Notably, amongst others, this includes the assessment of the provided ideas (West and Bogers 2014). In fact, an empirical study involving 331 Australian innovation managers revealed that the overall effectiveness of the innovation process "is significantly correlated with the effectiveness of idea assessment, suggesting that *idea assessment* is a very important phase of the innovation process" (Schulze et al. 2012, p. 11). Given the close relationship of service innovation to open innovation, as discussed above, the documented importance of idea assessment presumably also applies to service innovation.

Thus, this chapter aims to provide an overview on the topic of idea assessment in service firms by addressing three guiding questions:

1. How is idea assessment reflected in and supported by current service innovation capabilities frameworks?
2. What are state-of-the-art mechanisms for idea assessment in service firms?
3. What novel approaches to ideas assessment are about to emerge, and how are they perceived by service organisations?

Correspondingly, this chapter is structured as follows: In the subsequent section, we describe the foundations of service innovation capabilities frameworks, provide an overview on four prominent versions and discuss how idea assessment is reflected in them. Next, we address the second guiding question and give an overview of related approaches, ranging from board-driven classical portfolio management, to the use of market-based methods, such as idea markets or betting markets. Based on a case study, we then outline two novel approaches for idea assessment, namely the application of *serious games* and the corporate use of *crowdfunding* mechanisms, a combined assessment and funding approach,

currently well received by the start-up scene. Finally, a summary, limitations and areas of future research are presented in the last section of this chapter. In this chapter we will use the term idea assessment, while frequently used synonyms include decision making on service ideas, idea screening, idea selection, and service proposal screening.

2 Idea Assessment in Service Innovation Capabilities Frameworks

As nicely put by Hamel (2006, p. 75): "While there is no sausage crank for innovation, it is possible to increase the odds of a 'Eureka!' moment by assembling the right ingredients." More scientifically, these 'ingredients' are termed (service) innovation capabilities. Corresponding research investigating the foundations and composition of these ingredients relates to a concept termed Dynamic Capability View (DCV) which, according to Makadok (2001), describes the idea that there are capabilities in organisations that improve the productivity of other capabilities and resources, i.e. they function as catalysts to them. Service innovation capabilities thus are capabilities that represent an organisation's ability to develop new services.

As indicated in the introduction, several frameworks for service innovation capabilities have been introduced. Recent, prominently cited and service specific publications among these include the Capability Maturity Model Integration for Services (CMMI-SVC) (CMMI Product Team 2010), the Innovation Capability Maturity Model (ICMM) of Essmann and du Preez (2009), as well as corresponding models of den Hertog et al. (2010), and Kindström et al. (2013). In accordance with our first guiding question, we will subsequently discuss to what extent service idea assessment is reflected in these frameworks of service innovation capabilities.

The *Capability Maturity Model Integration for Services* (*CMMI-SVC*)—maintained by the Software Engineering Institute (SEI) of Carnegie Mellon University—belongs to a family of CMMI frameworks that date back to the early 1990s (CMMI Product Team 2010). Although the name of the framework suggests a primary focus on the appraisal of organisations, the overall purpose of CMMI-SRV is said to be "providing guidance for applying CMMI best practices in a service provider organization" (CMMI Product Team 2010, p. i). Hence, it aims for functionality beyond determining maturity levels. Nevertheless, the framework rather answers questions on 'what to do', than on 'how to do it'. Consequently, assessing the maturity of an organisation's capabilities to provide quality services is still a dominant area of application. To this end, the framework comprises of a set of maturity levels consisting of scales for 24 process areas, ranging from Capacity and Availability Management to Strategic Service Management.

Therefore, given the bandwidth of the process areas, CMMI-SVC can hardly be considered service innovation specific. Still, the descriptions of process areas, such as 'Service System Development' and 'Decision Analysis and Resolution', do refer to the assessment of ideas for new services. While the first—more broadly—suggests

structured approaches to the design and development of service systems in order to satisfy current and future service agreements, the latter requests structured decision processes across all areas of application.

The second framework, the *Innovation Capability Maturity Model (ICMM)* of Essmann and du Preez (2009), pursues the concept of a maturity model as introduced by CMMI-SVC. In contrast with CMMI-SVC, this framework focusses explicitly on innovation capabilities. Although the framework addresses innovation capabilities more generically and cannot be thought of as service specific, it was evaluated in an exploratory manner via case studies from the professional services and financial services domains. Therefore, the capability framework provides insights that are arguably relevant to innovation in services.

The ICMM framework comprises three dimensions: (1) The Innovation Capability Constructs dimension summarises innovation capabilities hierarchically. On the top level, it comprises of three Innovation Capability Areas named Innovation Process, Knowledge and Competency, and Organisational Support. One level below, the so-called Innovation Capability Construct Items provide more detail on the above areas. (2) The Organisational Constructs dimension is supposed to make sure that all fundamental aspects of an organisation are covered by the framework. Essmann and du Preez distinguish five fundamental aspects, including Strategy and Objectives, Functions and Processes, Organisation and Management, Data and Information, and Customers and Suppliers. (3) Finally, the Capability Maturity dimension consists of three maturity levels.

The dimensions can be depicted as a heat-map, i.e. a 42-field matrix, with the possibility to assign a maturity level to each field. Interestingly, more than 10 % of this heat-map's fields specifically address aspects of the assessment of innovative service ideas, i.e. our guiding question: a) Balancing the innovation portfolio, b) Using fundamental principles to guide processes and make decisions, c) Testing, screening and prioritising opportunities and concepts, d) Involving customers and suppliers in the innovation process and e) Allocating resources appropriately. Notably, according to the overall evaluation of the case studies, capabilities c) and e) were among the worst performing in the firms considered, highlighting a need for research and improvement (Essmann 2009).

The third model by den Hertog et al. (2010) represents one of the few comprehensive approaches to modelling and categorising service innovation capabilities (Kohler 2013), and is being advanced by the service science community (Janssen 2012). In contrast to CMMI-SVC and ICMM, the framework of den Hertog et al. (2010) is of rather conceptual nature, i.e. it is not suitable for direct managerial advice. For their conceptual work the authors build mainly on extensive literature studies and case studies to put so-called service innovation dimensions in relation to service innovation capabilities.

Service innovation capabilities, as defined above, are supposed to catalyse the development of novelties in these service innovation dimensions. den Hertog et al. (2010) derive six of these capabilities from their research, titled (1) signalling user needs and technological options, (2) conceptualising, (3) (un-) bundling, (4) (co-)

producing and orchestrating, (5) scaling and stretching and (6) learning and adapting.

Out of this set, two capabilities address aspects of our guiding question regarding the assessment of new service ideas:

(1) *Signalling user needs and technological options*, i.e. effectively perceiving needs in the markets and un-covering potentials related to new technological developments, is twofold: On the one hand it provides critical inspiration for the creation of new service ideas, on the other hand it contributes to the knowledge and market insight needed to properly assess the potential of these new ideas.
(2) *Conceptualising* As den Hertog et al. (2010) point out, conceptualising goes beyond the detailing and visualising of new services, and includes all aspects required to transform initial ideas into new services. This explicitly includes activities, such as the assessment of strategic fit, and an analysis of the target audience. As we will discuss in the subsequent section, these are important criteria for the assessment and subsequent selection of ideas for new services.

An interesting *framework* in terms of the reflection of idea assessment in the service innovation capability literature was developed by Kindström et al. (2013). As one of the most recent frameworks, it focusses on product-based services and is thus particularly suited for industrial companies shifting from product-centricity to a product-service orientation, a process called servitization (Vandermerwe and Rada 1989; Neely 2007). The authors build on an established framework by Teece (2007, pp. 1319–1320) that aims to explain "the sources of enterprise-level competitive advantage over time", and has a strong notion of innovation capabilities. Teece introduces three capabilities: (1) Sense and shape opportunities and threats, (2) seize opportunities and (3) maintain competitiveness. He subsequently underpins them with so-called micro-foundations, i.e. "distinct skills, processes, procedures, organizational structures, decision rules, and disciplines". With regard to the seizing capability, he explicitly mentions the decisions on competing investment paths, represented by alternative product or service ideas. He points out that biases in decision making, such as anti-cannibalisation proclivities, are ample, and by implementing appropriate procedures to overcome these biases, companies can obtain competitive advantage. Kindström et al. (2013) build on Teece's work and aim for service innovation specificity by gathering supporting data from eight case studies. The resulting capabilities exhibit incremental changes to the original framework, and are reported as (1) sensing, (2) seizing and (3) reconfiguring. With regards to seizing opportunities, they emphasise the importance of decision making after ideation: "Firm decision-making processes geared towards products can miss service innovation opportunities that would be seized by a more service-oriented capability" (Kindström et al. 2013, p. 1065).

To conclude, the capability frameworks considered above indicate the relevance of idea assessment in service innovation efforts, some more implicitly (CMMI Product Team 2010; den Hertog et al. 2010), others more explicitly (Teece 2007; Essmann and du Preez 2009; Kindström et al. 2013). Together, they point towards

some high-level recommendations for idea assessment in service firms: Implement a service-specific idea assessment approach that (1) leverages market insight that is present and accessible due to the co-creation of value, (2) considers a fit between the idea and the organisations strategy, (3) avoids biases towards anti-cannibalism, (4) ensures resource allocation to selected ideas and (5) leads to a balanced service portfolio.

However, these recommendations are arguably not specific enough to provide managerial advice. Hence, subsequently, we will discuss service idea assessment on a more operational level.

3 Cornerstones of Service Idea Assessment

Idea assessment is still a challenging task to organisations (Barczak et al. 2009; Cooper 2009; van Riel et al. 2011). If breakthrough ideas do not get recognised, no matter how fruitful an organisation might have been in terms of idea generation, opportunities for maintaining and fostering competitive advantage are missed. And, as mentioned above, the necessary considerations for recognising promising service opportunities can differ from product environments. So what are the cornerstones for assessing service ideas?

Based on a compilation of related literature and extending an overview of internal success factors for decision making on service ideas published by van Riel et al. (2011), we have identified *five areas relevant to idea assessment in service innovation* (see Fig. 1):

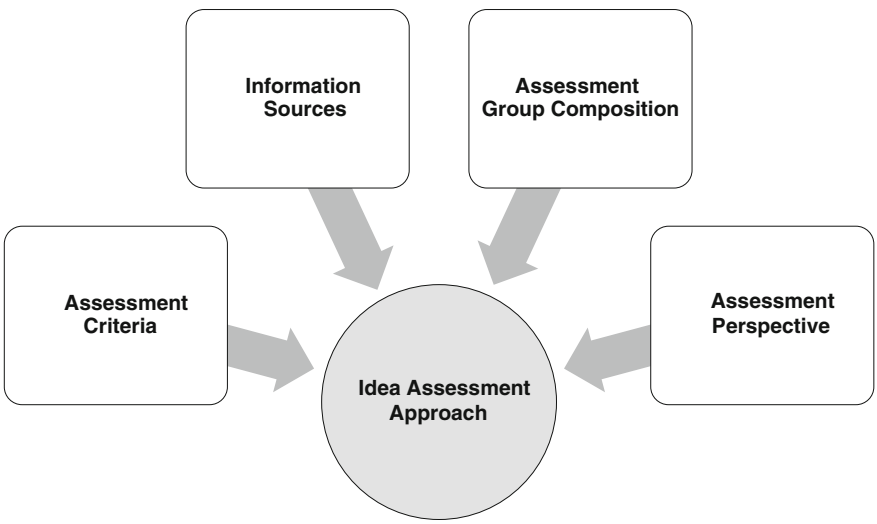

Fig. 1 Core elements of service idea assessment

1. *assessment criteria* (i.e. what should be assessed),
2. *information sources* (i.e. which input should be considered),
3. *assessment group composition* (i.e. who should conduct the idea assessment),
4. *assessment perspective* (i.e. what mind-set and time line should be applied), and
5. *assessment approach* (i.e. how should service idea assessment be organised).

3.1 Assessment Criteria

The innovation management and portfolio management literature calls for *criteria for idea assessment* (Cooper et al. 2001a). Related papers have been published by researchers from various disciplines, such as Information Systems, Economics and Management Research. Subsequently, we will outline the results of a few recent, and prominently cited, studies.

Dean et al. (2006) pulled together 90 related empirical studies to address idea assessment from a general innovation management point of view. While not service specific, this research contributes relevant insights to our study, due to its exhaustive analysis of assessment criteria dimensions. From their literature study, the authors derive four main dimensions for idea assessment, with two subdimensions for each of them. The dimensions are: (1) Novelty, in terms of originality or modification of a paradigm, (2) workability, meaning the feasibility of an idea in terms of being implementable and acceptable, (3) relevance, i.e. the applicability and effectiveness of an idea toward a given problem and (4) specificity, stating whether an idea provides a complete solution to address a problem. While these dimensions cover recommendations stated in the portfolio management literature, they still miss out on some requirements highlighted by the capability literature mentioned above, such as strategic fit or tapping existing market insights.

In the service innovation specific literature, the topic of idea assessment criteria has not been covered as intensively. Some early remarks on the issue of assessment criteria for service ideas have been made by Sundbo in the late 1990s (Sundbo 1997). Based on an empirical study with 21 Danish service firms, he emphasises the importance of strategic approaches to service innovation, in particular the assessment of the fit of an idea with the organisations' strategy.

In a later study, Aas (2010) undertakes a more comprehensive approach towards assessment criteria for service ideas. Building on literature from fields such as budgeting, management control, innovation management and foresight, he derives key characteristics for an idea assessment approach. Amended by an in-depth literature review on the firm-level effects of service innovations (Aas and Pedersen 2010) he extends it to ensure service specificity, and names it QSI—tool for pre-Qualification of Service Innovation projects. QSI comprises of three modules, (1) the Business Strategy Module that represents a top-down perspective and—in accordance with Sundbo—ensures that ideas comply with the organisation's strategy, (2) the Scenario Assessment Module providing the means to construct

future scenarios for evaluating ideas that can serve as a basis for the idea assessment and (3) the Value Assessment Module that finally supports the assessment of service ideas.

The latter integrates five firm-level effects of service innovations (Aas and Pedersen 2010), i.e. process, capability, relationship, financial and competitive effects; in a way that an idea's value can be expressed along three dimensions; namely, Financial Performance (e.g. process, cost, productivity or flexibility effects), Competitiveness (e.g. learning, culture, employee growth, relationship or industry structural effects), and Risk. Thus, by combining financial measures with non-financial service innovation specific measures, QSI considers insights from the innovation management literature (Cooper 1999; Cooper et al. 2001a; Christensen et al. 2008), and does not solely focus on financial aspects. Interestingly, in a subsequent multiple case study on management control of service innovation activities, conducted by the same author (Aas 2011), ten top-performing Norwegian service firms stated that their corresponding control systems predominantly consist of financial indicators. However, this surprising result has to be taken with caution given that management control covers more than idea assessment, the size of sample analysed and the variety of size, and industry of organisations sampled.

3.2 Information Sources

Assessment criteria alone are not sufficient to draw proper conclusions on service ideas. Naturally, the information available limits the possibilities of assessing ideas according to the criteria, and thus plays a critical role as well. Consequently, there have been a number of studies on *what information to gather and where to source it from*.

In two widely cited studies, van Riel et al. (2004, 2011) survey 251 high-technology-based service innovation projects from across industries and continents. The authors explore internal factors for decision-making effectiveness in a service innovation context. With regard to sourcing information, their 2004 and 2011 analyses cover the three aspects (1) Information Gathering, i.e. the types of information gathered and the extent to which an organisation gathers them, (2) Information Sources used to gather information for idea assessment and (3) Information Diffusion, i.e. the importance of informal communication and innovative climate as a means to gain access to tacit knowledge.

The findings of the studies are somewhat surprising: While information about customers and technology were identified as important for the effectiveness of idea assessments, information about competitors showed a negative correlation. Correspondingly, leveraging information sources providing market insight, such as marketing plans or market research, were found to lead to more long-term innovation success. Short-term success, on the other hand, is influenced more by the use of business plans.

Van Riel et al.'s findings on Information Diffusion add another interesting aspect to the recommendations derived from the capabilities literature. They find that an innovative climate serves as a key stimulant to internal knowledge sharing and therefore, the exchange of this knowledge between staff and decision makers. In fact, the importance of internal staff as a key information provider is underlined by additional literature (Blazevic and Lievens 2004).

To conclude, from a content perspective, information about customers and technology are key for idea assessment. Accordingly, externally oriented information sources, e.g. market studies or marketing plans, are identified to be relevant for long-term innovation success. In terms of acquiring this market-related information—beyond the use of documents and studies—leveraging the market insight of the organisation's staff is emphasised.

3.3 Assessment Group Composition and Assessment Perspective

Apart from assessment criteria and the kind of information that support idea assessment scholars investigated the question of *who is supposed to process this information and carry out the actual assessment*. Typically, authors refer to the senior management level as being in charge of performing idea assessment (Sundbo 1997; Brentani 2001; Vermeulen and Dankbaar 2002; Aas 2011). To mitigate biased assessments, several authors report on companies implementing multi-disciplinary boards to incorporate various perspectives into idea assessment (Froehle et al. 2000; Brentani 2001; Bullinger et al. 2003).

The previously cited studies of van Riel et al. (2004, 2011) add some more information on the characteristics on the involved individuals, rather than their role in an organisation. The authors find that well-informed decision makers who aim to augment their knowledge are important to assessment effectiveness. Domain expertise does not seem to play a major role, while multi-disciplinary expertise on the other hand seems to be relevant—which reflects the findings from literature mentioned above. What is more, the participation of holistically experienced managers is crucial for assessment effectiveness. In particular, the presence of CEOs and COOs seems to have a positive effect on idea assessment from a long-term perspective. CFOs and middle management, on the other hand, do not impact the outcome significantly.

Beyond the formation of assessment boards with a small number of decision makers, there is a tendency towards involving the wider staff—as reported in the previous section (Blazevic and Lievens 2004; van Riel et al. 2004, 2011). As we will discuss later on, several attempts to aggregate staff knowledge and perception of ideas via IT-platforms, and to funnel the results to assessment boards, exist. However, the wider involvement of staff is not yet prevalent. Similarly, the participation of customers in idea assessment is still rather uncommon.

Finally, in their study van Riel et al. (2011) point out that decision makers perform differently, depending on what perspective they apply to the perception, organisation, and interpretation of the available information. They summarise that the involvement of experienced managers with a long term, entrepreneurial attitude had the strongest positive effect on success.

3.4 Assessment Approach

The initially discussed service innovation capabilities literature suggests systematic approaches for the development of new services including the idea assessment. So far, we have discussed criteria, information sources and the composition of groups for idea assessment, as represented in the service innovation literature. Consequently, in this section we will provide an *overview of approaches that integrate the previously outlined aspects and lead to a structured idea assessment*.

Today, companies are ill-equipped with methods and tools specific to the characteristics of service innovation—therefore, innovation governance, and management have often been built around classical product innovation processes (Ganz et al. 2012). This also seems to apply to the assessment of service ideas. Idea assessment is an important task at the intersection of innovation management and portfolio management. According to Cooper (2001b, p. 4), "Portfolio management is a dynamic decision process, whereby a business's list of active new product projects is constantly updated and revised." To carry out portfolio management, a stage-gate process is used to review innovation projects on a regular basis, with the initial review called idea assessment or idea screening. These reviews are typically conducted by small boards of decisions makers deliberating on ideas proposed by company employees or external parties. To facilitate deliberation, Cooper suggests to consider the fit between idea and the organisation's strategy and to apply a scoring model consisting of pre-defined criteria. The aspects of idea assessment discussed earlier align well with Cooper's recommendations, allowing the implementation of stage-gate type innovation processes in service organisations (Smith et al. 2007).

Nonetheless, one of the main differentiators between the assessment of product and service ideas is rooted in services constituting processes of co-creation of value. To mitigate the shortcomings of the standard, board-based portfolio management approaches; staff or customer knowledge needs to be made accessible to the decision makers at the point of deliberation, a task often referred to as information aggregation (Stathel 2010). According to the number of participants involved, we categorise those information aggregation mechanisms for idea assessment into group-based and crowd-based methods. Figure 2 gives an overview on the most prominently discussed methods. Notably, most of these methods provide information for a final decision taken by a board. Subsequently, we will outline the methods mentioned in the figure except from the novel approaches serious games and crowdfunding. They will be covered separately in the next section.

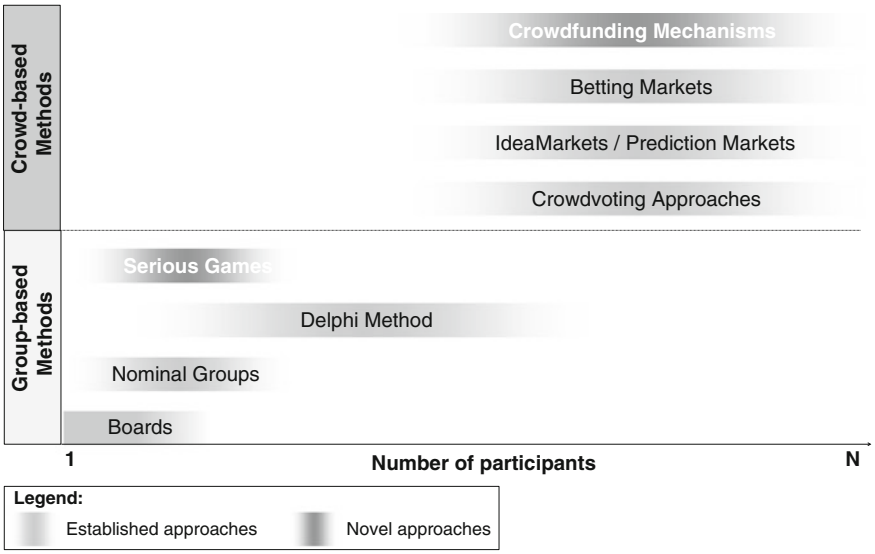

Fig. 2 Overview of group-based and crowd-based approaches for information aggregation in the context of idea assessment

On the group-based side, boards apply approaches such as nominal groups or the Delphi method to capture information from a wider audience, e.g. their staff (Stathel 2010). Nominal groups (van de Ven and Delbecq 1974) are a type of facilitation of a meeting that helps to integrate different points of view present in a group by altering between participants working alone and then again in groups. Due to the facilitation character, the number of individuals to involve is limited. In our case, a group of representatives from the wider staff, providing the organisations services, would need to form a nominal group. Their results would be taken into account by the decision makers. In addition, approaches such as nominal groups or Delphi are sometimes also used within the decision making boards as a consensus making tool (Aas 2009, p. 3).

The Delphi method (Dalkey and Helmer 1963) on the other hand, offers the possibility to address a larger audience. In iterative sessions experts are asked to state personal estimations on a given question. After each iteration, they receive an anonymous summary of the results and some background information for them to take into consideration in the next round. In our case, members of the service providing staff would be asked to estimate the success of a set of ideas, and rank them accordingly. Results and thoughts would be shared, and the process would be repeated until the ranking becomes stable. While the Delphi method has proven to deliver quite accurate results (Graefe and Armstrong 2011) in terms of forecasting, manual effort of identifying the panel members and facilitating the process, as well

as the required duration of a Delphi study, are mentioned as key drawbacks (Stathel 2010). Correspondingly, the addressable audience is still limited, and continuous usage with a larger staff base seems to be unlikely.

Given the drawbacks of the Delphi method, and building on the possibilities of (online) mass collaboration, crowd-based mechanisms have been introduced for information aggregation. Several examples demonstrate the creative and decision making potential of large crowds (Füller et al. 2004; Surowiecki 2004), also termed the 'Wisdom of the Crowd'. In general, this concept fits very well with the requirements of innovation in services. For creativity, as well as decision making, we are seeking to involve a relatively large crowd, i.e. those individuals who are involved in the provision of services. In early 2000, the wisdom of the crowd concept became popular alongside the open innovation movement, spurring many related platforms integrating crowd-voting mechanisms (Hrastinski et al. 2010). On these platforms users can typically express their appraisal of an idea by rating it with 'stars' or 'likes', i.e. fairly simple mechanisms for information retrieval.

In recent years, more complex market mechanisms that also support crowd-wisdom became popular, in particular amongst scholars. Market mechanisms, as known from the stock exchange, are used to gather and aggregate information kept by a large group of individuals. Depending on their configuration, these markets are called prediction markets, or betting markets. According to Arrow et al. "Prediction markets are forums for trading contracts that yield payments based on the outcome of uncertain events (Arrow et al. 2008, p. 877)". They have shown high prediction precision in many fields, e.g. forecasting election outcomes. Therefore, they have been applied to a broad set of situations, for instance in the defence and healthcare industries, and have often surpassed other prediction tools (Wolfers and Zitzewitz 2006). In the context of idea assessment, prediction markets are commonly known as idea markets, and work as follows (Kamp and Koen 2009; Soukhoroukova et al. 2012): Each idea is represented by a security, e.g. shares, which are introduced to the market via a sort of Initial Public Offering (IPO) with predetermined prices. Market participants receive a certain amount of a virtual currency, so they can start buying these idea shares. If the amount of shares sold for a specific idea exceeds a predefined threshold at the end of the IPO phase, the idea passed a first gate. Otherwise it is taken off the market. Subsequent to the IPO, market participants can trade their idea shares in a similar fashion to the real stock market. The current price of a share reflects the value of the related idea as perceived by the market. In our services context, these participants would be the service providing staff, or even customers.

Betting markets are related to prediction markets, but are inspired by betting at horse races, rather than the stock exchange. Correspondingly, participants do not buy shares, but place bets (Plott et al. 2013). One major difference between betting markets and idea markets lies in the number of rounds the market is used for. While idea markets typically are designed as a two-step approach, i.e. IPO and subsequent trading, betting markets consist of one single step.

So far, idea and betting markets have been implemented at various corporations in different geographies, e.g. EnBW (Stathel 2010), GE (Spears et al. 2009) or Intel

(Gillen et al. 2012). Nevertheless, their use is far from widespread. While idea markets do provide some clear advantages for information aggregation, such as the potential to involve large numbers of individuals, quick results, and continuously updated preferences of the participants, they also have a downside. As Graefe and Armstrong (2011) found out in an experimental setup, prediction markets were not very popular amongst participants, compared to more traditional approaches.

3.5 Summary Discussion

In this section, we have addressed our second guiding question, i.e. to provide an overview on state-of-the-art mechanisms for idea assessment in service firms. We have seen that key criteria to evaluate service ideas comprise of strategic fit and various aspects of competitiveness, ranging from resonance in the market, to the strengthening of internal capabilities. Correspondingly, sources offering insight into market resonance of an idea is of great importance, and in service organisations this insight can often be found with the wider, service providing, staff. With regard to the group composition for idea assessment, multi-disciplinary boards with well-informed decision makers who are constantly seeking further information from their staff, are critical. Various approaches to support decision makers to gather and aggregate obtainable knowledge are available. Those approaches that cope with large audiences (crowds) and support a quick provision of information have yet to mature, and become more accepted by their users.

In seven exploratory interviews with German innovation managers of national and international service firms offering professional services, ICT-related services, and financial services; we saw that most organisations still stick to the classical board approach to assess ideas. However, three organisations already use collaboration platforms to allow their staff to discuss early stage ideas. The openness towards more sophisticated market mechanisms was mixed. *This raises the question whether there are novel approaches that are potentially more appealing, while still offering the possibility to aggregate information from a large audience.*

4 Novel Approaches to Idea Assessment in Service Firms

In order to address our third guiding question, we have conducted a case study on novel approaches for idea assessment, in cooperation with a large German financial services provider. So far, the company has gained experience with an idea management platform, which offers idea collection, discussion and voting mechanisms. The goal of the case study was to investigate the acceptance and effects of two new mechanisms of idea assessment that address shortcomings of the previously discussed approaches. The *two novel approaches* in question are the application of *serious games*, and *crowdfunding* mechanisms for idea assessment in an established

organisation. In this section, we will introduce both approaches and subsequently report on the results of our exploratory study.

4.1 Serious Games

In August 2012, Bloomberg BusinessWeek (Greeley 2012) reported on an event that took place in San José, California. San José was suffering from shrinking revenue while expenses kept growing—a picture common to many cities internationally. In this situation, San José made an unusual move. For one day, they invited 90 leaders from neighbourhood associations into the city's town hall to allocate the annual city budget by playing serious games. At the end of the session, all groups agreed on the allocation of resources, as well as on concrete areas and actions to realise savings. They achieved a balanced budget, while at the same time getting buy-in from key representatives of the area's inhabitants. So far, the so-called San José budget games have been played three times between 2011 and 2013, with growing participation.

According to Susi et al. (2007, p. 2) *serious games* are "games for purposes other than entertainment", incorporating elements of strategic thinking, communication, collaboration, negotiation, planning and also strengthening related skills. The game applied in the San José case, named Buy a Feature, fulfils this definition. Buy a Feature was originally developed by a Silicon Valley-based company, with the purpose of solving decision making and budget allocation issues in companies (Hohmann 2006). As exhibited in the San José budget games, Buy a Feature was used to prioritise items with respect to limited resources; a task encountered in all idea assessment processes in innovation management. Hence, we selected this game for our exploratory study and collaborated with the game developers to adjust it to an idea assessment situation in a corporate context. Building on their experiences from practice, we defined game rules: Each idea received a title, a description, an overview of its benefits, and a price tag representing the costs of realisation. For the sake of simplicity, we used 'shirt sizes' (e.g. S, M, L) as price tags, with average costs per category. Based on experience from the game's inventor, we defined a joint overall innovation budget for all participants, which was set to 40 % of the ideas' value, and split it evenly amongst the players. In the actual game, the participants placed their individual budgets according to their personal preference. However, they did not necessarily need to spend all of their money. Collaboration, exchange of thoughts, and group discussions amongst participants were explicitly permitted to potentially make players reconsider their individual decisions. In order to maintain high dynamics, the game was set up to be played by up to ten players, last a total of 20 min, and contain no more than 15 ideas. Discussion and exchange were additionally stimulated by a facilitator, who also had the option of chatting with individual participants.

Applying the game to the idea assessment within a pilot business unit of the financial services provider, we were presented with a set of 27 ideas and eight

players. In order to comply with the game rules set out above, we organised the idea assessment in the form of a tournament: The eight participants played two games (semi-finals), one with 13 ideas and one with 14 ideas. In this round, 12 out of the 27 ideas received the required funding and thus got transferred into the finals. In the finals, six ideas were selected by the participants. Consequently, we ended up with three categories of ideas: (1) Winners of the finals, (2) winners of the semi-finals, which did not get funded in the finals, and (3) rejected ideas, i.e. the remaining 15 ideas, which were not chosen in the first round.

Although the sample size is not sufficient for inferential statistics and extrapolation, we compared the result of our game to the outcome of the conventional board-based decision process in a descriptive manner. The result of the conventional approach was achieved by having a small number of company executives decide in parallel on the ideas on the basis of the same information presented to the game participants. As shown in Table 1, most of the ideas winning the finals were also selected by the conventional board-based decision process. However, opinions differed with regards to the importance of winners of the semi-finals.

Following, the assessment and prioritisation of the idea portfolio, we asked the participants for feedback via an online questionnaire. Again, due to the small sample size of eight participants (seven of which answered our questionnaire), the results are not statistically reliable, but rather provide interesting tentative insights. Over 70 % of the participants stated not to use the existing idea management platform regularly, i.e. not every week. Even when they do access the platform, roughly 60 % use breaks at work to mostly just browse new ideas (50 %). Only 20 % of their platform usage is dedicated to voting, and 30 % to contributing own ideas.

As mentioned in the previous section, user acceptance is challenging for some idea assessment mechanisms. Hence, we asked our participants to compare the application of serious games to their current involvement in idea assessment via voting. The corresponding results are shown in Fig. 3. All of the respondents reported to 'like the game', and even perceived it as 'enjoyable', while only 57 % assigned the same attributes to the current mechanism. Also, a larger number stated a feeling of greater involvement, and 85 % said that they would spend spare time to play the game, while currently none of the players would invest spare time in the established idea management solution.

To conclude, in terms of the categorisation depicted in Fig. 2, serious games fall into the category of group-based approaches. Serious games provide an alternative

Table 1 Overview of results from the serious games case study

Serious games	Conventional decision	
	Selected	Not selected
Winners of finals	5	1
Winners of semi-finals	2	4
Rejected ideas	1	14

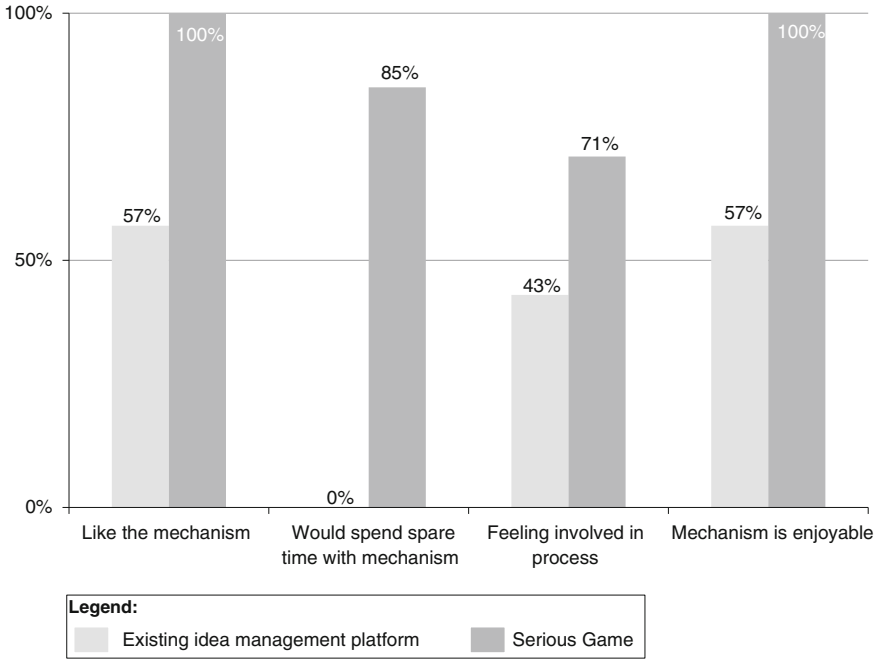

Fig. 3 Acceptance of serious games versus voting on idea management platforms

mechanism for deliberation, which has the potential to facilitate intense involvement of participants. As the Budget games show, the games approach can be used with larger groups. However, it is not designed for involving crowds.

4.2 Enterprise Crowdfunding

In recent years, a phenomenon called *crowdfunding* has emerged, driven by advances in ICT and Internet use. It became particularly popular amongst initiators of charity, creativity, or investment related grassroots projects (Ordanini 2011). Structurally, crowdfunding builds on the idea of crowdsourcing (Howe 2009), which can be described as sourcing something from a large crowd that would have normally been provided by one self or paid employees (Geiger et al. 2011). Accordingly, Belleflamme et al. (2014, p. 588) define crowdfunding as involving "an open call, mostly through the Internet, for the provision of financial resources either in form of donation, or in exchange for some form of reward and/or voting rights." Crowdfunding became known to a wider public by the launch of platforms such as *kickstarter.com* or *indiegogo.com*. These platforms provide a forum for people to propose ideas to a large audience and ask for financial contributions in return for usually rather small and symbolic givebacks. These proposers define a

desired funding threshold for their idea that needs to be achieved in order to claim success and receive the funds. In addition to the funding aspect, crowdfunding platforms offer several features allowing proposers and investors to communicate with each other, and build communities around ideas in order to advance and promote them. Initially crowdfunding gained popularity for ideas related to charity, music, arts, film, etc. Very soon, proposers of ideas for innovative consumer products, e.g. the Pebble Watch (Medeiros 2014), used the platforms to raise funds for realising their ideas in return for the actual product. Building on this, crowdfunding became popular amongst start-ups to acquire equity. Since 2010 specialised equity-based crowdfunding emerged in a number of countries and have grown since (e.g. Massolution 2012). By reviewing all past and current projects on the largest German equity-based crowdfunding platforms such as Seedmatch, Innovestment, and Companisto we found that companies on these platforms are typically early stage start-ups offering scalable services over the Internet or via apps seeking funding between 50,000 and 300,000 EUR.

Crowdfunding is a type of idea assessment mechanism on the internet which not only helps to evaluate ideas but also ensures their funding in case they are selected by the crowd. This makes the mechanisms particularly interesting for use inside companies, i.e. using internal staff as the crowd. This mechanism potentially allows to address a shortcoming of established idea assessment mechanisms as discussed in literature. Barczak (2009) states that about 20 % of ideas emerging from established selection processes do not receive any budget for their advancement. Cooper (2009) calls this phenomenon 'hollow Go-decisions' which lead to large project portfolios and slow implementation. Hence, the possibilities to integrate assessment with funding of ideas, to tap the knowledge of a wide audience, to facilitate an exchange between idea proposers and those who assess the ideas, to form communities around ideas which potentially help to realise them suggests to explore the applicability of crowdfunding as an instrument for company internal idea assessment. Subsequently, we will call this company-internal use of crowdfunding 'enterprise crowdfunding'.

In our case study of the German financial services provider, we conceptually designed an enterprise crowdfunding approach. In general, we followed the characteristics of crowdfunding platforms as known from the Internet but had to change some of them to accommodate the use inside a company: (1) Since we did not want employees to spend private money on the organisation's projects, we needed to proactively identify participants and provide them with a budget to invest. We decided to invite all employees of a dedicated business unit, and allocate the same budget to each participant, irrespective of hierarchical level and function. (2) In terms of givebacks for investments in successful ideas we decided to allow small monetary rewards that could increase the participants' funding budget on the enterprise crowdfunding platform. (3) Additionally we suggested implementing enterprise crowdfunding in the form of isolated funding rounds rather than ongoing as known from the Internet. The primary reasons were to accommodate a potentially lower number of ideas and a simpler assignment of funding budget to individual funding rounds. However, the introduction of funding rounds raised new

questions which demand further research. Examples include the identification of an optimal duration of a round, its total budget, or the dissemination of this budget amongst participants.

While the concept still needs to be implemented and tested, we already shared a description of the approach with potential participants, and asked them for feedback. We received 18 responses, which again may serve as a tentative insight. Interestingly, only 20 % of the participants had already heard about crowdfunding, only 11 % have looked at a small number of projects (2–5), and none of the respondents had ever invested money on a crowdfunding platform. After explaining the concept of enterprise crowdfunding to these potential participants, they showed a positive attitude towards its implementation. They particularly liked the idea to be able to 'contribute to the company's future development' (67 %) and to gain 'overview of ideas for innovations in their own company' (56 %). The chances to receive non-monetary (56 %) or monetary rewards (50 %) were also perceived as motivation to participate in enterprise crowdfunding.

In parallel to our study, IBM conducted initial experiments with internal crowdfunding at their research labs in the USA (Muller et al. 2013, 2014; Feldmann et al. 2013). First results show high participation rates, extensive inter-departmental collaboration, and a tendency of supporting ideas with a clear business benefit. Apart from investing monetary budget in ideas, IBM has introduced the possibility of dedicating one's own time to projects, an idea that could integrate well with the application of enterprise crowdfunding in service firms, given that for instance ideas in professional services are often rather labour than capital intensive.

Overall, combining the feedback from our exploratory study with the results of IBM's trials, enterprise crowdfunding seems to be a mechanism to tap the wisdom of crowds that is quite appealing to participants.

5 Conclusion

In this chapter we have provided an overview of the current status of the discussion on idea assessment in the context of service innovation. We have explored how idea assessment is reflected within the service innovation capabilities literature. While the importance of the topic is underpinned in the most recent capabilities framework, there is still little advice on how to implement it in companies. Subsequently, we reviewed several requirements and approaches for the implementation of idea assessment on a more operational level from the literature. In particular, the importance of involving the staff that provides services into the assessment became apparent. Several approaches on how to aggregate knowledge of this audience, and make it accessible to decision makers, were discussed. This ranged from conventional, group-based approaches to more recent approaches supporting the wisdom of the crowd paradigm. We saw that there is still a gap to bridge between the capability to involve a large audience of service providing staff, repeatability of the approach on a regular basis, and user acceptance. Finally, we explored two new

ways for facilitating idea assessment, serious games as a representative of group-based approaches, and enterprise crowdfunding as a crowd-based approach. In regard to these two novel approaches, research is at a very early stage, and more in-depth studies need to be undertaken to better understand their effects in the area of internal service idea assessment. Moreover, the application of idea assessment mechanisms in service firms, as well as their potential to address service-specific requirements, provides ample opportunities for further research.

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Employees and Users as Resource Integrators in Service Innovation: A Learning Framework

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Abstract In order to exploit the emerging opportunities in the marketplace or in society, service organizations are increasingly interested in new innovation models and effective innovative practices. The involvement of users and stakeholders is an essential aspect in these models. This is also the basis of the service-dominant (S-D) logic. This framework replaces the traditional producer-centric view with an actor-to-actor perspective and considers the integration of resources an essential activity in the co-creation of value. Even though S-D logic has apparent implications for theorizing about service innovation, managerially-oriented research in this area is at an early stage. Product- and producer-centric practices and in-house R&D are still the focus of innovation studies, and they also dominate innovation efforts in organizations. The particular interest of this chapter concerns the integration of user-based and employee-driven perspectives in innovation. The two perspectives have until now developed separately, the latter having very few linkages to the S-D logic discussion. However, grassroots-level employees are in a key position as receivers of user insights and as collaborators with users. We suggest a *new integrated approach* by analyzing the user–employee interaction in innovation both theoretically and in two empirical cases.

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1 Introduction

Continuous change, which is based on intensifying global competition and quickening technological development, is a central characteristic in today's economies. It has made rapid learning, i.e., the adoption and creation of new knowledge, an essential ability in organizations. Innovation activities have come to the fore and our understanding about the successful ways of carrying out these activities has deepened and become more versatile. In order to make innovation more efficient and effective, two developments are particularly important: the opening and the democratizing of innovation. The former is a result from the insight that organizations do not possess all the valuable knowledge in-house, but the utilization of external sources is necessary (Chesbrough 2006, 2011). The latter highlights that innovations do not emerge from expert groups only, but also emanate from "non-experts" in communities of practice (Lave and Wenger 1991). In these communities, people learn with others while engaging collectively in creative efforts (John-Steiner 2000). Both views emphasize users, i.e., citizens, communal members, or service customers, as active agents (see also von Hippel 2005).

The view of innovation as a collective undertaking is not new. However, early theories restricted the cooperation to specialized R&D functions and focused on separately organized innovation processes. Mainstream theories considered neither layman employees nor users to be capable of contributing to innovation; their role was limited to application of science-based inventions. The linear model, which favored strong preplanning and systematic process, narrowed the perspective even further (Kline and Rosenberg 1986; Dosi et al. 1988). Since the latter half of 1980s, the engagement of various actors with different skills and competences has been considered beneficial for the emergence and spread of innovations. Innovation has been understood as intertwined and co-evolving with practical activities, which means that it is closely linked with different forms of learning—not only with the conscious search for novelties but also with learning-by-doing (Lundvall 1992).

The earlier view focused mainly on radical technological inventions. Without broadening this view, the majority of service innovations and other intangible innovations would have remained hidden (Miles 1993; Howells 2004). Service innovations are not usually radical breakthroughs, but incremental in nature. Recombination of pieces of existing knowledge is typical. However, these small improvements may gradually lead to radical changes; hence neglecting them would be a serious mistake (Jensen et al. 2007). The pioneers of service innovation theory have pointed out that the cognitive inputs behind the individual outcome may be widely applicable, although the visible change would be minor (Gallouj and Weinstein 1997; Preissl 2000). While the broad view of innovation has enabled the

"discovery" of service innovation, the latter has also encouraged further development of the broad view. An example is the perception that innovation activities in services are usually dispersed in different parts of the organization (den Hertog et al. 2006; Sundbo 1997; Tuominen 2013).

This perception has fostered research into the management of multiple and recursive, not only unified and linear, processes of innovation. The emergence of the broad view does not mean downplaying the need for the management of innovation. The point is to reconcile the top-down managerial activities with the grassroots-level activities that also include "management" in the form of resource integration. This chapter focuses on the resource integration carried out by employees and users.

In recent years, service-dominant (S-D) logic has become one of the most influential approaches in service research (Vargo and Lusch 2004, 2008). It suggests the adoption of an actor-to-actor perspective, instead of the currently dominant provider-centric view, in the analysis of economic and social practices. In this sense, it is in line with the user-based views of innovation. However, the proponents of S-D logic have focused more on the general economic development and everyday business behavior than on innovation. Connecting S-D logic with the broad view of innovation is a tempting perspective, but also a very demanding task.

We take a step in this direction: we examine and integrate the approaches of user-driven and employee-driven innovation and apply S-D logic and its "neighboring" theories—effectuation and bricolage—in this framework. Based on the close linkages between innovation and learning noted above, we supplement our analysis with learning theories, especially with the theory of expansive learning (Engeström 1987). We argue that the actual interaction between frontline employees and users is a unique learning opportunity that organizations should utilize more effectively in the development of novelties.

We have structured the chapter as follows. We start by reviewing the present discussions of user-driven and employee-driven innovation. Thereafter, we summarize those points of S-D logic, effectuation, and bricolage, and the theory of expansive learning, that we will apply in the creation of an integrative view about the role of user-employee collaboration in innovation. We demonstrate the suggested framework with two case studies and discuss the framework's contribution to the theory and managerial practice of service innovation.

2 Perspectives on User-Driven and Employee-Driven Innovation in Services

Employees' and users' involvement has been considered fundamental in the service innovation literature. This is because an innovator needs to understand a variety of activities involved in value creation linked to a particular service (Fuglsang and Sundbo 2005; Sundbo and Gallouj 2000). In addition to analyzing the service providers' activities, the interactions in the user interface and the users' activities that are not visible for the organizations are important to understand (Grönroos

2012). Users and employees are key actors in innovation because they co-create value in intangible service processes and thus have best knowledge of them. The perspectives highlighting their role are summarized next.

2.1 User-Driven Views on Innovation

The point that organizations do not create innovations alone was first highlighted during the 1970s (e.g., von Hippel 1976, 1978). Later on, a large body of literature has indicated the importance of users for innovations; here, we refer to these studies as *user-driven innovation* perspectives (hereafter UDI). Users act in several roles, ranging from the suggestion of ideas to acting as sole innovators (e.g., Edvardsson et al. 2010; Nordlund 2009). Recent literature suggests a growing range of methods that enable users' participation in a controlled manner in different phases of an innovation process (e.g., Alam 2006). Users also innovate without service providers' guidance by creating new solutions for their own use (e.g., von Hippel 1978) and by reinventing and modifying an innovation after its launch (Tuomi 2002; Sundbo 2008). Organizations are advised to identify and develop the users' solutions further into replicable solutions (e.g., von Hippel and Katz 2002).

Whereas our knowledge concerning these situations is increasing rapidly, what is often overlooked is that also everyday interactions during service delivery are important arenas for UDIs (Sørensen et al. 2013). This is highlighted in project-based services, where user-specific solutions may lead to innovations (Gadrey and Gallouj 1998). However, the active role of users as innovators is often not explicitly addressed in this literature. On the other hand, similar everyday activities are perceived as one form of employee-driven innovations.

2.2 Employee-Driven Views on Innovation

Frontline employees are considered important in service innovation, both because they have practical knowledge of service processes and because they are able to identify and communicate users' needs and ideas during their daily work (den Hertog et al. 2006; Gadrey and Gallouj 1998; Sundbo 1997). Employees' roles are currently creating interest also in general innovation management discussions. *Employee-driven innovation* (hereafter EDI) refers to "the generation and implementation of ideas, products, and processes—including the everyday remaking of jobs and organizational practices—originating from interaction of employees, who are not assigned to this task" (Høyrup 2012, p. 8, see also Kesting and Ulhøi 2010). Even though EDI as such is a fairly new discourse, it builds on earlier studies on participation and democratization of work (Ehn 1993), organizational creativity (Amabile 1988), high-involvement innovation (Bessant 2003), innovative work behavior (Axtell et al. 2000), proactive behavior (Bindl and Parker 2011), and

intrapreneurship/corporate entrepreneurship (de Jong and Wennekers 2008). These studies show that employees raise concerns, suggest ideas, negotiate and promote ideas, carry out innovation activities, make decisions, and modify novelties in their daily work (de Jong and den Hartog 2010; Scott and Bruce 1994; Tuominen 2013).

The proponents of EDI suggest that employees can act as active innovators in all types of innovation processes, even though the form may vary from organized participation in management-driven processes to spontaneous and autonomous creation of novelties at the grassroots level (Høyrup 2012). In service organizations, especially the latter activities are important to recognize: employees create novelties during their daily customer work (Carlzon 1987; Gallouj and Weinstein 1997; Sundbo 1997; Sørensen et al. 2013). These activities are strongly linked with learning, which has been characterized as practice-based, improvisational, or experimental (Brandi and Hasse 2012; Brown and Duguid 1991; Ellström 2010). While the EDI discourse emphasizes employees' resources—such as creativity, competences, and problem-solving ability—as the drivers of innovation (Høyrup 2010), it does not yet focus on the relationship between employees and users.

2.3 A Need for an Integrative Perspective

The studies show the importance of users' and employees' involvement and describe practices through which UDI and EDI take place. While this knowledge is developing rapidly, we recognize two research gaps. First, UDI and EDI theories have developed in isolation from each other, as the focus is either on user-driven or employee-driven innovation. Even though studies show that many innovations take place in the user interface, only a few empirical studies provide insights into how users and employees practically innovate *together*. Second, even though grassroots-level activities are viewed as important, they are not necessarily recognized and supported with managerial models. Without managerial support they may never transfer into replicable solutions (Fuglsang 2010; Brandi and Hasse 2012). Particularly management models that would integrate UDI and EDI are still scarce (Hasu et al. 2011).

Next, we will suggest several promising concepts for addressing these gaps. First, S-D logic can provide a sound theoretical background for conceptualizing users' and employees' interaction in service innovations. Second, the concepts of effectuation and bricolage address situations where changes happen in an experiential way; even in circumstances of resource constraints, entrepreneurial employees and users can find innovative solutions based on "whatever is at hand" (Baker and Nelson 2005; Fuglsang 2011). This viewpoint is especially relevant in public services, which face demands for cost-cutting and structural renewal. Third, the theory of expansive learning provides understanding of the emergence and development of these processes and helps integrate perspectives.

3 Service-Dominant Logic Applied in the Innovation Framework

During the last two decades, the focus on use value has gained ground in innovation theories (Normann and Ramirez 1998; von Hippel 2005). This viewpoint is particularly suitable in the service context, in which it is difficult to think about value as inherent in specific outputs. A strategy based on the pursuit of use value is tightly linked to the pursuit of innovations: redefining the users' problems and discovering hidden demand, and providing users (or together with users, i.e., coproduction of value) solutions which they can make use and benefit in their everyday life (e.g., make vital improvement, achieve important goal, acquire anticipated change, enhance wellbeing etc.). When innovations are examined as new values, it is not enough to pay attention to individual services, but broader solutions and systemic changes are often under the spotlight. In these, the rearrangement of existing items may be the core of innovation (Kim and Mauborgne 1999; Normann and Ramirez 1998).

Value-based analysis has much in common with the broad view of innovation (Kline and Rosenberg 1986; Lundvall 1992). In recent years, similar thoughts have been presented within the framework of S-D logic. As a service marketing-based approach, S-D logic is not directly linked to innovation theories. On the other hand, it aims to change our traditional thinking even more profoundly than any other theory toward the appreciation of users as central economic and social actors. Next, we first summarize the core propositions of S-D logic and then analyze its implications from the viewpoint of innovation.

3.1 Short Summary of the Core Propositions of S-D Logic

Service-dominant logic, developed by Vargo and Lusch (2004, 2008), focuses on the process of collaborative and reciprocal value creation. It starts from the critique of goods-dominant (G-D) logic that views economic activities from the perspective of the exchange of tangible and intangible products. According to S-D logic, the products represent only temporal cross-sections in more complex and timeless value-creation networks that make up the economy and society.

S-D logic focuses first and foremost on new theorizing based on the concept of "service", not "services." The former refers to *the process of using one's competences (knowledge and skills) for the benefit of another party*. "Services" (plural) are a particular type of products. Both goods and services are important, but not primary to value creation. They are conveyors of competences, i.e., appliances or vehicles for service provision. In G-D logic, value is seen as a property of goods, which are created by the provider and distributed to users. S-D logic argues that the provider cannot create value but value is collaboratively co-created with the beneficiary. The multiple relationships in the user's economic and social context

contribute the value creation—the user integrates contextual resources with the specific input received from the provider. Before the value can be realized, *the input from a single provider has to be integrated with other resources*, some of which are obtained through the market, others based on public sources, and still others privately provided.

3.2 Linkages of S-D Logic to Innovation

Even though the analysis of S-D logic in relation to innovation is only beginning (see Mele et al. 2010; Kowalkowski et al. 2012 as examples of the first efforts), it contributes in several ways to the deepening of our view on innovation. It highlights the social and systemic features of innovation and the recursive and complex nature of the processes in which innovations emerge. It points away from linear, sequential views—based on the dyad of the provider and the customer—towards the interactive network orientation. A special contribution is the replacement of the producer-centric view with *an actor-to-actor perspective* (Vargo and Lusch 2011). This view favors genuinely user-based approaches in innovation. If users are seen only as a target, the "user-based" approach is restricted to surveying their needs and interpreting them from the producer's viewpoint, while the creative potential of users is neglected. In addition, the end result may be perceived as a useful novelty by the producer, but not by the user (Helkkula and Holopainen 2011).

Broadening of the view from the focal actors—the provider and the user—to their context brings to the fore the resources available to actors. Vargo and Lusch (2004) made an important remark from the viewpoint of innovation: *resources are not, but they become*. The usefulness of any particular potential resource from one source is moderated by the availability of other potential resources from other sources, the removal of resistances to resource utilization, and the beneficiary's *ability to integrate* resources (Lusch et al. 2010). S-D logic highlights the importance of networks of the actors providing resources. *Networks are not just aggregations of relationships, but dynamic systems.* A critical characteristic of these systems is that they are self-adjusting and thus simultaneously functioning and reconfiguring themselves (Vargo and Lusch 2011). The importance of resource integration and the reconfiguration of relationships links S-D logic to learning theories—learning in a dynamic, changing environment is essential.

In addition to its own theoretical postulations, S-D logic has analyzed and integrated views that are dispersed in various scientific "schools" and disciplines, and which are relevant in the development of nonlinear, user-, and actor-based understanding of innovation. S-D logic-related approaches that are particularly useful are *effectuation and bricolage*. Next, we discuss the similar views of these two approaches on behaviors related to innovation in uncertain, resource-constrained environments. These notions can be used as a "bridge" between S-D logic and innovation theories—regarding the theories on the management of innovation in particular.

4 Effectuation and Bricolage as Frameworks to Tackle the Uncertainties in Innovation

How do people take action in uncertain, resource-constrained environments in order to innovate? Prominent theoretical perspectives on entrepreneurial action, particularly effectuation (Sarasvathy 2008) and entrepreneurial bricolage (Baker and Nelson 2005), suggest that instead of selecting between means to achieve a predetermined goal, in these environments individual entrepreneurs may rely on already available resources in identifying and exploiting opportunities (Fisher 2012). Effectuation replaces predictive logic with *a means-oriented approach*, which begins from available resources and allows the goals to emerge in the courses of action. In line with S-D logic, it highlights that any given resource can be made more or less valuable and capable of producing long-term advantages: thus, what participants do with resources matters. *Expanding cycles of resources* characterizes effectuation, including the process of partner acquisition (Sarasvathy and Simon 2000; Sarasvathy 2008). In iterative processes of *adaptive trial and error*, participants try out strategies that enable direct control, co-creation, and transformation of situations toward positive outcomes. Quickly realized *small successes and failures* help avoid the risk that some action would put the entire effort in jeopardy (Sarasvathy and Kotha 2001). For the present study, effectuation provides means to recognize and understand the often messy potential of service innovation processes in the making.

Bricolage gives us a view of the *grassroots problem-solving practices of participants*. It suggests that when faced with resource constraints, employees may find innovative solutions based on "whatever is at hand" (Baker and Nelson 2005; cf. Lévi-Strauss 1967). The participants create and combine their scarce resources in a novel way in order to develop some useful and novel outcomes (Baker and Nelson 2005; Fuglsang and Sørensen 2011; Salunke et al. 2013). Bricolage is a process of co-shaping an emerging path: participants offer inputs to generate a virtuous learning circle. The boundaries blur between design and implementation, and between rulemaking and rule following (Garud and Karnøe 2003).

Effectuation and bricolage both emphasize the significance of *individuals' actions and control over resources* (Fisher 2012). In order to explore how "ordinary" interaction between employees and users can lead to innovations, we chose to use the concept of bricolage in the empirical analysis. Bricolage serves as a bridging concept between inherently abstract notions of UDI, EDI and resource integration. While being a theoretical concept, it is also a mode of individual practice which can be observed empirically. Bricolage incorporates contributions and resources of all participants in a given situation. Personal experience of bricolage, signaling the motive/need of an individual or a group, and the benefit that bricolage provides for meeting that motive/need, is often required for resource integration to begin (Engeström 2001a; also Baker and Nelson 2005).

5 Development of Value Co-creation: The Theory of Expansive Learning

Practice-based (Blackler 1995; Ellström 2010) and situated (Lave and Wenger 1991) views on learning are especially relevant in the context of service innovation. New knowledge created in innovation activities is not only incorporated in new products, processes and services, but also in organizational practices; it is internalized by the people involved in the activity (Lundvall 1992; Ellström 2010). Due to the intangibility of services, opportunities for unique value constellations may emerge during everyday service delivery, and the actors involved may improvise on the spot by creating and testing new tactics for value creation (Gallouj and Weinstein 1997). Service ideas are developed and elaborated in action without detailed a priori planning and new opportunities are rapidly used to revise the goals and value offerings (Toivonen and Tuominen 2009; Toivonen 2010).

As discussed above, S-D logic, effectuation, and bricolage all open up new perspectives on the *significance of multiple relations and activities* in acquiring resources for value creation in service innovation. We also acknowledge that these views inherently approach the idea of learning, i.e., the development of communities and capabilities related to new value creation (e.g., John-Steiner 2000; Miettinen 2013). The idea of resources as "becoming" (Vargo and Lusch 2004) suggests that *resources emerge in social action.* Correspondingly, the argument that what people do with resources matters (Read et al. 2009) proposes that *people's context-specific actions* related to resources are significant. These views imply that integrating or expanding resources for innovation require concrete "making": creative and laborious process in which contexts, participants, and relations are constantly being reconfigured in order to create new value.

Why and how would participants make the effort to reach beyond their known resources and capabilities in order to collaborate creatively (John-Steiner 2000)? This question is the interest of inquiry in the theory of expansive learning (Engeström 1987) which derives from the cultural-historical activity theory (Cole and Engeström 1993; Leont'ev 1978) and which is also closely connected to practice-based, situated, and cultural theorizing of learning.

Expansive learning in a community begins when, during the course of activity, some individuals begin to question the current goals, patterns and norms, sometimes even the basic motive/need of the activity, and search for new practices. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort at grassroots level (Engeström 1999, 2001a, b), after which a new motive and expansive cycle follows. Engeström (1987) proposed this as a new form of learning: *expansive learning* of cultural patterns of activity that are not yet there, and which therefore involves *horizontal or sideways* learning and development (Engeström 2001a, b). Hence, actions in situations that require innovative solutions often take the form of improvisation and bricolage (ibid.). Individuals' and groups' transformative agency is at the core of expansive learning: a firm cannot be the subject of expansion. Therefore, *expansive learning perspective offers theoretical*

and analytical means to explore, in a nuanced way, the emergence and development of resource integrator roles and practices in service innovation.

6 Integration of Resources as a New Perspective in Innovation Management

The separate development of EDI and UDI literatures has both theoretical and practical consequences. The exclusion of employees in the theorizing on user-driven innovation and vice versa conflicts with the basic ideas of widening inclusion in open innovation and innovation democracy. It also undermines the network perspective for innovation. From the viewpoint of organizational practice, this separation may cause confusion among those who try to guide the involvement of users, employees, and other participants in innovation.

Consequently, we suggest an integrative framework in order to better understand and enhance users' and employees' interaction, especially the integration of resources for co-creation of use value in service innovations. We apply ideas from three sources discussed above: S-D logic (Vargo and Lusch 2004, 2008), effectuation and bricolage (Read et al. 2009; Garud and Karnøe 2003), and expansive learning (Engeström 1987). Together these theories tackle the following interrelated processes:

(1) Practice-based emergence of motive, relations, and capabilities related to resource integration and configuration (this involves opportunity recognition by experimenting with resources for tackling the unknown, i.e., what is not yet there).
(2) Integration and configuration of resources from multiple actors (this relates to the actor-to-actor -perspective, the expansive use of resources comprising of users, employees, and other parties, and the ensuing creation of new resources).
(3) Adoption or transformation of integrated resources for sustaining and diffusing/reinnovating the use value (effectuation through expanding cycles of resources).

The three interrelated processes can be seen as a dynamic development process or a temporal trajectory of resource integration and configuration. Expansive learning takes place—or needs to take place—across all these processes, but especially in the second and third processes. Shifts between processes are critical for the expansion to continue, as it does not necessarily proceed smoothly (Hasu 2000a, b; Hasu and Engeström 2000). Figure 1 presents the focus of the present study and the linkages to its three theoretical backgrounds, hereafter formulated as *the learning framework of resource integration*.

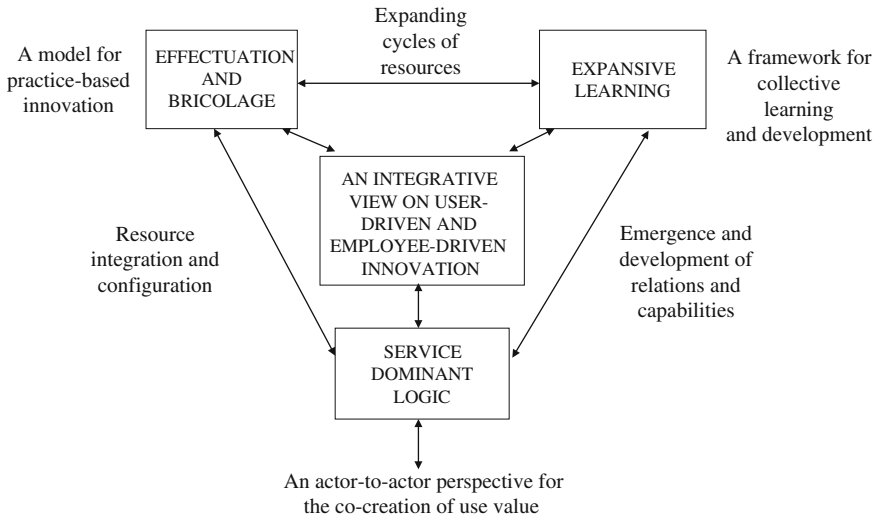

Fig. 1 The focus of the study and the linkages to its three theoretical backgrounds: learning framework for resource integration in service innovation

7 Learning-Based Resource Integration in Practice: Two Case Examples

We provide two in-depth case studies from the Finnish public sector to illustrate the developmental dynamics of the resource-integrator roles of employees and users in a resource-constrained environment. We apply the framework developed above and highlight these groups as "practical bricoleurs." Both case studies, *Elderly day club* and *Forest pre-school*, come from a middle-sized city in the southern part of Finland. Next, we present the analytical challenge, the data and the methodology used. After that we summarize our results as three phases of resource integration.

7.1 Invisibility of the Creation and Use of Resources as an Analytical Challenge

Even in service organizations, the S-D view faces the risk of being neglected because the value creation is indirect in nature. Typically, attention is directed to single goods and services that are easy to grasp (Vargo 2009), whereas the potentially innovative resources of grassroots-level actors may not be visible to managers and top executives. Even the employees themselves may not recognize the significance of solutions they create to users' problems. They may lack the

means to comprehend and communicate to the managers their individual and collaborative competences and other available resources.

In order to explore the role of resources of employees and users in microlevel interactions, we apply the learning framework for resource integration developed above. The framework provides the analytical means to make visible the emergence of various cultural resources and the expansion of these resources from one mode of activity or one participant group to another.

7.2 Data and the Case Study Methodology

The data collected from 2011 to 2013 included thematic interviews of four informants involved with the Open day club for elderly and eight informants involved with the Forest preschool, each lasting approximately 1.5 h. In addition, few on the spot interviews of managers, employees, and users were conducted during participant observation. Interview themes covered the interviewees' perceptions concerning their prevailing—current and future—intentions, roles, practical tasks/duties, benefits, and ideas related to the novelty under scrutiny. The interviews also included narratives about everyday life at the sites. All the interviews were recorded and transcribed. Field notes and reports were written during and after the observations. Also documents, such as planning documents, brochures, journal articles, webpages and a book, were collected from both cases.

Our case study included both the temporal and the social-material point of view of expansion, i.e., what actions had been taken in particular point of time, and what material and social resources had been used at that time (methodology of analyzing expansion, see Hasu 2005, 2000a). Among the *potential dimensions of expansion* (Engeström 2001a; Hasu 2000a), the *social-spatial* ("who else should be included?") dimension refers to the inclusion of employees, users, and potential other parties as resource integrators in service innovation. It characterizes the interactional practice in the context in which resource integration takes place and new relationships are built up in order to create, sustain, and spread a novelty. Accordingly, we aimed at examining and interpreting the temporal development of value co-creation in resource integration activities as social-spatial expansion. Our analysis was conducted in three phases. First, the development trajectories of both cases were written into rich narratives bearing the resource integration (of all the actors involved) in focus. Then, the trajectories were divided into three phases of expansion and finally, the elements in social-spatial expansion in each phase were investigated and considered in detail (as shown in Table 1).

Table 1 Developmental phases of resource integration and related roles in the two case studies

Phase	Objectives of the analysis—social-spatial dimension of expansion	Case elderly day club	Case forest preschool
Phase 1 Origin and emergence of employee resource integrator capabilities	Societal motive/need of the idea	Rapidly increasing and differentiating service needs of the elderly and simultaneous decreasing of funding	Flexibility and pedagogic quality as new challenges of children's day care services and pressures to reduce costs
	Context, relations, and activities in acting upon the idea	Open elderly campus as a new facility offering spaces, relationships, and opportunities for a creative and multi-skilled, networked employee to initiate new services	Tradition of utilizing nature in education, new residential area surrounded by forests. Shortage of space for preschoolers led enthusiastic outdoor-hobbyist manager–employee dyad to initiate solutions
	Resource integrator role	Single employee as resource provider, gatherer, and integrator—employee as bricoleur	Employee-pair as resource provider, gatherer, and integrator—employees as bricoleurs
	Role of management	Distant, managers constantly changing	Local manager as active, engaged participant
Phase 2 Emergence of collaborative resource integration of employees and users	Context, relations, and activities in developing the novelty	Carpentry workshop - project: putting the idea of dedicated activities for elderly men on the campus in action	Hut in the forest—project: putting the idea of the forest preschool in action and making it a local attraction. Connection to forest pedagogy researchers
	Resource integrator role	Hands-on collaboration of the employee and elderly users as resource gatherers and integrators (co-bricoleurs)	Hands-on collaboration of employees, parents, and children as resource gatherers and integrators (co-bricoleurs)
	Characteristics of use value	Employee empowerment and improved wellbeing and quality of life for elderly in single location—elderly men as a new customer group	Motivated employees, active agency of children, novel quality of day care, and attractive area for families
	Role of management		Active partner in the creation of novelty

(continued)

Table 1 (continued)

Phase	Objectives of the analysis—social-spatial dimension of expansion	Case elderly day club	Case forest preschool
		Recognition of the novelty and the critical role of the employee	
Phase 3 Transformation of resource integrator roles of employees and users	Context, relations, and activities in developing the novelty	Reinnovating the elderly day club activity and diffusing it in other locations of the city	Diffusing the forest preschool to other parts of the town (effectuation) and learning from the new sites
	Resource integrator role	Employee as coordinator of service delivery in multiple locations—end of the co-bricoleur role of employee, but elderly users continue as bricoleur-collective	Employee becomes an active agent in diffusing the novelty and forming a learning network between forest groups—partially continuing the role of co-bricoleur
	Characteristics of use value	Emerging opportunity for larger group of elderly to participate and make use of the novel service (option for enlarged beneficiary)	Larger group of children and their families using the novel service (realized enlarged beneficiary)
	Role of management	Preoccupied, changing managers: focus on systematization of services in all locations instead of developing quality and differentiation of services	Active support: expansive role of upper management and local manager as partners in generalization of the concept (expansion of leadership roles)

7.3 Results: Development of Resource Integrator Roles and the Co-creation of use Value in Two Cases

We identified three phases of resource integration and related roles in the two cases:

1. Origin and emergence of the resource integrator capabilities of employees (employee bricoleur)

2. Emergence of collaborative resource integration of employees and users (the most critical phase of expansion in the resource integration)
3. Transformation of resource integrator roles of employees and users

All the three phases are depicted above in Table 1. The findings suggest that the second phase is critical especially from the viewpoint of employee–user interaction. It opens up an insight into the previous and preceding phases of resource integration accordingly. Next, we will first describe both cases by briefly introducing the overall context, and then concentrating on the second phase of the resource integration.

7.3.1 Elderly Day Club: Emergence of Collaborative Resource Integration of Employee and Elderly

This case describes a municipal service which provides the elderly with an opportunity for social interaction and stimulating social activities. The aim was to promote the physical, social, and mental wellbeing of the elderly who were living on their own. The case illustrates how an employee, working as a facilitator of the elderly day club, together with the users, creatively integrated available human and material resources (her own and those of the users) in order to develop novel activities. The facilitator actively sought new resources by developing collaboration with volunteers and other groups. As an outcome, the elderly day club covered a much wider range of social activities than originally budgeted for.

In the first phase of resource integration (Table 1), the responsible employee had learned how to gather and nurture scarce material resources to test her service ideas. However, a new service idea, carpentry workshop, was the outcome of collaborative resource integration. The engaged employee convinced the local manager that separate, dedicated groups were needed for men and women in order to keep men participating in the club. She made an application with an action plan, got a few rooms, and acquired some funds and donations; when the workshop project started, she was the motor of the project.

Critical expansion in this second phase marked the emergence of collaborative roles of the employee and elderly users as resource gatherers and integrators. Because of scarce resources and without former experience of woodwork, the responsible employee asked the future users, i.e., the elderly men, to help finish the carpentry workshop facility. She "hand-picked" a small group of recently retired men and collaborated with them intensively in gathering donations, materials, and equipment from their personal and former occupational networks. The men were eager to help. Instead of being the sole bricoleur, the responsible employee and the elderly users became co-bricoleurs.

New activities, abilities, and energy emerged in the participant groups. This resulted into rich production of crafts, which were then sold outside to get new funds for materials and trips. For instance, men renovated old furniture and donated them to the campus. The men's group sustained: more men came in and stayed. The

most inspired participants recognized the unique potential of the service and volunteered to spread the activity. The responsible employee felt empowered as she succeeded and learned new competences.

The carpentry workshop project proved successful, and as the word spread, also the upper management recognized the work and praised it in public. Ideas of the elderly were heard and appreciated in the planning of the activities. In the third phase of resource integration (Table 1), however, a major transition started in the organizing of many services for elderly, and the management's target shifted to systematization of all services instead of developing single services. The roles of the responsible employee and the elderly in the local campus changed: the employee was given a new assignment as a general coordinator of the elderly day activities in the city, and the elderly users adopted the role of facilitators of their own activities.

7.3.2 Forest Preschool: Emergence of Collaborative Resource Integration of Employees, Managers, Children, and Parents

This case study illustrates how a pedagogical novelty called Forest Preschool evolved from a local service improvement in a children's day care center into a forest pedagogy concept covering the entire town. The first experiment was created by employees, and nurtured by several training occasions, contacts with foreign forest pedagogy researchers, and the forest surrounding the day care center. During a period of scarce financial support, resources and knowledge were actively sought from the parents of the children. However, spreading the local service improvement required help from the service director. The expansion of resources and ideas from the employee-bricoleur to the service director, and the resulting collaboration between them, served as a springboard for the wider diffusion and sustainability of the novelty.

In the first phase of resource integration (Table 1), a nature-enthusiast local manager had encouraged her employees to integrate nature in their educational practices. She had asked one outdoor-hobbyist employee to plan how nature could be integrated to the early childhood education and even solve the shortage of facilities. The outcome of the ensuing broader collaborative resource integration was the forest preschool—with a hut in the woods—as a local attraction. Two employees made a plan, actively participated in the start-up, and solved many practical problems while organizing the educational activities outdoors. In the early phase, the group stayed only a few hours a day in the forest but later on they started to spend there more time to fully benefit from the idea. In spite of many practical problems, the employees persistently developed the nature-related educational activities outdoors, and stayed outdoors even during the winter.

Critical expansion in the second phase was the emergence of collaboration between employees, parents, and children as resource gatherers and integrators. The children kept a diary on their nature observations, which formed a basis for learning and documentation of the novelty. The parents were welcomed to join right from

the beginning and their occupational competences served as a resource in enriching the education. Especially, fathers became enthusiastic collaborators: some of them joined winter-fishing trips and loaned their fishing equipment to children. Employees, parents, and children became co-bricoleurs.

Preschoolers became active observers, explorers, and bricoleurs of their surroundings. One of the two responsible employees became known as an expert of forest pedagogy, and started to write a book about the endeavor and to give lectures for early childhood educators. The other responsible employee became a skillful photographer of the nature and the preschool activities. Fathers in particular became involved with early childhood education in a new way, and the residential area became attractive for families.

The local manager and upper management (a service director) reacted quickly to the needs of the forest preschool group: for instance, a milk trolley was acquired in order to serve lunch outdoors. The local manager often acted as a partner in problem solving and bricolage. In the third phase of resource integration (Table 1), one responsible employee, the local manager, and the service director joined forces and started to spread Forest preschool as a service concept in the municipality. All parties broadened their competences, but the capabilities and responsibilities of the individual employee expanded the most as she became an active agent in diffusing the substance of the novelty.

7.3.3 Summary of the Two Cases in the Critical Phase of Resource Integration

Figure 2 depicts the critical second phase of resource integration, the expansion of employee–user interaction and emergence of collaborative roles in resource integration (co-bricoleurs) in the two cases. The cases have similar characteristics, but they also differ in some respects.

The cases illustrate, first, that the ability for expansive resource integration between employees and users was actually rooted in the *preceding experiences of small successes and failures* (Sarasvathy and Kotha 2001) and *relations in the wider network contexts,* in which the motivated employees had learned to replace missing or incomplete resources with other available sources (e.g., Vargo and Lusch 2004, 2011). The employees had become bricoleurs, equipped with a work pattern of dynamic resource utilization and confidence on self-determining and creative problem solving.

Second, employees' *ability to recognize users' experiences, networks, and competences* as meaningful resources was an important prerequisite for successful collaboration. Users were respected as co-bricoleurs, i.e., hands-on partners in service development. Inspired by a challenging opportunity, employees and users together collected and nurtured partial resources and combined them in a novel way. Through this laborious activity they built control over the idea and resources (Fisher 2012) that were meaningful and available for them. The service opportunity was materialized in new facilities and equipment, and manifested in new supportive

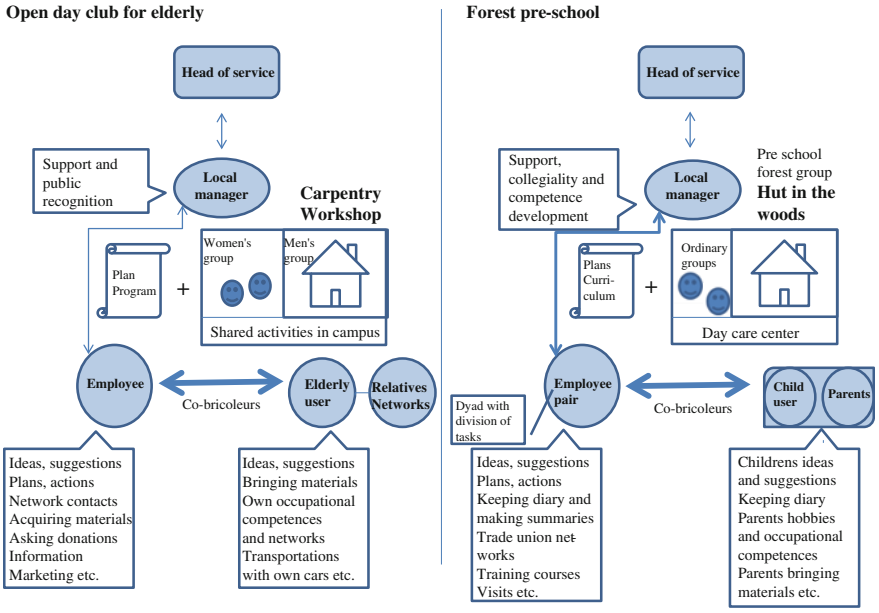

Fig. 2 Second phase of resource integration in the two cases (the width of the *two-arrow line* indicates the intensity of interaction)

and rewarding relations (social-spatial expansion). Both employees and users learnt new capabilities and agency as they co-created new value.

The case examples also reveal the challenges in creating service innovations through bricolage: the *work methods were not replicable as such, as they depended on creative combinations of unique resources in the local context*. However, the features and principles of forest education were generalized, or as they themselves call it, productized (cf. Valminen and Toivonen 2011). This was not yet the case in the Elderly day club, as the managers were reconsidering the role of the service.

Third, the cases show that these combinations may involve different sets of actors and the lack of some actors' involvement can be replaced by others." Here, the cases differed in some respect. In the Elderly day club, resource integration became a shared capability between a single employee and the elderly users, while in the Forest preschool, collaborative agency emerged within a larger community, which included employees, managers, children, and their parents. In the Elderly day club, discovering the capabilities and social support of the elderly at least partially replaced the management's support. Constant managerial support was not critical, implying that learning and agency of elderly users as producers of their own services was strengthened. When the role of the employee later changed into that of general coordinator, the elderly partially replaced her as the facilitator at the site (see Table 1, phase 3). In the Forest preschool, on the other hand, the employees could not rely solely on children's own willpower. The broader community

comprising parents and managers had to be mobilized for nurturing the novelty, which also strengthened the resource utilization from the very beginning. In spite of scarce and partial resources available in the two cases, both succeeded in expanding the novelty.

8 Conclusion

The motive of our study derived from the observation that even though the resource integration perspective in the co-creation of value is increasingly discussed in the context of service innovation, producer-centric and R&D-based practices still dominate both innovation studies and practical innovation efforts. Although interest in "lay knowledge" in service innovation has increased, research on grassroots users' and employees' practical activities and, in particular, their interaction in resource integration, has not attracted much research interest. In this chapter, we analyzed the user–employee interaction as a source of innovation both theoretically and on the basis of empirical cases. We aimed to contribute to this research gap and suggested *a new integrated approach* via combining several theoretical frameworks, namely, user-driven innovation, employee-driven innovation, S-D logic, effectuation and bricolage, and expansive learning.

We demonstrated the benefits of this framework in empirical analysis: it enabled exploring resource integration as a practical, dynamic activity which is sensitive to practice-based interaction and learning between users, employees and other potential stakeholders. Our study showed that grassroots-level collaboration between employees and users was critical in the development of the novelty.

This approach provides several contributions. First, the framework established a connection between *user-driven and employee-driven views of innovation*, both of which can be placed at the center of open and democratic innovation debates addressing widened participation and "lay knowledge" in innovation from the point of view of resource integration. Second, the approach links S-D logic *with the theory of expansive learning*, which—supplemented with effectuation and bricolage—provides S-D logic with new analytical means to explore how, in microlevel practices, use value is co-created in dynamic processes of expansion. The integrated view therefore represents the *learning framework of resource integration*. Third, we applied S-D logic to study innovation in the *public sector* which is also a new contribution in the S-D logic field.

The framework also suggests theoretical and managerial implications. First, it has implications for the research and management of *service innovation processes*. Earlier research addressing co-creation have either focused on planned activities or on practices at the organizational level (Kowalkowski et al. 2012; Mele et al. 2010; Salunke et al. 2013). Our study implicated, on the contrary, the *significance of improvisational practice-based activities*. Effectuation and bricolage provide useful analytical perspectives for studying these activities. From a managerial point of view, effectuation and bricolage can be considered as alternatives for linear,

predetermined managerial processes (Fisher 2012). Our cases indicate that these bottom-up managerial patterns do emerge also in the public sector, where renewals are traditionally initiated by policy or structural changes and managed top-down. The bottom-up practices enable the emergence of novelties by providing the employees not only with a frame for service but also with control over resources and freedom to use creativity. The *combination of frame, freedom, and control of resources* supports the employees and users to utilize opportunities perceived.

Second, implications address fostering of *service innovation culture*. Our study suggests analytical and methodological means to understand the *nuances of practical contexts, actions, and roles* in the emergence of new services. Recognizing the dynamics of resource integrator roles requires sensitivity from managers. Service employees and users do not necessarily recognize the innovative potential of their practices. In addition, they typically lack the time, motivation, or capability to conceptualize their novelty in order to be able to transfer it from one context to another. A successful resource integrator needs to be able to expand his/her role and related interactions (e.g., Wrzesniewski and Dutton 2001). An essential managerial capability is that of being able to *identify the role of both employees and users in service processes*, and of sensitively *guiding the dynamics* of the resource-integrator roles.

Third, the implications of the research on *diffusion of service innovation* include the *view of resource integration* as *developmental* process in which collective, practice-based learning is critical. Prerequisites for the diffusion of the novelty do not just exist there to be discovered by an outside party, but they are rooted in the preceding cycles of expansion: experiences of small successes and failures and relations in the contexts (e.g., Sarasvathy and Kotha 2001). A theoretical perspective able to analyze development is needed. From the managerial point of view, our study suggests *that the replication of novel solutions is a separate learning challenge which is often unrecognized, and consequently left unmanaged*. It requires that a broader group of actors learn from the novel value-creation processes. Managers may initiate these collective learning processes, if they are able to recognize the significance of a solution, and provide resources and support for subsequent developmental activities. Another option is to create a collaborative service culture in which service employees within and between organizations actively share novel solutions, and in this way gradually develop the services. Thus, although novel solutions often emerge at the customer interface, *a single employee cannot leverage the solutions without managerial support*.

Our study also suggests a few new directions for *further research* which we were not able to cover in detail, but which are connected to the implications discussed above. The current views on service productivity highlight that it is not enough to focus on efficiency of resource utilization, but the interactive process between the provider and the user and the impacts on the use value (effectiveness), have to be taken into account (Grönroos and Ojasalo 2004). The suggested theoretical framework contributes to this interactive view of creation of use value in service innovation. Further research will be needed to explore how the proposed learning framework of resource integration can be applied to study service productivity and quality.

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Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation

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Abstract Identifying opportunities for service innovation and exploiting them requires novel capability building in the rapidly changing business environments. This study extends the existing literature on dynamic capabilities in service innovation by operationalizing the capabilities of sensing and seizing new opportunities. The purpose of this chapter is to examine how futures thinking and design thinking can facilitate service innovation from the dynamic capabilities point-of-view. As a result this chapter provides a conceptual framework for service innovation process that is grounded on foresight and service design. To synthesize the literature into a new conceptual framework, this chapter is based on a large body of literature from four burgeoning fields of study: dynamic capabilities, service innovation, foresight, and service design. The key point the chapter wishes to make is that a forward look at new methodological perspectives in service innovation is needed and that integrating the methods and tools of foresight and service design to the service innovation process provides a promising new avenue to future success.

Keywords Foresight · Service design · Dynamic capabilities · Service innovation

1 Introduction

In today's dynamic environments in which customer needs, market trends, technologies, and other factors change rapidly, new opportunities for service innovation appear in great abundance. To identify and exploit these opportunities, the

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emerging view on dynamic capabilities can offer a powerful framework (Teece 2009; den Hertog et al. 2010; Kindström et al. 2012; Ramírez et al. 2013). For this reason, it has been selected as the starting point of this chapter.

Dynamic capabilities can be defined as routines within a company's managerial and organizational processes that aim to gain, release, integrate, and reconfigure resources (Teece et al. 1997). Resources are specific physical (e.g., geographic location), human (e.g., expertise), and organizational (e.g., superior sales force) assets that can be used to implement value-creating strategies (see Eisenhard and Martin 2000). When introducing the term "dynamic capabilities", Teece and Pisano (1994) highlighted the importance of adapting, integrating, and reconfiguring resources in the rapidly changing environment. Thus, while operational capabilities are geared toward the operational functioning of a company around the question how to earn one's living (Zollo and Winter 2002; Winter 2003), dynamic capabilities focus on the modification of operational capabilities and lead to changes in the company's products or production processes (Cepeda and Vera 2007).

Teece (2007) divides dynamic capabilities into three categories: (1) sensing and shaping new opportunities and threats, (2) seizing opportunities, and (3) maintaining competitiveness through enhancing, combining, protecting, and reconfiguring the company's intangible and tangible assets. The dynamic capability of sensing new opportunities requires the ability to recognize, interpret, and shape developments related to technological options, structural evolution of industries and markets, customers' expressed and latent needs, and likely suppliers' and competitors' responses (Teece 2007). This involves creative activity and scanning and monitoring what is going on in the business ecosystem. The dynamic capability of seizing opportunities refers to the formulation of a strategic response to the opportunities sensed (Fischer et al. 2010). Reconfiguring capability is a key to sustained profitable growth, and it means the ability to recombine and to reconfigure assets and organizational structures as the company grows and markets and technologies change (Teece 2007). In other words, dynamic capabilities include the capacity to identify needs and opportunities for change, formulate a response to those needs and opportunities, and implement a course of action (Helfat et al. 2007). Since, dynamic capabilities are required to adapt to changing customer and technological opportunities, to shape the ecosystem the company occupies, to develop new products and processes and to design and implement viable business models, the dynamic capabilities view is well suited for studying innovation (e.g., Lawson and Samson 2001).

The dynamic capabilities view has been mostly used in product and technology-related contexts but less in the context of service innovation, even though it seems particularly useful for service innovation (Fischer et al. 2010; den Hertog et al. 2010; Kindström et al. 2012). For example, Agarwal and Selen (2009) highlight the importance of dynamic capabilities in service companies in providing a proactive way to explore new opportunities and help anticipate threats from competitive innovations. Also Carlborg et al. (2013) mention that managing service innovation means continuously redesigning and adapting new and existing service offerings to address frequent changes and emerging opportunities. Thus, understanding and

developing dynamic capabilities associated with service innovation is important for being able to reap the benefits of future service innovation (den Hertog et al. 2010; Fischer et al. 2010; Kindström et al. 2012). However, developing dynamic capabilities is challenging (Winter 2003; Teece 2007; O'Reilly and Tushman 2008), and companies need support in operationalizing them (Fischer et al. 2010).

To address the above challenges, this chapter makes a unique contribution by providing an important standpoint on operationalizing the dynamic capabilities in service context. The purpose of this chapter is to examine how futures thinking and design thinking can facilitate service innovation from the dynamic capabilities point-of-view, and this chapter, accordingly, provides a conceptual framework for service innovation process that is grounded on foresight and service design. To synthesize the literature into a new conceptual framework, this chapter is based on a large body of literature from four burgeoning fields of study: strategic management literature focusing on dynamic capabilities, service management and service-dominant (S-D) logic literature focusing on service innovation, futures thinking literature focusing on the principles and methods of foresight, and design thinking literature focusing on service design processes and methods. The most inspiring sources of information contributing to this chapter have been the recent studies that cover two of the four focus fields, i.e., dynamic capabilities in service innovation (e.g., Agarwal and Selen 2009; den Hertog et al. 2010; Fischer et al. 2010; Kindström et al. 2012), foresight in innovation process (e.g., van der Duin and den Hartigh 2009; Holopainen and Helminen 2011; Carleton et al. 2013), foresight as a dynamic capability (e.g., Ramírez et al. 2013), design thinking in innovation (e.g., Brown 2008; Bauer and Eagen 2010), and foresight in design processes (e.g., Evans and Sommerville 2007; Alstyne 2010; Leihener and Breier 2013).

The dynamic capabilities view is a very suitable starting point for this chapter because the interdisciplinary fields of futures thinking and design thinking are both about sensing and seizing—focusing on figuring out and addressing changes and opportunities in customers' expressed and latent needs, market trends, technologies, and other evolving issues in business ecosystems. Being definitely needed in successful service innovation, they can offer useful approaches and methods for dealing with the dynamic capabilities in practice. For example, van der Duin and den Hartigh (2009) mention that there is a significant need for further development of dynamic perspectives, not only for academic purposes but also as practical tools for managers, and they stress that futures research seems extremely well suited to connect to such developments. Similarly, Brown (2008) suggests that incorporating design thinking into all phases of innovation process would offer a huge benefit. However, the current literature on service innovation does not seem to elaborate the full scale of futures thinking and design thinking. For example, Miles (2010) highlights the poor relationship between the theory and practice of service innovation and service design, the big challenge being integration of these bodies of knowledge. Leihener and Breuer (2013) suggest that service design should address and incorporate a leap into the future because most of the current methods used in service design processes rely on empirical data that deliver insights that are valid only for the past or the present.

This chapter aims at providing improved insights for novel approaches and methods in service innovation. Its next section discusses the needs for dynamic capabilities in service-logic-based innovation. In the section after that, the main principles of futures thinking and design thinking are shown. The next-to-last section introduces the framework of a novel, future-oriented service innovation process, and discusses the methods of foresight and service design in the process. The final section presents the conclusions.

2 Service-Logic-Based Innovation Calls for New Capabilities

Service innovation has been viewed as a significant driver of growth in businesses, and companies are looking for better methods for service innovation (e.g., Ostrom et al. 2010). Consequently, studies of service innovation are accumulating rapidly (Droege et al. 2009; Carlborg et al. 2013). Still, most of the research in this field has been carried out according to the manufacturing-based innovation paradigm resting on the goods-dominant (G-D) logic that sees innovation as an output, i.e., a new good or a service, and focuses on companies' internal innovation processes that are clearly separated from the actual service practice (Mele et al. 2009; Barcet 2010; Toivonen 2010; Ordanini and Parasuraman 2011). Recently, mainstream business thinking has been shifting from G-D logic to service logic (Michel et al. 2008; Chesbrough and Davies 2010; Grönroos and Ravald 2011) or service-dominant (S-D) logic, (Vargo and Lusch 2004; Gummesson et al. 2010), in which service as experienced by a customer is the fundamental basis of the new business logic. Based on S-D logic, service is the central mechanism of any economic exchange, and it can be conceptualized as the "process of application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself" (Vargo and Lusch 2004, p. 2). Thus, S-D logic, interpreted as strategic business logic, portrays creating value in conjunction with—rather than for—customers as a source of competitive advantage (Karpen et al. 2012). The shift from G-D logic to S-D logic is consistent with the dynamic capabilities view (den Hertog et al. 2010).

Service logic has profound theoretical and managerial implications for service innovation (e.g., Michel et al. 2008; Edvardsson et al. 2010; Ordanini and Parasuraman 2011). However, the analysis of these implications is still at an incipient stage (e.g., Helkkula and Holopainen 2011). The S-D logic perspective seems highly appropriate for studying service innovations because it integrates both intangible service offerings and tangible goods into an overarching service view (Vargo and Lusch 2006). Viewing service as a co-produced process that involves the application of competences supports a new perspective for thinking about service innovations (Ordanini and Parasuraman 2011). When the customer is at the center of value creation, service innovation focuses on developing value propositions and prerequisites

for customers so that they can engage in value creation by providing resources with their knowledge and skills (Edvardsson et al. 2010). Michel et al. (2008) stress that service logic innovation requires changes in customer thinking, participation, and capabilities for creating and realizing value, and the nature and magnitude of change in competences determine the extent of service innovation. According to them (ibid. 2008, p. 50), "altering value *as it is defined and used by the customer*, not value in production and exchange, defines innovation". In a recent definition of service innovation, den Hertog et al. (2010, p. 494) pay attention to the role of customers in the creation of value: "*A service innovation is a new service experience or service solution that consist of one or several of the following dimensions: new service concept, new customer interaction, new value system/business partners, new revenue model, new organizational or technological service delivery process*".

Karpen et al. (2012) emphasize that the literature provides limited guidance for implementing the S-D logic perspective in practice, and little research attention has been paid to the capabilities required to enact S-D logic. A study by Kindström et al. (2012) indicates that identifying and exploiting the benefits of service innovation cannot rely only on capabilities derived from manufacturing-based innovation. Service-logic-based innovation requires a new way of looking at the processes, roles, and mechanisms that create value (Sebastiani and Paiola 2010). In other words, the paradigm shift from manufacturing-based to service-logic-based innovation implies that deep relationships with customers and their processes are becoming central (see Barcet 2010), and adding customer-centricity in innovation to replace the traditional and limiting product- and provider-centric view (Michel et al. 2008; Edvardsson et al. 2010). According to S-D logic, the capability to collaborate with customers during service development transforms the customer into an operant resource on which the firm can draw to foster innovation (Vargo and Lusch 2004). Also Carlborg et al. (2013) stress that service innovation studies should focus on processes and gain a better understanding of interactions with the customer and other stakeholders in the company's service ecosystem. According to Möller et al. (2008), successful service innovation demands that both the service company and its customer first recognize each other's value-creating strategies. Thus, the capabilities needed in service-logic-based innovation focus on creating new ways to better facilitate and enhance value co-creation with customers for mutual and long-term betterment.

Ordanini and Parasuraman (2011) integrated S-D logic with innovation-related insights from the literature and, based on that, introduced a framework that posits three main sources of service innovation: collaborative competences, dynamic capability of customer orientation, and knowledge interfaces, i.e., social and physical conditions facilitating knowledge transfer within and among companies. Collaborative competences include both "looking outside", i.e., collaborating with business partners and customers, and "looking inside", i.e., integrating employees in the innovation processes (see also Helkkula and Holopainen 2011).

Den Hertog et al. (2010) have proposed dynamic service innovation capabilities, and according to them, the capability to empathically understand customers, to sense their (potential) needs well in advance, and to see dominant trends and

promising technological options are particularly important in service innovation. They stress that the capability to conceptualize is essential in service innovation due to its conceptual and highly interactive nature. A conceptualization helps stakeholders understand the usefulness and value of a new service and might involve visualization of the service offering and deciding on how the new service relates to company's strategy, what the forms of customer interaction are, who the partners are, and what kind of a revenue model is to be used (den Hertog et al. 2010).

Kindström et al. (2012) found that the dynamic capability of sensing includes activities in four main areas of service innovation: customer-linked service sensing, service system sensing, internal sensing, and technology exploration. Thus, service innovation requires creativity, foresight, and deep customer, competitor, and supplier information and intelligence (see also Teece 2007). Once new opportunities are sensed, the dynamic capability of seizing these is a vital prerequisite to the creation of value and accruing of profits through service innovation (Kindström et al. 2012). This involves the design of a service concept and the business model and defining the manner by which the company co-creates value with customers, entices customers to pay for value, and converts those payments to profit (see Teece 2007).

3 Why Are Futures Thinking and Design Thinking Needed in Service Innovation?

The interdisciplinary fields of futures thinking and design thinking are both about sensing and seizing new opportunities. Thus, they support each other (e.g., Evans and Sommerville 2007) and provide essential approaches needed in service innovation. They also offer practical processes and concrete methods that are useful for gaining relevant insights, ideating and imagining the unthinkable in uncertain environments, and anticipating and conceptualizing novel value. Next, the principles of futures thinking and design thinking and the synergies between them are discussed.

3.1 Principles of Futures Thinking

Several terms are being used when referring to looking into imaginable futures, such as foresight, futures studies, futures research, futures field, futurology, and forecasting (see e.g., Bell 2009; van der Duin and den Hartigh 2009). In this chapter, the term "futures thinking" is used when speaking about looking into futures as a general approach, and "foresight" when focusing on the concrete forward-looking work aimed at mapping the change and influencing it (see Bishop and Hines 2012).

Futures thinking has generated a rich and wide-ranging literature (see e.g. Slaughter 2009), and, as a holistic and synthesizing field, it draws on methods from many disciplines (Popper 2008). Futures studies discover, examine, evaluate and propose possible, probable, and preferable futures (Bell 2009). The aim is to orient people's mental models to consider different possible futures in preparedness to various chains of actions (see Hiltunen 2010). The futures thinking also offers the possibility to actively shape the future (Alstyne 2010).

According to Bell (2009), *prospective thinking* is a distinctive principle of futures thinking. *Visioning* is used in capturing the essence of and developing preferred futures. A vision is the guiding principle in a long-term transformation, i.e., an image of what future might look like (Bishop and Hines 2012). Although prediction is an essential aspect of futures thinking, it is not about predicting a single, unconditional, and certain future. Instead, the predictions are typically multiple, conditional, contingent, corrigible, and uncertain (Bell 2009). This is why futurists usually use the plural word "futures". Thus, the focus is to explore many different kinds of alternative futures, and hence, *alternative thinking* is a central principle of futures thinking (Alstyne 2010; Bishop and Hines 2012). Besides possible, probable, and preferable futures, futures studies examine also wildcard futures: low-probability, high-impact events with significant consequences (Slaughter 2009).

In the process of creating alternative futures, both *creativity* and *critical thinking* are needed. Critical thinking is used in careful analysis of evidence related to the economic, technological, social, political, and ecological changes in business environments (Bishop and Hines 2012). Creativity breaks boundaries and reframes problems (Alstyne 2010). A central feature of futures thinking are s*ystems thinking*: each entity is seen as a system that consists of parts within a larger system. Every system and their parts are interconnected to other systems, interacting in ways that can produce surprising results. Understanding and predicting system behavior make futures thinking very challenging (Bishop and Hines 2012).

Problem solving and practicality are important principles of futures thinking, which aims to be of use in the real world (Bell 2009). Futures thinking offer novel methods and tools that help companies make sense of complex situations, imagine unexpected possibilities, and broaden perspectives (Alstyne 2010). In today's world, where surprises keep emerging with ever greater rapidity, *sensitivity* towards *weak signals*, i.e., the first indications of changes, and *trends*, i.e., the general direction found in the long-term development of a phenomenon, are obviously needed for rapid reaction, seizing of opportunities, and avoidance of threats (see, Hiltunen 2010; Godet 1994). *Early warning systems* allow companies to identify and follow newly identified threats and opportunities emerging in the environment (Ramírez et al. 2013).

To sum up, there seems to be a strong link between futures thinking and the dynamic capabilities of sensing and seizing opportunities. Futures thinking aims to sense weak signals and trends and to influence future developments. By understanding alternative futures, companies can become more innovative (Inayatullah 2008). Consequently, futures thinking should be explicitly integrated in innovation processes (van der Duin and den Hartigh 2009).

3.2 Principles of Design Thinking

Academic research on design thinking has its roots in the late 1960s (Simon 1969; Lawson 1972). Still, managers' and business researchers' interest in design thinking only started widening in the 2000's (Boland and Colloby 2004; Brown 2008). In this chapter, the term "design thinking" is used when referring to designers' general approach, and "service design" when speaking about applying design thinking in service contexts (see Wetter-Edman 2011).

Design thinking aims at creating *meaningful solutions* (Verganti 2009). Observations are translated into insights and insights into products and service solutions (Brown 2009). According to Griesbach (2010, p. 200), design thinking can be considered as "a special way of problem solving which creates more value by better satisfying human needs in the long run than other ways of problem solving might do." Brown (2008, p. 86) defines design thinking as "a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity". Thus, even though a central feature of design thinking is *creativity*, design processes are controlled and channeled toward producing a viable, practical solution to a design problem (Ambrose and Harris 2010).

Design thinking is a highly *participatory, dialogue-based and issue-driven* approach, and its *iterative nature* aims at continuous invention and learning rather than stability and control (Shamiyeh 2010). The process toward new solution differs from a straightforward and linear problem-solving process by including continuous invention, learning, and experimentation and paying sequential attention to idea generation and evaluation (Liedka and Ogilvie 2011). Design thinking underlines *user-centered empathy*, *multidisciplinary co-design, and holistic engagement*. In fact, the current literature highlights empathy as one of the most important features of design thinking (e.g., Brown 2009; Liedka and Ogilvie 2011). This involves focusing on understanding people's practices, complex interactions, diverse contexts, latent needs, emotions, and hidden motives (Dyer et al. 2011), and thus design thinking offers views for applying S-D logic in practice (Wetter-Edman 2011). Collaboration, conversations and co-designing with customers/users, and other stakeholders are crucial. Design thinking facilitates the creation of collaboration platforms and tools to engage people in experimenting with prototypes, mock-ups, and new service concepts (Meroni and Sangiorgi 2011). Design thinking offers means for visualizing issues (Wetter-Edman 2011), and in fact, *visualization* is often seen as one of the most essential features of service design due to the intangible nature of service interactions and value (e.g., Segelström 2012).

Thus, there seems to be a strong link between design thinking and the dynamic capabilities of sensing and seizing opportunities. Design thinking brings empathic and participatory approaches and methods to deeply understand customers, their contexts, and latent needs. Design thinking also involves visualization, storytelling

and prototyping to support rapid testing, and agile service implementation (e.g., Rogers et al. 2007). Moreover, design thinking emphasizes creativity and idea management that for example Lawson and Samson (2001) stressed as essential in innovation capability.

3.3 Synergies Between Futures Thinking and Design Thinking

Futures thinking and design thinking have both common grounds and unique elements that supplement each other. This synergy between them seems to be acknowledged (Evans and Sommerville 2007; Leihener and Breuer 2013), yet not clearly highlighted in current literature.

First, they are both *future-oriented*. Not only futures thinking, but also design thinking can help map a path into the future since it deals primarily with what does not yet exist (Brown 2009; Liedtka 2010). Second, both futures thinking and design thinking are about *creative problem solving* aimed at seizing new opportunities. In other words, there is an iterative dialog between divergence, i.e., generating options, and convergence, i.e., building synthesis (e.g., Brown 2009). Creativity and intuition are integrated in systematic yet radical processes of design thinking and futures thinking. Both fields reinforce intuition with documented information and emphasize it (Meristö and Laitinen 2009; Kuosa 2012). Fraser (2010) suggests that imagining is the key issue in taking the leap from observable and provable to embrace what could be a possible new solution for unmet needs.

The third shared principle is *a participatory* approach to nurture the sensing of unthinkable futures and solutions. Integrating customers/users and other stakeholders in design processes is a central feature of design thinking (see Sanders and Stappers 2008), and also futures thinking has been developed more to the direction of participatory and open foresight engaging various stakeholders in the process (e.g., Ramos et al. 2012; Miemis et al. 2012).

Design thinking is anchored strongly in a human-centered approach. Often the psychological, anthropological, and sociologic perspectives enrich design projects with needed nuances (Blomkvist et al. 2010). Therefore, while design thinking aims at a deep understanding of the context and constraints by immersing into the lives of the customers/users, futures thinking focuses on holistically analyzing the commercial, technological, cultural, ecological, and political environment. Indeed, this is the key difference, and simultaneously the key reason in bringing design thinking and futures thinking together to strengthen the dynamic capabilities of sensing and seizing new service opportunities. Together they help in uncovering customers' expressed and latent needs and recognizing and influencing changes in business environments.

4 A New Framework: Service Innovation Process Grounded on Foresight and Service Design

In the literature, particularly in the emergence of the field, the terms "service innovation" and "service development" have been used interchangeably (Menor et al. 2002). Therefore, for this chapter we studied over 20 different processes for service innovation, new service development, and service design (e.g., Scheuing and Johnson 1989; Edvardsson et al. 2000; Mager 2004; Moritz 2005; Goodwin 2009; Toivonen 2010; Stickdorn and Schneider 2010; Holopainen and Helminen 2011). As a synthesis of these processes and based on the literature on foresight and service design methods, we introduce a four-phase process for service innovation (Fig. 1) that is grounded firmly on foresight and service design.

The phases of the future-oriented service innovation process are: (1) Map and understand, (2) Forecast and ideate, (3) Model and evaluate, and (4) Conceptualize and influence. However, it should be noted that this is rarely a linear process—instead it may be highly iterative, the phases might overlap, and the innovation process may be heavily integrated in actual service practice. Based on literature, we have selected five illustrative foresight (F) and/or service design (SD) methods for each phase. In fact, due to the interdisciplinary nature of foresight and service design, many of these methods have been originally drawn from other fields of study to be applied in foresight or service design (see, e.g., Popper 2008; Wetter-Edman 2011). In each of the phases, the methods of foresight and service design play a different role. Still, we would like to highlight that many of the methods linked to individual phases are also useful for other purposes in the other phases of the process (e.g. socio-drama). Additionally, since most of these methods and tools can be used creatively and adaptably (e.g., Hanington 2003), they can also be integrated, e.g., personas can be used in design games, trend cards in scenarios etc.

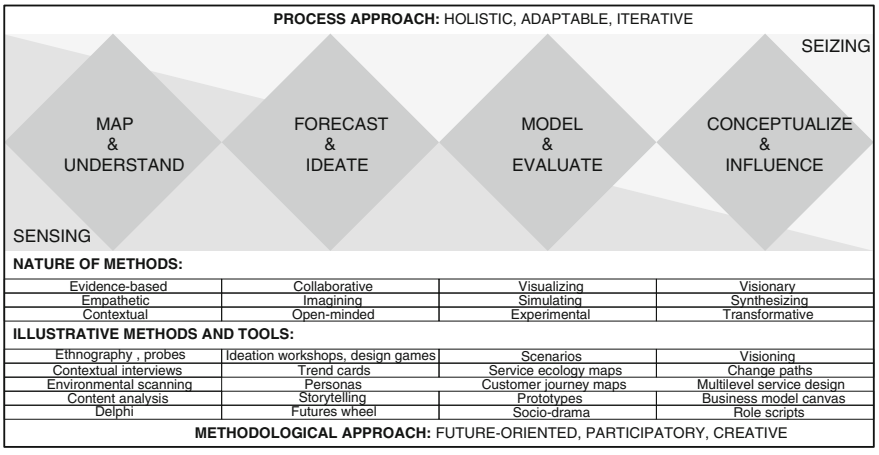

Fig. 1 The service innovation process grounded on foresight and service design

The application of methods is situational, highly context driven and depends on the resources available (see, Saco and Goncalves 2010). An insightful combination of various methods and tools can create visionary foresight and unique new ideas (see, e.g., Aaltonen and Sanders 2005).

The criticality of *sensing*-related methods is high in the beginning of service innovation process, especially in the mapping and understanding phase. *Seizing* capability and related methods are most essential in the end of the process, where service is conceptualized for the implementation purposes. Throughout the process, different methods encourage and even require engaging current and future customers/users, staff members, other stakeholders and experts from different fields in co-designing the service (see Sanders and Stappers 2008).

4.1 Phase 1: Map and Understand

Mapping future changes in business environments and understanding and anticipating customers' needs and desires in their contexts are essential in building sensing capability for service innovation purposes. The methods of foresight help to gain a holistic and systemic view based on insights from a range of different viewpoints (Slaughter 2009). Monitoring and scanning the environment are essential in sensing changes in the society, economy and technologies, and anticipating their future developments (e.g., Bell 2009). Future trends and weak signals can be identified at different levels: at the macro level, a specific sector level, and at the level of a particular service (Holopainen and Helminen 2011).

The methods of service design bring empathy to allow deep understanding of customers' and other stakeholders' perspectives (e.g., Polaine et al. 2013). The best way to gain a deep customer understanding is through ethnography, observation and empathic methods (e.g., Silverstain and DeCarlo 2009). The typical foresight (F) and service design (SD) methods that can be used in understanding customers' future needs and in mapping trends and weak signals in business environments are listed next.

Ethnography (SD/F) allows to sense customer needs by getting deep insights on people's everyday lives through closely observing their behavior in real-life environments (e.g., Moritz 2005). Besides direct observation, *probes* can be used as self-documenting tools that engage people to participate and to explore opportunities for a prolonged time period. Probes focus on people's personal context and perceptions which they actively document, e.g., in a diary or with a camera and thus, produce design inspiration (Mattelmäki 2006; Stickdorn and Schneider 2010). In foresight, ethnographic research typically includes lengthy and detailed, often repeated interviewing, during which a respondent is asked to construct possible future scenarios (Bell 2009).

Contextual interviews (SD) are conducted with (potential) customers in their own environment or in the context of a new service. Depth interviews are an effective way to generate insights into customers' perceptions, behaviors, and needs, and to

uncover their values and opinions (Polaine et al. 2013). Interviewing in real contexts helps interviewees to remember and focus on specific details, and it allows the interviewer to understand the social and physical surrounding and interpret its effects (Stickdorn and Schneider 2010).

Environmental scanning and *PESTE analysis* (F) help to identify significant changes and developments in business environments. Environmental scanning is used for identifying, collecting and translating information about external influences, including trends, early warning signals, events, and expectations of different interest groups (Albright 2004; Bishop and Hines 2012). In the PESTE analysis, political, economic, societal, technological, and ecological variables are explored and probable driving forces, signs of change, and weak signals are collected to map the changes in the future operational environment (Meristö and Laitinen 2009).

Content analysis (F) is a systematic and objective study to identify emerging trends and weak signals by collecting and analyzing information from sources such as internet, newspapers, television broadcasts, speeches, etc. (Evans and Sommerville 2007; Bell 2009).

Delphi method (F) generates views on future by involving an expert panel and proceeding through several rounds of expert responses to specific questions about futures. Feedback from an earlier round is first summarized and then sent to the respondents. Experience has shown that the Delphi method is effective when a collective judgment of experts is needed (Bell 2009; van der Duin 2006).

4.2 Phase 2: Forecast and Ideate

Findings from the mapping and understanding phase are taken forward to inspire ideation and to forecast alternative futures. Open-minded collaboration and co-designing with different stakeholders through forming heterogeneous teams is the key in providing divergent thinking for innovation (Brown 2009; Lockwood 2010). Foresight fosters alternative thinking in service ideation and allows understanding of not only probable but also possible futures (Meristö et al. 2009). Illustrative foresight (F) and service design (SD) methods and tools that can be used in forecasting alternative futures and creating innovative service ideas are listed next.

Focus groups and *ideation workshops* (SD/F) involve different stakeholders in brainstorming new ideas and co-designing a service (Polaine et al. 2013). *Design games* are useful tools in workshops. Flexible and context-based games help diverse teams to structure, interact, and inspire thinking around design challenge utilizing playful elements and tangible game objects (Vaajakallio 2012). Collaborative workshops can be also used to work with future trends and weak signals. For example, Holopainen and Heinonen (2011) have developed *the Future-oriented 3D Concept Generation* method, in which groups of people co-design a service by first ideating with trend cards and then using three-dimensional building materials to build the concept. Also public social networking platforms and other *virtual environments* are valuable for collaboratively producing alternative futures (Ramos et al. 2012).

Trend cards (F) are a useful tool for ideation and prioritizing ideas. They are visual and textual descriptions of trends created based on data generated in the first phase. Trend cards are often used for understanding the change and its potential effects on people (see, Raymond 2010).

Future users/Personas (F/SD) are fictional, visualized customer/user archetypes that are created based on customer insight gathered by research in the first phase (see Moritz 2005; Goodwin 2009). They help to identify relevant patterns in customers' behavior, motivations, desires and needs, and can thus be helpful in ideation and other innovation phases. They bring empathy and focus into ideation (Williams 2006) and enable a more in-depth understanding of a group of potential customers.

Future-telling/Storytelling (F/SD) is based on insights of future and helps ideating and translating everyday challenges into customer needs (Watson 2010). Stories typically include elements of rich characters, detailed settings, goals, and even dramatic elements. A *storyboard* can also be sketched to explain a set of events (Moritz 2005). The *What if* method is a simple way to consider alternative anticipated or imagined future developments (Casti et al. 2011). It also helps to evaluate the sustainability of service idea by asking how the service would be affected if changes took place in its context (Stickdorn and Schneider 2010).

Futures wheel (F) is a tool for ideating the consequences of today's issue on the longer-term future (Inayatullah 2008). It can be used for graphical visualization of future impacts of certain changes and for group brainstorming about possible future developments. The possible impacts of a trend are collected and placed on a page in a structured way, and the relationships of the causes and results are marked by interconnecting lines. Thus, the futures wheel composes a mental map of the future, and it can be used to stimulate new thinking and to organize and question thoughts about future development (Glenn 1994).

4.3 Phase 3: Model and Evaluate

Modeling new service solutions moves the service innovation process from sensing to seizing new opportunities. The intangible nature of service solutions and uncertain nature of future both require narrative and visual means to propose, communicate and test potential new service solutions. Therefore, service design and foresight create highly visual and anticipatory stories by means of scenarios, prototypes and preliminary concepts, for example. This phase includes zooming in and out, i.e., focusing on details and seeing the holistic picture (Polaine et al. 2013). Modeling new service solutions early helps in evaluating their true value for the customer and for the company before large amounts of resources are used for actual implementation. Presenting and testing new ideas quickly, iteratively, and creatively through experiencing is the best way to see what might work in the future (Dyer et al. 2011). Brown (2009, p. 18) introduces three overlapping criteria for successful ideas: (1) feasibility (what is functionally possible within the foreseeable

future), (2) viability (what is likely to become part of a sustainable business model), and (3) desirability (what makes sense to people and for people). The typical foresight (F) and service design (SD) methods and tools that can be used in modeling and evaluating service innovation are listed next.

Scenario planning (F) is an essential method in illustrating the alternative future developments related to market potential and needs, societal requirements, and technological feasibility (Meristö et al. 2009). Scenarios are narrative stories about alternative possibilities for the future, and they are analytically, synthetically, and collaboratively created from emerging signals of change (Alstyne 2010). Still, they go beyond objective analyzes and include subjective interpretations (Schoemaker 1995). Inayatullah (2008) shows multiple methods for creating scenarios. Timespan of a scenario extends typically beyond 10–20 years (Bell 2009).

Service ecology maps (SD) visualize the service system around customer experience. They can be graphical diagrams of all the actors related to the service and the relationships between them, displayed in a systematic manner (Polaine et al. 2013). Mapping the service ecology and creating stakeholder maps (e.g., Stickdorn and Schneider 2010) concretize the complex service system with its different contexts and human interactions.

Customer journey map (SD) is a visualization technique that connects together all the touchpoints, i.e., the moments of customer interaction, and maps a customer's journey across the phases of the service experience (Polaine et al. 2013). *Service blueprint* also adds the backstage processes to customer journey, and it is a comprehensive tool to capture all service moments, their logical and timely procession, actions, and their resources (Shostack 1984; Bitner et al. 2008). Personas can be used in customer journeys for designing a way through service for each type (Polaine et al. 2013).

Prototypes (SD/F) help to ground the change, moving from analytical to the experiential and rapidly testing the service experience (Polaine et al. 2013). Prototypes include physical objects, models, or simulations for concept and context exploration and stakeholder communication (Meroni and Sangiorgi 2011). *Mock-ups*, e.g., photo montages, can act as prototypes illustrating a certain idea, and *mood boards*, i.e., collections of different images and materials, can show a certain mood or atmosphere of a new service idea (Moritz 2005). Prototypes can also be targeted to future. For example, the *Next year's headlines* method illustrates a future impact of a service concept in a simple way (Evans and Sommerville 2007).

Socio-drama (SD/F), a form of experience prototyping, includes acting and empathizing with individual service moments (Holopainen and Helminen 2011). Theatrical methods are very useful in service innovation since service is more of a performance than manufacture (Polaine et al. 2013). *Roleplaying* allows people to act out service situations that are not yet real. Roleplaying, ranging from quick to elaborated longer-term stagings, can involve many kinds of stakeholders. In foresight, *simulation* of a real environment or situation helps participants consider the possible consequences of their actions and the possible future actions and reactions of other participants (Bell 2009). *Empathic conversations* invite all stakeholders to

step into the shoes of future users. Open and divergent dialog aims to create insights into future experiences through learning about users' current and past relationships (Raijmakers 2011).

4.4 Phase 4: Conceptualize and Influence

The fourth phase of the service innovation process conceptualizes the new service finally influencing the future. This phase aims at transformation, and accordingly, the future is narrowed toward the preferred (Inayatullah 2008). This is also the phase where concurrent business analysis is integrated into creative thinking (see, Lockwood 2010). Illustrative foresight (F) and service design (SD) methods and tools that can be used in conceptualizing a service innovation and influencing the future are listed next.

Visioning (F) provides the destination for an innovation, allowing planning the route ahead (Bishop and Hines 2012). It provides the guidelines for action and commitment. Carleton et al. (2013) suggest three methods that help to find and form visions for innovation: Vision Statement, DARPA Hard Test, and Pathfinders. *Vision Statement* helps in presenting a new idea as a clear and concise summary. *DARPA Hard Test* measures the visionary potential of the innovation. The *Pathfinders* method determines an idea's best path through the organization or network.

The Change paths method (F) helps to define the major steps or choices that must be taken to get to the future vision. It helps to lay out the critical milestones to be achieved on a particular innovation path. Instead of a typical direct path, a series of smart choices linked together in a cohesive vision is envisaged (Carleton et al. 2013). This is closely related to the *Backcasting* method, in which a series of steps to the future are worked out backwards from the future to the present (Inayatullah 2008). Backcasting offers a way to get a group to determine what must happen in order to reach the envisioned future (Evans and Sommerville 2007).

Multilevel Service Design (SD) is an interdisciplinary method for designing complex service systems, and it contributes toward multilevel understanding of customer experience. This method enables integrated development of service offerings at three hierarchical levels: (a) Defining the company's *service concept* with the customer value constellation of service offerings for the value constellation experience; (b) Defining the company's *service system*, comprising its architecture and navigation, for the service experience, and (c) Defining each service encounter with the *Service Experience Blueprint* for the service encounter experience (Patricio et al. 2011).

Business model canvas (SD) is widely used in outlining companies' business models (Osterwalder and Pigneur 2010). It consists of nine interrelated building blocks: value proposition, target customer, distribution channel, customer relationship, value configuration, core capabilities, partnership, cost structure, and revenue streams (Osterwalder 2004).

Role scripts (SD) are used to clarify the roles of different stakeholders within a new service. They include different possible service scenarios and help staff and other stakeholders to understand the new service and their role in it (Moritz 2005). The shared understanding of the new service is critical for its successful realization.

5 Conclusion

This chapter makes a unique contribution by introducing a conceptual framework for service innovation process that is grounded on foresight and service design. This is a novel perspective in operationalizing the dynamic capabilities in service context since both futures thinking and design thinking can evidently facilitate sensing and seizing new opportunities for service innovation. Futures thinking help to make changes and uncertainty in business environments more understandable and easier to approach. Design thinking provides systematic, yet creative, and human-centered approach for understanding and conceptualizing customer value and for integrating customers, and other stakeholders in the innovation process. Both futures thinking and design thinking are future-oriented, creative and participatory approaches, and they tackle issues in a holistic, systemic, and iterative way.

The methods of foresight and service design complement each other in innovation process. Foresight offers means for imagining and creating alternative futures. Service design brings customers and other stakeholders and their needs into these future contexts and ideates and visualizes potential new solutions in creating desired futures. In the first phase of the service innovation process, the evidence-based, empathetic, and contextual methods allow mapping the future changes in business environments and deeply understanding customer contexts and needs. In the second phase, foresight and service design help to forecast alternative futures and create new service ideas based on the insight generated in the first phase. The methods are highly collaborative, creative, and open-minded. In the third phase, the new ideas are concretized and tested. The methods are visualizing, simulating, and experimental. Finally, in the fourth phase, the service is conceptualized for realization and the future is influenced by this new concept. These methods are visionary and synthesizing, and they aim at transformation. Combining the methods and tools of foresight and service design and using them creatively together can generate the most forward-looking, open-minded, and distinguishable end results.

To conclude, this chapter shows that companies looking to service-logic-based innovation to generate new opportunities for value creation should employ futures thinking and design thinking. Since futures thinking and design thinking boost the dynamic capabilities of sensing and seizing opportunities for service innovation, they should be built into organizational processes, structures and every day practices, and they should also be trained as individual skills. Rather than doing them in a one-shot activity, applying them should be a continuous activity in any organization.

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Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis

Davide Consoli, Dioni Elche and Francesco Rullani

Abstract Knowledge-Intensive Business Services (KIBS) are specialized suppliers of intermediate inputs with expertise in locating, developing, combining, and applying generic knowledge to specific needs. The sectors in which these firms operate have experienced extraordinary growth over the last two decades both in terms of employment share and of value added, and are often referred to as key hubs within the modern knowledge-based society. This chapter offers a review of scholarly perspectives on the growth trajectory of KIBS, and elaborates an empirical analysis to explore in detail commonalities and differences across this diverse group of sectors.

Keywords Knowledge-intensive business services (KIBS) · Professional service sectors · Skill intensity · Cross-sectoral variety

1 Introduction

Services have been at the center of the scholarly debate for over three decades now due to their remarkable contribution to employment, productivity, and innovation among the world's most advanced economies. Within this body of research is a strand dedicated to the study of Knowledge-Intensive Business Services (KIBS) Sectors, that is, of activities whose core competence is the codification of highly

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specialized knowledge for the purpose of screening, assessment, and evaluation. The expansion of KIBS is ascribed to the physiological maturation of modern knowledge economies where rising levels of per capita income and increasing specialization have given way to new form of production and of division of labor.

When it comes to conceptualizing KIBS, scholars have been more preoccupied with setting the precise boundaries in the geography of industry (i.e., what KIBS are) as opposed to understanding their functional aspects (i.e., what KIBS do). This is partly due to the unwarranted but implicit premise that KIBS are a homogenous group of activities. It is argued here that the latter is a misconception at odds with empirical evidence on the systematic diversity in the expansion rates of sectors across countries, including service sectors. More cogently, this narrow view poses serious limitations to our knowledge of the sources of growth and innovativeness that characterize these important sectors.

Building on this, the chapter elaborates an alternative view framed in the context of industry dynamics. The central tenet is that the development of sectors and industries feature specificities that depend on the interplay across (i) the relevant body of know-how; (ii) the key actors and the networks in which they operate; and (iii) the institutional infrastructure (Malerba 2005). We take the view that employment structures and their underpinning knowledge bases are useful entry points to understand what a sector is about, and what commonalities and differences exist across sectors. Using industry data on the United States, we analyze the dynamics of employment and the attendant skill bases over a 10-year period to address the following questions:

1. What employment structures and skill configurations characterize each Professional Service Sector?
2. Using the former units of analysis, what commonalities and dissimilarities are observed across the whole group of Professional Service Sectors?
3. How do the former evolve over time?

2 Knowledge-Intensive Business Services

2.1 Background

Knowledge-Intensive Business Services are suppliers of intermediate inputs built from the codification of specialized knowledge related to a specific (technical) discipline or (technical) functional domain (den Hertog 2000; Miles et al. 1995). KIBS firms are problem-solvers with expertise in locating, developing, combining, and applying generic knowledge to specific issues. The sectors in which these firms operate have experienced extraordinary growth over the last two decades both in terms of employment share and of value added, and are often referred to as key hubs within the modern knowledge-based society (Boden and Miles 2000;

den Hertog 2000; Muller and Zenker 2001; Kuusisto and Meyer 2003; Wood 2006; Castellacci 2008; Ciarli et al. 2012).

A broad recognition of the now ample literature on KIBS reveals three common threads. First, most studies emphasize the centrality of knowledge which is not only a key input but also the output that is traded in the market. Accordingly, specialized expert knowledge, research and development ability, and problem-solving are core components of KIBS (Miles 2000; Simmie and Strambach 2006). A second important feature is the interactive nature of KIBS whereby client–supplier interaction is a significant determinant of the content and the delivery process of these services (Gadrey and Gallouj 1998; Sundbo and Gallouj 2000; Gallouj 2002). The interaction consists of negotiation and efforts in reaching a shared understanding of the nature of the problem and the boundaries of the solution. The third common trait of KIBS is that the final outcome implies the transformation of the knowledge base of both the supplier (in the form of experience) and the user (in the form of codified information). Put another way when clients consult with KIBS firms they seldom purchase a standardized product but, rather, engage a focussed interaction that culminates in new standards, new procedures, and new responses designed around the context of use.

KIBS can be very diverse and encompass "traditional" professional activities, for example assistance for legal or accountancy matters, to activities closely related to technology, especially computers, but also activities associated to creative endeavors such as design and advertisement. Table 1 provides a synthesis of the component areas of economic activity within the "Professional, Scientific and Technical Services" heading of NAICS sectoral classification.

For what concerns the internal organization KIBS rely heavily on tacit knowledge embodied in their employees as well as on codified knowledge, which is both input for and output of such activities. Several studies show that codified knowledge may only become valuable when it is combined with tacit knowledge (Wood 2002; Foray 2006). KIBS firms often contribute to both the adaptation of existing production techniques and business methods or the creation of wholly new ones (Landry et al. 2012). Thus the core competence of KIBS firms is the recombination of existing information into a new, and often unique, set of instructions to assist organizations with "problems for which external sources of knowledge are required" (Miles 2005, p. 39). Before proceeding with a more detailed analysis of the way in which KIBS have been conceptualized in the literature, it will be useful to summarize briefly the main empirical trends that brought this class of services to the attention of scholars.

2.2 Main Drivers of KIBS Growth

The rise and spectacular growth of KIBS is primarily associated with the transformation of systems for production and distribution. The growing importance of specialization for competitiveness pushes firms to concentrate on their core

Table 1 Professional, scientific, and technical services (NAICS classification)

Code	Sector	Main activities
541100	Legal services	Legal and paralegal assistance. Establishments in this industry group are offices of lawyers, offices of notaries, and offices of paralegals
541200	Accounting, tax preparation, bookkeeping, and payroll services	Auditing accounting records; designing accounting systems; preparing financial statements; developing budgets; preparing tax returns; processing payrolls; bookkeeping; and billing
541300	Architectural, engineering, and related services	Structure design, drafting, building inspection, landscape design, surveying and mapping, laboratory and onsite testing, and interior, industrial, graphic, and other specialized design services
541400	Specialized design services	Specialized design services except architectural, engineering, and computer systems design
541500	Computer systems design and related services	Expertise in the field of information technologies e.g., writing, modifying, testing, and supporting software; Internet webpage development; integration of hardware, software, and communication technologies; onsite management; training, and support after sales
541600	Management, scientific, and technical consulting services	Providing expert advice and assistance to other organizations on management, environmental, scientific, and technical issues
541700	Scientific research and development services	Original research to gain new knowledge; application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes
541800	Advertising, public relations, and related services	Mass-media advertising or public relation campaigns; selling media time or space to advertisers or advertising agencies for media owners; creating and implementing indoor or outdoor display advertising campaigns; creating and implementing direct mail advertising campaigns

competencies, and to subcontract secondary functions. As more companies need external knowledge to incorporate their production process, KIBS provide services based on a level of professional knowledge. Within this paradigm-specific drivers underpin the expansion of the market for Knowledge-Intensive Business Services.

2.2.1 Outsourcing

KIBS act as critical cross-sectoral connectors especially for firms that rely increasingly on contracting out knowledge-intensive functions that were previously carried out in-house (Rubalcaba et al. 2008; Huws and Dahlmann 2004). This phenomenon

responds to the logic of competing by strengthening core competences in an increasingly globalized market, and entails specific benefits and costs. Business service suppliers can achieve significant economies of scale, as well as increased efficiency coming from experience and learning from a broad portfolio of clients. The client firms gain degrees of freedom in the managerial function, and can afford higher flexibility by, for example, changing suppliers or dealing with an ample spectrum of projects. On the other hand, locating and using external suppliers of such services entails significant transaction costs and requires, on the part of the client, sufficient absorptive capacity. For outsourcing to be successful, managerial and administrative routines have to be put in place, especially to prevent conflicts in the implementation of strategic functions (Carter 1989; Amable and Palombarini 1998).

2.2.2 New Technology

Being information both input and output for business services it is hardly surprising that rapid advances in computing had a significant impact in the development of these activities. Interestingly the relation between services and technology has changed over time. Back in the days where they were still viewed as subordinate of manufacturing, services' heavy use of Information and Communication Technologies (ICTs) was framed as a dependency relation: in short, productivity increase in services followed from improvements in technology available "off the shelf." This posture, however, overlooks the interpenetration between physical technologies and organizational structure, and how these became eventually indispensable to one another (Uchupalanan 2000; den Hertog 2000). More recently the impact of technology on KIBS has been conceptualized as triggering a dual "enabling" effect: on the one hand the scale of operations, due to the remarkable decrease in the costs of generating, storing, and reproducing information, and on the other hand the scope of activities, due to the proliferation of specialized applications. As far as the practical implementation, the integration of ICTs has gone through phases: the initial pioneers faced a steep learning curve in acquiring know-how and developing new routines around it. Interestingly, ICTs have given way to an independent area of opportunities for business services providers that, over, the years, has grown diverse and encompasses systems integration, writing software, designing web pages, consulting on technology strategy, facilities management (Miles 2005).

2.2.3 Regulation and Globalization

The provision of specialised knowledge is especially important when rapid or profound transformations in the attendant social or legal frameworks render obsolete established routines. These processes usually threaten consolidated competitive positions but, also, open up new business opportunities: in both instances KIBS facilitate compliance with new criteria—for example environmental

regulation or health and safety—by providing intelligence, intermediation, strategic advice as well as specialized staff training. Beyond the archetypal examples of legal and accountancy firms, the broad trends of globalization and specialization have spurred new specific needs and, in parallel, new lines of business (D'Ippolito et al. 2012). Professionals assist clients in understanding the social and cultural environment of foreign markets, carry out market research, study consumption patterns to adapt marketing, and mediate among stakeholders from different parts of the world. The challenges of globalization need not be restrained to the demand side of the market: several firms are pushed to seek inputs from foreign markets (Miozzo and Miles 2002).

Clearly, all of the drivers outlined above will affect differently the spectrum of activities carried out by KIBS firms depending on the country in which they are located, the scale of the market, and the nexus of formal and informal connections across areas of economic activity (i.e., sectors). Let us now concentrate on the rich scholarly debate that has emerged over the last two decades around the peculiarities of Knowledge-Intensive Business Services.

2.3 Shifting Perspectives on Knowledge Services

The KIBS phenomenon has attracted much attention and fueled different perceptions among scholars. Two main phases of study stand out. The perception of services as derivative activities of manufacturing typical of the early literature of the 1980s was very much influenced by Pavitt's (1984) sectoral taxonomy. In this framework business services were relegated to the marginal role of specialized information providers heavily dependent on hi-tech (Wood et al. 1993). This perception changed once the nature of KIBS evolved and their role went beyond that of passive users of technology. A study on intermediate demand based on Input–Output tables in the UK estimated that between the late 1970s and the mid-1980s business services grew by an impressive 37 %, and together with manufacturing contributed to more than half of GDP growth (Barker 1990). Subsequently Barker and Forssell (1992) found that business services contribute significantly the average performance of all sectors. This and other evidence made it clear that KIBS were key nodes for knowledge generation and transmission within specialized networks. To be sure, closer attention to intersectoral linkages led to new taxonomies (e.g. Soete and Miozzo 1990).

A study by Miles et al. (1995) laid the first milestone of the intellectual endeavor of understanding and categorizing these services in a systematic manner. It did so by distinguishing services that have a closer functional relation with technology (T-KIBS) from those that are more interpersonal and linked to traditional professions (P-KIBS). This work catalyzed attention to the KIBS phenomenon and inspired a stream of research with marked empirical flavor (see reviews by Zenker and Doloreux 2008; Muller and Doloreux 2009). Nowadays, the study of KIBS is a

specialized field of research drawing on and contributing to different streams across social sciences.

The field of *innovation studies* is arguably the origin of much empirical work on KIBS using a combination of theoretical notions of Neo-Schumpeterian tradition with empirical case studies (Coombs and Miles 2000; Tether 2003; Drejer 2004). Central to this approach is the concept of innovation as endogenous response to the limitations that make the current set of activities inadequate. Such changes generate paths of problems and solutions shaped around the relevant know-how. Allied to this is the idea that innovation triggers the cyclical reconfiguration of know-how across partially connected technical, organizational, and institutional domains (Langlois 1988; Loasby 1991; Metcalfe 2002). But as knowledge is heterogenously dispersed across individuals (Hayek 1945) changes in its structure entail reconfiguration of communication mechanisms too. Therefore innovation systems thrive on the diversity of the forms of specialization within but, at the same time, requires coherence through coordination across the activities in which knowledge is embodied. This particular view gave way to a new approach to service innovation in the 1990s, one in which KIBS gained prominence for a number of reasons. The first is that because of the close interaction with users some (but not all) KIBS have close connection with the organization of production, in the sense that they shape it. The second reason is that KIBS provision entails often the creation of dedicated platforms across sectors and industries. The third, related to the former, is that the search for and the implementation of solutions is uncertain due to the contingent adaptation of the institutional architectures that determine the conditions of access to and use of knowledge.

Against this backdrop the dynamics of KIBS is a very close reflection of the systemic nature of innovation (Consoli 2007). This approach is informed by a great deal of empirical evidence (mostly survey analysis) on the specificities of services. Some works ascribe the emergence of KIBS to the emergence of an actual market for knowledge (Antonelli 1998). Rapid developments in technology facilitate opportunities for appropriation of codified knowledge thus paving the way to new opportunities for specialization. This is a central aspect in the dominant mode of production of KIBS. A study by Hipp et al. (2000) shows that technology-related KIBS are more likely to supply specialized service compared to other service sectors. The upshot is that these firms have greater flexibility and tendency to adapt their outputs to client needs. Other empirical works (reviewed in Miles 2005) highlight important peculiarities of business services, for example their tendency to engage multiple dimension of novelty, namely "service concept," "client interface," "delivery system" and "use of technology" (Miles 2008). This bundling together of technological and organizational dimension speaks, on the one hand, to the complexity achieved by some service organizations while, on the other hand, it grounds even more markedly business services to the specific context of problem-solving. Compared to other service firms, KIBS stand out for the ability to interface effectively by entertaining different forms of collaboration with different parties (Tether 2003; Salter and Tether 2006). The latter finding has been conceptualized in terms of combinatorial properties of knowledge as a main source of innovation

stemming from business service sectors (Strambach 2001; Miles 2005; Amara et al. 2009). Yet another important contribution of innovation studies is a strong toning down of service uniqueness due to user-producer interactions. Several scholars refuted this extreme view and argue that interactions with users in KIBS tend to be rather heterogeneous (Tether 2005). Besides, in the extreme view the virtues of interaction seldom consider the considerable coordination costs involved (von Hippel 2005). While, as Miles (2005) makes clear, some KIBS are by their very nature communication-intensive and strongly dependent on user feedback, there are significant differences in the way in which interactions take place and contribute to innovation.

Several studies in the area of *management* offer important insights into the organizational and strategic aspects of KIBS too. Heavy users of technology like service firms respond to the pressures of higher opportunities and harsher international competition by taking advantage of enhanced capabilities in codifying information. This has, however, significant impact on the organizational structure. An early study by Quinn et al. (1990) on the "thinning out" intermediate layers of management and administration in service firms shows the reconfiguration of the skill base with demand for routine white-collar workers falling drastically relative to that of shopfloor, sales, and distribution workers. Other studies articulate the role of power relations within professional service firms (Barley 2005; Blau and Scott 1962) and the contribution of individual professionals on firm performance (Greenwood et al. 1990; Hinings et al. 1991; Maister 1993; Winch and Schneider 1993). A number of works in the area of *sociology* share common ground with the latter stream, especially for what concerns relational issues and power relations. The pioneering study of Abbott (1988) is an important milestone for the conceptualization of professions. The processes by which particular problems are matched with occupations and the forms of know-how embedded in them involve nontrivial efforts in establishing authority and legitimacy. Professions, understood in terms of bundles of practices, are therefore continually challenged by both inside forces, such as communication gaps with clients, and outside forces such as the diversification of scientific knowledge in specialized subdisciplines. At the same time, these reconfigurations of professional practice are strong catalysts for conceptual and organizational innovations (see Muzio et al. 2013).

Last but not least, it is important to mention important contributions stemming from *economic geography*. At root of this stream is the interest in understanding the extent to which specialist services contribute to the economic growth of regions: the underpinning tenet is that knowledge-intensive activities like KIBS encapsulate the characteristics of the local environment and their growth is likely to strengthen the differences across regions, as the conditions that favor a structural change toward a knowledge-intensive economy are cumulative and difficult to extend elsewhere (Wood 2005; Ciarli et al. 2012). The relationship between KIBS and local economic development has been studied mostly from two perspectives: on the one hand, the way in which KIBS interact with other local actors to produce innovation and regional growth is emphasized; on the other hand, the way in which producer services access their clients and form central places is studied. KIBS have

also been analyzed as vectors of information exchange: the role that they play as innovators, facilitators, carriers, and sources of information between companies. Regional development is a by-product of this activity to the extent that KIBS are thought to play this role within relatively closed regional innovation systems (den Hertog 2000; Muller and Zenker 2001). Still in this stream of research, Chadwick et al. (2008) examine the changing geography of KIBS employment in Great Britain during the 1990s. Using evidence from English and German cities Simmie and Strambach (2006) suggest the existence of strong correlation between the economic performance of city-regions and the employment share of KIBS. Hansen (1994) finds that the growth performance of US cities is positively related to the size of the KIBS sectors. Other work examines the challenges associated with localization. A recent study by Wessel (2013), for example, finds that polarization in access to KIBS is a source of inequality with negative impact on the performance of small- and medium-sized enterprises. Wood (1998) finds that consultancy markets are strongly localized in the EU, a further indication of the pressures of globalization: while know-how of international practices is important, most firms feel that a "local" flavor adds competitive edge to their operation. Muller and Zenker (2001) extend this analysis by means of surveys in France and Germany, and finds higher levels of reported innovation and expenditures on innovation-related activities among manufacturing SMEs who interacted with KIBS than among those who did not.

The wide range of perspectives discussed in the preceding paragraphs demonstrates clearly the extent to which the literature on KIBS has grown over the years. This variety of approaches has enriched scholarly understanding of the phenomenon and has contributed to a nuanced articulation of the sources, the effects, and the ways in which these services connect to the dynamics of knowledge and, therefore, to innovation. Our critical reading of this literature, however, suggests a paradox: while most scholars would agree in recognizing the qualitative differences across professional service sectors, most empirical studies treat them as a homogenous block. The remainder of the chapter will address this shortcoming and offer empirical evidence in support of the hypothesis that cross-sectoral differences exist and matter.

3 Heterogeneity and Sectoral Diversity

Before proceeding to the empirical analysis it is important to stress the conceptual roots of our proposition. We draw from the field of innovation studies, in particular the notion that the growth of knowledge is the main driver of the evolution of sectors and industries. Central to this tenet is the notion that an ample spectrum of governance mechanisms is crucial to coordinate effectively different forms of know-how (Nonaka and Takeuchi 1995; Antonelli 2008). Accordingly sectoral patterns of development are understood as diverse depending on the ways in which knowledge, in the terms outlined above, impinges upon the development and adaptation of new

technologies (see Pavitt 1984; Mowery and Nelson 1999; Malerba 2002). Against this theoretical backdrop studies on sectoral dynamics have strived to analyze various dimensions, including size of innovative firms, patterns of entry and exit, institutional arrangements, intensity of cooperative R&D, impact of R&D on productivity, cross-organizational interactions, and appropriability conditions (see Kamien and Schwartz 1982; Pavitt 1984; Malerba and Orsenigo 1996; Los and Verspagen 2004; Breschi et al. 2000; Van Dijk 2000; Malerba and Montobbio 2003). Malerba (2005) unified these threads in the framework of sectoral dynamics by stressing interdependencies across three dimensions: (i) the knowledge base; (ii) the key actors and the networks within which they operate; and (iii) the underpinning institutional infrastructure.

This conceptual premise opens the way to an analysis of the differences across the skill bases of sectors. As already anticipated, Knowledge-Intensive Business Services tailor solutions around clients' specific requirements and engage high levels of openness and networking (Hitt et al. 2001; Muller and Zenker 2001; Lowendhal et al. 2001; Kuusisto and Meyer 2003). This modus operandi depends heavily on the expertize of employees since the typical task structure of this class of business services entails a mix of general knowledge, practical problem-solving, and on-the-job learning (Bettencourt et al. 2002; Miles 2005). Therefore skill bases encompass a mix of cognitive skills, such as creative response and critical thinking, and of social skills to the effect of cultivating close relations with clients. This pattern of specialization differs considerably from that observed in technical assistance-type of activities. Our proposition is that the repertoire of skills that are embedded within occupational structures captures the distinctive combinations of knowledge underpinning the operation of each sector. Accordingly, we set out to explore empirically the occupational structures and the skill requirements of KIBS to assess whether, and to what extent, these feature diversity.

To be sure, we are not alone in recognizing that employment structures bear on the dynamics of industrial organization. Barley and Kunda (2001) lament that the organizational literature has paid little attention to the role of changes in work configurations. Others emphasize that occupational structures are not static but adapt to growing professionalization in the organization of productive activities and that, as a result, high-skill professionals concentrate on core management activities while ancillary tasks are assigned to support staff, either low-skilled white-collar or blue-collar workers (Caroli 2001; Levy and Murnane 2004; Vona and Consoli 2011). Malhotra and Morris (2009) recently connected the literature on the sociology of professions with organization and management studies to elaborate a systematic connection between firms-level heterogeneity and the professional sector setting. Overall, they conclude, the literature on sociology has made much headway in articulating differences across professions with regards to knowledge production and use (see e.g. Abbott 1988; Collins 1990).

The cogent question is: which specific aspect of employment structures is most relevant to our purpose of analyzing cross-sectoral variety? In the framework proposed here, sectors are viewed as bundles of tasks whose execution entails the generation and/or application of specific knowledge (Nelson and Winter 1982).

Skills are individual abilities or proficiency in carrying out activities, and occupations are industry-specific pathways for matching skills with institutionally agreed tasks.[1] Accordingly, job specifications are blueprints—imperfect as they may be—of the repertoire of skills that the labor force is expected to possess and use in order to carry out successfully particular work tasks (Autor et al. 2003; Levy and Murnane 2004). In aggregate, the composition of the workforce reflects the knowledge mix that is relevant in a particular industrial sector at a specific moment. By the same token, as industry needs change over time occupations evolve and so do the agreed tasks and the relevant skill mix. This implies that the complementarities across different forms of knowledge matter a great deal for the ability of an individual worker to meet successfully their job requirements depends on the composition of the overall employment structure and on mechanisms of intraoccupations collaboration (Rosenberg 1976).

4 KIBS Employment and Skills

The empirical study of the present section draws on the conceptual framework outlined above with a view to explore commonalities and differences across KIBS sectors. Following the premises of the preceding pages, we propose that occupations are instituted channels for the application of know-how to specific problems. This is operationalized by means of vectors of skill-task co-occurrences that capture the knowledge pool that is embedded in the workforce.

4.1 Data Description

The analysis is based on information of the Occupational Information Network (O*NET) electronic database of the U.S. Department of Labour (DOL). The data contains information on the physical and cognitive abilities that are required on 1,102 job titles. This information is provided by trained occupational analysts, job incumbents, and occupational experts who are asked to assign a score to 35 types of skills on the basis of their importance for performing the tasks entailed by the job. The O*NET classification uses the Standard Occupational Classification (SOC) system and is therefore aligned with other sources of occupational information such as the US Bureau of Labor Statistics (BLS). The final dataset is built by merging employment statistics on KIBS sectors (NAICS coding) with the corresponding

[1] Thus, some skills are generic and can be applied to a broad range of tasks while others are specific to particular tasks; some skills are used to generate cognitive responses, others involve physical activities; finally, some skills pertain to the individual's sphere while others facilitate interpersonal interaction.

occupational information on skills contained in O*NET. The observations available for the period 2002–2011 are those of the occupations within each sector, and of the vector of skill specific to each occupation.

4.2 Employment Structure

Figure 1 shows the aggregate employment levels of KIBS sectors in the US. The diagram offers a clue of the magnitude of these activities, and of their trends over the decade 2002–2011. In particular, it can be observed that employment grows in all sectors growing until 2009, when the effects of the global economic crisis became manifest, relatively more for Architectural and Engineering services compared to sectors that suffered less job losses like Design, Advertisement, and Legal Services.

A look at the composition of employment in Table 2 offers interesting qualitative indications. The breakdown of the KIBS workforce into smaller categories reveals four distinctive groups:

- Sectors with mostly *Hi-Skill* occupations such as Computer System Design (82 %), Scientific Research and Development (77 %) (R&D henceforth), and Architectural and Engineering (78 %);

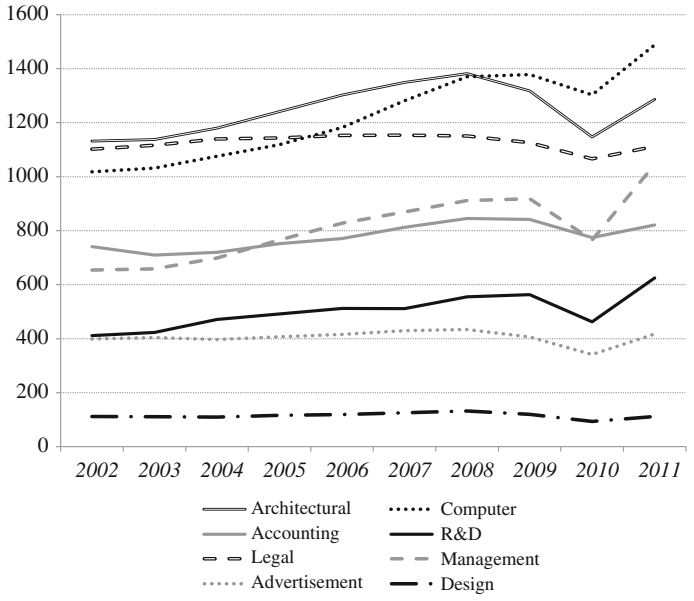

Fig. 1 Total employment (000 s) in KIBS sectors

Table 2 Employment type (%) by skill level

	Low	Medium	High
Legal	44.5	51.0	4.5
Accounting	43.6	1.5	54.8
Architecture and engineering	15.6	6.3	78.1
Design	23.5	31.4	45.2
Computer system design	13.3	5.1	81.6
Management consultancy	36.5	7.6	55.9
R&D	17.3	6.1	76.6
Advertising	31.0	27.2	41.8

- Sectors with a *polarized* employment structure featuring comparable shares of Hi-Skill and Low-Skill workers, like Accounting (55 % High, 44 % Low) and Management Consulting (56 % and 37 %);
- Sectors with a *balanced* workforce of Hi-, Medium-, and Low-Skills such as Advertising and Design;
- Legal Services, a singleton with mostly *Low- and Medium-Skill* workers (96 % combined).

The first snapshot does not seem to confirm the commonly-held notion that KIBS are the exclusive camp of highly qualified professionals. As a matter of fact, this is only true for the first of the groups above, that is, for Computer System Design, R&D, and Architectural and Engineering Services. In the remaining, and the majority, of the cases the workforce encompasses different levels of occupations and a richer knowledge mix than one would infer from the traditional view. These qualitative differences become more apparent if the focus is narrowed down to the occupational categories that populate individual sectors (Fig. 2). Here we observe that:

- Among *Hi-Skill sectors* both Computer System Design and Architectural and Engineering are dominated by sector-specific occupations—i.e., Computer Specialists and Architects and Engineers. R&D services are different in that Scientists hold the lion share of employment together with other occupations like Office workers, Architects and Engineers, Computer Specialists and Managers—more so at the beginning of the decade;
- The pattern of employment in *polarized* sectors, Accounting and Management, sees similarly high shares of specialists like Business and Financial workers and of Office workers;
- The sectors with a *balanced* employment structure, Advertising and Design, are rather different too: the former has a richer composition with Office workers, Sales workers, and Design specialists showing a comparably strong presence through the period; the sector-specific occupation instead is the dominant worker category in Design services;

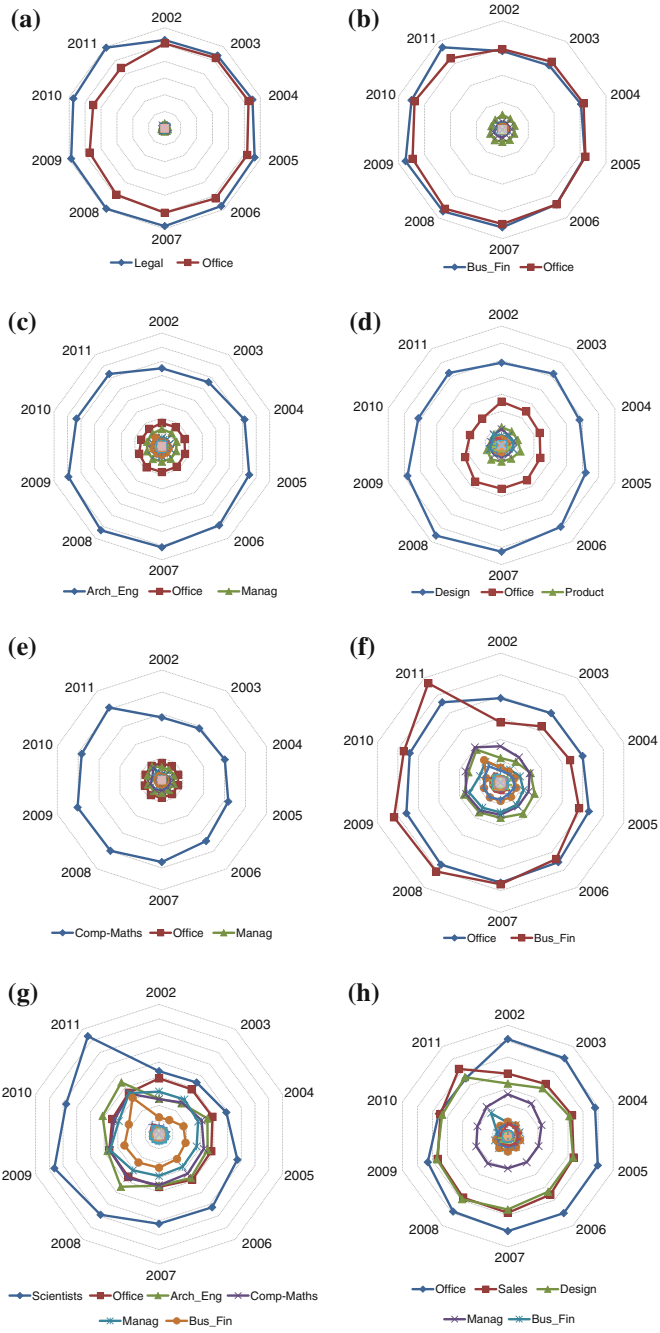

Fig. 2 Employment groups (2-digit SOC). Legal services, accounting and bookkeeping services, architectural and engineering services, specialized design services, computer system design services, management, scientific and technical consulting services, scientific research and development services, advertising, public relations and related services

- The configuration of the workforce of the Legal Services sector, mostly Low-Skill, resembles that of polarized sectors, with strong complementarity between specialists, legal workers in this case, and Office workers.

On the whole, these patterns indicate with clarity the existence of two meta-categories of occupations. On the one hand are the specialized professionals, such as Legal workers or Architects and Engineers, whose skill sets match closely the requirements of specific activities—and this is what causes these "species" prevail in the occupational ecology. On the other hand are cross-sectoral occupations, like Office workers or various types of Managers, whose professional profile are more generic and exhibit greater combinatorial possibilities with tasks that are relevant in a variety of sectors. Critical aspects of work relationships characterized by high degree of interdependency have been examined in the literature (see e.g. Gosselin 1985). From the latter one infers that the complementarity across different types of workers is valued as an important source of renewal for professional know-how. At the same time, this brief exploration of employment structures suggests the existence of significant cross-sectoral differences, even among activities like KIBS that have been unwarrantedly approached as a homogenous group.

4.3 Skill Configurations

Let us now focus on the skill content of occupations within KIBS sectors. To this end, we aggregate occupation-specific information on skills by industry using relative scores, that is, weighted indexes of skill intensity (see Consoli and Elche-Hortelano 2010, 2013). Averaging over occupations in each industry yields an input intensity measure of each skill in each industry. Figure 3 shows the movements of average skill measures for KIBS sectors over the period 2002–2011.

The first indication from the above is the gap between *High-Skill* sectors as per above (Computer System Design, R&D and Architectural and Engineering) and the others. A second interesting feature is the divergence within the latter group in the latter part of the decade: in fact, Legal and Accounting exhibit diminishing levels of skill intensity while Management Consulting, Design, and Advertising up-skilling. In sum, the two distinct blocks of KIBS sectors observed at the beginning evolve into three separate groups toward the end of the period.

Next, we reduce the set of skill measures to a smaller number of nonoverlapping dimensions by means of a factor analysis. Table 3 presents a compact view of the skill constructs extracted from the 35 indicators of skill intensity for the period 2002–2011. Altogether the four factors explain a large percentage of the variance.

Using the previous literature as reference, these constructs can be interpreted on the basis of functional specificities (see Autor et al. 2003; Wolff 2006). The first factor includes items that involve the use of cognitive abilities in nonroutine circumstances, like interpersonal interaction or abstract thinking. This is labeled *Cognitive Interactive Skills*. The second construct, *Cognitive Analytical Skills*,

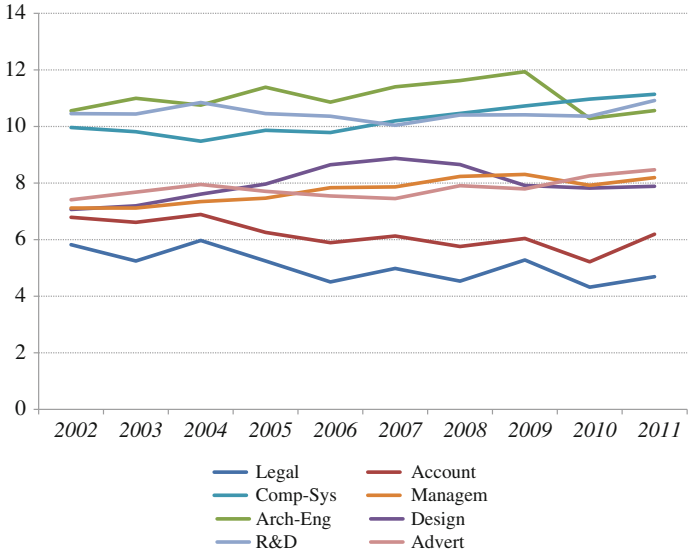

Fig. 3 Skill intensity in KIBS sectors

contains a range of cognitive abilities that are normally employed for highly routinized tasks prone to automation. The third factor is labeled *Semi-Manual Skills* and encompasses abilities for mixed cognitive-manual routine tasks, mostly with the aid of specialized technical equipment. The last construct, *Administrative Skills*, brings together abilities for managing human, financial, and material resources. The fact that they stand out as an independent group is not surprising considering the high importance of organizational processes in knowledge intensive that has been reiterated by the specialized literature on KIBS (see e.g. Miles 2005).

As a last step, we concentrate on sector-specific configurations with the aid of Fig. 4, where the intensities of the skill constructs are displayed in detail for each one of the KIBS sectors.

In the first group, *High-Skill* KIBS, Cognitive Skills are the leading category of abilities. Within it, Computer System Design and R&D Services are alike by virtue of relatively higher intensity of Cognitive Analytical skills (Factor 2) compared to Interactive skills (Factor 1), which are instead dominant in Architectural and Engineering. Among *Intermediate Skill* KIBS, Management Consultancy and Advertising share a similar skill configuration with the highest peaks corresponding to Interactive skills (Factor 1) followed by Administrative Skills (Factor 4). Design services stands out as the KIBS sector where Semi-Manual Skills (Factor 3) have the highest relative intensity. On the right-hand side of the diagram are traditional professional services like Legal and Accountancy which share a similar skill configuration and the overall lowest skill intensity (cf. Fig. 3).

Table 3 Factor analysis of skill constructs

	Factor 1	Factor 2	Factor 3	Factor 4
Learning strategies	**0.8695**	0.2826	0.0838	0.1466
Social perceptiveness	**0.8575**	−0.1161	−0.3589	0.1556
Active listening	**0.8488**	0.3281	−0.3239	0.0547
Speaking	**0.8390**	0.2556	−0.3794	0.1957
Service orientation	**0.8254**	−0.1789	−0.2263	0.1682
Instructing	**0.8043**	0.1433	0.1769	0.2280
Monitoring	**0.8041**	0.3445	−0.0830	0.3626
Time management	**0.7488**	0.3310	−0.1971	0.4149
Reading comprehension	**0.7357**	0.5605	−0.2037	0.0500
Writing	**0.7299**	0.4885	−0.3555	0.0952
Coordination	**0.7098**	0.3213	0.0364	0.5355
Active learning	**0.7082**	0.6663	−0.0330	0.1440
Critical thinking	**0.7009**	0.6312	−0.1361	0.1578
Persuasion	**0.7001**	0.2651	−0.3889	0.3356
Judgment and decision making	**0.6526**	0.5913	−0.1641	0.3320
Negotiation	**0.6441**	0.1700	−0.4046	0.4705
Programming	0.0432	**0.8536**	0.1642	−0.0213
Operations analysis	0.2733	**0.8274**	0.1695	0.3378
Systems analysis	0.2668	**0.8052**	0.1801	0.3615
Mathematics	0.1733	**0.8041**	0.1149	0.2957
Complex problem solving	0.5673	**0.7648**	0.0445	0.2217
Systems evaluation	0.3465	**0.7485**	0.1586	0.4188
Technology design	0.1407	**0.7462**	0.5304	0.0706
Science	0.2379	**0.6699**	0.3293	−0.0736
Equipment maintenance	−0.3003	−0.1260	**0.9069**	−0.0364
Repairing	−0.2581	−0.0420	**0.8812**	0.0211
Operation and control	−0.2549	0.0151	**0.8577**	−0.0514
Installation	−0.1144	0.2397	**0.8547**	0.0521
Troubleshooting	−0.0721	0.4432	**0.8513**	0.0264
Operation monitoring	−0.1861	0.1183	**0.8456**	−0.0739
Equipment selection	0.0519	0.4054	**0.7824**	0.0890
Quality control analysis	−0.0139	0.6051	**0.7050**	0.1194

(continued)

Table 3 (continued)

	Factor 1	Factor 2	Factor 3	Factor 4
Management of personnel resources	0.3838	0.1653	−0.0185	**0.8510**
Management of financial resources	0.4067	0.2822	−0.1484	**0.8052**
Management of material resources	0.3215	0.2661	0.3470	**0.7758**

Factor 1 Cognitive interactive skills
Factor 2 Cognitive analytical skills
Factor 3 Semi-manual skills
Factor 4 Administrative skills

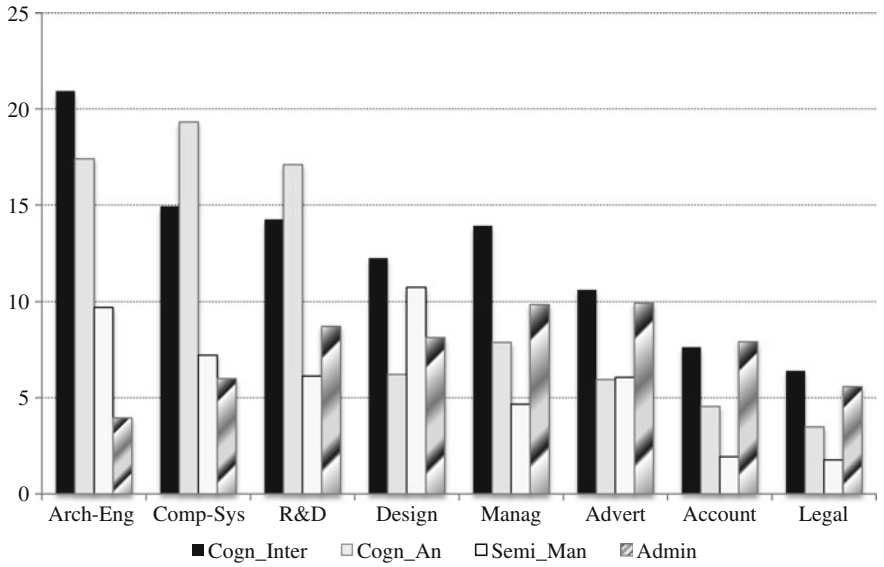

Fig. 4 Detailed skill intensity in KIBS sectors

5 Conclusion

What can be inferred by this brief empirical excursus of employment structures and skill configurations? The first discrepancy with the inherited wisdom is that KIBS are not the exclusive realm of high-skilled professionals. The breakdown of employed workforce by job levels captures different groups with different mixes of high-, medium-, and low-skills. It is particularly interesting to highlight the cases in which medium-level occupations do play an important role, such as Legal Services and, to a lesser extent, Advertising and Design (cf. Table 2). This resonates, though for different reasons, with the realities of these sectors due to the importance of hybrid know-how in facilitating the match to complex task requirements (see Malhotra and Morris 2009).

Further, the diversity observed in the skill types that characterize KIBS, and the proportions in which they mix underscore more relevant insights. As pointed out in the opening section, KIBS rely heavily on tacit knowledge embodied in their employees as well as on codified knowledge, which is both input for and output for these activities. This however begs the question of "what" type of knowledge is relevant considering the specificities of each sector? The configurations observed in the preceding pages suggest that the task structures, and the associated skill requirements, of some KIBS exhibit a low degree of standardization and contemplate circumstances in which problem-solving strategies are generated in the context of client–supplier relations. This is certainly the case of Engineering and Architectural Services, Computer System Design or Research and Development, wherein frequent reliance on intuition, creativity, and immediacy reduces the replicability of learned solutions. These sectors tend to be characterized by intensive reliance on cognitive abilities, both social (Viz. Factor 1) and analytical (viz. Factor 2). On the other hand, the core activity of other KIBS sectors do not require changes in the information content or radically new know-how, but merely maintenance and use of infrastructures for transmission. The output produced by these types of services is more amenable to standardization, and the skills they require are more of the "routine-type". In between the two extremes of this spectrum stand intermediate cases with peculiar blends of different forms of know-how, not merely as High- and Low-Skills but qualitatively different ways of organizing things. These remarks resonate with Herbert Simon's (1969) distinction between "semantically-rich domains"—such as architecture or business consultancy—reliant on task-specific information, and non "semantically-rich domains"—and as technical assistance or maintenance—wherein task structures are more standardized and professional discretion is lower. In the latter, the repertoire of problem-solving options is known ex-ante with a finer degree of precision, and replication of existing routines through noncognitive skills suffices.

The overriding signal of this bird-eye look at the skill content of KIBS sectors is the strong complementarity between routine and nonroutine skills. This phenomenon is not new, and is not restricted to KIBS but rather is the generalized signature of growing routinization in a vast array of activities (Autor et al. 2003; Levy and Murnane 2004). Before the ubiquitous adoption of ICTs altered drastically the core of work organization (David 2002) it was acceptable to differentiate sharply cognitive and noncognitive tasks, the latter associated mostly with manual activities. But the current technological regime has given way to patterns of organization in which the dichotomy between manual and nonmanual has vanished. These developments anticipate intriguing scenarios and, no doubt, leave plenty of room for creativity and innovativeness in the future.

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Dynamic Capabilities for Service Innovation in Service Systems

Renu Agarwal and Willem Selen

Abstract One of the principal drivers of productivity growth is innovation, which includes not only technological but nontechnological innovations. A key element of nontechnological innovation is skills which drives a large part of productivity improvement at the organizational level. Scholars have enunciated that innovation in services is brought to market through collaboration, asset orchestration, technological adoption, and knowledge-based competencies. To this effect, the role of human capital in promoting service innovation is identified in the innovation literature. Further, service innovation in a service ecosystem is centered on the *resource-based* definition, where services are treated as an application of competencies, making use of knowledge, skills and experience of all stakeholders. In addition, the *process-based* definition of service highlights the important role customers play in the service production process, where the customer themselves are an input to the service delivery process. Amidst resource limitations and acute competition, service firms need to therefore not only upskill the human talent of their employees and customers, but also reconfigure, renew, and redeploy resources and capabilities on an ongoing basis. This indeed highlights the importance of capabilities required to facilitate the creation of sustainable competitive advantage, which are not ubiquitously available in large proportion amongst service organizations. It is in this context that we identify and explore in this chapter the role played by service firms' learning capacity to deploy operational and dynamic capabilities across service systems. This chapter highlights an entire suite of dynamic capabilities which are made up of higher order competencies, such as relationship capital, organizational learning, collaborative agility, entrepreneurial

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alertness, innovative capacity, and customer engagement, which are instrumental to service firms for innovation.

Keywords Service innovation · Human capital · Dynamic capabilities · Service systems

1 Role of Human Capital in Skills and Capability Building

Economic theory posits that 'economic competencies' that make up human capital are instrumental in economic growth of nations (OECD 1998). These economic competencies include brand equity, organizational capital creation, and organization-specific human capital as the key determinants (Nelson and Phelps 1966). As well known, the role of human capital in fostering innovation is dominated by a requisite variety or creative abrasion (Nonaka and Takeuchi 1995), which forms the basis of sustained knowledge creation. It is for this reason that measures of innovation have been broadened to include innovation resources, innovation effort, innovation outcome, and innovation performance (Cosh et al. 2006).

Skills and human capital are indeed one of the five drivers of productivity, with the other four drivers being enterprise, investment, innovation, and competition (Great Britain Treasury Report 2000, Camus 2007). No doubt, skills play a critical role in stimulating productivity growth, with several scholars suggesting increased investment in workplace up-skilling and training to address the 'skills gap' faced by organizations, as well as improve nations' global positioning and competitiveness, and long-term economic performance (Black and Lynch 2004; Hall et al. 2013; O'Hanlon-Rose 2008–2009; Green et al. 2009; Toner 2007, 2009). With this backdrop, according to the OECD's *Innovation strategy report* (2010), many nations not only make capital investments, which include machinery, equipment and buildings, but equally invest in intangible assets related to innovation (R&D, software, skills, organizational know-how, knowledge and learning, and branding (Alexopoulos and Tombe 2009).

According to the GCI index, innovation-driven nations are characterized by enhanced productivity and innovation performance through active research and development, adoption of modern technologies, and exhibit a high share of knowledge-based services (Schwab 2013). Agarwal and Green (2011) point out that "*Productivity growth relies on a continual stream of innovations of both new technologies and improved work practices. New and innovative ways of working provide a source of efficiency gains, enabling workers to operate more effectively, thus providing firms with greater opportunities to use labor and capital inputs in ways which will maximize their productive potential*." (2011, p. 82). In the context of these services- and knowledge-based economies, organizations are increasingly collaborating for enabling innovation through engaging in innovation 'ecosystems' or 'service systems' (Vargo et al. 2008). Additionally, the important role played by

customers in the service production process, where customers themselves are the input to the service delivery process (Sampson and Froehle 2006), is noted. With this notion of the customer considered a resource, services are treated as an application of competencies, knowledge, skills, and experience of all stakeholders (employees and customer coproduction), taking into consideration a collaborative end-to-end supply chain view across both goods and services.

2 The Role of Networks in Partnering Organizations

The supply chain view above deploys a network rationale which enables collaborating organizations in the network to cope with uncertainty, complexity, and risk management through fostering skills and appropriate resource allocations (Cravens and Shipp 1993). Interactions with partners in collaborative setting arms firms with new knowledge, thus allowing them to develop new competencies and build higher order capabilities (Gupta and Govindarajan 2000; Agarwal and Selen 2009, 2014). Further, as partnering firms operate in a plug and play mode, adopting loosely coupled organizational structures, these organizations tend to share ideas, resources, and competencies more fluidly (Uzzi 1999; Tsai 2001; Agarwal and Selen 2009, 2014). The dynamic learning mechanisms and dynamic capabilities development both are dependent on the learning intent and embedded learning mechanisms of partnering organizations (Chen et al. 2009). Henceforth, knowledge pooling and fostering complementary knowledge are both inculcated via structured collaboration (Rindfleisch and Moorman 2001), which cumulatively enhances the firm's ability to innovate (Goes and Park 1997; Agarwal and Selen 2014). After grounding the rationale for partnering organizations with the pivotal role of the customer as a resource, we next examine the mechanisms by which service innovation in service networks is enabled.

3 Service Innovation in a Service System

Increasingly, organizations are mutually reliant on external entities for innovation and engage in innovation 'ecosystems' or 'service systems' (Vargo et al. 2008). The "service system" combines the "coproduced resource"- and "process-based" definition of service. The *process-based* definition of service (Sampson and Froehle 2006) defines the important role customers play in the service production process, with the key distinction being the customer providing the inputs, versus the customer themselves being the input to the service delivery process. In the *resource-based* definition, with a service-dominant logic view, services are treated as an application of competencies, making use of knowledge, skills and experience of all stakeholders (employees and customer co-production), taking into consideration the notion of the supply chain and collaborators across both goods and services

(Vargo and Lusch 2006). Finally, coproduced services view customers as an integral part of service delivery as they are "transformed" or simply interact during the transaction, allowing the split of a front- and back-stage approach of a service at any point in the continuum (Teboul 2006). According to Arnould et al. (2006), customers deploy operand (physical) and operant (knowledge and skill) resources made available to them by the firm, by other internal, private and market facing systems, and by themselves. In that way, they realize cocreated value, referred to as customer resource integration.

For our further discussion, we define the service system as a service network structure comprised of several attributes:

- a permeable organizational boundary that facilitates better communication, openness, trust and/or relationship with key partners, and binds the relationships between network members;
- a relationship with partners which is based on interdependence, rather than power;
- an organizational structure which can be characterized as a flexible, value-adding network;
- decision-making processes that are decentralized and organic;
- organizations which are linked by mutual gains and are associated with the planning, design, and delivery of an elevated service offering (service innovation) to the service system targeted customer base;
- a pool of resources which allows leveraging of tangible and intangible resources, and supplementing complementary resources; and
- seamless integration, interconnectivity and open communications across resources of the organizations that form the service system, namely technology and IT—its applications and processes, knowledge management, and relationship management.

The attributes described above are referred to as a resource deployment system in the intellectual capital literature (Peng et al. 2012; Roos 2014).

In regard to service innovation, a completely new service will mean new features and attributes for a service offering (see Fig. 1). This changes the way employees work (delivery system), relate and interact with customers (client interface), and the way technology is used in business processes (technological options). Further, business services rely on knowledge, form key inputs in products or processes of other businesses, and often apply ICT to support the delivery process. In addition to ICT's impact on innovation, there are also nontechnological service innovations to take into account, including new business models/concepts, new customer/delivery interfaces, and new service-product offerings. As such, the concept of service innovation should include organizational and managerial forms of innovation, such as better management practices, innovation capability in enterprises, skills development, and participatory work organization (Commonwealth of Australia 2013; Green et al. 2012; Boedker et al. 2011).

Service innovation in such a service system can be seen as a new or modified service offering, where the service offering is "elevated" beyond what is possible by

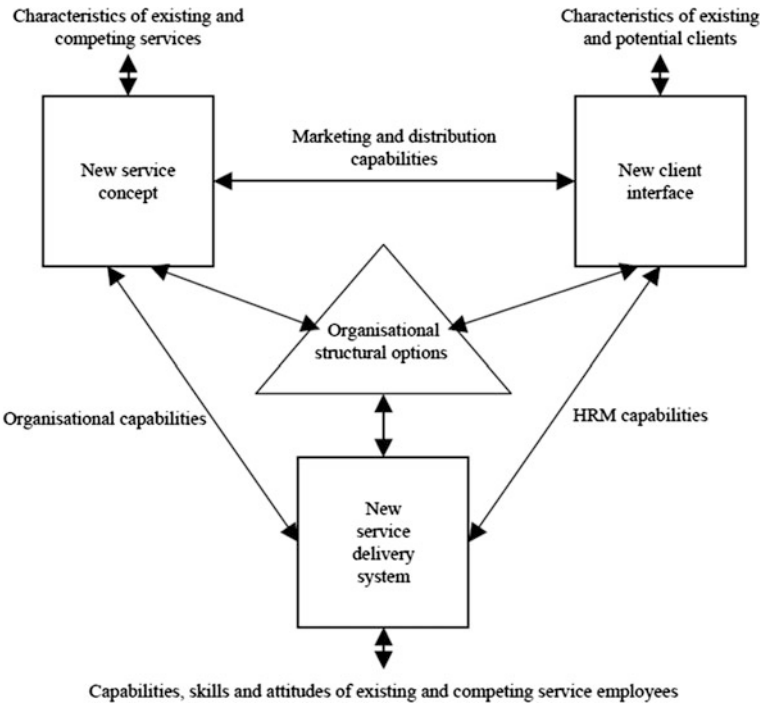

Fig. 1 Service innovation in a collaborating environment (*Source* Agarwal and Selen 2011)

the individual firm through collaborative efforts and/or expertise of the network partners. Hence, the notion of an "elevated service offering" or ESO (Agarwal and Selen 2009, 2011, 2014) is brought about through the deployment of particular dynamic capabilities (Teece 2009).

An example of an "elevated service offering" (Agarwal and Selen 2009) refers to a virtual critical-care (ViCCU) tele-health case study (Li et al. 2006) that helped ease emergency specialist shortages in regional Australia, and which operated in a service network setting. This business setting involved Commonwealth Scientific and Industrial Research Organisation (CSIRO), CentiE, and Sydney West Area Health Services as network partners, and deals with the support of critical-care services between a referral hospital and a rural hospital by transmitting very high-quality, real-time multimedia information, including images, audio, and real-time video, over an internet protocol (IP)-based network. In the ViCCU case, the radical approach of treating emergency patients located remotely, especially in areas where the reach of appropriate emergency services was difficult to deliver in time, is an example of an ESO. Through the use of relationship management (patient, nurses, doctors, telecommunications company, and CSIRO), knowledge management (the use of tacit and explicit knowledge of partners in coming up with the practical solution of this need), technology management (appropriate use of technology—IP-based

network with excellent video quality), and process management (design of new resources, routines, and tasks and the integration with old practices through ICT systems and processes integration across partners), a new system was developed to deliver customized emergency hospital care.

In this chapter, we will discuss in greater detail what makes up an elevated service offering in a service system environment as described earlier, and what emerging dynamic capabilities are at play to enable and foster such service innovation.

3.1 Service Innovation as an Elevated Service Offering

Service innovation in a service system has strategic and operational dimensions. The ESO-Strategic component comprises of strategic decision-based elements, such as new or modified service offerings, new or modified customer interfaces, new service delivery processes and an expansion into new market segments and/or other industry sectors, arising as a result of collaboration with partners, something which was not possible on individual organizational merits (Agarwal and Selen 2011). As organizations collaborate, it is the coordination and integration of the end-to-end processes, activities, and routines that require inter- and intraorganizational alignment, as a result of which new operating structures and/or new delivery methods may emerge (Agarwal and Subramani 2013).

Decisions relating to new service offerings and service delivery methods, along with the target reduction in transaction unit costs, are interrelated, which are dimensions of the service strategy. ESO-Operational includes facets related to service customization, utilization of assets, demand capacity, customer satisfaction and service reliability; characteristics pertinent to lead time associated with commercializing of service offerings, service delivery lead times, on-time delivery of services, and customer waiting time.

Managers of collaborative service organization need to visualize innovations in services differently to traditional new product development and new service development processes, and the concept of innovation should be extended to include organizational and managerial forms of innovation.

4 Dynamic Capabilities Needed to Build Service Innovation

Teece (2009) termed dynamic capability as a metacapability which facilitates translating managerial entrepreneurship capability into operational excellence. Service firms operating in competitive environments need to harness rare and difficult to replicate dynamic capabilities in order *'to continuously create, extend, upgrade, protect, and keep relevant the enterprise's asset base'* (Teece 2009, p. 4). Agarwal and Selen (2009, 2014) have demonstrated the process of dynamic

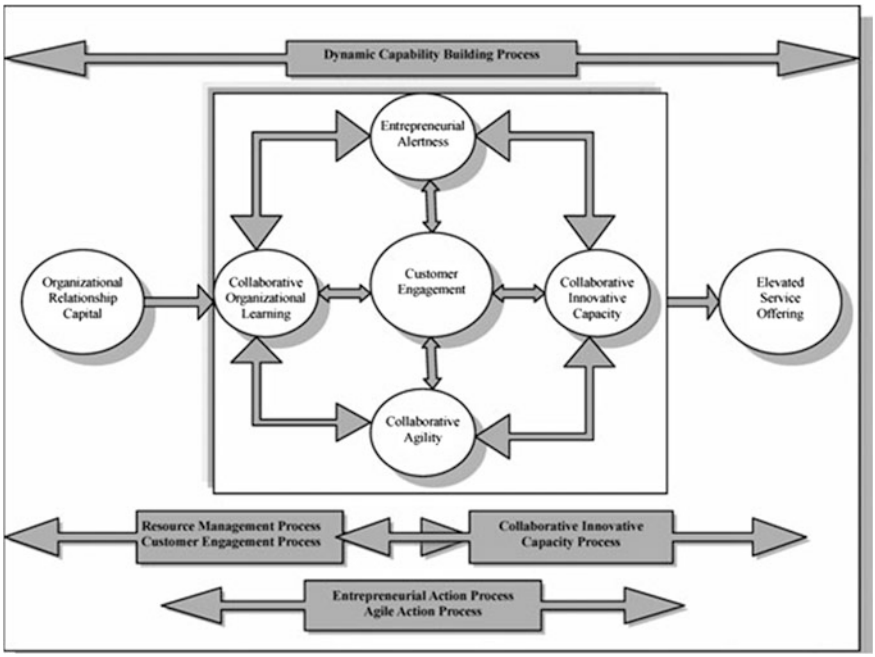

Fig. 2 Dynamic Capabilities for creating Service Innovation (ESO) (*Source* Agarwal and Selen 2009)

capability building in collaborative firms, resulting in service innovation, and have operationalized several dynamic capabilities in a service ecosystem. However, according to Helfat and Winter (2011), the linkage between operational and dynamic capabilities has not been investigated in a detailed manner, with operational capabilities performed on a regular basis (Helfat and Peteraf 2003), and dynamic capabilities required to perform entrepreneurial activities to identify and exploit opportunities in external environments (Teece 2009). Henceforth, scholarly investigation is critical to redefine operational activities from the dynamic perspective to articulate the application of dynamic capabilities on the operational routines of service firms in a service ecosystem, which comprises of individuals, organizations or institutions. These capabilities in turn can have an impact on the focal organization, along with their customers and suppliers (Teece 2009).

From our discussion above, the question remains as what are the dynamic capabilities that collaborative organizations need to create and deliver innovation in services (ESO) in collaborative settings, with particular focus on customer interactions in service organizations.

Agarwal and Selen (2009) established a framework (see Fig. 2) that interrelates service innovation (ESO) and dynamic capabilities needed to enable such innovation in a service system (network). Each of these dynamic capabilities, empirically validated in the telecom sector in Australia, is discussed next.

4.1 Organizational Relationship Capital

Agarwal and Selen (2007) deploy the concept of organizational relationship capital[1]. (ORC) as the combination of *relational capital, employee capital*, and *prior relationship*. *Relational capital*[2] refers to the wealth in the form of mutual trust, respect, friendship, and high reciprocity among individuals at the personal level between partner organizations. *Employee capital*[3] refers to interorganizational product, service, and process knowledge present in their employees' minds, whereas the management-driven reward systems relates to recognition mechanisms prevailing across partnerships as a means for personal motivation. *Prior relationship* is based on trust, defined as "the extent to which a firm believes that its exchange partner is honest and/or benevolent" (Geyskens et al. 1998) and interaction, which is believed to generate a high degree of learning and information or know-how exchange between partners (Ring and Ven 1992; Gulati 1995).

4.2 Collaborative Organizational Learning

Zollow and Winter (2002) proposed that deliberate learning efforts articulate and codify collective knowledge, which translate into managerial skills and dynamic capabilities through which the service system is likely to modify its strategic and operating routines in pursuit of greater effectiveness and improved efficiency. This in turn assists development of new information and new knowledge about the routines performance, with executed changes becoming routines over time and knowledge gradually becoming increasingly embedded in human behavior.

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[1] This term was used in Alwis (2004). The role of intellectual capital in organizational value creation: An application of a theoretical model to two case studies. School of Information Systems, Computing and Mathematics. Brunel University. UK

[2] For early discussions of this see, e.g., Karlsson and Westin (1994). Patterns of a network economy—an introduction. In Patterns of a network economy (pp. 1–12). Springer Berlin Heidelberg; Källstrand Cand Sandh J (1992). Intellectual Capital Statement–The German Process Approach. Harvard Business Review; Roos et al. (1997), Intellectual Capital: Navigating in the New Business Landscape. Macmillan Publications; Roos and Roos (1997). Measuring your company's intellectual performance. Long range planning, 30(3), 413–426.

[3] For early discussions of this see, e.g., Kalamas and Kalamas (2004). Developing Employee Capital: Setting the Stage for Lifelong Learning. Human Resource Development.; Murphy (2005) Employee Capita—Resource or Reoccurring Nightmare, February Issue, Licensing World, Jemma Publishers Ltd: Dublin.; Mouritsen et al. (2001). Reading an intellectual capital statement: describing and prescribing knowledge management strategies. Journal of Intellectual Capital, 2(4), 359–383.

4.3 Customer Engagement

Customer Engagement is the ability of the service system to encourage customers to participate and engage during the service encounter (face-to-face or technology mediated), and through the customer's engaging and learning process, judge and respond to customer's needs and expectations with agility and innovativeness (Agarwal and Selen 2009). Customers can take on four specific roles, namely as a resource (Smith and Ng 2012), a coworker (coproducer), buyer (user), or as a cocreator (Edvardsson et al. 2010; Smith and Ng 2012; Vargo and Lusch 2004, 2008). As such, a firm can design its offerings, and cater for the needs of a customer, through any or all of the above stated customer engagement mechanisms. Firms use customers' expectations to decipher market intelligence and identify competitive opportunities.

4.4 Entrepreneurial Alertness

Entrepreneurial Alertness is the "dynamic capability of an organization to explore its marketplace, and detect areas of current and future market place threats and opportunities" (Sambamurthy et al. 2003, p. 250), which comprises two specific capabilities, namely *strategic foresight* and *systemic insight*. *Strategic foresight* is the ability to anticipate discontinuities, threats, and opportunities of the future, while making us more vigilant of market place dynamics. When delivering services to customers, foresight is critical to entrepreneurial action taken by the front-of-house staff in real time. It reflects the ability to anticipate and visualize market imperfections, and at the same time gage opportunities for information technology (or any other technology)–based competitive actions, and acts as a "probing and learning" mechanism to provide time to learn and act at the speed at which the industry changes. Similarly, *systemic insight* is the ability to visualize and apply knowledge and experience in architecting competitive actions, that is, to be in a situation where one can contrast internal and external views of the system.

4.5 Collaborative Agility

Sambamurthy et al. (2003) define agility as *customer agility*, *partnering agility*, and *operational agility*. *Customer agility* forms the basis of a dynamic and adaptive capability provided by service system in response to customer needs and demands. *Partnering agility* is an organization's ability to explore and exploit opportunities through sourcing and staging service delivery processes, or customer interfaces and customer support assets and resources, to provide organizations with an ability to adapt or modify their extended networks to gain access to assets, competencies, or

knowledge not currently resident in the current service system. Enabled by standardized interfaces among ICT applications across organizations, business processes are becoming modular and atomized. This enables the service system to build and execute end-to-end processes flowing transparently across organizational boundaries, taking into account interdependencies and dynamics of coordination and transaction cost issues. *Operational agility* in a service system can then be seen as the managerial capability to rapidly adapt and change network structures and organizational cultures, integrate modular processes to rapidly change and redesign existing processes, and create new processes for exploiting a dynamic marketplace. These three forms of agility make up the collaborative agility of the service system.

4.6 Collaborative Innovative Capacity

The scope of idea creation is wider than just customer requirements, and has been extended to accommodate ideas from employees with the cultivation of ideas from customers and suppliers (Oke 2007). Collaborative Innovative Capacity (CIC) is the ability to come up with innovative ideas, which gives partnering organizations the capacity to introduce new services, new or modified processes, new or modified operating structures, new ways to market products or services, or ideas through the integration of capabilities and resources in an urge to incite innovation. Further, CIC may broaden horizons and equip partnering organizations with an ability to cross-fertilize ideas and allow the application of ideas within and across industry sectors. It is also a skill set that promotes lateral thinking.

5 Conclusions

In summary, service systems invest both in the tangible aspects of innovation, most notably technological research and development, and in more intangible aspects, such as social and human capital, knowledge creation and exchange, systems integration and business model design and innovation. In today's knowledge- and service-based economy, intangible resources of trust, cooperation and reciprocity, a collaborative and entrepreneurial culture with customer as both an operant and operand resource, and a creative mind-set of employees underpins organizations' success. At the same time, information and communication technologies (ICT) increasingly cause organizational boundaries to fade, and make inter- and intraorganizational interactions happen expediently at a local and global level.

This chapter highlighted an entire suite of dynamic capabilities which are made up of higher order competencies, such as relationship capital, organizational learning, collaborative agility, entrepreneurial alertness, innovative capacity, and customer engagement that are instrumental to service firms to innovate. Notably, this is not an exhaustive list of dynamic capabilities, and there are other capabilities

that may be required to accommodate the impact of external factors on the service system. Yet, the management quality and expertise of service firms will be instrumental in developing appropriate internal dynamic capabilities and sustainable competencies, which eventually translate into economic growth, innovation, and higher service productivity.

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Part III
Technological Developments in Service Innovation

Role of Web 3.0 in Service Innovation

The exponential growth of data and the web has seen a focus on new ways of understanding the world. Semantic Web is a new and emerging technology with wide and exciting application into areas like health-care, research, marketing, and IT itself. It is a major step forward in Web evolution and is already finding application in consumer technology such as mobile phones (Siri in iPhones, for example), and not just in esoteric research. Web 3.0 could also help develop geographic variations in the nature of innovation. At the core, Semantic Web is a means to improve interoperability between systems, applications, and data sources.

Highlight *Research at University of London and German Research Centre for Artificial Intelligence is trying to bridge the "semantic gap" between what people understand and what computers can manage. Semantic analysis of multimodal video at a conceptual level aims to index segments of interest of videos. In reaching this goal, it requires an analysis of several information streams, say audio, video, and annotation. At some point in the analysis, these streams need to be fused. A recent trend in semantic video analysis is generic indexing approaches, using machine learning (Snoek et al. 2005).*

Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility

With rapid change sweeping through the globe—agility and ambidexterity is a much sought state for an organization. Service-oriented computing (SOC) has emerged as an architectural approach to flexibility and agility, not just in systems development, but also in business process management.

Highlight *The integration of internal systems was identified as a core business driver for SOA by a majority of firms in a broad industry study. This is consistent with existing studies on the use of SOA for application integration (Baskerville et al. 2005; Legner and Heutschi 2007; Yoon and Carter 2007) that indicate that an SOA-based infrastructure facilitates easier application and enterprise system integration.*

Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations

Innovative, disruptive models of healthcare delivery that leverage current information, communication and decision technology platforms in novel ways have the potential to change the practice of healthcare delivery and management.

Highlight *Medical consultations through internet technologies, referred to as eVisits, can be delivered using synchronous communication (e.g. video chat) or asynchronous communication via email or message service. The latter is an increasingly adopted form of online medical service, and is regarded as a digital innovation that has the potential to transform healthcare delivery.*

Technology-Driven Service Innovation in the Banking Industry

The Australian financial system witnessed far-reaching financial reforms during the early to mid-1980s, following the recommendations of the inquiry into the financial system (Campbell review) to significantly deregulate the financial sector and allow foreign banks to enter so as to bolster competition. Sixteen foreign banks were invited to participate in the newly deregulated financial sector but even today much of the banking business in Australia remains concentrated in the hands of the big four banks (who collectively hold approximately 60 % market share). Despite this concentrated ownership, the increasing competition from non-financial institutions and the big advances in technology and communications has intensified further competition in the industry.

Highlight *With the advent of smart phone technology, new mobile payment apps have come on to the market. Westpac announced in April 2014 that it had launched a 'tap-to-pay' service for its customers using Samsung mobile phones using Near Field Payment (NFC) technology. NFC allows the user to transmit and receive information securely using their mobile phone to facilitate contactless payments of goods and services. Apple's iPhone 6 is also rumoured to have NFC payment technology on-board when released. CBA initiated a similar system late in 2013 for Google Android smartphone users and in March 2014 Cuscal, a 'transactional banking, liquidity and capital management products provider' for Australian credit unions and other financial institutions, released its trial of a Samsung mobile phone with NFC payment capability.*

Role of Web 3.0 in Service Innovation

Ranjith Nayar

Abstract This chapter discusses the role of the emergent technology Web 3.0 (Semantic Web) in service innovation, addressing technological-options dimension of the den Hertog (2000) service innovation model, and technology as vector of influence of the Nayar-Lanvin innovation framework (2013). Semantic Web is a new technology, still emerging, and has wide innovation impacts in domains like health care, research, marketing, and IT itself. It is a major step forward in Web evolution and is already finding application in consumer technology such as mobile phones (Siri in iPhones, for example), and not just in esoteric research. Web 3.0 could also help develop geographic variations in the nature of innovation. At the core, Semantic Web is a means to improve interoperability between systems, applications, and data sources. Emerging personal computing paradigms such as ubiquitous and mobile computing will benefit from better interoperability, as interoperability is an enabler of higher degree of automation of tasks that would otherwise require end-user intervention.

Keywords Semantic web · Open innovation · Knowledge management · E-Science · Science 2.0 · Health-care · Distributed enterprise · Semantic analytics · Big data

1 Introduction

Web 3.0—or, Semantic Web since it manifests itself as a web of data rather than a web of documents—is a quantum change on the method of linking data by a method of ontology of meaning. Functionally, it overcomes limitations of the conventional Web (now also known as Web 1.0) and Web 2.0 which encompasses social networks, blogs, microblogs, and 'wikis'. The new Web tools aggregate the 'Wisdom of Crowds' for superior decision making and focus collective effort on

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prioritized outcomes (Cake 2011). This chapter attempts to define implications on the way these help enterprises innovate.

The idea of a Web of Data originated with the Semantic Web to solve the inherent inability of machines to understand web pages. Semantic Web aimed initially to invisibly annotate web pages with sets of meta-attributes and categories, enabling machines to interpret and contextualize text. The approach failed as the annotation was too complicated for non-technologists. The Web of Data resulted from this limitation and the existence of distributed structured data containing all kinds of information. Typically, datasets contain knowledge about a particular domain, like books, music, and encyclopaedic data. If datasets are interconnected (link to each other like websites), computers could traverse this independent web of noiseless, structured information to gather semantic knowledge of arbitrary entities and domains, resulting in a massive, freely accessible knowledge-base forming the foundation of a new generation of applications and services (Kroth 2009).

1.1 Benefits of Web 3.0

Web 3.0 helps link people within communities of common interest; this collaboration helps deliver higher quality of community outcomes. Increased usage of Web 2.0 technologies within enterprise firewalls is changing firms to what is increasingly being defined as Enterprise 2.0. With the IT evolution—or revolution—bringing in newer technology of semantic web or Web 3.0, semantics will also come inside enterprises, with major implications on how organizations work.

While it is early to predict exhaustively these impacts, the most obvious implication will be a boost in innovation capability because of increased participation or deeper engagement of quasi-hidden talent pools within the community, and by integrating separate groups and geographies. Semantic Web will enable innovation by being an aggregator of innovations practiced across the extended organization, via Semantic Innovation Management Systems or SIMS (Li and O'Sullivan 2004). In parallel, techniques like semantic clustering, semantic mediation, and breakdown of information silos through interoperability across applications will ease knowledge management, significantly boosting innovation within enterprises and in the open innovation community.

Of these, Semantic Innovation Management will make the most impact for extended enterprises. The ability to aggregate distributed innovation accelerates the process, reducing wastage in effort, time, and cost. Technologically, semantic analytics and serendipitous interoperability (Lasilla 2005) across platforms are the most important contributions of Web 3.0 technologies to service innovation. As will be seen in subsequent sections, Web 3.0 will lead to automated decision making, adding velocity, and accuracy to innovation models. Wisdom of crowds gets harnessed innovative ideas and crowdfunding to finance innovative ideas.

Semantic videos are being researched on to enable search of videos for specific content, and are already used in controlled situations like sporting events (including

in 2012 London Olympics) and analyses of closed-circuit television footage. Enabling computers to recognize what they 'see' could end the need for police sifting through hours of videos in search of a particular event or individual. Research at University of London and German Research Centre for Artificial Intelligence is trying to bridge the "semantic gap" between what people understand and what computers can manage. Semantic analysis of multimodal video at a conceptual level aims to index segments of interest of videos. In reaching this goal, it requires an analysis of several information streams, say audio, video, and annotation. At some point in the analysis, these streams need to be fused. A recent trend in semantic video analysis is generic indexing approaches, using machine learning (Snoek et al. 2005).

Semantic analytics enables extremely accurate identification through crunching large disparate data. For instance, poverty used to be a reflection of scarcity; now it is a problem of identification, targeting, and distribution—a problem that can be solved through analytics, especially considering the wide prevalence of phones as the society's 'bottom of the pyramid' data generators.

Boosts to innovation in the mega-industry of advertising, and delivery of products and services, will follow. Semantics, as explained in subsequent sections, will be able to target individuals' likes and dislikes. While this has obvious marketing implications, the indirect implication is of cost savings of very large order. With direct marketing costs of $120 billion in the US alone (2012), the 3 % take-up rate (conversion to buying) translated into advertising costs of only 0.1 % for electronic advertising, and 0.01 % for online advertising. Now IBM's Almaden Research Center researches psychological profiling of tweeters, testing software that analyzed 3 months of data from 90 m Twitter users (Economist 2013).

1.2 What Makes Web 3.0 Different

Semantics has the opportunity to bridge the gap between data and knowing what it means, by putting a layer of well written and increasingly world-supported semantics on top of raw, immature systems (thus open data standards). Fundamentally, the Semantic Web tags and gives data a description. By putting more metadata with the data, software can interrogate data to find out what it is, and what it is capable of. The rise of big data could help spur adoption of Semantic Web technologies (Martin 2013). There are three main Semantic Web standards:

- The Resource Description Framework (RDF), a general method for data interchange on the Web, allows sharing and mixing of structured and semi-structured data across various applications.
- SPARQL (recursive acronym for SPARQL Protocol and RDF Query Language), queries data across different systems.
- OWL (Web Ontology Language) enables users define concepts in a way that allows them to be mixed and matched with other concepts.

Semantic Analytics is the use of these ontologies to analyze content in web-based resources. Big Data, explained in sections below, is the very large volume of structured and unstructured data generated by social networks, smart devices, and the emerging M2M (or machine to machine, also called 'Internet of Everything'). While Big Data has no clear unique definition—two definitions commonly used are the data centric "data that cannot be fit into a relational database", and the user centric "subjective state a company finds itself in when its human and technical infrastructure cannot keep pace with its data needs" (Aziza 2013)—Linked Data is about using the Web to connect related data that was not previously linked, or using the Web to lower the barriers to linking data currently linked using other methods. Wikipedia defines Linked Data as a term to describe recommended best practices for the sharing, and connecting of data, information, and knowledge using Uniform Resource Identifiers (URI) and Resource Description Framework (RDF) on the Semantic Web.

Semantic Web ties each data item on the web to other data items of like kind, regardless of their location. Rather than sifting through search results, semantic web automates assembly of data items that are somehow tied together (Gow 2013). Thus, Web 3.0 is a major evolution of the Web, with two key functionalities: greater interoperability, and computers deriving meaning. These features enable users to search for contextually appropriate content instead of character strings. Thus, Web 3.0 browsers makes searching easier and intuitive—operating on cross-application data and allowing intelligent questions, which is useful both for innovators and for end users, who will now be to complex searches directly rather than having to feed the result of one simple query into the next search. This complex search would thus be equivalent to conditional searching in programing. This enables IT developers reduce the number of extractors and hence, develop simpler codes to get query results from heterogeneous data-sources and from Big Data. Similarly, Web 3.0 browsing enables innovators to easier access of larger amounts of data to test and validate theories. With repeated use, Web 3.0 enabled browsers will even 'learn' what users want, and need less structured queries.

Every interaction of a person on the internet adds a little more information about the user's known profile. This makes it easier for marketers to target products to individual requirements, rather than to demographic approximations. The Economist Intelligence Unit says that more companies in the US now employ a Chief Data Officer, to make use of the massive volumes of data available to them from the Web. Thus, social media captures comments, likes and suggestions from customers and potential demographics that can be studied in order for the company to make appropriate strategic choices (Giles 2012).

Hence, Web 3.0 will be used as a marketing tool, and artificial intelligence—Web 3.0 algorithms distinguishing biased and unbiased results—will make searches more focused and intelligent, which in turn, aids innovation by generating 'cleaner' data, unpolluted by similar sounding, but otherwise dissimilar, information. Health care and service is a representative example of this.

Web 3.0 data analysis is likely to influence patient-centred care. 'Health care' encompasses tools and providers of therapeutic services, such as doctors, nurses, hospitals, and other organizations. It includes medical equipment and pharmaceutical

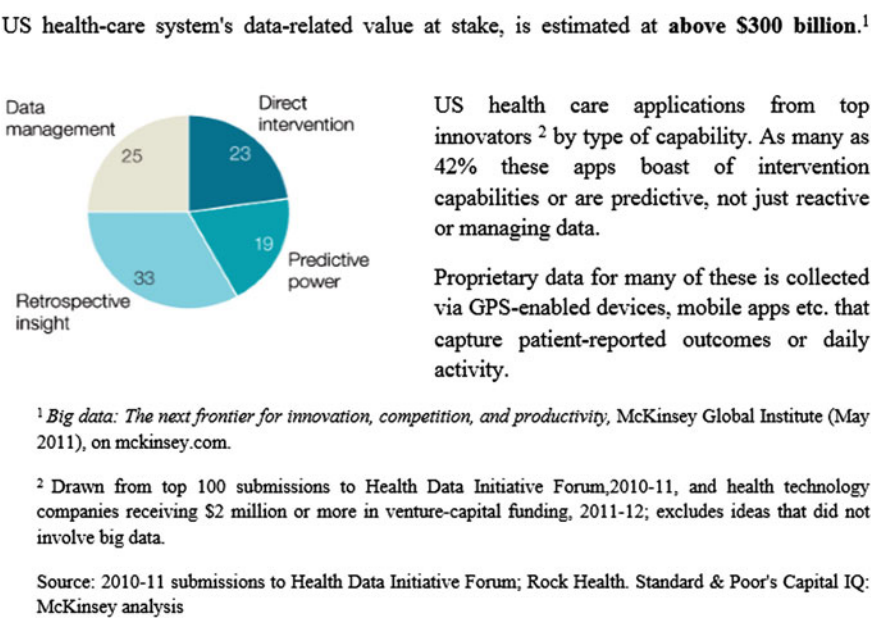

Fig. 1 Data apps for health care valued >$300 Billion (Kayyali et al. 2013)

manufacturers and health insurance firms (description adopted from http://businessdictionary.com). Health data is conventionally stored in disparate data receptacles and repositories. This is a blocking point for prompt and timely availability of crucial data, both in the case of emergency health assistance, and even planned interventions serious enough to involve multiparty healthcare providers who may each have diverse information systems.

Big data, accompanied by cross-database correlation and analysis, enables services to be personalized to the extent of individually tailored solutions in, say, health care, and marketing. Other service functions, transport for instance, could, in the reverse, dynamically dispatch their services based on where traffic is accurately predicted to congregate. Innovative healthcare data applications based on these principles enable direct intervention and predictive power (Fig. 1).

Semantic technologies pave the way for intelligent aggregation, integration, and reuse of information. They embed information in a larger context of meaning and enrich content with metadata. Semantic techniques provide Scalable End-User Access to Big Data (Haase 2013). Optique (http://www.optique-project.eu/optique/), a large European project focusing on comprehensive and timely end-user access to very large datasets, is an example of how semantic technologies tackle Big Data, which is critical for effective data analysis and value creation. Semantic technologies (1) provide a semantic end-to-end connection between users and data sources, regardless of their format, structure, author, and location, (2) enable users to rapidly formulate intuitive queries using familiar vocabularies and conceptualizations, and (3) allow seamless access to data across multiple distributed data sources.

2 Drivers of Innovation

Several studies point out there are two main factors that drive innovation, namely, the prevalence of a culture of innovation and the presence of an organization within the firm to drive innovation. McKinsey Consulting reports that organizing the innovation process from beginning to end is a critical element of innovation management, and the two biggest problems are lack of formal organization, and execution. Fundamentally, the biggest challenge is organization (Capozzi et al. 2010).

To actualize /enhance a culture of innovation, literature points to two key factors —leadership and technology enablers (aggregation of ideas, dissemination of innovation intent and leadership influence). The rapidly evolving network centric world of today has resulted in another key role for technologies as an enabler of vast amounts of data, unparalleled in history. Current estimates by IDC show an information creation of the order of ten times the level of 2005 in just 6 years (see Fig. 2).

Availability of these enormous amounts of data give rise to tremendous opportunities for service innovation, as organizations gain deeper and more precise understanding of customer needs. However, two broad areas of concern emerge from the sheer volume of data: the velocity with which it is increasing and the variety of sources and repositories. These concerns center around the ability to process such volumes and make sense of it fast enough to be topical, and the fact that these volumes of data are both unstructured (do not always fit into relational databases) and spread over large and increasingly disparate applications which do not interoperate.

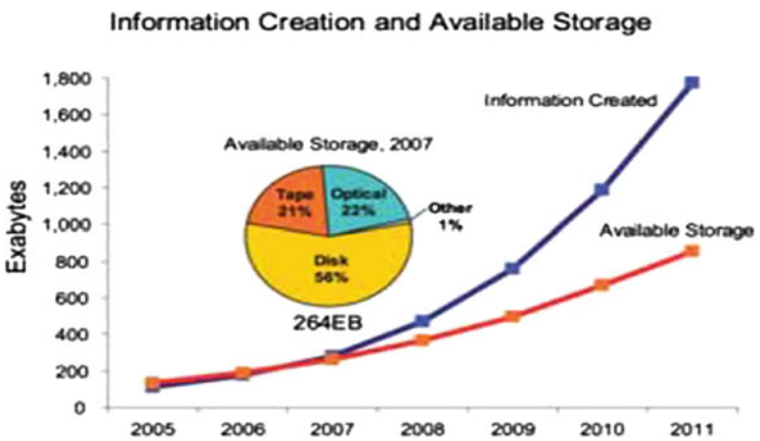

Fig. 2 The data boom since 2005 (Cukier 2010)

Overcoming these challenges requires Web 3.0 based semantic technologies. These have the capability of interoperability and the ability to derive machine-read meaning out of data.

3 Technology Enablers for Innovation

Three frameworks of innovation are discussed here to illustrate the role of technology for innovation.

Although service innovation is certainly possible without technological innovation, in practice, there is a wide range of relationship between the two, from technology playing a largely facilitating or enabling role, to a role something much closer to supply-push, technology-driven innovation where technology plays a supply-push role (den Hertog 2000).

The den Hertog four-dimensional model for service innovation maps service innovation and helps development of new services and service innovation policies. The first three dimensions—the service innovation concept or a new value proposition, innovation in the interface between service provider and client, service delivery mechanism—are cross-linked along with technology, the fourth dimension of the model.

Agarwal and Selen (2011) adapt den Hertog's four-dimensional model for service innovation (see Fig. 3) to show that new or extended service offerings (ESO) result from collaborative environments between partnering service organizations. Their research based on a large technology organization in Australia shows that innovation in service is multidimensional and includes organizational innovation in addition to new products and services—and in practice, majority of service innovations involve various combinations of these four dimensions

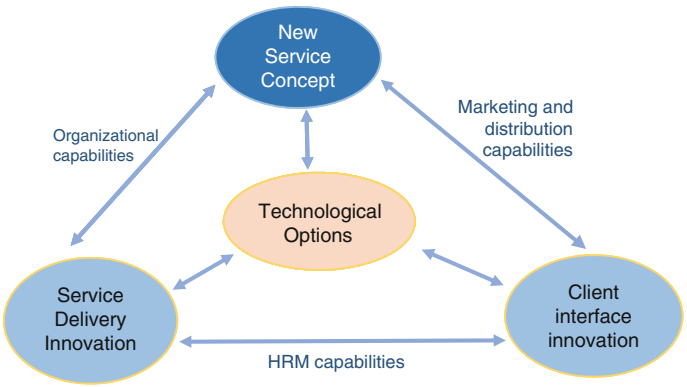

Fig. 3 den Hertog's 4-dimensional model for service innovation (Agarwal and Selen 2011)

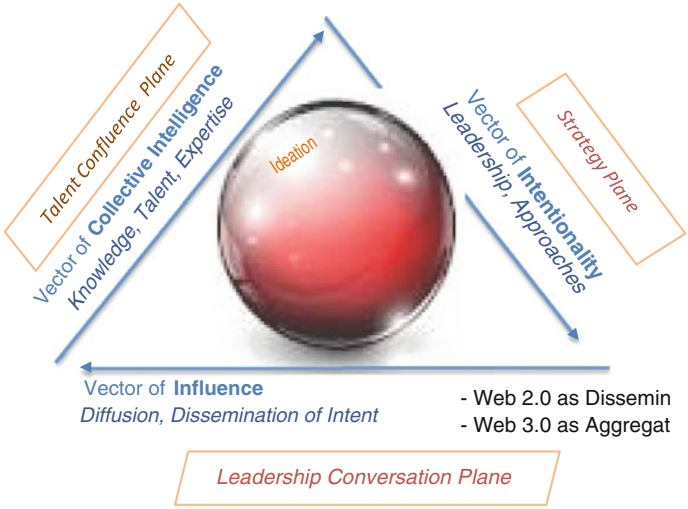

Fig. 4 Nayar-Lanvin 3i framework for sustained innovation (Nayar and Nayar 2013)

A second framework highlights technology as necessary for innovation to be sustained. The Nayar-Lanvin 3i framework (Nayar and Nayar 2013) defines intentionality, influence, and collective intelligence as necessary for sustaining innovation in enterprises, where intentionality is the strategic intent of the enterprise; influence resultant of technologies that diffuse that intentionality as well as collate the social intelligence gathered by those technologies, while collective intelligence is the sum of the skills and knowledge that is brought to bear on the topic at hand (Fig. 4).

Similarly, Moggridge (2007) shows how people, technology, and business intersect to create different types of innovation: the intersection between people and business results in 'emotional innovation' of brands, relationships and marketing since people represent desirability while business represent viability; 'process innovation' at the intersection between business and technology since technology represents feasibility of the product; and 'functional innovation' at the intersection of technology and people. The three factors overlap leads to a trisection of functional, emotional and process innovations, or 'experience innovation' (see Fig. 5).

New information technology is especially important to services, particularly due to the efficiency and effectiveness in information-processing that is widely prevalent in service sector. "Although IT is certainly not the only relevant technology in service innovation, IT is particularly pervasive …. IT is thus often perceived as the great enabler of service innovation" (den Hertog 2000). Technology provides Big Data and the analytics necessary to derive insights from it resulting in aggregated availability of social intelligence to innovators. Combining insights that exist inside enterprise business knowledge with information available in the external ecosystem will lead to better innovation. Taking into account social media, web and e-commerce sites, blogs, and Linked Datasets, along with data the enterprise itself

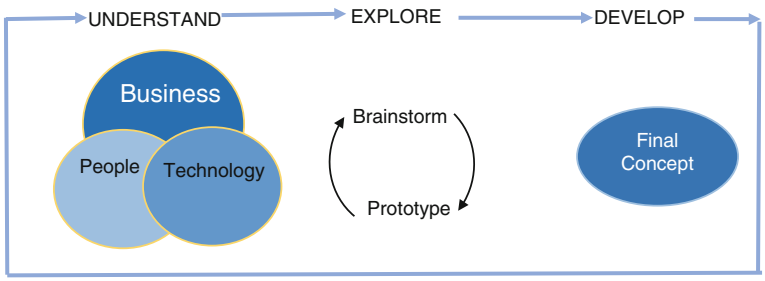

Fig. 5 Moggridge's IDEO innovation framework (http://glennas.wordpress.com/tag/ideo/)

possesses, will improve decision making. Competitive advantage creation relies on the ability to enrich such data. Contextual processing platforms focus on improving and automating analytical tasks on Big Data to making it possible to recognize entities or apply specific patterns to extract semantics, and sentiments, automatically from Big Data. Big Data enriched with semantics, has wide implications—embellished with explicit semantics (e.g., semantic annotations, and metadata) and implicit semantics (e.g., machine learning, inference), embed in applications to drive smarter business decisions and processes (Ruffolo and Manna 2008). Semantic technologies are needed for managing the external unstructured data, which enterprises will put together with their internal structured data; and to develop mechanisms to extract sentiments and opinion analyses. Enriching internal data with rich unstructured external data leads to better insights on customer needs, and hence, better innovation.

To better understand how Web 3.0 technologies are instrumental in service innovation, the evolution of semantics in Web technologies is examined in brief below.

3.1 Web 1.0

By an informal definition, in Web 1.0 hierarchically distributed information is read from HTML pages. HTML, introduced in 1991 by Tim Berners-Lee, is a mark-up language web browsers use to interpret and compose text, images, and other material into visual or audible web pages. HTML 2.0 arrived 1995; HTML 3.2 and HTML 4.0 were published 1997 as W3C (World Wide Web Consortium) Recommendation. The current HTML 5 was published as a Working Draft by the W3C in 2008. W3C is developing a comprehensive test suite to achieve broad interoperability for the full specification by 2014.

Semantic HTML is a way of writing HTML that emphasizes the meaning of encoded information over its presentation. HTML has included semantic markup from its inception. In a 2001, discussion of the Semantic Web, Tim Berners-Lee and others gave examples of ways in which intelligent software 'agents' may one

day automatically crawl the web and find, filter and correlate previously unrelated, published facts (Raggett 2002). Such agents are not common even now, but ideas of Web 2.0, mash-ups and price comparison websites are close. Mashups are Web sites that combine content data from multiple sources to create a new user experience. For search-engine spiders to rate the significance of pieces of text they find in HTML documents, for creating mash-ups and other hybrids, and for more automated agents when developed, HTML semantic structures need to be widely and uniformly applied to bring out the meaning of published text (Shadbolt et al. 2006; Hendler 2001).

3.2 Web 2.0

An essential part of Web 2.0 is harnessing collective intelligence, turning the Web into a 'global brain'. The high trend of IT usage in modern enterprises will help deployment of enterprise Social Networks or 'e-SocNets'; the resultant organizational transformation, labeled Enterprise 2.0 by McAfee, will thus lead to measurable gains (Fig. 6).

The major differentiator is community participation in producing content. This boosts collaborative innovation, with creativity feeding off the creativity of others. Web 2.0 covers a range of technologies, most commonly as blogs, wikis, podcasts, information tagging, prediction markets, and social networks. Making innovation work using Web 2.0 within a business needs sufficient technology integration of the

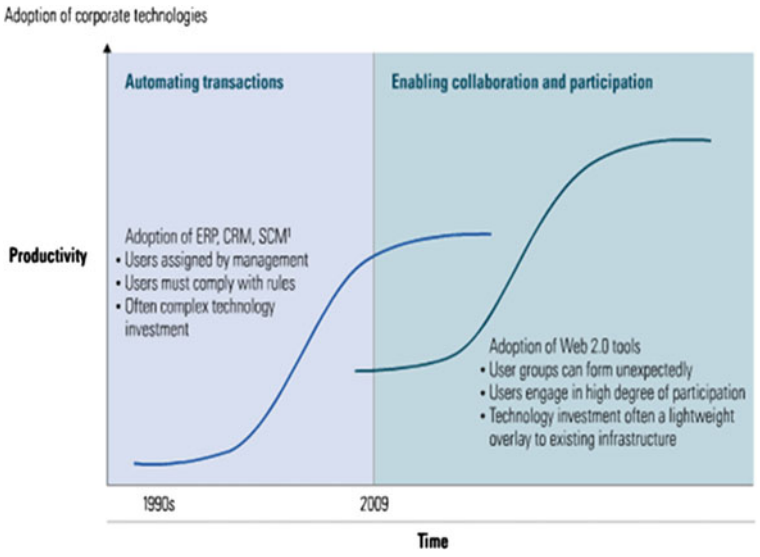

Fig. 6 Adoption of web 2.0 in enterprises (Chui et al. 2009)

Web 2.0 tools with the legacy IT systems, managers who are comfortable in peer-credibility-based leadership, and employees 'agreeing' to a socialization of business (Domínguez 2011).

Web 1.0 came with the notion of a web browser with Netscape leading the 'web as platform' paradigm. After the dotcom crash, Google heralded the *software as a service* ('SaaS') concept.

Arguably, the SaaS concept became an enabler of innovation, making IT computational power more ubiquitous, as well as analytics readily accessible with little investment. Though Google is a specialized database and a collection of software applications, it was never sold as software or application, and simply became a service. Web 2.0 deployment within the enterprise also streamlines the work of an innovation management organization, as the gathering and dissemination of innovation information becomes easier with the prevalence of experts' networks, which help in specific innovation examples bringing together those who are not directly involved, but are interested in the topic, to contribute incrementally (Nayar et al. 2012b).

Wikis and blogs have eased knowledge management, an innovation requisite in the Nayar-Lanvin innovation framework (refer Fig. 4). Wikis are web sites (developed collaboratively by a community participation) that allow any user to add or modify content. It allows rapid sharing and growth of information on a particular topic, and builds a shared knowledge usually within communities of practice. Such communities or teams use the Wiki as a central place to collaborate on a subject.

One of the most celebrated features of Web 2.0 is *blogging*. A blog is, fundamentally, a personal home page in diary format. Like Wikipedia, blogging harnesses, the so-called 'wisdom of crowds' (which is based on the principle that collective intelligence of large groups of people is higher than of an elite few, in solving problems, fostering innovation, coming to sagacious decisions, or even predicting the future). Another feature of Web 2.0 is social networking which help to connect participants in a peer-to-peer network, a nonhierarchical, and circular concept that can speedup ideas communication and thus enhance collaboration so critical to innovation particularly in a geographically distributed enterprise.

Enterprise social network is the application of Social Networks inside the enterprise to take advantage of Web 2.0 tools—Wikis, blogs, etc.—to build internal communities of practice for intra-enterprise collaboration. Social Networks exist throughout an organization in various forms. More formal ones include ITIL tools like Remedy. These bring together the talent (of experts dispersed across functions and across geographies in a distributed organization) within a network (intranet/extranet/internet/social networks), for leveraging employee networks to increase individual and organizational performance within an enterprise. This is the first step toward Enterprise 2.0 mentioned above. Gartner predicts that networking the expertise, and enhancing communication through an informal, open platform will gradually replace email (Smith et al. 2009).

Big Data boom is the innovation story of our time, because breakthroughs in innovation often rely on breakthroughs in measurement and today, businesses can measure their activities and customer relationships with unprecedented precision

(Brynjolfsson 2013). Data has become a major source of competitive advantage for commercial and service enterprises. Clickstream data give precisely targeted and real-time insights into consumer behavior. CISCO's Chief Technology and Strategy Officer, Padmasree Warrior predicts *three vectors of differentiation—data differential* with more and more devices and sensors churning out that data over the 'internet of things'; *experiential differential* driven by customer-pushed needs; and a *velocity differential* that drives the shift to cloud computing ('Saas') with IT as a service rather than as a data centre investment with delivery time constraints. Although IT companies of the future will have to solve these three problems, what is important here is not the data, but the analytics that will be applied to make the business process a better process (Warrior 2013).

Big data, super intelligent content and knowledge management services are clearly the medium term future. Innovative applications based on Big Data will help service providers foster closer ties with customers, partners, and employees. With Web 3.0, elaborate and complex virtual worlds where social interaction drives business operations can be realized through the Internet (Laurent 2013). Browsers will gravitate toward being the database of the future.

Some examples of the impact of Big Data:

Big Data and Marketing Big data alters marketing strategies and customer relations marketing (CRM). IBM defines three imminent waves of change; first a disaggregation of market segments into individual-based service; second as a process of active engagement with the individual customer, rather than the current concept of reaching out to the customer (saturated with the arrival of last-mile marketing (Krishnan et al. 2012) which marries branding and marketing with logistical penetration of rural outreaches), and thirdly, data centricity in marketing that enables marketers to personalize and contextualize interactions. These three waves will be adopted by service providers to innovate around their products to individualize the products. The main enabler is data—mostly structured data.

Big Data and Health Care More accurate and timely the information available, more realistic is its usage for service innovation. This shift from reactive to predictive and proactive care will change the face of medical care and health services. While the concept of personalized care is not new, Big Data and semantic analytics will make available patient centric data so large that individualized care can be tailored to fit exact needs (Rometty 2013). Emerging technologies are poised to personalize consumer experience radically via On-demand Marketing (Dahlström and Edelman 2012).

Innovation of Operations MIT's Brynjolfsson and McAfee study the effect of Big Data on innovation of enterprise management and concluded that it is very striking how companies that measure their operations more carefully, taking these very large volumes of data and creating more analytical types of management practices, dramatically outperform their competitors. The pervasive use of IT has turned customers into unwitting business partners, as our purchases and searches are tracked to improve those businesses. Replacing hypotheses testing by direct data gathering from large number of customers gives companies the ability to test its ideas rapidly—this speeds up their innovation efforts and approach. IT

significantly compress the 'hypothesis-to-experiment' cycle time. (Brynjolfsson and McAfee 2011). Such packages are even available off-the-shelf; these packages (covering pricing, inventory management, labor scheduling, and more) can be cost-effective and easier and faster to install than internally built, tailored ones (Biesdorf et al. 2013).

Big Data and Analytics Computerized Data Analytics is still in its early stages of development, and things will change as new innovations come to the forefront (Kolb and Kolb 2013). Although cognisant of the value of big data and advanced analytics management, most companies do not have a Big Data plan for themselves. Any such plan must involve three components—Data, Analytical Models, and Tools. Organizational capability is a critical enabler needed to animate the push toward data, models, and tools (Biesdorf et al. 2013). High-performing companies will embed analytics directly into decision and operational processes, taking advantage of machine-learning and other technologies to generate insights in the millions per second, rather than an "insight a week or month" (Davenport 2013). Creating innovative services requires data on a targeted audience. Owning classes of core data (location, identity, calendaring of public events, product identifiers, name spaces) is a source of competitive advantage, targeting customers for innovative services. Where there is significant cost to create the data, there could be an opportunity for an Intel Inside style play, with a single source for the data. Where data cost is not significant, reaching critical mass via user aggregation first, and turning that aggregated data into a system service will be a winning proposition. Data is a competitive advantage. Hence, database management is a core competency of Web 2.0 companies (O'Reilly 2005).

As more and more devices are connected to the new platform, new innovative applications become possible. After a period in which innovation was concentrated on the scale and breadth of data, technology providers have begun to focus on *velocity*. For the first time, business leaders can ask their databases specific ad hoc queries and receive immediate answers. Data showing a live search for lower-cost service options on a firm's website might prompt instant ideas for new sales. In today's global business environment, where volatility has become a constant state, data velocity is the key to securing a competitive advantage. Reducing "time to insight" is a business necessity (Mulani 2013).

3.3 Web 3.0

The Web 3.0 Consortium, W3C, defines Semantic Web as a web of data. Data is controlled by application(s), and unless there is interoperability across applications, it is not possible to merge that data. Web 3.0, or Semantic Web, introduces a contextual paradigm of interoperability, since, Web 2.0 data from different silos or repositories are difficult to link together. While literature defines *Semantic Web* in different ways, a concise definition would be "Highly specialized information silos, moderated by a cult of personality, validated by the community, and put into

context with the inclusion of meta-*data through widgets*" (Spalding 2007). Information silos are Web 1.0, community validation is a characteristic of Web 2.0, and contextuality (or 'Semantic') via metadata is a feature of the interoperability characteristic and user-centric 'cult of personality'.

In Web 3.0, we 'execute' on the web and collaborate to deliver community outcomes. Web 3.0 will connect and focus effort with the same commercial and community outcomes in open, transparent, and accessible networks that focus collective effort by harnessing the wisdom of crowds for superior decision making (Cake 2011). Inability to merge data in application specific repositories impacts both personal data as well as data that could be relating to the same function, such as enterprise data locked up in silos of application databases or even email in-trays. Semantic Web deals with two things—common formats for combination or integration of data drawn from diverse sources (unlike Web 1.0 that largely focused on documents interchange), as well as the language for recording how the data relates to real-world objects. It, therefore, allows a machine to start off at one database, and then move through a series of databases connected by being about the same thing (W3 Consortium 2011).

Web 3.0 adds a new dimension of *data-centricity*. Data centricity is about:

- *Organizing Data*, or "data warehousing" is the process of cleaning, joining ,and storing data for proper analysis. Technologies exist to organize large amounts of data. IBM's Watson system, unconnected to Internet, beat human past-winners on the speed-of-response dependant quiz show *Jeopardy,* accessing 200 million pages or 4 terabytes of structured and unstructured data.
- *Analyzing Data*, or "analytics", which involves techniques like clustering, predictive modeling, pattern recognition, and outlier detection, among others, to reveal business insights that can increase profits, reduce costs, reveal hidden opportunities, and improve efficiency. This crosses into the statistical analysis side of data science, but gets more challenging because of the amount of data.
- *Presenting Data*, where traditional business intelligence tools, infographics, and data visualizations come into play. Presenting data is the final step in this process.

In regard to data centricity, a number of evolutions and examples are seen:

Data analytics are useful instruments to gain insights from enterprise or extra-enterprise data. However, having experts quickly derive meaningful insights from Big Data is not practical, given the 3 V's of Big Data (volume, velocity, and variety). New web applications now enable automated analytics. Computerized Data Analytics is in the early stages of development.

Semantic technologies increase the power of data manifold. Some existing service innovations are: narrow-target marketing based on learning customer secrets (for example, Target Corporation predicts pregnancy trimesters by recognizing purchasing patterns); predictive crime prevention; sales analytics; student retention by predicting likely dropouts and targeting their reasons; targeting political messages based on sentiment prediction; targeted health care; etc.

Service analytics are able to provide customers better service at restaurants. In new data driven restaurants, every item sold, tip received, and every moment of a restaurant experience is recorded, profiled, and analyzed. New software, like Slingshot, Compeat, and Eatec build data solutions tailored toward the restaurant business (Kolb and Kolb 2013). This change is powered by transaction data. Orders are entered instantly into the computer system and trends and anomalies analyzed. This change to data-driven business is an example of companies building analytics tools tailored to small business needs. Kolb and Kolb predict five developmental directions to watch, most of which predicted to happen within the next 3–5 years, while others are already happening:

1. New applications will crunch data in real time and tell users what is interesting by learning what they find interesting
2. Better visualization and presentation of graphics, leading to easier understanding, and faster decisions.
3. Self-service data intelligence using Data Discovery tools
4. Natural intuitive data interfaces (touch, voice, gestures) abstract away complexity, enabling finding valuable information without expertise. Apple's Siri and Microsoft's Kinect train people to use voice and body gestures respectively. These modes of input combined create interactive environments that let you explore the data and interact with it.
5. Collaborative: Data that needs to be evaluated is simply too big even for large numbers of people to look at efficiently. New types of interfaces (above) will alleviate this problem.

This new data centricity leads to more and more individual-specific innovation giving more customer tailored services.

4 Web 3.0 Driving Innovation

Web 3.0 will deliver a new generation of business applications that will see business computing converge on the same fundamental on-demand architecture as consumer applications. This is not something that is of merely passing interest to those who work in enterprise IT. It will radically "change organizations" (Wainewright 2005). This change results from Web 3.0's capability to speed up decision making—with better analytics based on far greater data, and interoperability across multiple data sources. This will lead to better decision making and faster responses in target profile changes, leading to speedier user needs identification. Enterprises can, thus, become more responsive to customer needs, and faster.

Web 3.0's interoperability across platforms leads to ease of collation of information/knowledge, which enhances Knowledge Management (KM) capability enabling innovation not only by increasing the quality of ideas shared, but also by providing better insights and contexts. Further, as a market research tool, it provides the capability of faster testing of these ideas.

Web 3.0's features of semantic clustering and interoperability across silos of information make it a powerful tool to boost service innovation. Web 2.0 and Web 3.0 democratize innovation by supporting a wider spread of participation. Web 3.0 is perhaps the most powerful element of digital technology. Innovation can become powerful with Web 3.0—and further, will reduce the cycle time of innovation. This is primarily due to the logic of searching—conventional web searching is a search for a string of characters, whereas Web 3.0 browsers enable searching for concepts and strings of concepts by being able to accept complex queries. Thus, the collation of search results in order to arrive at a pre-determined search becomes shorter with the construction of concept links. For instance, conditional search for services would need multiple searches, conventionally, but with conceptual links, could be searched with a complex search criterion. In the Semantic Web, information is stored in such a categorization that both computers and humans fathom what it represents. Unlike Web 2.0—where keywords are used to organize data into digestible nuggets for search engines—Web 3.0 will present digital information a visually improved manner that eases interaction, analysis, intuition, and search. The key driver is the concept of taxonomies—standardized and self-describing classifications with codified semantics related to each other via highly normalized and descriptive metadata, not by static hyperlinks. For information on the World Wide Web to have a solid degree of relevance to users and live up to the 3.0 hype, it must contain a new magnitude of (artificial) intelligence (Laurent 2013).

In the long run Web 3.0 will reduce the cost of innovation (dollar and time), its interoperability, and semantic clustering. Marketing professionals will understand how Web 3.0's semantic clustering provides deeper contextual search results than conventional data mining does for market analysis, as well as understand geographical semantics.

Next, some specific service innovations to be enabled by Web 3.0 technologies are highlighted:

4.1 Asian Innovation

Service innovation is greatly enhanced by Web 3.0's semantic clustering feature as a marketing tool. The ability to zero-in on geographic or local specificities and meanings (semantics) is invaluable in an Asian context where cost sensitivity is very high. The Danish Universe Foundation's Asia New Business Creation project's extensive research in Asian companies, produced case studies and workshops to exchange methods among five large Danish companies, and three Asian companies (Haier from China, Singapore's ST Electronics (STe), and Woonjin/Coway from Korea). The study concluded that Asian companies are different from Western companies in their approach to innovation. It identified four generic elements of the Asian approach (Hesseldahl 2011):

- Suitability of products (as opposed to generic),
- Ability to let go of style or details in order to chase the market,
- Fluidity, i.e., support change and uncertainty, and
- Companies are young, have fluid organization structures, and are keen to grow.

The above points particularly apply to the service industry, such as financial services and banking, where product differentiation is narrow and the customer spectrum is wide. Asian companies generally tend to work on existing products, adapting these to local community needs, driven by the diversity of Asian marketplace, price sensitivity, and features its target customers need.

Angelia Herrin, editor for special projects and research at Harvard Business, says *Big Data* and *Analytics* could be the twin forces driving innovation in Asia—one provides information, while the other sifts through it for precious insight. In Asia, the applications are endless: Forecasting revenues of a new business unit; pinpointing bottlenecks in regional supply chains; even searching for niches in unwieldy consumer markets. The semantic web can be an approach to understand and respond to what innovation is required in different cultural contexts (Garud 2011).

4.2 The Value Proposition

Service provision is an interaction with a service client. A larger client base therefore leads to linear cost increase. However, with the appropriate use of web technologies, the linear cost increase can be reduced, since both the data collection cost and the services distribution cost will considerably fall at the unit level. The Value Proposition explains a service to various stakeholders, and has to be formulated more formally and/or precisely than is currently done by means of natural language sentences. On the other hand, this formalization and precision must be balanced with comprehensibility and practical usability. The answer to these requirements comes from well-handled semantics (Winkler and Dosoudil 2011; Winkler and Staníček 2011). The approach is based on 30-year experience with semantics modeling, using a functional approach based on Transparent Intensional Logic (HIT) (Duží 2002).

4.3 Semantic Innovation Management

Ning and O'Sullivan (2006) have developed a framework for Semantic Innovation Management System (SIMS) based on metadata harvesting and RDF (Resource Description Framework) access technologies, and developed a practical case study using RDF Gateway. Their work "demonstrates the feasibility and potential to adopt semantic web technologies to improve innovation management across

extended enterprises" viz., large enterprises spread across multiple areas of operation or geographies. Extended enterprises face a problem in managing internal innovation, originating in the fact that while innovation does grow with collaboration, it is largely a collection of local process. Collaboration across boundaries helps seed new ideas and germinates local ideas—and indeed, helps carry developing concepts further. Since, innovation is essentially local in nature (much as imported seeds will probably flower in the local soil, but the nature of growth is a localized process dependent on the contextual parameters), this implies a local innovation management infrastructure for nurturing and managing the innovation climate. Conventionally, extended enterprises use central coordination among their local organizations' innovation management to share and cross fertilize ideas and innovations across the enterprise. This is largely through project management collaboration techniques (meetings, workshops, emails, webpages, etc.), which are push techniques for targeted audiences, and emphasis on information delivery and not on insight development. Semantic Innovation Management will, on the other hand, be able to automate the aggregation process, making it possible to focus on insights and applicability, rather than managing the collaboration process. Web 1.0 has significant roles in collaborative innovation, easing professional connectivity among peers. Web 2.0 facilitates open innovation. Web 3.0 is about machines talking to machines, enabling machines to understand the meaning of information, making the Web more automated and intelligent.

4.4 Emergent Analytics

Emergent analytics is semantic software analysis that lets data scientists get intelligence about organizations from distributed data repositories. This is done by enabling business units to describe their own information entities using RDF descriptions organized in OWL (Web Ontology Language)-ontologies rather than analyzing extractions from data warehouses. This allows information assets to continue residing where they exist, while real-time data across systems can not only be graphically displayed but also related to other data, leading to superior insights and analyses (Zaino 2010). Organizations, thus, needs Data Scientists—teams composed of a business analyst, a data analyst, and a statistician—to analyze the data largely coming from a listener that tracks one's search history, and delivers or pushes results based on that to the user tailored to the user's persona (Krishnan 2013). Data scientist Hans Rosling, a statistician, medical doctor, and Professor of International Health at Karolinka Institute, demonstrates the power of data and how it can change the world by focusing on the right problem (Rosling 2013). His Gapminder Foundation developed the Trendalyzer software that converts international statistics into moving and interactive graphics (available freely on Gapminder website, www.gapminder.org. Google acquired Trendalyzer in 2006, making it freely available for public statistics.)

4.5 Semantic Analytics: The Capability to Ask More Complex Questions

Use of ontologies to analyse content in web resources, combining text analytics, and Semantic Web technologies can automate analytics. Several tools exist for semantic analysis. While Web search has moved beyond just finding keywords, it still does not read the billions of web pages and book pages for semantic content. Yet, it is feasible for computers to pick up semantic meaning. This will enable people to prompt more complex questions (Kurzweil 2013).

The capability to ask more complex questions will make computing and the results more compelling for innovation. Semantic analytics through 3D visualization, called "Semantic Analytics Visualization" (SAV), has the capability for visualizing ontologies and metadata, including annotated web documents, images, and digital media such as audio and video clips in a synthetic three-dimensional semi-immersive environment. More importantly, SAV supports visual semantic analytics, whereby an analyst can interactively investigate complex relationships between heterogeneous information (Deligiannidis et al. 2006). Similarly, the PREDOSE program (for PREscription Drug abuse Online-Surveillance and Epidemiology) combines text mining and semantic web technologies to automate information extraction and sentiment analysis using social media (tweets, web forums), with the goal of assisting qualitative researchers with drug abuse surveillance and epidemiology using timely information present in large amounts of dynamic User-Generated Content or UGC (http://wiki.knoesis.org/index.php/PREDOSE Mar 2013).

4.6 Open Data

Governments and states hold gigabytes of data. This data could be used, for example, to make cities safer. City administrations like San Francisco in the US lead Web 3.0 open-source government efforts, opening public information—train times, crime statistics, health-code scores—to software developers, who then use this data to create innovative applications tailored to residents' needs (Kazan 2010). For instance, with the data and the analytics, a department could receive a daily report of possible crimes including likelihood, location, and timeframe, all with ranges and calculated probability—and take action for crime prevention. This is just one-way government could use data and analytics to make societies better. If cities start using data to its full potential, Data Science teams can create transformative tools with this wealth of information (Kolb 2013). Police in Maryland and Pennsylvania in the US are taking an even more data science-driven approach, crunching databases of tens of thousands of crimes and looking for patterns. Software automates decisions once made by police officers and judges, and this move to data-based decision making has dramatically decreased the percentage of repeat offenders among parolees (Kolb and Kolb 2013).

Governments nowadays are putting large datasets on the Web, such as data.gov and data.gov.xx sites. The notion of *Open Data*, data made freely available, could be used for innovative applications based on interoperable databases used for social uplift and poverty alleviation. Food-policy experts believe that a crucial step toward this goal is to give farmers, scientists, and entrepreneurs unhindered access to agricultural data generated at research centers worldwide (Patel 2013). For instance, apps on farmers' phones could club information about particular area's soil condition, match it with the best seed and fertilizer information, and further, with locational information of seed distribution centers. Making such 'what if' scenarios a reality will require increasing amounts of free, accessible agricultural research data that is easy to use, not just by humans but also by machines. Much of the data has been collected by scientists at universities and research centers—like plant genomics, weather conditions, datasets on crops for certain soils, rainfall changes, signs of pests and diseases, and anticipated prices at local markets—and made purposefully inaccessible for security or privacy reasons. Overturning that privacy model with Open Data will lead to innovations in solutions that are not limited to agriculture, coupled with simpler and more URL-based metadata, the descriptive data about the datasets, which would make datasets more accessible to search engines and allow linking to databases from websites and from other databases, and will also require semantic clustering.

4.7 Smarter Computing Through Web 3.0

Engines that search for meaning, rather than words, will make the Web more manageable (Cherry 2002). Ongoing research into making the Web more homogenous will make it easier for automated search though software agents by making the pages more computer understandable. In other words, if Web pages could contain their own semantics, i.e., a Semantic Web, software agents would not need to know the meanings behind the words. Building intelligence into billions of documents on the Web is not impossible. The first step required is an extensible markup language (XML), an invention that spearheaded W3C. It isolates (the) hundreds of data elements a Web page might contain. With new XML tags, <price> , for instance, a software agent might be able to, for example, compare shops across different Web sites, or update an account ledger after an e-purchase. The Semantic Web is just one item on the W3C's diverse agenda. Other items include interoperability (in file formats, for example), and technologies for trust, like digital signatures. While companies like Google, Autonomy, and Verity explore better ways to deliver the best documents the existing Web exhibits on a given topic, the Semantic Web looks beyond the current Web to one in which agent-like search engines will be able to not just deliver documents, but get at the facts inside these documents as well. The Semantics in Web 3.0 are actualized partly via the resource description framework (RDF). RDF makes it possible to relate one URI to another, expressing a relation between entities. An RDF might

express, for example, that one individual is the sister of another, or that a new auction bid is greater than the current high offer. Since, language statements cannot be understood by computers, RDF-based statements are computer-intelligible because XML provides their syntax by marking their parts. The notion of ontology, the final component, is a collection of related RDF statements, which together specify a variety of relationships among data elements and ways of making logical inferences among them. A genealogy is an example of an ontology.

Thus, concept searching becomes more intuitive and users will process information in a continuum with computers, rather than as disjointed search and collation. New ideas—innovation—will, therefore, become more seamless. 'Sense making' is a reason why 75 % of people search, sift through, and gather perceptions, according the Peter Pirolli of the Palo Alto Research Center (PARC), and hence, it will not replace regular Web searching. The evolving 'scatter/gather' search method takes a random collection of documents and gathers them into clusters, each denoted by a single topic word, such as "medicine," "cancer," "dose," or "beam." Users pick several of the clusters, and the software re-scatters and re-clusters them until the user gets a particularly desirable set. This helps the searcher make sense of the topic in minutes. The method works by precomputing a value for every word in the collection in relation to every other word. This is the Bayesian network model used also for describing how long-term memory works in the human brain (Cherry 2002).

Semantic clustering is a tool that helps us understand customer attitudes about a service offering. Software crawl hundreds of sites to acquire data from web text. The semantic clustering process then identifies key concepts and the connections between them. Relative intensities of the words used, and its evolution over time, tracks attitudes, helping strategists understand how people are responding to changes, and enable them to take action based on this understanding. For English denominated websites alone, a half-million attitudes and opinions are offered up daily, voluntarily, in blogs and comment forums, in addition to social media (Twitter reports an average of 50 million posts a day (http://blog.twitter.com/2010/02/measuring-tweets.html). This represents a huge reservoir for analysing changing attitudes (Shaughnessy 2010).

Distributed computer programs interacting with nonlocal web-based resources may eventually become the dominant way in which computers interact with humans and each other, and will be a primary means of computation in the near future. This integration of agent technology and ontologies may impact significantly on the use of web services, and the ability to extend programs to more efficiently perform tasks for users with less human intervention. Unifying these research areas and bringing to fruition a web teeming with complex, 'intelligent' agents is both possible and practical, although a number of research challenges still remain. New platforms (like Hadoop) are being designed to solve problems of Big Data analytics that are deep and computationally extensive, like clustering and targeting. These analytics help service innovation in a variety of areas. For instance, one can build sophisticated models that have difficulty working with a database engine to perform accurate portfolio evaluation and risk analysis; or to deliver better search results.

Architecturally, Hadoop spreads out the data across multiple hardware, enabling decision makers to ask complicated computational questions, since, multiple processors are harnessed together to work in parallel (Olson 2011).

Google's Ray Kurzweil, winner of the US National Medal of Technology and Innovation, predicts that, powered by Semantic Web, computers will have emotional intelligence by 2029. Google is making strides toward understanding complex natural language, and with it the ability to move well beyond recognizing keywords and onto understanding the emotional and intelligent content of web pages, and users' search requests.

4.8 The Potential of Semantic Technologies

Access to large data gives developers capability to provide more scalable and personalized innovative products and services to finely target communities. The phenomenal growth and popularity of software apps shows the reach and scalability of IT-based services (be they games or customer services, like the ability to call a taxi). The challenges presented by Big Data will only continue to grow as companies generate more new information day-by-day, minute-by-minute. Semantic technologies like those utilized in the Optique platform offer an as yet unmatched opportunity to tackle unheard volumes of complex, unstructured data; and sort it into something manageable, searchable, and most importantly, valuable (Haase 2013).

The big challenge at the moment for data miners is that datasets are dispersed in different locations. Developing applications that sit onto linked data, navigating across such data in such a way that enables that data location to be identified, and used later from a centrally located application, is the next step (McCauley 2013). DERI and Fujitsu collaboratively developed a prototype to show the potential of this linked data, and the ability to join up different datasets. Their researchers have also developed a data search function within the application to allow users to quickly sort and access data—an application that brings in data from different sources presented in a single interface.

Some application areas of these semantic technologies are elaborated on next:

Health Care Applications which can access and aggregate data across repositories will have a particular effect on health care for two reasons—one, that healthcare requirements are universal and urgent and, two, that more often than not, health data is locked in different small databases (or even non-electronic records) and privacy concerns prevent aggregation into centralized data mines. Hence, semantic applications which could access those multiple repositories for cross analyses, without actually pulling out that data from the proprietary receptacles, enable creation of services that, by virtue of larger data samples, would provide far greater levels of accuracy and meaning. Aalto University's Puustjärvi discusses how semantic technologies are helping to realize the global need for patient-centred healthcare. Changing patient-centric values requires patients to obtain and understand available health information, and make informed decisions about treatment,

together with healthcare providers. Although e-health applications provide patients and consumers with access to health information, such applications usually are stand-alone and do not interact with other applications (Puustjärvi and Puustjärvi 2011). This is where semantics step in. They developed a Personal Health Server that would allow disparate e-health tools to work together by sharing an ontology, defined as the computer glossary of terms, definitions, and their relationships. They derived the ontology for their Server by integrating ontologies from e-health tools, which support personal health records, e-health oriented blogs, and information on different diseases and treatments, as well as information therapy, prescribing information rather than pharmaceuticals. Their new system uses knowledge management technology and could easily be extended to capture information from additional e-health tools. The Personal Health Server captures the functions of a personal health record, information therapy, and health-oriented blog; and has interoperability with e-health tools using OWL. The Server stores the addresses and URLs of all the information entities and blog items, and can load them on any other server.

Finance Sector Key players in the financial services sector see Web advances as innovation tools. Citibank's Innovation Labs leverage new web, mobile, supply chain, and analytics technologies to engage institutional clients more innovatively, and to create more effective solutions and products. Communities of practice, such as Innotribe, a small team within SWIFT, focus on innovation, bringing together bankers, venture capitalists, and technology entrepreneurs. Their role is not to do innovation, but to enable other people to do it (Kaushik 2012).

4.9 Innovating Societal Norms?

The power of interoperability and the analytics that will use database interoperability is so profound that it may not only change services, but societal norms as well. Identity and privacy are central concerns, and as privacy challenges increase, the need to hide the identity becomes ubiquitous. Google predicts that every young person one day will be entitled automatically to change his or her name on reaching adulthood in order to disown youthful indiscretions stored on their friends' social media sites, and that the future of search is unknown—for instance, an increased number of searches are done without even needing to type (Schmidt 2010).

The semantic web will make up the context of the query. For instance, search results automatically generate items of contextual interest, rather than display everything about the search string. A single query search for a music legend's age will also list his awards as a sidebar, while a similar search for an astronaut's age would list the time he spent in space. This contextual search—seemingly obvious to a human brain, but not as obvious to a machine and not available even a year ago—is based not just on a collation of information, but based on most common queries made by the rest of the world about the same person. This kind of complex searches

are made possible by extensive mathematics, computing power, and ability to understand the underlying ontologies, meanings, and relationship of multiple queries and data about the queries stored in multiple fractured data receptacles.

4.10 Innovation of Personal Search: Telling Customers What to Do

Google CEO Eric Schmidt states that "most people don't want Google to answer their questions; they want Google to tell them what they should be doing next." Big data and Web 3.0 based search capabilities result in 'very, very personal search'. Applications based on such data will know the details of anyone's doings well enough to proactively tell him things it thinks he should know, such as prompting an individual to purchase a product in real-time because the application already knows what he needs, and, based on his current location within a fine accuracy, also knows the product availability in the same geography or nearby. Such very personal search leads to services tailored to individual needs, rather than to a demographic. This 'intelligent' and 'anticipatory' search results will be useful for innovators looking for more personal products and services to deliver (McCracken 2013).

4.11 Innovation for Manufacturing

Developing innovative and competitive products in the globalized world requires an orchestrated Product Life Cycle Management (PLM). To achieve this, enterprise policies and good human-based communication channels, and appropriate technologies are required. Such technologies should enable the representing, managing, and reusing of PLM knowledge, same as inferring implicit knowledge in large and geographically distributed knowledge bases.

Advances in manufacturing systems include attempts to create collaborative networks for enterprise integration and information interoperability. The web has emerged as a basic entity for interconnecting man and machine, and almost all parts of the Enterprise Communities are being reshaped to exploit the opportunities presented. Apart from web technology, there are various other tools and techniques that have attracted research communities to represent data in ways that both machines and humans can understand. Semantic web is enriched by machine-processed information to support users in their tasks.

For effective information exchange in distributed manufacturing environments, it is necessary to maintain compatibility and preserve syntactic and semantic content during the exchange of messages. Web technology and services have been widely employed in different sections of the manufacturing domain. Various web-based manufacturing systems have been developed in the past decade for supporting activities in different parts of a manufacturing life cycle. Interoperability is a central

issue in the manufacturing domain. Web technology is unable to solve the issue of interoperability among heterogeneous systems. Therefore, the concept of ontological engineering—ontologies and semantic web—has been developed to ultimately aim for seamless manufacturing system integration (Khilwani et al. 2009).

5 E-Science as the Talent Enabler

Science research is also positively impacted by Web 2.0 and Web 3.0. Research that requires very large data, computational capability, and high performance visualization is often referred to as e-Science (also known as Science 2.0 as it takes an open collaboration approach to research, rather than a collaboration between well-defined set of researchers.) A well-known example is CERN's Large Hadron Collider which is credited with the Higgs Boson particle finding. e-Science involves two engines, a Web 2.0 based Social engine and the Web 3.0 based Semantic engine. Semantic representation of e-Science is managed better by Web 3.0.

Mashups represent a new application in e-science. For example, in health care and life sciences (HCLS) Web 3.0 capabilities are useful since the Semantic Web facilitates heavyweight semantic data mashup and social networking in the HCLS domain. Another research collaboration between Fujitsu, a major ICT player, and DERI, the Digital Enterprise Research Institute, allows researchers and organizations to unlock billions of open datasets and merge it with their own data to create new insights into everything from financial information to healthcare breakthroughs (Cheung et al. 2008).

6 Conclusion

The semantic characteristic of Web 3.0, coupled in particular with the ability to harness explosive amounts of data available today, make emerging Web 3.0 play a very important role in enabling service innovation to a scale not seen before. While early innovations could be seen in individual-targeted marketing, most significant innovations will be in services that raise the quality of life of billions through the application of Web 3.0 analytics, such as agriculture, healthcare, and e-Science.

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Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility

Haresh Luthria and Fethi A. Rabhi

Abstract Firms are seeking new avenues for organizational agility in response to rapidly changing market environments. Research literature in strategic management indicates that firms may gain a competitive advantage in such situations by concentrating on their dynamic capabilities—i.e., product flexibility and agility in organizational transformation in response to rapidly changing market conditions and customer requirements. Service-oriented computing (SOC) has emerged as an architectural approach to flexibility and agility, not just in systems development, but also in business process management. There is, however, a lack of critical research assessing the practical usage of SOA as a technology and business infrastructure, and its efficacy in achieving organizational agility. This chapter examines the conduits through which service-oriented architectures (SOAs) may exert influence on dynamic capabilities within firms, and then empirically investigates this relationship in the context of organizations. The results could potentially assist in evaluating if and how the adoption of service-oriented architectures may help achieve key dynamic capabilities, giving the enterprise a competitive edge.

Keywords Service oriented · Service-oriented architectures · Service-oriented computing · Dynamic capabilities · Competitive strategy · Agility

1 Introduction

Recent cross-industry surveys of global CEOs indicate that organizational agility is high on the priority list of business executives looking to establish a competitive advantage in the global marketplace. The convergence of the digital, social, and

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mobile spheres of communication are connecting customers, employees, and partners in new ways to organizations and to each other (App Dynamics 2011). The CEOs are looking to adapt their organizations to be able to respond with relevance and speed to the complexity of increasingly interconnected organizations, markets, societies and governments. In addition, the business risk landscape is changing radically with threats coming harder and faster, from all directions, and in more subtly varied forms. As a result, traditional risk management approaches are not enough (PwC 2013). The solution, according to CEOs in these surveys, is to build organizations that are agile and adaptable: to not only survive, but thrive amid disorder and emerge stronger than before.

The organizational processes that facilitate this kind of agility are termed "dynamic capabilities" (Teece and Pisano 1994) in the management literature. In practical terms, there are five dimensions of dynamic capabilities: integration of internal resources, integration of external resources (partners, customers, etc.), rapid product development, learning, and the creation of assets. The ability to use these dynamic capabilities to rapidly build new resource configurations can result in sustained competitive advantage (Eisenhardt and Martin 2000).

The challenge then lies in implementing the organization's business processes with information technology (IT) solutions that can facilitate these dynamic capabilities, thereby enabling organizational agility (Sambamurthy et al. 2003). IT infrastructures based on Service-Oriented Computing (SOC) principles may provide process and infrastructure agility and, consequently, be a source of competitive advantage (Erl 2005). The SOC paradigm views whole-business functions (order placement, for example) as modular, standards-based software services. The associated Service-Oriented Architecture (SOA) establishes a defined relationship between such services offering discrete business functions and the consumers of these services, independent of the underlying technology implementation of the service and its location.

There has been a great deal of enthusiasm in the industry about this concept for many years (DSJ 2008), but the adoption of SOA by end-user organizations is still in a relatively early stage and there is little critical research on the practical use of SOA (Luthria and Rabhi 2009). There is, hence, a great dependency on analyst reports and vendor surveys for insights into the strategic value of implementing SOA. A few empirical studies of Web services, and more generally SOA, are emerging (Hirschheim et al. 2010; Lawler and Joseph 2011; Luthria and Rabhi 2012; Mueller et al. 2010). Nonetheless, there continues to be a strong need for further critical evaluation and empirical investigation of the potential of SOA to provide organizations with a competitive advantage.

Starting with the premise that the use of dynamic capabilities by firms to achieve competitive advantage is well-established in the management literature (Eisenhardt and Martin 2000; Sambamurthy et al. 2003; Teece and Pisano 1994), this chapter describes how SOA may be used in practice to achieve dynamic capabilities. First, an analytical framework is presented to link SOA with dynamic capabilities. This framework is then used as the basis for an empirical study of firms that have adopted SOA, and results of the study are discussed.

2 Service-Oriented Architecture and Dynamic Capabilities

A service is a business function implemented in software, wrapped with a formal, documented interface that is well known, does not depend on the internal workings of other services, and can be located and accessed by any software agent using standards-based communication mechanisms (Papazoglou 2003). These services could be simple services performing basic granular functions such as order tracking or composite services that assemble simple or other composite services to accomplish a broader modular business task such as a specialized product billing application.

An SOA puts these practices of abstraction into a framework that, independently of the underlying technologies, requires service providers to advertise their services with associated service-level agreements (SLAs) in registries that can be discovered, accessed, and used by clients (Bell 2007). Essentially, an SOA is an interconnected set of services which in its basic form is a message-based interaction between software components, each accessible through standard interfaces and messaging protocols. These components can be service providers or service requesters (clients) interacting with service discovery agencies to access the service providers. According to widely accepted definitions of services (Erl 2005; Huhns and Singh 2005; Papazoglou 2003), SOA-compliant architectures exhibit the following four properties:

- *Modularity* The services in the architecture are developed as independent modules of functionality, representing discrete business level operations.
- *Loose Coupling* This is enabled by encapsulation of the underlying functionality so that the implementation is logically decoupled from the invoking entity.
- *Technology neutrality* Services are universally usable by any requester, and communication between services is message based, with the message format being standards-based and platform-neutral.
- *Location transparency* The services are self-describing in that they have formal documented interfaces that are well known, and they are easily locatable and accessible over a network.

Surveys over the past few years (AppDynamics 2011; Benbasat et al. 1987; DSJ 2008; Forrester 2010; Huang and Hu 2004) are fairly consistent in their findings indicating that a vast majority of organizations have SOA initiatives in some form, while only a few have indicated success. The major technology vendors also appear to have invested significant effort in SOA, actively promoting it as a concept, building supporting products and tools, and even publishing related research. Online trade journals have an abundance of information on vendor products and initiatives, and ongoing collaboration efforts across various vendors to promote standards and interoperability for enterprise service infrastructures.

The research literature in the field of strategic management has focused on sources of competitive advantage, especially in rapidly changing market environments (Rumelt et al. 1994). In dynamic markets, the strategic advantage appears to lie in the ability to change repeatedly to meet customer needs and stay ahead of the

competition. Seminal work by Teece and Pisano (1994) in this area analyzes the competencies or capabilities of firms that could result in potential competitive advantage. The concept of a firm's *dynamic capabilities* is introduced in this context of competition as those *competencies or capabilities which facilitate the rapid creation of new products and processes by the agile coordination of "internal and external organizational skills, resources, and functional competences" in response to dynamic market conditions*.

Teece and Pisano (1994) identify a firm's dynamic capabilities as primarily its organizational processes, its market positions, and its possible expansion paths. The processes are explained to be the managerial and organizational routines for accomplishing tasks within the firm—coordination or integration (both of internal resources and with external partners for enhanced value products and services), learning by doing (both individual and organizational), and transformation (the reconfiguration of resources to respond to a changing customer environment). Positions, in the context of dynamic capabilities, refer to a firm's assets—both tangible (e.g., financial assets) and intangible (e.g., reputation). The authors also include as dynamic capabilities, the organization-wide decision paths taken in the past and those decision paths available to the organization going forward.

In concrete terms, then, the following dynamic capabilities are identified to be potential sources of competitive advantage:

1. internal coordination and integration of business processes,
2. integration with strategic partners,
3. rapid product development,
4. learning by doing, and
5. creation or acquisition of assets (technological, complementary, financial, reputational, structural, institutional, and/or market assets).

3 An Analytical Framework of SOA as an Enabler of Dynamic Capabilities

An often-cited study in the area of IT and organizational performance theorizes that information technology can be used to enable key organizational capabilities and strategic processes (Sambamurthy et al. 2003). A review of the literature in this area indicates, however, that of the studies that have investigated this relationship, few have linked SOC with the building of dynamic capabilities in the management or information systems research literature. Those that have examined the strategic positioning of SOC have focused specifically on the impact of Web services on a single generic organizational capability (such as application integration or business process flexibility). The rapid adoption of SOA, and the fact that the move to service orientation requires a nontrivial reconfiguration of business and technology architectures, provides impetus to the examination of the ability of SOA to achieve organizational agility.

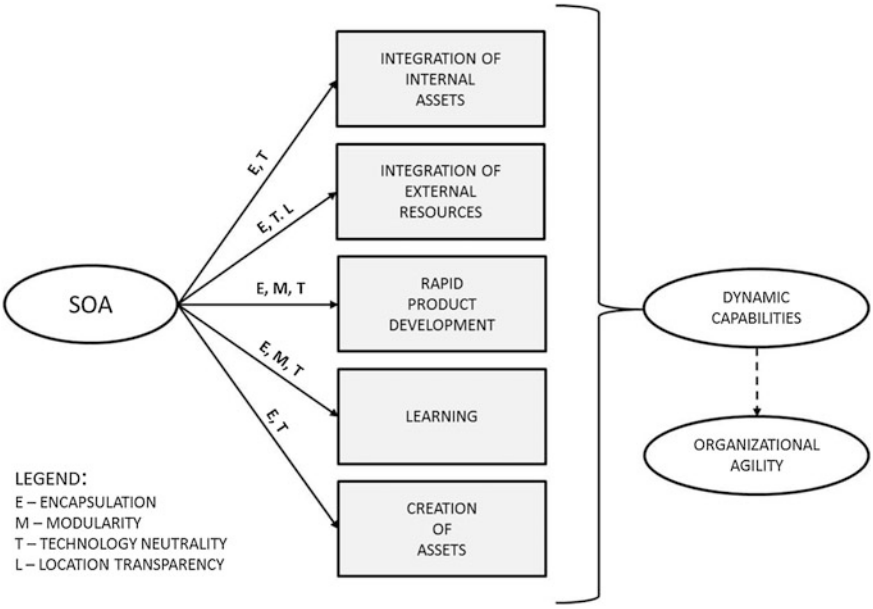

Fig. 1 Conceptual framework linking SOA to organizational agility

The five dynamic capabilities identified in the preceding paragraphs are linked to SOA and analyzed in light of the existing literature in how the fundamental properties of an SOA-compliant architecture can help achieve these dynamic capabilities. The result of this analysis is the *SOA-DC Conceptual Framework*, depicted in Fig. 1, which provides the basis for the subsequent formal empirical examination of the relevance of SOA to organizational agility.

3.1 Integration of Internal Assets

A service-based approach allows existing and proven legacy system functions to be encapsulated as services on a new standards-based integration platform. The services can encapsulate single functions, or be composed of several smaller services, thus allowing for the integration of internal resources that may be implemented across disparate platforms and infrastructures (Bell 2007; Channabasavaiah et al. 2004; Curbera et al. 2003). Although the argument for location transparency could be made for geographically disparate resources, the properties of encapsulation, along with technology neutrality, are sufficient conditions to address basic intra-enterprise integration of diverse resources.

3.2 Integration of External Resources

The transformation of an enterprise's business processes to services, along with standards-based communication protocols, opens up new avenues of strategic partnerships with suppliers, partners, and customers (Hagel and Brown 2001). Primarily, encapsulation allows services from external service providers to be included as part of the system without having to understand the underlying implementation of the service. The inter-enterprise communication required for such cross-domain business flows may then be facilitated by the technology neutrality property of SOAs, i.e., a messaging infrastructure based on open standards. Arguably, the most significant advantage of a service-based business model in the context of inter-enterprise integration is that services have interfaces that are location transparent. This means that the services are reachable independent of whether they are implemented within the boundaries of the same business process, in another business process within the organization, or in a business process in an external (partner or customer) domain.

3.3 Rapid Product Development

Modularity, encapsulation, and location transparency allow for rapid development in that existing components implemented within and across varying platforms may be encapsulated and then assembled to form new business applications (Bell 2007). This could potentially reduce the time to pull together well-designed tested functionality to meet new market needs (Huang and Hu 2004). The reuse of existing modular components also reduces risk in more ways than one (Channabasavaiah et al. 2004) in that the enhanced business process incurs no new potential points of failure, and the maintenance of the supporting infrastructure continues to remain unaltered.

3.4 Learning

A considerable amount of critical literature exists on the link between learning and product modularity, with critical analyses of how modular product design and architectures can positively impact learning at the individual and organizational level. While component modularity helps in individual learning of system components insulated from disruptions at the architecture level, modular architectures help organizations learn about markets by enabling rapid product variations due to modularity of the architectural components (Sanchez and Mahoney 1996).

From a system perspective, component modularity may contribute to the reduction over time of the learning curve of the development or assembly team due to familiarity with existing modular services (Channabasavaiah et al. 2004;

Huang and Hu 2004; Huhns and Singh 2005). From a business process perspective, existing architecture frameworks tend to be program-centric with business flow or process knowledge often spread across individual system components, hampering the consolidation of information relevant to clearly understanding business flows. Effective SOAs tend to be well-defined process-centric architectures, allowing for better process design and knowledge, monitoring, and rapid transformation of these processes from a business perspective rather than systems perspective (Channabasavaiah et al. 2004; Huang and Hu 2004; Sprott 2004). This flexibility of service-based business process architectures is enabled by modularity, loose coupling, and technology independence, allowing rapidly assembled variations to be tested against changing market requirements, potentially building a better awareness or knowledge of markets.

3.5 Creation of Assets

While the concept of software as a service is not new, the packaging of discrete business functions as services appears to provide new business opportunities for organizations. The clear representation of business flows as services, allows for the identification of business services that are the core competence of the organization, allowing for the noncore services to be substituted by those provided by vendors with the relevant expertize (Channabasavaiah et al. 2004). As a result, service-based architectures enable corporations to offer their core competencies as services to other companies (Hagel and Brown 2001; Huang and Hu 2004; Turner et al. 2003), focusing on areas of comparative advantage while buying or leasing services in which they lack superior expertize from other service providers (Curbera et al. 2003). As time progresses, the developed services become a core asset of the organization—a library of tested, ready-to-use, and compatible components (Channabasavaiah et al. 2004), encapsulated as services to be made available to external entities, independent of location, as products. Technology neutrality can add to increasing the market base but is not a necessary condition to make internal business functions available as marketable service assets.

4 Empirical Assessment of the SOA-DC Conceptual Framework

In order to empirically assess the potential of SOA-compliant architecture to realize dynamic capabilities according to the framework presented, case studies were conducted in a two-step process using rich qualitative data from firms that have implemented or are planning to implement an SOA initiative. In the first step, a broad industry study of 14 firms was conducted to understand if and how the five dynamic capabilities are being achieved in practice. This was followed by an

in-depth case study of an Australasian bank (X-Bank) that has adopted service orientation in a bid to gain a competitive advantage nationally over rival foreign banks.

Results from the case study findings indicate that some of these dynamic capabilities are being realized to a greater extent than others. Firms deploying SOA initiatives were able to use the service concept to integrate their internal resources, and to a lesser extent to create services for use by other business units and for rapid product development. The use of services to integrate resources across organizational boundaries, however, is still a challenge since organizational contexts need to be semantically reconciled before service thinking can help. The other area where service orientation does not help is in increasing organizational learning. The lack of consistent reuse of services minimizes the opportunities for increased learning in organizations.

The following subsections examine the data collected from the 15 firms—the broad industry study and the in-depth case study—in the context of the proposed framework, thus examining how the use of SOA by these firms impacted the five dynamic capabilities.

4.1 Integration of Internal Assets

The integration of internal systems was identified as a core business driver for SOA by a majority of firms in the broad industry study. This is consistent with existing studies on the use of SOA for application integration (Baskerville et al. 2005; Legner and Heutschi 2007; Yoon and Carter 2007) that indicate that an SOA-based infrastructure facilitates easier application and enterprise system integration; and many of the firms in the study were indeed able to use service-oriented principles to integrate their internal resources—back-end or legacy systems. Generally, firms were moving from individual Web services to more of a platform paradigm, looking to deploy all their products or offerings through a single service platform. In order to achieve this, firms were wrapping existing functions, and in some cases whole applications, with Web service interfaces. These Web services were then being plugged into existing messaging infrastructures, thus simulating the functions of an Enterprise Service Bus (ESB). The wrapping of these functions as Web services also facilitated uniform access to disparate applications from a single Web-based front-end simulating the integration of the firms' back-end systems. This enables a uniform customer experience across diverse back-end systems.

The experience of X-Bank mirrors that of the firms in the industry study. The initial technical infrastructure for the bank's business had been put together by purchasing and integrating best-of-breed products. These products used a variety of data exchange formats initially, but the technical team made a formal decision to move to a service-based infrastructure, migrating critical business functions one at a time. They used a Web services model to wrap existing back-end applications and an XML format to exchange data. As a result, they were able to use Web services to

integrate their back-end systems, and provide a single-view of their banking functions to their customers.

A significant number of firms were able to leverage SOA to create a delivery platform with an integrated view of their internal back-end systems. The ability for SOA to achieve the integration of internal resources, it may be argued then, appears to be high. What was significant, and not surprising, was that they had not been able to integrate external systems with their internal delivery platforms.

4.2 Integration of External Resources

The existing studies on application integration mentioned in the preceding subsection also indicate that the use of SOA eases partner and post-Mergers and Acquisitions (M&A) integration. This use of SOA as an integration framework in the context of M&As is also examined by another study reviewing five companies across industry sectors which concludes that SOA can be used to effectively integrate disparate systems (Henningsson et al. 2007). Our data, contrary to these findings, appears to indicate significant challenges in the integration of external systems.

Firms in the broad industry study expressed skepticism that the integration with partners or new products would not be a customized effort each time. Many firms were struggling with rationalizing the semantic nature of XML and the varying standards adopted by partners. Each partner integration effort continued to be handled as a "one-off" project focused on the exchange of business data. In a telling example, a firm which had just acquired another organization was struggling with the integration of the two enterprise systems, finally resigning to operate two separate banking systems with minimal integration. Another firm, which was faced with the integration of two large enterprise systems after an M&A, had to settle for a nonstandard integration maintaining two separate data sources, managing their data exchanges by the screen scraping of customer data from one system to be ported to the other! According to the Technical Architect—"Even normalizing one system gets hard. [The] format of messages coming and messages going out are prescribed. The time line is prescribed. But we are actually talking about different things, data semantics because implementation and doctoring over the years makes it (sic) two different systems." Although the firms were using XML in their integration, it was not usable for a more generic integration because of the differing semantic interpretations of the data fields. This challenge was also noted in other recent studies detailing the challenges of adopting SOA and Web services (Ciganek et al. 2005; Luthria and Rabhi 2008).

While X-Bank had not integrated any new products and new external functionality in the recent past, such an effort, if undertaken, was expected to be handled as custom integration despite using a Web service infrastructure. Interestingly, the back-end infrastructure of X-Bank was pulled together by integrating various products over time using Web services to wrap interface functions and XML to exchange data between applications. The Enterprise Architect at X-Bank indicated

that this was made easy because they had already been working with the applications prior to the move to SOA and had control of the application interfaces and the formats being used for data exchange.

4.3 Rapid Product Development

While service providers, a number of firms indicated that reusable and portable services reduced product deployment time, in fact a particular firm had actually benefited from the reuse of created services to develop new products rapidly. They were able to realize a savings of as much as 60 % in the development effort of some products. Another firm indicated that it had seen the potential for reducing development time but had not been able to take advantage of these opportunities because of the inability to enforce reuse. Interestingly, X-Bank indicated that while service reuse was actually low, the teams were nevertheless able to reduce the product development time because they created new services by applying minor modifications to existing services.

The Enterprise Architect and the Application Architects at X-Bank indicated that they were able to leverage existing Web services across applications, primarily because of two proactive initiatives. First, a dedicated "shared services" team was put together to create shared infrastructure services. This shared services team actively worked to identify functions built for specific business applications that could be of broader use. While being handicapped because of developer skepticism of others' codes, the shared services team was able to successfully reuse services in certain development efforts by focusing on developing lower level data access or communication modules for the business units. Examples of the services they targeted were common application functions like creating a customer record, retrieving customer data, and customer address validation. These services were then discussed with other business applications to see if they could be reused. Second, a governance function was established to approve all new services. Here again, while the focus was on what services were being developed and not why they were being developed, the governance team nevertheless had some success by bringing existing services to developers' attention. While the services were not always reused as is, developers were able to cannibalize the code thus reducing development time.

Overall, the results indicate that there appears to be the potential for rapid deployment owing to modularity of services, and there is some realization of rapid product development using SOA.

4.4 Learning

There is little or no empirical research tying the use of SOA to organizational and/or individual learning. While the reuse of services may be thought to contribute to the reduction over time of the learning curve of the development team due to familiarity

with existing services, the firms in our study indicated that it was difficult to create reusable services in practice with developers generally re-creating services needed for newer applications. While developers indicated that this re-creation of existent services was done because applications needed context specific customization of the so-called common services, the managers in the study felt that it was not possible to enforce a culture of reuse, because of the creative nature of programming. Similarly, although X-Bank's middleware team was able to reuse some services in specific contexts, the majority of services were generally not reused resulting in many versions of a service being created to address business rules specific to applications. Learning by reuse, therefore, appears not to be feasible within the SOA context.

Our empirical data indicates that reuse poses many challenges, some of which were ownership and accountability, security, performance, and sheer apathy for reuse. The lack of reuse, therefore, results in the proliferation of redundant services and re-creating of existing functionality. Arguably, this lack of reuse indicates a low correlation between the use of SOA and learning.

4.5 Creation of Assets

Although loosely coupled services could potentially be marketed as independent services, we found that only 3 of the 15 firms had actually been able to achieve this, although only within the organization. Others were able to articulate this as a potential benefit but had not realized it for themselves. One firm indicated that once ownership issues are resolved, infrastructure services could potentially be used across the organization, but they had not seen external sharing of common services. This was echoed by the CIO of another firm, who felt that there was definitely "a need for a large number of semi-public domain services for use" by the larger banking industry sector, but the general support ecosystem was not ready. According to this CIO, along with ownership issues, bank specific regulations precluded the dissemination and use of common shared services. Yet, other firms indicated that the granularity of services was critical and they had been unable to find the right level of granularity to allow for their services to be used across multiple applications. The correlation of SOA with the creation of technological assets, therefore, has some merit according to the firms we interviewed, and there appears to be no data to refute this argument. As discussed in the preceding subsections, X-Bank has been able to use some of its lower level services across applications, but generally developers tend to resist reuse, preferring to recreate functionality in many cases.

5 Conclusion

The critical role of organizational strategy in gaining competitive advantage is reflected by investments in technology initiatives that are strategically important to firms' core businesses (Swanson 1994). Investments in SOA appear to continue to

be strong in a majority of organizations across a variety of industries (AppDynamics 2011; Forrester 2010). Little is known, however, of how SOA aligns with the strategy of the organizations adopting SOA. There is some academic literature relating to the potential strategic value of Web Services and SOA (Huang and Hu 2004; Iyer et al. 2003; Lim and Wen 2003) and other empirical studies are emerging (Baskerville et al. 2005; Henningsson et al. 2007; Moitra and Ganesh 2005). These studies use varying approaches to examine the impact of SOC on agility and, hence, competitive advantage. Even as these studies break new ground in the area of the strategic value and competitive advantage using Web services implementations, the links between SOA and competitive advantage remain largely unexplored given the relative infancy of the adoption curve of the SOA.

The strategic management concept of dynamic capabilities is a widely accepted approach to understanding the competitiveness of organizations. Few studies have linked SOC with the building of dynamic capabilities in the management or information systems research literature. Those that have examined the strategic positioning of SOC have focused specifically on the impact of Web services on a single generic organizational capability such as application integration or business process flexibility. There is no study that links SOA as a technology concept to the "first principles" of dynamic capabilities and the attributes of SOA that may make it amenable to creating dynamic capabilities and the channels through which it might be able to influence its creation are not well understood. This chapter discussed and addresses this gap by investigating the role of SOA in realizing dynamic capabilities which, as defined by Teece and Pisano (1994), facilitate organizational agility and could lead to the firm gaining a competitive advantage in the marketplace.

Recently, there has been some research trying to assess the economic potential of SOA, most notably a rigorous analysis (Mueller et al. 2010) of a large repository of secondary data comprising published cases from a variety of sources, such as "journal databases, print publications, case collections, press coverage, and material issued by companies, vendors, consultants, and analysts dealing with SOA". While the data analyzed is secondary, this study is noteworthy for the variety in the dataset —"164 case descriptions covering 141 organizations from 32 industries with current or past SOA implementation projects." This study concludes that the potential value of SOA lies in the design principles of modularity and standards. Modularity has the potential for reuse, reducing time-to-market, and easier use of third-party services. In addition, modularity, along with standards, increases interoperability and interorganizational coordination. Interestingly, the findings of our study stand in contrast to these observations, as is illustrated and discussed in Fig. 2.

While standards are understandably more controllable within an organization, the paucity of interorganizational standards was a practical obstacle in coordination and integration of cross-organizational boundaries. Our findings indicate that while adopting a service-oriented approach facilitates integrating internal systems within organizational domains, integrating systems across domains of customers or even partners still could prove challenging because of the lack of industry standards and mature tools.

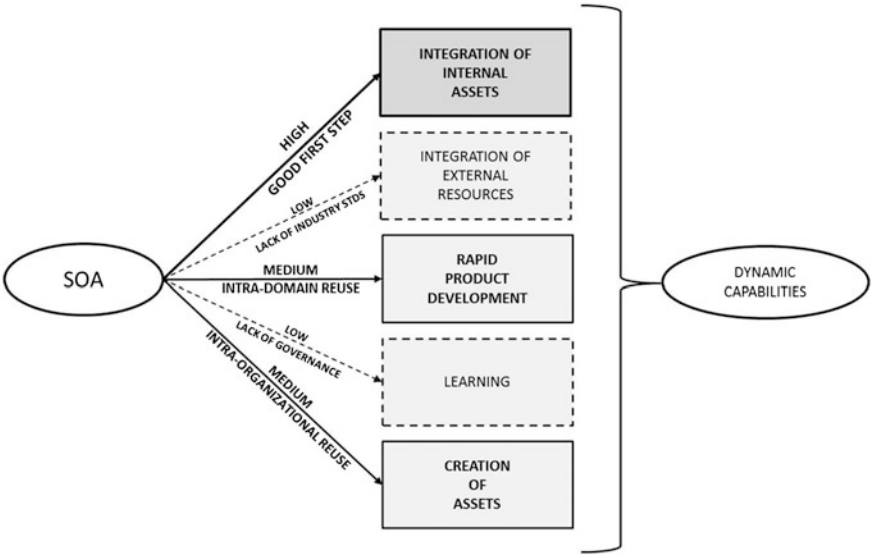

Fig. 2 Efficacy of SOA in achieving dynamic capabilities

It was primarily the service providers in the industry study that were able to leverage the portability of services across infrastructures to deliver service and products to clients running diverse platforms. Driven by profitability pressures, they worked actively to identify common infrastructure requirements across client projects and implemented them as services for reuse across various applications, thus reducing product development time and increasing profitability. However, there was very little reuse of services outside the service provider domain, with only 2 of the 15 firms interviewed being able to leverage services within, but not across, development teams.

It could be argued that reuse encourages familiarity with the services, thereby potentially enhancing learning. While modularity does promote rapid development, we found that it does not necessarily result in reuse because development teams may tend to reuse components they had developed but rarely used available modules developed by other teams. As a result, learning through reuse was not a significant outcome.

The possibility of offering up services to customers, both internal and external to the organization, was expressed as a desirable goal by many of the firms we spoke with. However, when it came to easier creation of third-party services, modularity posed another kind of problem. Firms were unsure of what granularity of service constituted a service that could pragmatically be consumed by third-parties. There was some evidence of the use of common infrastructure services being reused across the organization, but a general consensus that the infrastructure and tools to support the external sharing of services was still not mature enough.

Overall, firms deploying SOA initiatives were able to use the service concept to integrate their internal resources, and to a lesser extent to create services for use by other business units and for rapid product development. The use of services to integrate resources across organizational boundaries, however, is still a challenge since organizational contexts need to be semantically reconciled before service thinking can help. The other area where service orientation does not help is in increasing organizational learning. The lack of consistent reuse of services minimizes the opportunities for increased learning in organizations.

In summary, this chapter described a conceptual framework to examine how the fundamental properties of an SOA-compliant architecture can help achieve the five dynamic capabilities—integration of internal resources, integration of external resources, rapid product development, learning, and creation of assets. First-hand empirical interview data across 15 firms were subsequently used to examine how SOA is being used in practice to achieve dynamic capabilities. The cross-firm data was examined using widely accepted rigorous qualitative analysis techniques to understand the firms' experiences with integrating internal systems, integrating external systems (partners, customers, etc.), rapid product development, learning, and the creation of assets. Although the broader industry study comprised 14 firms, five of these were service providers who were able to give us an insight into how their clients were using SOA. According to these service providers, their clients spanning varied industry sectors had similar experiences using SOC. The similar patterns claimed to be observed by the service providers across their clients of diverse profiles helped bolster the argument relating the use of SOAs to the realization of dynamic capabilities. In addition, the in-depth study of X-Bank also yielded very similar results, strengthening the validity of the findings.

Further detailed case studies will help flesh out ways for overcoming obstacles faced by the selected organizations in this study.

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Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations

Changmi Jung and Rema Padman

Abstract Health care is the largest service sector in many economies worldwide, but it lags behind other industries in the use of efficient and innovative approaches to both patient care and service organization. Thus, innovative, disruptive models of healthcare delivery that leverage current information, communication,and decision technology platforms in novel ways have the potential to change the practice of healthcare delivery and management. To satisfy the growing demand for medical care, several new models are currently being developed and piloted, such as online medical consultations, which do not rely on face-to-face visits as the sole model of care delivery. Alongside, the current patient-centered care imperative has also resulted in the use of portal technologies, among others, to inform, engage, and empower the patient in shared decision making. In this chapter, we briefly introduce different types of digital service innovations in health care and provide some details about these current streams of care delivery innovations, particularly in the primary care setting given its broad influence on overall healthcare services. Furthermore, we focus on the potential of online care delivery that includes web portal services for patients and online medical consultations beyond simple email communications between patients and physicians. We conclude with a brief discussion of the implications of these models for the future of healthcare delivery in the digital age.

Keywords eHealth · Patient portal · Online medical consultation · eVisit · Disruptive service innovation

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1 Introduction

1.1 Service Innovation in Health Care

For centuries, health care has relied heavily on face-to-face interactions for its service delivery due to the specialized, personalized, and knowledge-intensive nature of the tasks associated with clinical care. However, enabled by new and advanced means of communication and message delivery, there has been a slow but steady change in the traditional approaches in the twenty first century (Wilson 2003). Assisted by a virtual communication channel with advanced computing systems, healthcare industry has initiated significant changes to its core service by providing medical consultations with diagnosis and treatment plans via online transactions (Adamson and Bachman 2010; Wilson 2003; Whitten et al. 2007).

1.1.1 Types of Innovations in Healthcare Delivery

Service innovation in health care can be categorized into embodied and disembodied innovations (Bower 2003). Embodied innovations are tangible, such as medical devices and pharmaceutical products, and disembodied innovations are intangible and constructed from newly formed knowledge such as advanced surgical techniques and new care protocols (Bower 2003) that produce procedural changes. We can further subdivide these types of innovations into (1) healthcare process, (2) operational care delivery, (3) medical products, and (4) healthcare organizations. Innovations in medical products can be categorized as embodied innovations, and the rest of the types of innovations can be bound to the disembodied, except innovations in care delivery which include both tangible and intangible innovations. Traditional face-to-face encounters with healthcare providers have been reshaped into virtual encounters in which patients and providers can exchange messages asynchronously, or in sync if videoconferencing is available. This online medical service delivery has created a new channel of healthcare services, potentially at a lower cost and higher convenience. Most innovations in the healthcare sector in the recent decade have focused on digitization via computing, communication, and decision technologies, particularly internet technologies.

In this paper, we examine these digital innovations in healthcare service delivery that are poised to dramatically disrupt current practices. We summarize how these models are being architected, deployed, and evaluated in care delivery settings. Furthermore, we investigate challenges and opportunities for adoption and use by examining current online medical consultation, also called eVisit, deployments by health systems to provide online consultation service to patients in the ambulatory care setting. The eVisit service provides patients with online consultation through a series of secure message exchanges with a physician, providing an alternative for onsite office visits and non-reimbursed phone-based care (Padman et al. 2010;

Jung et al. 2011, 2013). These are distinct from email consultations because they capture relevant information about the patient's acute, nonurgent condition for immediate diagnosis and treatment.

The key stakeholders are the physicians, patients, and insurers. The patients need to be convinced that the eVisit service provisioned via portal technologies can provide them with good quality of service while offering the additional convenience of accessing a physician's medical advice online. The physicians need incentives to participate in such services, primarily through reimbursement for their services, as well as providing better care (Tang et al. 2006). Insurers need a clear understanding of how this service is going to be implemented, its value, and the relevant policies and guidelines, so that it can be covered under current health plans. The success of portals and eVisits is dependent on the buy-in from the stakeholders mentioned above. Finally, these novel but challenging digital innovations have the potential to add considerable value in other care delivery settings as well, such as postoperative management and chronic care management, thus providing better access and service to patients and improved value and competitive advantage for the organization.

1.1.2 Theories of Service Innovation

Several theories of service innovation are applicable to the healthcare delivery context. Wang et al. (2010) organized the diverse definitions of service science into four major categories: discipline-oriented concepts by Bitner et al. (2008), systems approach concepts by Maglio and Spohrer (2008), value-oriented definition by Vargo and Lusch (2008), and content-based definition by Cai et al. (2008). Although these approaches differ in construction, there is agreement on the underlying purposes for studying service science—to drive innovation and improve productivity and quality (value) via rigorous scientific research methods.

More than two decades ago, it was noted that the emerging information technology's main adopter would be the service sector, and that advanced technologies will drive innovation in service industry (Barras 1986). Examining classical innovation dimensions (Schumpeter 1934)—product innovation, process innovation, market innovation, input innovation, and organizational innovation, we observe that technological innovation in healthcare delivery touches upon all these dimensions. Until more recently, information technology in healthcare had mainly focused on administrative and financial transactions rather than clinical care delivery (Audet et al. 2004), but this is changing quickly and dramatically.

Innovating clinical care delivery via internet technology is a complicated process not only because it involves many stakeholders such as end users (providers, patients), payers, hospital staff, system administrator, and technicians but also due to nature of the task performed via the system, which is knowledge intensive, case specific, and must be embedded with the current work flow. Thus, developing the system itself is an innovative move (product innovation), and providing care via the system is a process innovation. Using internet technologies, care providers can reach patients who, otherwise, would likely not have access to health care without

the technology, and thus it has a potential to create a new market for underserved populations. As internet technologies allow virtual encounters, providers affiliated with a hospital offering such online medical services can also extend them to other patients within the hospital practices. This internal outsourcing may create input innovation. Lastly, additional care delivery channels will change the organizational structure or at least work process in healthcare organizations in order to perform the new service seamlessly with existing ones. This leads to organizational innovation. Overall, innovation in technology-enabled healthcare delivery is multi-dimensional (Agarwal and Selen 2011), has the potential to generate a large impact on the healthcare industry resulting in elevated service offerings (Agarwal and Selen 2009), as a result of an interplay of service concepts, service delivery practices, client interfaces and service delivery technologies (den Hertog 2000; Miles 2005). Thus, it is important to understand what the new opportunities as well as barriers and challenges will be when innovating healthcare service delivery.

1.1.3 Digital Innovations in Health Care

Health care is entering the digital age aided via the wide-spread deployment of Electronic Medical Records (EMR), availability of Personal Health Record (PHR) systems, Decision Support Systems, and other healthcare information, communication, and decision technologies. Paperless systems are gradually being adopted by providers and patients, and promoted by regulations such as the HITECH Act (Health Information Technology for Economic and Clinical Health) in 2009.

Ongoing digital transformation of medical care delivery, particularly primary care, is being driven in part by the increasing gap between provider availability and patient demand for high quality, easily accessible care (Margolinus and Bodenheimer 2010). With some studies reporting that 33 % of the patient population were unable to get timely appointments (Strunk and Cunningham 2002), expanding access to all consumers is a fundamental challenge faced by the US healthcare reform initiatives (Rittenhouse and Shortell 2009). One approach to satisfy this growing demand for medical care is patient-centered care initiatives that do not rely on face-to-face visits as the sole model of care delivery (Margolinus and Bodenheimer 2010; Rittenhouse and Shortell 2009; Stange et al. 2010; Rosenthal 2008). A sustainable service delivery model should address current challenges regarding providers' already overburdened workload, timely access to care for patients, and cost of care delivery. Telemedicine has been promoted as a means of bridging the gap (Grigsby et al. 2007). Since the 1990s, there has been increasing use of telemedicine technology enabled by the dramatic developments in digital communication (Zanaboni and Wootton 2012; Menachemi et al. 2004). Although the first 'telemedicine' solutions emerged in 1920s when telephone communication was introduced to care for remote patients or for ordering tests, radio communication became useful for medical support during the World War I (Sosa-Iudicissa et al. 1998). More recently, telemedicine applications have focused on specific areas such as remote-monitoring of chronic patients and teleradiology (transmitting x-ray

images to remotely located radiologists in order to obtain specialist opinions) (Zanaboni and Wootton 2012; Grigsby et al. 2007) that have been made possible by advanced internet technologies. Thus, use of telemedicine in primary care settings has great potential in solving provider capacity problems and timely access to care.

1.1.4 Disruptive Innovations in Primary Care

Expanding the deployment of telemedicine using internet and web technologies, patient portals, and online medical consultation services are emerging as one of the most critical disruptive innovations in the healthcare sector. A disruptive innovation is one that affects its domain in large volume, which creates a new market and value, and eventually replaces existing technologies/processes (Hwang and Christensen 2008). This innovation provides products or services at relatively lower cost and in a less complex manner, and thus attracts customers with reduced needs or customers who are often ignored by existing market mechanisms. A well-known example is Ford's Model T automobile in early 1900s which was introduced at a lower price via mass-production. It replaced a large number of horse-carriages and eventually transformed the transportation market. Other examples include online classes and their potential to transform the education sector, and the role ATM has played over the past few decades in transforming the banking industry for consumers.

Unlike other industries, health care has remained expensive and lacks resources and accessibility regardless of advances in technologies and many other innovations (Hwang and Christensen 2008). However, the migration of services to online platforms has advanced technology-enablement of the healthcare industry via patient portals and online medical services because of their potential to improve dissemination of healthcare information and to enhance communication between patients and healthcare providers (Baker et al. 2003). This new development involving the use of internet and web technologies to deliver services has created a new field called e-health. These services empower patients to access necessary and valuable information relevant to their own health faster and easier than ever, such as information about particular diseases, test results, and ability to make appointments online and even communicate with their healthcare providers at almost no cost. This in turn helps patients to participate in health care decision-making process with the knowledge that would not have been available without the power of internet. e-health, characterized as internet enabled medicine, is the latest development in the telemedicine stream of applications and is defined as health services and information delivered via internet and related technologies (Eysenbach 2001; Wilson and Lankton 2004). In addition, with the total internet-enabled population in the U. S. growing from less than 20 million in 1996 (Hoffman et al. 1996) to over 245 million in 2009 (CIA 2009), e-health services are now easily accessible and provide considerable convenience to these online consumers. This lower cost and greater convenience coupled with the instant information retrieval capability of e-health attracts patients, and therefore the demand is growing. More particularly,

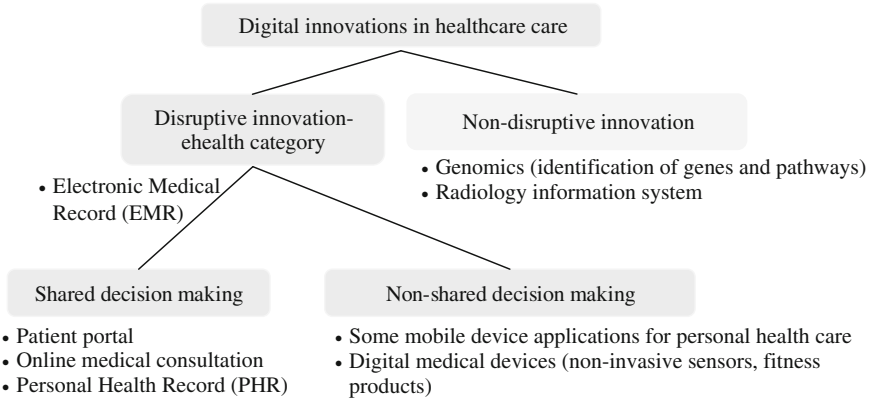

Fig. 1 Envisioned structure and examples of digital innovations in health care

low-cost online medical consultation is a way to substitute physical clinic visits in cases where patients experience acute, nonurgent health concerns. Thus, e-health has the potential to be a disruptive innovation in healthcare industry. Details about its components, such as patient portals and online medical consultations, will be discussed in the next section.

One of the most important advantages that e-health is facilitating is shared decision making (Padman et al. 2010). Traditionally, patients have been passive participants in medical decision making because healthcare information and even patients' own medical records were hardly accessible in the past. Due to their lack of knowledge and lack of easy access to information, patients were unlikely to be involved in their treatment decision-making process. In the internet enabled environment, when patients are able to retrieve necessary information as well as manage their healthcare records whenever they wish, they are better equipped with the necessary knowledge, and potentially more involved in their own health care if they so desire (Harle et al. 2011). This trend is shifting the decision making position from the physician to a shared view by the physician and patient (Hesse et al. 2005; Smith 1997; Wald et al. 2007), which is a necessary aspect of patient-centered care. In summary, Fig. 1 depicts the positioning of e-health in healthcare innovation.

2 Patient Portal

2.1 What Is a Patient Portal?

With secure internet transactions providing standard offerings in many industries and progressing to over 50 % of online users in industries like financial services, the healthcare delivery sector is seeking to leverage deployment of the electronic medical record (EMR) to provide improved customer service and market

differentiators to consumers by supporting appropriate levels of care in a secure, online environment (Padman et al. 2010). As a consumer-facing extension of the EMR, patient health portals are becoming a critical part of a healthcare organization's service delivery strategy. While the EMR facilitates access to patient health information for providers and the care delivery team to make informed decisions at the point of care, health portals empower patients to access their clinical information and interact with their healthcare team (Weingart et al. 2006). It allows patients to take a more active role in their own health by providing secure and convenient electronic access to their own health information.

Patient portals provide value to the healthcare organization by streamlining workflow, empowering the patient, and creating new communication pathways. Through patient portals, users have the ability to self-service and research their own health information and health issues. By providing them with access, they can review and validate portions of their medical record, such as test results, prescribed medications, and visits to clinics. Interactions with the office also become more user-friendly and efficient. Requests for prescription refills, appointments, medical advice—appropriate medication use and follow-up questions/updates after discharge—and other related information can be received electronically, automatically routed to the correct resource, and managed in a timely fashion that integrates into workflow with minimal disruption to the patient or staff (Carrell and Ralston 2006). Properly leveraged, patient portals can also be a valuable tool for an organization to inform patients of services and resources. Health reminders can be automatically and securely sent to patients reminding them of upcoming appointments, potentially decreasing no-show rates, the need to schedule appointments for annual physical or vaccinations, which may improve compliance with preventive care requirements, or informing them of new services available from the organization (Jung et al. 2011; Padman et al. 2010).

2.2 Patient Portal and Service Innovation

Most services deployed via patient portals have traditionally been served by telephone calls or physician office visits, such as to make an appointment and check test results for which patients sometimes needed to visit their physician's office. With internet-enabled self-services, patients obtain what they need without waiting since there is no queue in a virtual space. Patients can instantly make an appointment online, and check laboratory and radiology results without waiting on a telephone call or making a trip to doctor's office. Thus, the traditional form of healthcare delivery for end-users is significantly being reshaped by technology.

With self-service patient portal features, patients can perform simple tasks without contacting their primary care providers or medical staff. Hence, this self-service format has the potential to increase resource availability in the form of higher available capacity from care providers and better ability to meet the needs of patients who are in greater need of face-to-face consultations. Thus, healthcare

service innovation via patient portal can potentially enable redistribution of supply of limited resources including physician providers and clinical staff, as well as redistribution of high demand by segmenting patients based on their characteristics. These hypotheses have yet to be rigorously tested from portal deployments in diverse healthcare delivery settings. A recent study reported in the *Annals of Internal Medicine* found mixed evidence about the impact of patient portals on health outcomes, patient satisfaction, utilization and efficiencies, and raised concerns about the digital divide in patient portal use (Goldzweig et al. 2013).

One of the most demanded services that can be provided by patient portal technology is communication with care providers (Alder 2006). Ninety percent of internet users wish to communicate with their care providers (Harris Interactive 2002), however, development of such communication solutions has been very slow compared to other portal services (Wilson 2003). A basic form of online communication between patients and their physicians started with email, then developed into secure messaging within patient portal platform, and has finally evolved into paid online medical encounters with simple messaging features on the side. The online encounter service via patient portals with integrated EMR has great potential to substitute for traditional face-to-face healthcare service delivery.

2.3 Examples of Patient Portals

The different types of web-based patient portals can be grouped into three main categories. The first category includes patient portal applications integrated into the existing systems of the healthcare organization, which enables links between patients' electronic medical records (EMR), clinician work processes, and the patient portal. This type of portal service is provided for its own patients by large healthcare provider organizations such as the University of Pittsburgh Medical Center and Veterans Affairs (My HealthVet: https://www.myhealth.va.gov/index.html, accessed November, 2013). They are capable of providing a range of services since all patient information is captured and can be retrieved from within the same system (Adamson and Bachman 2010; Nazi et al. 2010; Padman et al. 2010).

The second type of patient portal is provided by health insurance organizations such as Kaiser Permanente for their covered members (Sarkar et al. 2010). The integration of patient portal within the organizations' system is very similar to the first category, except that this is driven by payer organization, not hospitals or clinicians. This model mainly works as linkage between patients and physicians within the network. For example, Kaiser Permanente (KP) deployed a basic patient portal service in Northern California in 1999 with minimal features, adding prescription refill in 2001 and appointment scheduling feature in 2002. KP's laboratory test results and email communication with physicians became available in November 2005. Finally, its Personal Health Record (PHR) was later fully linked with the Electronic Health Record, KP Health Connect (Sarkar et al. 2010).

The third and final category comprises free-standing patient portals. Healthcare organizations and clinics without their own internet-enabled patient portal capacity can contract with vendors such as American Well who provide the communication environment and software products and platforms that allow registered patients to send messages to their providers or conduct simple tasks via the standalone system (Browning et al. 2012). In many cases, small-size providers are incapable of building their own patient portals due to high cost and low demand. For those providers, private companies provide patient portal solutions, serving patients via cloud-based communication services and platforms. In this context, self-managed online patient health record solutions are not considered as patient portals.

Most patient portals provide a basic service—asynchronous communication with healthcare providers. Some advanced and structured patient portals serve additional functionality such as appointment scheduling, reviewing laboratory/radiology test results, prescription renewals, reminders for appointments/medication, and so on. According to a survey (Klein 2007), patients in primary care setting are willing to use such systems for communication purposes. Studies and statistics show increasing accessibility, demand, and usage. Hsu et al. (2005) showed that portal service enrollees increased almost sixfold in 3 years from 1999 to 2002. Despite increasing consumer demand, we observe digital divide in e-health as well. Patient portal users are generally younger, affluent, and healthier than the average patient (Weingart et al. 2006; Andreassen et al. 2007), predominantly female (Jung et al. 2011), with disparity in usage and accessibility by race/ethnicity and socioeconomic status (Hsu et al. 2005). The disparity caused by socioeconomic differences is of particular concern because it may exacerbate existing disparities in healthcare accessibility (Viswanath and Kreuter 2007).

3 Online Medical Consultation

3.1 What Are Online Medical Consultations?

Medical consultations through internet technologies, referred to as eVisits in some contexts, can be delivered using synchronous communication (e.g. video chat) or asynchronous communication via email or message service. The latter is an increasingly adopted form of online medical service, and is regarded as a digital innovation that has the potential to transform healthcare delivery (Wilson 2003), and provided by organizations with advanced e-health applications (Wilson and Lankton 2004). Perhaps one of the most valuable capabilities of patient portals is the ability to provide services to treat patients for nonurgent health conditions (Padman et al. 2010; Adamson and Bachman 2010; Zhou et al. 2007). This offering provides patients with the ability to complete and submit basic information for designated nonurgent, episodic illnesses, and receive an online evaluation from their physician, providing convenient, timely, and comprehensive access to care.

Furthermore, this approach can evolve into a service that assists patients in managing chronic health conditions. By providing the tools to enter data, such as blood glucose levels, weight, and blood pressure, and resources needed to monitor and control their health conditions over time, patients have an improved ability to actively participate in their health care and achieve more favorable health outcomes (Minetaki et al. 2011; Carrell and Ralston 2006). A survey of nearly 5,300 patients by Forrester Research reported that US health reform initiatives will necessitate online consultations between providers and patients as more consumers seek access to doctors (Boehm et al. 2010). Despite these perceived benefits and needs, adoption rates have been uneven across patient groups. There is little research that has investigated current forms of online service delivery, drivers of adoption of such services, understanding early adopters, and barriers and facilitators of online care in order to improve awareness and adoption. In particular, by applying innovation diffusion theory (Rogers 2003) to the field of online medical care, more efficient and effective strategic approaches to encourage adoption can potentially be developed and evaluated.

The key stakeholders are physicians, patients, and insurers. The patients need to be convinced that the eVisit service provisioned via portal technologies can provide them with good quality of secure, reliable, service while offering the additional convenience of accessing a physician's medical advice online. The physicians need incentives to participate in such services, primarily through reimbursement for their services, as well as providing better care (Tang et al. 2006). Insurers need a clear understanding of how this service is going to be implemented, and the associated costs, benefits, regulatory policies, and guidelines, so that it can be included in covered services. The success of portals and eVisits is dependent on the buy-in from the stakeholders mentioned above.

In summary, this novel but challenging digital innovation has the potential to add considerable valuable in diverse care delivery settings as well as in areas such as postoperative care management and chronic care management, thus providing better access and service to patients and improved value and competitive advantage for the organization.

3.2 Current Practice

Many organizations with patient portal application currently provide some kind of online medical consultation services via the portal solution. Large healthcare organizations serve their own patients with patient portals that are integrated with the organization's EMR. Others utilize technology platforms provided by private entities, such as Relay Health (http://www.relayhealth.com), to connect patients to their physicians whereas other sites like American Well (http://www.americanwell.com/), TelaDoc (http://www.teladoc.com/), and others are available for anyone as long as there are online consulting physicians contracted to the organization within the patient's state of residence. In the latter case, it might be difficult to receive

appropriate diagnoses and treatment that has long-term implications, since, the provider does not have access to any medical history of the patient other than information the patient provides with the consultation request. However, there are no studies reporting the effectiveness of the different type of online medical consultations, and thus it is an open area for research. Nonetheless, online medical consultation is a growing trend and, if appropriately organized, has the potential to substitute physician office visits for nonurgent, acute symptoms at lower cost (Adamson and Bachman 2010).

Online consultations managed by provider and insurer organizations have the capability to link the service with existing EMR systems, which is an ideal service delivery mechanism (Viswanath and Kreuter 2007) because such e-health solutions can provide comprehensive information about patients to providers, hence, the quality of the virtual clinical encounter can also be improved. When the service is provided by hospital organizations, there is an opportunity to physically visit physicians for follow-ups or physicians can ask patients to come in if deemed necessary. This possibility may increase the level of trust by patients. Some online medical consultation sites have reimbursement structure for physicians, and the rest are paid by patients out of pocket. We do not regard email communication or simple messages that are free of charge as online medical consultation. Email and message exchange are used for follow-up questions, updates, inquiry for medication advice, etc. that do not necessarily require diagnosis and prescriptions, and can be answered by nurse practitioners or other clinical staff. Most online consultations are free-text format where patients describe symptoms and health concerns that they experience. Structured consultations consist of context-driven questionnaires that are relevant to the patient's choice of symptom, are mostly multiple choice, clarification questions but allow a few free-text forms, where patients enter details. Although healthcare practitioners and researchers agree on the usefulness of online clinician service for patients with chronic conditions, currently available sites are primarily being utilized for nonurgent, acute conditions. Figure 2 summarizes different characteristics of online medical consultations in current practice.

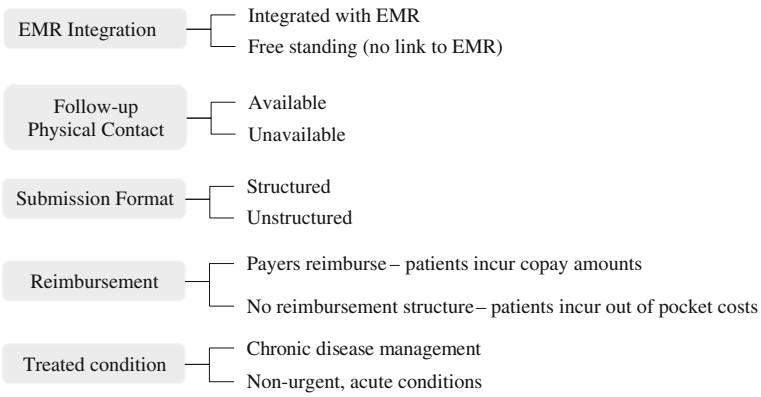

Fig. 2 Characteristics of online medical consultations

3.3 Analogy to Other Industries

Asynchronous communication between patients and physicians is an increasingly adopted form of care via patient portal in order to improve care quality and patient satisfaction (Wakefield et al. 2012) and it is a dominant online service format in primary care setting. Two types of innovative healthcare delivery via advanced internet technologies are synchronous communication such as video chatting, and asynchronous communication such as email/message exchange. Both synchronous and asynchronous communications transform traditionally inseparable healthcare services to separable services. Inseparable service by definition means that service production and consumption occur simultaneously (at the same time and place). Healthcare has traditionally been considered as an inseparable service sector since a patient and a physician need to be in the same room at the same time (Berry et al. 2006). Whereas synchronous communication only relaxes geographic restrictions, the more costly, asynchronous communication separates service production and consumption both in time and place, and thus provides higher level of flexibility. Borrowing the characterization of service innovation along the two dimensions of innovation—benefits offered (either core service product benefit or delivery benefit) and separability—from Berry et al. (2006), online medical consultation fits into 'controllable convenience' (Cell 2 from Fig. 3) that is separable, revolutionizing consumer access via the new service delivery method. Thus, the main contribution of asynchronous online medical consultation/communication to traditional healthcare sector are 'service separability' and delivery benefits.

Digital innovations have led to new market creation, especially by reshaping the market place from physical to virtual environments. They have penetrated many fields such as commerce, travel, banking, education, governance, and journalism, and have become necessary for many industries to stay competitive. Due to the virtual delivery of service, consumers no longer need to physically face service providers, enabling nonsimultaneous service consumption, which has transformed the traditionally inseparable service to separable through the innovation. Online

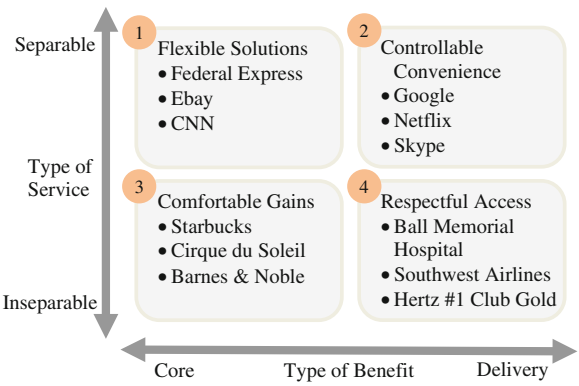

Fig. 3 Four types of market-creating service innovations (Berry et al. 2006)

banking, e-government, and e-commerce are examples with service separability and delivery innovation, while online class via video streaming lectures is separable and provides core product benefit.

There are clear analogies between online medical consultations and innovations in those other industries. First, all of them traditionally served customers via face-to-face transactions. Products were sold in stores, travel agencies consulted in their offices, customers needed to visit banks for transactions, students had to attend classes physically, and read paper-based journalism options that were delivered to our homes and offices. Second, they now provide their core service via online channel which is convenient and reduces transaction cost for both providers and consumers. Retailers and travel agencies no longer need to maintain physical offices, banks can handle simple online transactions instantaneously, schools can offer their classes to broader audiences without geographic constraints, and governments can manage their tasks online with minimal workforce.

Online banking, in particular, has very close resemblance to online medical consultation. Online banking is an innovation in service delivery (Miles 2005) similar to online medical consultation, and with some exceptions (internet banks and online doctors), both provide multichannel service delivery system that deals with relatively simple tasks of their core business services. The noticeable distinction is that healthcare industry is a knowledge intensive business service (KIBS), requiring high-skilled workers (Miles 2008). While online banking is self-service, online medical consultation requires responses from physicians.

Unlike majority of internet services in many industries, the online service delivery channel in healthcare does not depend entirely on self-service mechanisms although most service options are. Thus, there is a limited self-service path in healthcare sector. We depict the multichannel system of primary care practices with online portal and medical consultation capabilities in Fig. 4 based on the retail banking structure configured by Xue et al. (2007). Patients need to interact with the staff or physician via online messages for medical advice. Apart from online messaging, some organizations provide asynchronous virtual encounter with physicians that are paid medical consultations that evaluate the patient's symptoms to provide diagnoses and medication prescriptions or even test orders, which serves patients in exactly the same way as physical clinic visits but without actual face-to-face encounter.

4 Secure and Structured eVisit and Patient Portal

In this section, we describe a particular secure and structured online medical consultation solution provided by a large healthcare provider organization in Pennsylvania. This eVisit service provides patients with online consultation through a series of secure message exchanges with a physician, providing an alternative for onsite office visits and non-reimbursed phone-based care (Jung et al. 2011). The eVisit service is distinct from email consultations because it uses a set of structured

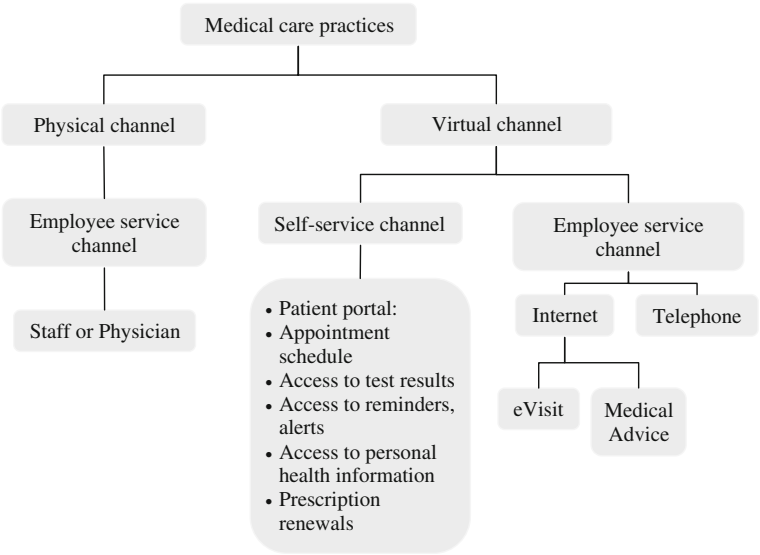

Fig. 4 The multichannel service delivery system in primary care practice (adapted from multichannel service delivery system in retail banking by Xue et al. 2007)

template-driven questionnaires to capture relevant information about the patient's acute condition. We have examined actual usage data over time as well as survey and interview results for trends in adoption, demographic and temporal patterns of usage, clinician and patient expectations and experiences, and challenges to sustainability of the service (Padman et al. 2010; Jung et al. 2011; Jung et al. 2013).

Similar to other patient portal services (Weingart et al. 2006), our study site allows patients to take a more active role in their own health by providing secure and convenient online access to their electronic health information (Padman et al. 2010). Patients who are 18 years or older are eligible to sign up for the service and are provided information about the portal services in their primary care providers' offices. Once signed up, users can review clinical information, such as health history, past visits, test results, and medications as well as business services, such as appointment scheduling, pre-registration, prescription renewal, payment, and reminders for future appointment/health maintenance. If there is no user activity for a given amount of time, users are automatically signed out. The system allows members to manage their family members' health records by providing 'proxy' feature by which members can make an appointment, view health records, and communicate with providers regarding test results, etc. on behalf of patients. The portal utilizes the underlying technical infrastructure and solutions offered by Epic Corporation via the EpicCare Electronic Medical Record (EMR) and MyChart patient portal (http://www.epic.com/software-phr.php, accessed November 2013). It has been in use for more than 6 years, has more than 150,000 current enrollees, and

continues to grow along the two dimensions of users (patients and providers) and services.

A new online service, eVisit, was deployed within the portal in 2008 as a pilot, providing patients with an online consultation through a series of secure message exchanges with a physician (Padman et al. 2010). The pilot service was deployed at a single practice where hundred percent of physician participation was achieved. Instead of free text messaging used in many online medical messaging services, this service uses structured templates for each eVisit condition, which creates formatted documentation for the consultation. Structured/standardized template means that patients' symptom reporting page is constructed as a sequence of questions, which prompts patients to not miss important and relevant information to be delivered to physicians who use them in assessing patient's condition. Thus, the template captures best practices and produces clearer evidence for communication and decision making. Collecting critical information without unnecessary details of symptom reporting that characterize free text entry, the application is easy to use for both patients and physicians. It is integrated with practice workflow, and thus provides access to information that is stored in the Electronic Medical Record (EMR). A successfully completed eVisit is finally documented in the EMR as well.

More recently, eVisit service has been deployed in several additional practices and reimbursed by a few health plans. The physicians and staff at the offices encourage patients to sign up for the patient portal and to use eVisits for the treatment of the specified episodic illnesses, which currently consists of 20 conditions including one exceptional category 'Other' that allows patients to request eVisit for unspecified conditions. The use of the service is purely voluntary for patients and providers.

When a patient clicks to initiate an eVisit, the system first checks whether the patient needs an eVisit or a simple, free message is sufficient for follow-up questions from recent visits, referrals, and questions for clinical staff other than physicians. If the patient proceeds with eVisit, cost information is provided, followed by an emergency disclaimer. After accepting the disclaimer, the patient is guided to the next screen where he or she chooses a reason for eVisit and specifies the pharmacy of choice, in case it is needed. Next, there are multiple steps to verify the patient's information including address, health issues, medications, allergies, etc. When all verification is completed by simple click through, patients need to answer a template-driven sequence of questions specifically designed for the patient's choice of symptom, until the final submission. Patients can cancel and leave the eVisit at any point during the procedure.

The eVisit process starts when a patient, experiencing an acute, nonurgent health condition, chooses to complete and submit an eVisit via the patient portal after sign in. Based on the symptom a patient chooses, several multiple choice questions follow, including a few with free text entry. The completed message goes to a support staff pool that forwards the eVisit to a participating physician; if primary care provider is unavailable, an assigned on-call physician takes the responsibility to act on the submission. Physician assignment is autonomously decided by the practice. If the submission occurs outside of office hours, call center staff notifies an

assigned physician. Once the physician reviews and responds with a diagnosis and treatment plan, the patient is alerted via their personal email to login for checking the response. The patient may choose to have further message exchanges before the physician closes the encounter, and thus one eVisit can have multiple threads as email communications. Once the encounter is closed, the physician removes the message from personal inbox and the support staff is notified, and then a claim is submitted for reimbursement. The details of the pilot system's process flow are found in the literature. Pilot studies reveal the basic demographic characteristics of the users being mostly working age between 30 and 50, primarily female; both as eVisit submitters (Adamson and Bachman 2010) and as patients (Jung et al. 2011). Providers also face unique challenges in learning to use the technology and improve productivity (Jung et al. 2013).

5 Future of Medical Service in Primary Care Setting

5.1 Multiple Models of Online Care Delivery

The healthcare industry is experiencing multifaceted shifts, from hospital-centered to patient-centered care, and from traditional face-to-face care to e-health, mobile health (m-health), and ubiquitous health (u-health) environments that collect patient information in real time. Although both technology adoption and organizational change management are slower in health care than other industries (Christensen 2009; England et al. 2000; Jung et al. 2013), a clear direction where digital innovations in healthcare sector may lead us to is a collaborative self-management format that is assisted by automated care system and efficient service delivery channels. In this model, patients take a proactive role in healthcare management rather than passively following physicians' decisions, and this active involvement coupled with accessible information will propel preventive care, which in turn may improve population health.

Even as online medical consultations and patient portals are being widely adopted, other care delivery channels, particularly mobile and ubiquitous channels, are being developed. This highlights the importance and urgency of moving forward to advanced, integrated online healthcare systems that provide well-defined, structured, and connected healthcare services including online medical consultation, advanced portal services such as prescription renewals, appointment scheduling, automated reminders for vaccinations and preventive tests, laboratory test results review, test image and medical history retrieval, relevant information search, and free message exchange for simple updates and advice. The system must be linked to patients' EMR to provide continuity of care and equipped with capacity to expand for diverse patient population as well as managing broader spectrum of health conditions, and possibility to link with mobile queries.

These new technologies and channels of care delivery require new problems to be solved and novel approaches to analysis and research. Prior studies have shown that online medical support and consultations targeting chronic conditions empower patients to become actively involved in their health management and participate in decision-making process (Cummings et al. 2009). Despite the predicted benefits, there is no large-scale systematic approach to build internet portals targeting the population with chronic illness, particularly providing predictive analytics for disease management and tracking disease progression (Harle et al. 2012). Building such environments would require binding primary care providers and specialists together into the system in which triage becomes unnecessary, and continuity of care is assured. Under health reform initiatives in the US, patient-centered medical home, and accountable care organizations, among others, are being developed and evaluated with significant information technology support to deliver the new requirements.

Second, little is known about users of such services such as portals and eVisits, which opens up new opportunities for future studies. Pilot studies in a few health organizations have identified some demographic characteristics that distinguish these users from the general patient population, but the driving factors for more frequent usage and adoption are still under scrutiny. In addition, it is important to understand to what extent eVisits, for example, will increase clinical staff and physicians' capacity or disrupt daily work processes. Their impact on health outcomes, efficacy and efficiency of the service, and patient/physician satisfaction level in various settings are yet to be investigated.

Third, there is a severe, imbalance in the supply and demand of online healthcare services. Surveys reveal a large gap in willingness to adopt between patients and physicians. As many as 90 % of patients surveyed would like to have e-mail communication with their healthcare providers (Taylor and Leitman 2002) and 75 % of patients with internet access were willing to pay for online services (Adler 2006), whereas 82 % of physicians prefer face-to-face interactions (Liederman and Morefield 2003; Padman et al. 2010). Patients with chronic conditions also indicate interest in utilizing state of the art health services; a survey of diabetes patients found that more than 70 % prefer using ubiquitous healthcare service despite their concerns about technological complexity (Lim et al. 2011). This huge gap between patients' eagerness to utilize online and advanced health systems and physicians concerns about providing the service may create larger discrepancy in accessibility to comprehensive health care. And although healthcare organizations and providers are investing to establish systems and environment to provide such online services, the new service market may not realize return on investment if patients' acceptance level is low. To resolve the issue, we must understand the barriers to adoption and find ways to address them.

5.2 Barriers and Solutions

From the providers' perspective, the barriers to the adoption of the service are lack of reimbursement, perceptions of overload by online patients' requests, liability concerns, and patient confidentiality (Sands 2004; Liederman and Morefield 2003; Katz and Moyer 2004; Whitten et al. 2007; Padman et al. 2010). However, earlier studies have found no evidence of inundation of workload on physicians (Leong et al. 2005; Liederman and Morefield 2003; White et al. 2004; Kittler et al. 2004). Confidential web portal development has addressed privacy concerns, and portals linked with EMR have addressed workflow concerns (Adler 2006). Despite these advances, lack of reimbursement has remained as the most significant concern among physicians as 80 % of surveyed physicians have responded that they would be willing to provide online communication with patients if reimbursed (Kittler et al. 2004). More recently, reimbursement for online services is being increasingly accepted by payers, and thus it is clear that the concerns regarding online messaging and consultations are gradually being resolved, and we can anticipate physicians' increasing involvement in online healthcare services in the near future.

The key barriers for patients to adopt online medical services can be summarized into a few important issues—accessibility to internet, concerns about content privacy, trust, and perceptions about care quality. Healthcare organizations with messaging capability in their online services provide secure messaging in which the contents are securely protected. Alongside, the population with internet access has grown rapidly and is still on the increase. Therefore, eliminating the observable barriers to patients has become a feasible task. Trust is a common barrier to the adoption of many other online services. Online commerce has created rating/evaluation systems in which consumers can share each other's experiences. Similarly, online evaluations of healthcare providers and organizations by individual patients as well as availability of summary evaluations by public reporting systems are also on the rise (http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalCompare.html). However, the level of trust is relatively higher for using online medical services when it is provided by patients' own practice and providers. Finally, there is a body of literature concerning individual adoption—innovation diffusion (Rogers 2003), theory of reasoned action (Fishbein and Ajzen 1975), technology adoption model (Davis 1989) and their many extensions that explain the level of individual adoption being affected by potential consumers' perceptions, such as perceived usefulness, ease of use, relative advantage, compatibility, and complexity. While these perceptions can be verified, updated, and dispelled, when necessary, using actual usage data, designing a patient portal structure and online medical service site to meet requirements for both consumers and providers is an important but challenging task.

The lesson from the story of Dvorak keyboard is that technological innovation does not diffuse by itself. Dvorak keyboard design that achieves equal usage of both hands by allowing hand-alternating is considered more efficient, but it never

diffused into the public arena and we continue to use the QWERTY keyboard for which the layout was designed more than 100 years ago (Rogers 2003). This tells us an important lesson that innovation alone may not survive or be sufficient to influence and reshape healthcare services in a way that improves the productivity and quality. We need to carefully devise a plan to help it diffuse as well.

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Technology-Driven Service Innovation in the Banking Industry

Christopher Bajada and Rowan Trayler

Abstract Business-to-business and consumer-to-business transactions in the banking industry have witnessed a dramatic shift in the method of payment over the last two decades. This rapid growth had been initially fuelled by the early adoption of electronic payments such as credit and debit cards but now with the advent of mobile and internet technologies, non-cash transactions have grown even more rapidly. These technological developments have spurred a range of service innovations within the banking industry that has not only improved consumer convenience and reduced staffing and bank operating costs, but also increased the need for greater vigilance around security and fraud detection. This rapidly changing technology is also facilitating the entry of new payment providers in the financial sector with innovative products to meet the changing needs of consumers and businesses. The consequence is a rapidly changing banking industry.

Keywords Banking · Financial system · Financial deregulation · Service innovation · Technology · Innovation · Internet banking · Mobile banking

1 Introduction

This chapter examines how innovations in technology, the advent of the personal computer and deregulation of the financial sector in the early 1980s, collectively fuelled spectacular changes to retail payments in Australia. Prior to the introduction of EFTPOS, consumers and businesses transacted primarily through the use of cash or cheque. Banking services were largely offered at the bank branch and access to cash was either over the counter or through the growing number of ATMs being made available. The introduction of telephone banking facilitated, to a certain

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degree, the convenience of making payments by telephone. Throughout the 1980s and early 1990s, banks and non-bank financial institutions (NBIFs) competed primarily through the services they provided via their bank branch network. It was not until the advent of the internet and mobile (smart) phone technology that a second wave of sweeping changes to retail payment and settlements of financial transactions took place. Innovations in the financial sector brought about by advances in technology have changed service delivery by financial institutions. Given that financial institutions offer relatively homogenous financial products, the service delivery model through which these products are offered has become the major driver of competition in the sector. The service delivery domain in this context can be considered as comprising of two elements: (i) innovations in service products and (ii) innovations in service processes. Each of these have had a profound effect on the productivity of the banks (and other non-financial institutions) by reducing staffing costs, facilitating improvement and innovations in financial products and an overall reduction in operating costs leading to increases in profits.

The Australian financial system witnessed far-reaching financial reforms during the early to mid-1980s, following the recommendations of the inquiry into the financial system (Campbell review) to significantly deregulate the financial sector and allow foreign banks to enter so as to bolster competition. Sixteen foreign banks were invited to participate in the newly deregulated financial sector, but even today much of the banking business in Australia remains concentrated in the hands of the big four banks (who collectively hold approximately 60 % market share). Despite this concentrated ownership, the increasing competition from non-financial institutions and the big advances in technology and communications has intensified further competition in the industry. This rapidly changing technology is also facilitating the entry of new payment providers to the financial sector such as PayPal and Google Wallet. Each of these providers enables payments and online money transfers, a service which once belonged in the domain of financial institutions. The need to remain competitive in such an environment adds pressure to further innovate and to find ways for improving operational efficiencies and customer convenience.

These innovations have resulted in either the development of products that have directly aided in the improvement of financial service delivery (e.g. ATM's, EFTPOS, credit and debit cards) or innovations in service processes (e.g. internet and mobile banking) which have revolutionised the way a consumer accesses services. However, the physical 'bricks and mortar' presence is fundamental to consumer participation in the services offered by a financial institution. The supposition that the internet would replace the bank branch has failed to eventuate, and the very institutions (internet only banks) without 'bricks and mortar' have failed to grow their small market share or even remain in business. The intensity of competition and the improvements in efficiency that technological changes have brought to the service delivery in the financial sector has strengthened the banking system in Australia. Two notable and recent external shocks, the Asian financial crisis and the Global Financial Crisis, have had little, if any, long-term impact on the stability and performance of the banks and non-banks alike. As a result the four major banks enjoy enviable credit rankings and performance statistics.

With the introduction of EFTPOS during the early 1980s, retail payments had begun the shift away from being solely undertaken in cash and cheque to electronic. This alternative means of payment provided customers the convenience of having real-time access to their funds without the need to go to a bank or ATM to withdraw cash. In more recent times, access to cash at the point of sale has changed the need for bank branches and ATMs, although the presence of a bank branch and ATMs are still favoured by customers for other service deliverables. Despite the humble origins of this form of payment system, electronic settlement of payments has become highly sophisticated, global, and a major driver of service innovation in banking and the financial sector more broadly. The advent of the internet and mobile (smart) phone technology has led to further changes in the way business is transacted and has facilitated the capacity to purchase locally and globally. Every party to the retail transaction has been able to benefit as a result of these innovations: customers—with convenience both at home and at retail outlets; retailers—receiving payments direct to their accounts, significantly improving cash flow; and banks—reducing costs and opportunities to innovate in the service delivery of financial products. These and other developments have transformed the banking sector to make it one of the leading innovators in the economy.

With the introduction of online and other electronic forms of banking, the risk of fraud and security breaches have greatly increased, as has the costs associated with detection and prevention measures. Needless to say, breaches of security and fraudulent activities were also evident prior to electronic banking, but the extent and ease by which this took place was limited in comparison. Despite the costs associated with heightened security measures, the advantages arising from the innovations we have witnessed dwarf these costs. Looking forward, the financial sector will continue to see further innovations to its current service delivery models and processes. The immergence of digital currency (e.g. Bitcoin), mobile payment applications and tools powered by modelling using data analytics will bring about many more sophisticated changes to payment settlements and banking in Australia and globally.

The remainder of this chapter is organised as follows. In Sect. 2 we provide an overview of the banking industry in Australia and in Sect. 3, a historical overview of financial deregulation and the technological change that ensued since that time. In Sect. 4 we examine how innovations and technology have shaped the services provided by the banking sector. We specifically look at service innovations in the financial sector as comprising of innovations in service products and innovations in service processes. In Sect. 5 we review some of the various perspectives on the future of banking, followed by conclusions in Sect. 6.

2 Overview of the Banking Industry in Australia

The financial sector in Australia is highly concentrated with more than half the market share in the hands of the big four banks (Commonwealth, Westpac, ANZ and the NAB). Recent mergers with smaller financial institutions has contributed

Table 1 Market share of Australia's big four banks—2013

Financial institution	Market share (%)
Westpac (*St George, RAMS Home loans, BT Financial Group*)	16.3
Commonwealth Bank (Bankwest, Aussie Home loans)	16.2
National Australia Bank (NAB) (MCC Holdings, U Bank)	13.8
Australia and New Zealand Banking Group Limited (ANZ)	14.4
Other	39.3

Source IBIS World (2014). The market definition here covers firms providing financial services (excluding insurance) in Australia. The most significant industries are building societies, credit unions, domestic banks and foreign banks

further to this concentration of ownership, with the big four banks now in control of 60.7 % of market share (IBIS World 2014). The Australian government's 'four pillars' policy limits any further concentration of the big four banks by preventing them from merging or acquiring one another. Table 1 highlights the concentrated ownership in the Australian financial sector. The institutions in parenthesis are those that have been acquired by each of the banks (Westpac, Commonwealth and the NAB). Each of the big four banks individually control between 13.8 and 16.3 % of market share. With the exception of these four, the market share of each of the remaining financial institutions (building societies, credit unions and foreign banks) is insignificant by comparison.

The financial market is divided into two main components, the consumer or the retail segment (comprising approximately 61 % of the market), and the corporate or commercial banking and advisory services segment (comprising approximately 39 % of the market) (IBIS World 2014). There is a significant competition amongst financial institutions in the retail market given that the deposit market constitutes a major source of bank (and non-bank) funding. The major lending activities are in residential mortgages, credit cards and margin loans. The consumer market is further divided into retail, private wealthy individuals, retirement and self-managed superannuation funds. The corporate market on the other hand includes lending to small and medium size enterprises (SME), corporates, institutions and governments.

The financial services sector contributes approximately 11 % to Australian national output (ABA 2013). The World Economic Forum's Financial Development Report (FDR 2012) provides a rank for 62 countries according to their financial sector's performance, competition and contribution to economic growth. FDR (2012) ranks Australia's financial system as fifth on the basis of breadth, depth and efficiency when compared to the other 61 countries on its list. Australia's financial sector's strong performance is due to a number of factors including the sector's willingness to embrace emerging technologies. Efficiency in the financial sector is measured by low transactions costs and fine margins between borrowing and lending rates. The Australian financial market is efficient on both these criteria. This strong performance enabled the financial sector to weather the major fallouts of the Global Financial Crisis which occurred in 2007–2008. The big four banks

also enjoy enviable credit ratings of AAA or AA, where many of the world's largest banks do not enjoy such high appraisals.

Since the 1950s, the banking industry in Australia has been highly regulated. It was not until the Campbell enquiry in 1981 that significant deregulatory changes to the financial system began to take shape. By 1997 the Wallis enquiry recommended further changes to the operations in the financial system that included (but not limited to) committing responsibility for: (i) monetary policy, supervision of the payments system and the stability of the financial sector to the Reserve Bank of Australia (RBA); (ii) bank supervision and regulation of financial institutions including banks, insurance and superannuation funds to the Australian Prudential Regulatory Authority (APRA); and (iii) consumer protection, market conduct, investor protection and overall financial market integrity to the Australian Corporations and Financial Services Commission (later to become the Australian Securities Investments Commission—ASIC). Both APRA and the RBA have also adapted the recommendations on bank supervision by the Bank for International Settlements (BIS) and the Basel Committee on Banking Supervision.

There are other regulations and government agencies that oversee aspects of operations and conduct within the financial sector. One such agency is the Australian Competition and Consumer Commission (ACCC), which is charged with the responsibility of ensuring effective market competition and the welfare of consumers. Another agency is the Australian Transaction Reports and Analysis Centre (AUSTRAC) which has responsibility as Australia's anti-money laundering regulator for recording and communicating with relevant government departments on large cash transactions. There are also other regulations governing operations within the financial sector such as the Banking Act (1949) and the 'four pillars' policy, which as we have noted earlier, limits concentration of ownership of the big four Australian banks by precluding mergers or acquisitions.

During the 1970s banking activities began transitioning from paper to computer-based systems, but much of the integrated data communications necessary to match data efficiently was still significantly underdeveloped despite the introduction of computer networks and mainframe systems. By 1997 the Australian financial system had undergone significant structural and technological change. The Wallis report on the Australian financial system noted that innovations in the financial system that had been occurring particularly since the Campbell enquiry were driven by a variety of factors including changing customer needs, customer's adaptation to the use of new technologies and demographic and work pattern changes (Hanratty 1997). The advances in telecommunications and computing technology contributed significantly to reducing the 'cost barriers to transmission', as well as 'breaking down physical constraints' and the 'storage and use of information' (Hanratty 1997).

With the threat of foreign competition as a result of the deregulation of the financial sector, the big four banks further consolidated their positions to insulate themselves against such threats (Wright 1999). However with the emergence of foreign banks, competition intensified and the financial system as a whole became more competitive (see, Abbott et al. 2013). The advances in technology, notably

with the growth in Automatic Teller Machines (ATMs) and Electronic Funds Transfer—Point of Sale (EFTPOS[1]) motivated confidence in electronic banking, such that it later contributed to swift uptake in new technologies as they emerged (see Sect. 3). Over this period the level of customer service significantly improved, highlighted not only by a greater physical presence in the form of bank branches but also more predominately through other service provisions that were only possible by improvements in technology. The banks (and other financial institutions) have embraced these changes to improve other areas of their business including system processes and their day-to-day banking operations. The level of innovation in services is one of the standout features in the development of the financial system in most recent years, characterised by innovation in service products (e.g. the ATM and EFTPOS terminals) and innovation in service processes (e.g. internet banking).

The adaptation of new technology and improvements in efficiency have contributed significantly to rising productivity and reductions in operating costs, especially for the big four banks. These big four banks are now listed in the top ten companies by market capitalisation on the Australian Securities Exchange (ASX 2014). They are also strong in world rankings making the Forbes top 100 list of world banks (Forbes 2014) and they are in the top ten companies in S&P Asia Pacific BMI index (S&P 2014).

Abbott et al. (2013) found that since the 1980s productivity within the banking sector in Australia has been improving year on year. In the most recent years this performance is predominantly explained by the reduction in operating costs brought about by advances in new technologies, which not only has improved service delivery but also reduced overall operating costs. Next, we turn to the technological change during and post deregulation of the financial system.

3 Financial Deregulation and Technological Change

Since, the early 1980s the Australian banking industry underwent significant structural change as part of a major reform initiative which commenced with the reports of the Campbell and Martin Committees. The process of financial deregulation initiated by the Hawke-Keating Labor government saw a significant number of changes including the removal of interest rate ceiling controls (on both loans and deposits), the liquidity requirement of holding liquid government securities (LGS) by banks and the statutory deposit ratio (SDR), which required banks to retain a specified percentage of their deposits with the central bank. In addition, this period was marked with restrictions on entry into the banking sector, which meant foreign exchange dealing licences were limited only to banks.

[1] EFTPOS in Australia is owned by the major financial initiations that are members of the Australian payments system.

During this time foreign banks had only a presence in Australia through finance companies or merchant banks. It was virtually impossible at the time for foreign banks to set up operations in Australia. Much of the regulation in the financial industry rested on the banking sector and incentives to create non-bank subsidiaries to operate in the less heavily regulated space were being taken up by banks (Daugaard and Valentine 1993). The growth in NBFIs grew rapidly over this period and although they could charge higher interest rates, they were limited to what they could offer to their customers in terms of financial products. During this time banks were either savings or trading banks. Savings banks, which were previously owned by State governments, were limited by the Commonwealth government on interest rates they could pay depositors, and limited their leading activities in providing mortgage loans. Trading banks were essentially commercial banks which did not trade directly with the public (ABA 2011).

Financial deregulation has been posited as the impetus for delivering significant improvement in efficiency and productivity across the finance industry. It has in many cases resulted in intensifying the level of competition (see, Neven and Roller 1999; Canhoto 2004; Cetorelli and Angelini 2003; Berger and Mester 2003; Ho 2010). Improvements in competition not only result in greater contribution to economic growth (see Claessens 2009; King and Levine 1993; Levine 1997), but also in significant improvements in the level of consumer welfare, primarily through better service provisions (Ho 2010) and reductions in costs and financial risks (Frame and White 2004). This, however, contrasts with Schumpeter's (1942) view that increases in competition leading to reductions in economic rent will limit the extent of innovation. The contrary view is that as firms attempt to respond to the level of competition, they innovate as a result (see, Aghion et al. 2001). Bos et al. (2013), building on the work of Aghion and Griffith (2005) and Aghion et al. (2005), finds evidence of an inverted-U relationship between innovation and competition in the financial sector, suggesting there is validity in both of these conclusions.

The literature also provides evidence to suggest that a relationship exists between size and adoption of innovation, that is larger banks more readily adopt innovative practices and technologies than smaller banks (see Wheelock and Wilson 1999; Berger and Mester 1997, 2003; Humphrey 1993; Hunter and Timme 1991; Elyasiani and Mehdian 1990). Hauswald and Marquez (2003) and Wilhelm (2001) suggest that innovation can change the nature of competition in the banking sector. However, the literature is scant on the relationship between financial innovation and the level of competition (Bos et al. 2013). Bhattacharyya and Nanda (2000) suggest that the larger investment banks are likely to be early adopters of innovation and development of financial services because they stand to profit from doing so given their larger market share, while the smaller players are less likely to take up similar innovations because of the associated risks (of adoption) involved. On the other hand, if such innovation leads to greater information dissemination, it is likely to increase the level of competition in the sector (Bos et al. 2013).

Chava et al. (2013) find that deregulation of the financial sector has led to increases in competition and firm-level innovation, although the literature on this is mixed (see Berger 2010; Petersen and Rajan 1994, 1995; Grossman and Hart 1986;

Hart and Moore 1990; Hart 1995). In Australia, financial deregulation of the 1980s freed up banks to innovate and take on innovative practices to improve their service deliverables, productivity outcomes and financial performance. With the introduction of the bankcard in 1974, the ATM in 1977 and EFTPOS in 1984, the focus on improved payment services and intermediation had begun, and set the benchmark for future technological innovations in Australia. These and other changes that have taken place over the last three decades in the Australian financial sector have seen substantial improvements in the efficiency and delivery of many financial products. This has been accelerated by advances in technology, combined with a level of enthusiasm by consumers and business for switching between the traditional forms of banking to an efficient and real-time option that only technology is able to offer.

In Table 2 we present a timeline of the introduction of key technology innovations in the banking sector in Australia, and reference to specific technologies introduced by some of the big four banks. The events outlined in this table highlight the combination of innovations of service products, innovations in service processes, and innovation in service systems.

Table 2 Timeline of selected technological innovations introduced by banks

Date	Event
Dec 1969	Commonwealth Bank introduces Black Light Signature system (to read invisible signatures)
1974	Bankcard introduced (first joint Australian bank's credit card)
1977	First ATM in Australia
1980	First money market trust
1981	Commonwealth Bank introduces Keycard (a statement savings account) Commonwealth Bank launches Autobank (using Keycard to access ATM)
1984	First EFTPOS introduced
1985	Commonwealth Bank completes its internal online computer network
1986	EFTPOS code of conduct introduced
1993	Maestro and Cirrus services introduced allowing worldwide retail banking transactions
1995	Stored value cards trialled in Australia
25 July 1995	CommSec (telephone) stockbroking launched by Commonwealth Bank
29 Sept 1995	Commonwealth Bank internet website launched
1996	ANZ website launched
1997	ANZ phone and internet banking launched
28 Feb 1997	Commonwealth Netbank website launched
2008	ANZ launches mobile phone banking; *ANZ Transactive* launched for corporate clients (web based cash management system)
2010	ANZ go money mobile banking app launched
2012	NAB multi-currency card launched
2014	Commonwealth Bank trials smartphone ATM withdrawals

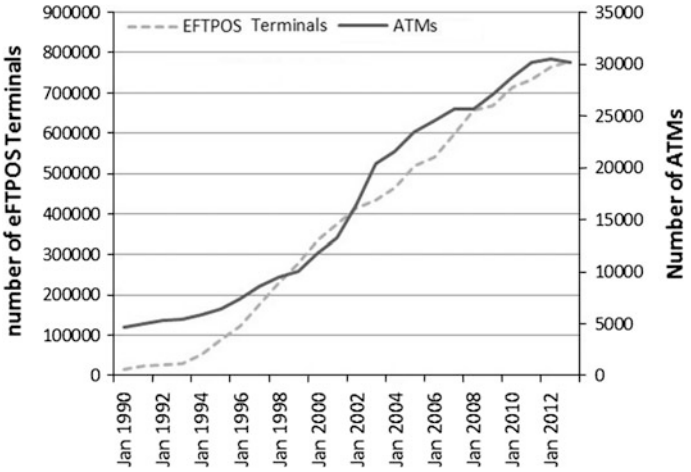

Fig. 1 Number of ATMs and EFTPOS terminals. *Source* RBA Bulletin: (C8) points of access to the Australian payments system

In Fig. 1 we plot the number of ATMs and EFTPOS terminals since 1990. Over this 23 year period the number of ATMs has grown sixfold from approximately 4,500 in 1990 to approximately 30,000 by 2013. EFTPOS terminals, on the other hand, grew much faster, from approximately 15,500 terminals in 1990 to 780,000 by 2013. Despite the growth in ATM's, both the volume and value of cash withdrawals from ATMs since 2005 has been declining.

In Fig. 2 we plot the number of cash transactions from ATMs. After a gradual upswing during the mid-1990s, the use of ATMs increased until 2009 when both the volume and value (not shown here) of cash withdrawals from ATMs begun to decline.

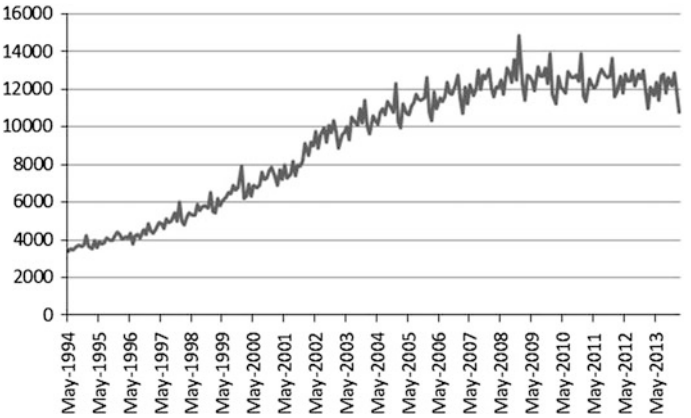

Fig. 2 Number and value of ATM cash withdrawals. *Source* RBA Bulletin: (C4) ATM cash withdrawals

This decline in the use of ATMs coincided with the growth of alternative payment methods and means for withdrawing cash at points of sale and other non-bank branches such as post offices. In Fig. 3 we compare the level of cash withdrawal from ATMs, EFTPOS and over the counter between 2007 and 2010.

Over this three-year period (2007–2010) the number of cash withdrawals from ATMs and over the counter declined, while cash withdrawals from EFTPOS increased. Despite the alternative avenues for withdrawing cash, the steady uptake of electronic means of payment has meant a declining use of cash at the point of sale. The combination of these factors explains the decline in the demand for cash at ATMs and other points of withdrawal. Interestingly, the value of cash withdrawals through EFTPOS increased marginally, while the value of withdrawals over the counter grew substantially. This may have been the result of direct charging of withdrawals at ATMs, which was introduced in 2009, making fees charged transparent, and leading to a change in consumer behaviour (RBA 2011).

The penetration of electronic means of payment via the use of EFTPOS in the retail sector has helped accelerate the use of alternative electronic and online service provisions by financial institutions. Since, the introduction of ATMs and EFTPOS, the payments landscape in Australia has changed dramatically. The introduction of other payments methods such as BPAY, telephone banking, internet banking,

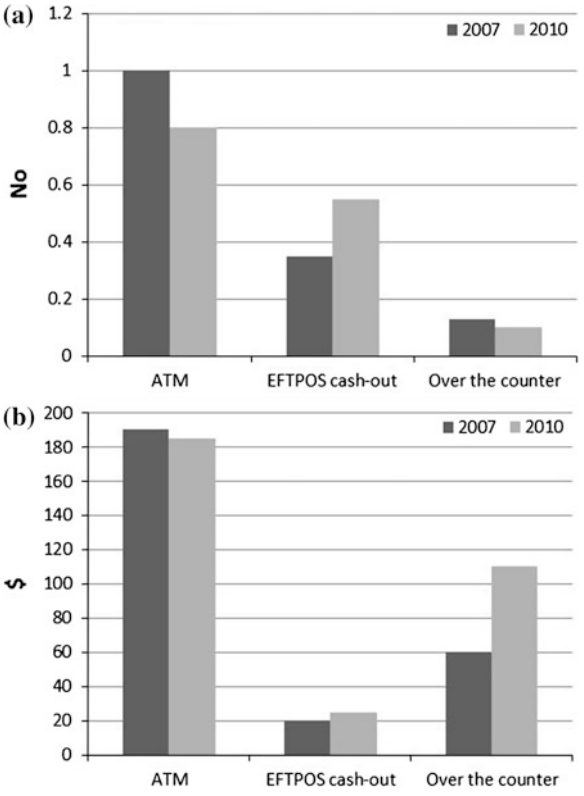

Fig. 3 Average number and value of cash withdrawals (per week by withdrawal method). **a** Average number of cash withdrawals. **b** Average value of cash withdrawals. *Source data* RBA (2011)

Master and Visa debit and credit cards, American Express, Diners, Paymate, Cabcharge, money orders, store cards, pre-paid cards and petrol cards have provided consumers and business several options for making and receiving payments. In Fig. 4 we plot the use of cash and other payment methods (as a group) for a range of different sized transactions. From Fig. 4 it is evident that cash remains the dominant method of payment for small value transactions, while cards and other non-cash methods of payment are more commonly used for mid-sized and large value transactions.

RBA (2011) found that the choice between the type of payment instrument used for mid-size and large value transactions is dependent on consumer preferences. Consumer preferences that are more inclined towards the use of one's own funds will typically attract payments methods such as debit cards, while consumer preferences oriented towards rewards and points are more likely to draw upon the use of credit cards that reward their use through such schemes. Those consumers who value their privacy will err towards the use of cash, even for those transactions that may be considered large. The use of cash is also a function of the consumer's age. RBA (2011) found that those aged 18–29 years on average hold $54 in their wallet, while those aged 60+ years hold $134 on average. Individuals that fall between the smallest and largest age brackets hold a cash balance in their wallets that increases with age. This may suggest that as the younger generation get older, overall dependence on cash will significantly decline, particularly if the subsequent generation follows this trend. This is supported with data on the percentage of online payments by each of these age groups (see Fig. 5). Those aged between 18 and 39 make 10 % of their total payment online, while only approximately 3 % of all payments made by those aged 60+ is done online.

The bill payment market has also changed substantially with the direct debit payments, BPAY and Internet and telephone banking overtaking cash as the means of payment (RBA 2011). The use of cheques on the other hand has declined significantly as a means of payment, as evident in Fig. 6.

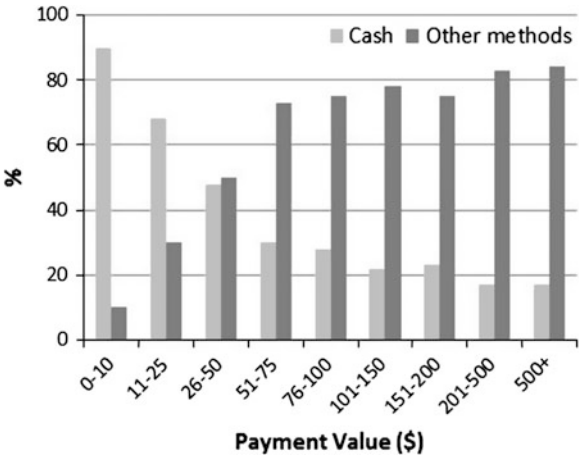

Fig. 4 Use of cash and other payments (percent of number of payments). *Source* RBA (2011)

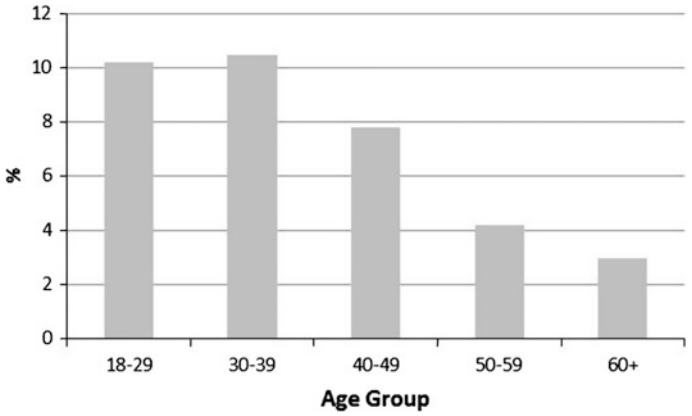

Fig. 5 Online payments by age group (percent of number of payments *asterisk*). *Source* RBA (2011). *Asterisk* includes all payments via the internet channel (for example, card payments, internet banking, Paymate, PayPal and POLi)

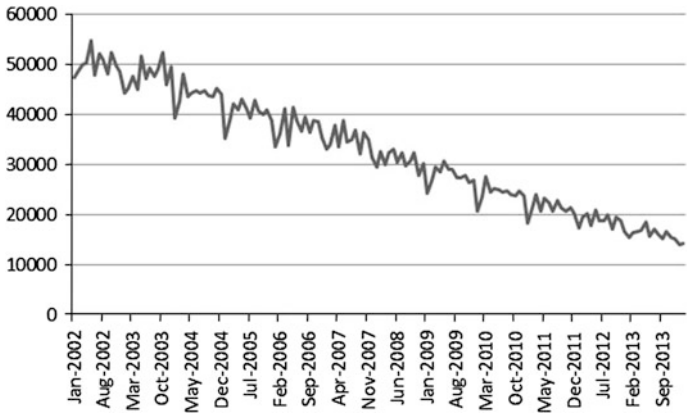

Fig. 6 Total number of cheques issued. *Source* RBA Bulletin: (C6) cheques and direct entry payments

4 Service Innovation within the Banking Industry

The role of banks as financial intermediaries has not changed despite the onset and adoption of new technologies that have swept the financial sector over the last two decades. Merton and Bodie (2005) have suggested that innovation in the financial sector has been a central driving force in the sector's growth and strong performance, and that this innovation has led to significant improvements in the efficiencies of financial institutions, particularly the large banks. Innovation has not only led to developments of new service products, but also new frameworks and

processes for managing risk. The literature on financial services marketing suggest that despite banks essentially offering the same products, improvements in service innovation has raised the level of customer loyalty and adaptability to change (see, Adamson et al. 2003; Bejou and Ennew 1997; Camarero 2007; Teixeira and Ziskin 1992).

The use of new technologies have spurred a range of service innovations that have not only improved customer convenience by providing more real-time service, but have also led to significant improvements in bank operating procedures that have led to reductions in staffing and better records and risk management processes. This, however, hasn't come about without additional costs, particularly around the need for greater security and the identification and detection of fraudulent activities. It is unquestionable that these advances in technology and their application within the financial sector have allowed banks to grow their revenue base and reduce their costs, leading to significant increases in their overall profit margins. The focus of this section is to examine how technology has impacted on service innovation in the banking industry over the last two decades as a prelude to the future areas of banking innovation discussed in Sect. 5.

4.1 Service Innovation

Innovation in service delivery is at the core of providing a better experience for customers and a draw card to attract new business. It is also essential for reducing costs and streamlining processes. Service innovation can include the introduction of a new product, but it could also include improving the service process for the customer or firm (Ettlie and Reza 1992; Utterback 1995). Back office innovations may go unnoticed by consumers, but efficiencies in these processes are an important cost saving for banks. Many of these innovations simply involve changing an existing process, while others may involve an entirely new approach to service delivery of a new or existing financial product. van Ark et al. (2003) defines service innovation as 'a new or considerably changed service concept, client interaction channel, service delivery system or technological concept that individually, but most likely in combination, leads to one or more (re)new(ed) service functions that are new to the firm, change the services/goods offered on the market and require structurally new technological, human or organisational capabilities of the service organization.'

In the services domain there are products and processes supporting service delivery. With this interpretation in mind and taking into account the earlier definition (van Ark et al. 2003) and the work of Miles (1993), we consider service innovation in the financial sector as comprising of two parts: (i) innovation in service products and (ii) innovation in service processes. We define innovation in service products as *goods* (sometimes tangible) provided by the financial sector that facilitates improved service delivery of an existing or new financial product. Examples of service products include *goods* such as credit cards, sweep accounts,

ATMs and EFTPOS terminals. Innovation in service products have allowed banks and their customers to benefit from these innovations through convenience and cost saving measures. Innovation in service process is an improvement in the process or mode of delivery (e.g. online) by which a financial product is delivered or accessed. Examples of innovations in service processes include telephone and internet banking facilities. Innovation in service processes have ensured banks achieve cost reductions and streamline processing time. The major non-interest cost in banking is staffing and bank office processes, for example, accepting cash (deposits) from business firms and retail customers. If a process can be streamlined or automated then there can be large potential cost savings for a bank or other deposit taking institution. A by-product of this is a reduction in errors and improvements in service delivery.

4.2 Innovation in Service Products

Utterback (1995) suggests that firms that concentrate more on customer perception of their products tend to be leaders in product innovation. A list of some of the major service product innovations that have been introduced in the financial industry over the last 20 years include: ATMs, EFTPOS, debit cards, offset loan account, specialty cards such as store cards, pre-paid cards, loyalty reward cards and foreign exchange stored value cards.

4.2.1 Case Study: EFTPOS and Smart Phone Adaptation

Cash flow is all important for the running and survival of a business. EFTPOS has allowed businesses to be directly credited for the payment of goods and services purchased by consumers without handling of cash and depositing of cheques. The consumer in turn benefits by not having to plan their cash holdings well in advance. In fact, EFTPOS has also facilitated the opportunity for consumers to determine their cash holdings while shopping, through the convenience of withdrawing cash at the point of sale. Naturally many opportunities arise for both businesses and consumers to access their funds when their deposit account is effectively carried in their wallets. This convenience has witnessed the wide adoption of EFTPOS as a means of payment (see Fig. 1), and consequently the declining use of alternatives (cash, to some extent, and cheques—see Figs. 2 and 6). EFTPOS has also facilitated opportunities to introduce other products such as store cards, loyalty reward cards and similar products. The introduction and uptake of these store cards, loyalty cards and value gift cards have added another dimension to retail transaction payments in Australia.

In October 2013, EFTPOS announced (EFTPOS 2013) the development of a new payment platform that will transform its payment processing, resulting in faster and more efficient processing of payments. This will facilitate the development of contactless, online and mobile payments. The development was in part driven by

the real-time settlement required by the RBA's settlements system to be introduced in 2016, itself another innovation.

The convenience that EFTPOS has offered business and consumers over the years has spawned the imagination of third party providers in developing a plethora of new technologies and improvements in financial service delivery to aid further with saving time and money. New mobile payments technologies such as 'tap-to-pay' or 'tap and go' with the introduction of chipsets to replace magnetic readers, are an example of such innovations. With the advent of smart phone technology, new mobile payment apps have come on to the market. Westpac announced in April 2014 that it had launched a 'tap-to-pay' service for its customers using Samsung mobile phones using Near Field Payment (NFC) technology. NFC allows the user to transmit and receive information securely using their mobile phone to facilitate contactless payments of goods and services. Apple's iPhone 6 is also rumoured to have NFC payment technology on-board when released. CBA initiated a similar system late in 2013 for Google Android smartphone users and in March 2014 Cuscal, a 'transactional banking, liquidity and capital management products provider' for Australian credit unions and other financial institutions, released its trial of a Samsung mobile phone with NFC payment capability.

4.3 Innovation in Service Processes

A list of some of the major service products that have been introduced over the last 20 years include mobile banking, online banking, telephone banking, direct deposits of payroll, electronic data interchange and payments and text messaging alerts, among many others. These innovations have directly benefited the financial institution and the customer by improving the efficiencies of service delivery and reducing the associated costs of time and labour.

Many of these service process innovations (often coupled with innovation in product services) have given consumers accessibility to their financial account without having to enter a bank branch or contacting a bank officer. Despite the benefits to financial institutions from reducing costs associated with staffing and physical premises, innovation in retail payments have not seen the end of the physical presence of banks and other financial institutions. The security of knowing that a financial service provider is backed by 'bricks-and mortar' has ensured these institutions maintain a face-to-face presence in the community. The rise and fall of internet only banks provides the case study on the importance for having a physical presence in the market.

4.3.1 Case Study: Internet Banking

Internet banking is a relatively recent innovation in the financial services industry. In Australia internet banking emerged during the mid-1990s. The first internet

involved a static web page that provided information to customers, which was later followed by an interactive web page which facilitated an internet banking service as we know it today. For the financial services industry this was seen as a true innovation of the service process as it offered convenience and dramatically reduced the operating costs for financial institutions where the primary point of engagement with their customers was at the bank branch. The use of the internet was not without it issues during the early stages of its introduction. Akinci et al. (2004) reports that users of the internet during the early phase was limited to those who were proficient with the use of PCs and who opted in because they were attracted by the convenience that it offered. Bauer and Hein (2006) also found that older people were less likely to use internet banking, although there was a high take up rate among younger customers particularly those familiar with the use of computers. Security concerns and a lack of understanding of what was the internet also slowed its adoption in the early years (Sathye 1999). Aladwani (2001) found that consumers were also concerned with not only the security, but also privacy and the regulations supporting confidentiality and access to user financial and other personal information. Akinci et al. (2004) suggested that banks target the highly educated customer group. A similar study for Singapore found that the perceived risks (security and otherwise), inaccessibility for those without computers or sufficient knowledge of them, as well as a lack of familiarity with technology explained the low take up of internet banking (Gerrard et al. 2006). Similar conclusions were drawn for Finland (Pikkarainen et al. 2004).

A study by Lichtenstein and Williamson (2006) of Australian consumers found that convenience was the principal driver for the adoption of the internet. They noted that risk was still an issue, but most users thought the safeguards around the use of the internet as acceptable. A more recent paper by Saeidipour et al. (2013) drew similar conclusions on the adoption of internet banking. They found that the up-take of internet banking was driven by internet access and connectivity and user demographics (young males, high income earners and those well educated were more likely to be early adopters of internet banking). Saeidipour et al. (2013) also reported that 34 % of the adult population in Australia were internet banking users in 2005 and by 2013, 59 % of Australians aged 14 or older used internet banking, of which 24 % had accessed their bank via their mobile phone or tablet (Roy Morgan 2013). Boyte (2014) in a report on New Zealand internet usage found that 2.2 million New Zealand residents (almost 50 % of the population) were using internet banking and on average visited an internet banking site twice a week, spending 43 min online on average.

As the population ages and the younger more technology savvy group grow in proportion of the total population, the use of internet banking will play an even more important role in service delivery. The high use of mobile phones and the development of apps will see this area become an important place for both product and service innovation. Many of the issues that slowed the early adoption of internet banking will slowly fade as the use of technology will become the norm for many of the service deliveries in banking, and indeed in many other sectors in the

economy. ABS (2013) forecast that 80 % of Australian household by 2016 will access the internet using smart phone and tablets, paving the way for further significant changes in the way financial transactions are settled.

4.4 Security Issues with Innovation

Breaches of security and fraudulent activities have been a major concern for financial intuitions and governments alike, even before the introduction of electronic payments. The increasing use of cards and online banking and retail transactions has led to a corresponding increasing rate in fraud, which has led to substantial costs to the industry. In 2009 there was a 12.5 % increase in costs associated with fraud, resulting in a loss totalling €4.9Billion (WPR 2011). The majority of payment fraud occurs at the authorisation stage of the purchase, and given the multitude of ways consumers can purchase goods and services, counter measures to limit authorisation fraud require regular updating and constant monitoring. Organisations such as Experian and Chase Paymentech are entering the market to take on the risk associated with fraud and releaving the sellers (e.g. banks) of this potential liability. Innovations in chip technology, online encryption tools,and the use of personal identification numbers (PINs) have been the common approach to reducing authorisation fraud. With the advent of new innovations in technology (some of which are outlined below) more sophisticated methods of securing payment are likely to emerge (e.g. biometric authorisation—a digital file of a biological characteristic).

ATM and EFTPOS card skimming is becoming a major issue for card issuers and their customers. Skimming occurs when a device is concealed within an ATM's card reader, or a EFTPOS terminal is tampered with so that data from the magnetic strip is illegally captured. Once the information has been captured, a duplicate card is made giving the skimmer access to the linked accounts on the card. Crime syndicates using more sophisticated technology are able to develop innovative ways to engage in fraudulent activities. For example, skimming devices are becoming smaller and harder for card users to detect with some devices now able to fit over the ATMs key pad to record key strokes.

But fraudulent activities are not limited to skimming of ATM's and EFTPOS. There is a plethora of ways by which criminal syndicates breach security protocols and access personal details and funds from unsuspecting users. These include phishing and vishing (voice phishing), bank and credit card fraud, identity theft, spoofing, wire transfer fraud and Trojans/spyware software. More recently, there have been fraudulent online shopping and employment scams, each attempting to solicit individuals to surrender their personal and bank details. Many of these frauds depend on the naivety of the consumer who is unaware that they are being scammed. Financial institutions are taking steps to limit these fraudulent activities by increasing security and investing in advanced detection software to predict breaches of security so as to provide security alerts to their customers. In Chase Paymentech

(2011) (payment processing of JP Morgan Chase) implemented a fraud detection software application aimed at reducing card fraud. Chase stated that it "protects merchants and their customers from the increasing risks associated with global online fraud and data breaches at the point of sale". By using encryption and enhanced data capture at point of sale, the risk of theft through the transmission process is reduced. Similar processes have been used widely by many financial institutions to protect against unauthorised access to accounts. In other instances, databases are compromised and credit card and other personal information is stolen, requiring other forms of security processes.

5 The Future of Banking

The World Payments Reports published over the last nine years has attempted to gauge the future trends in the use of technology and innovations likely to occur in the financial services industry. In this section we review the last three years of reports (2011–2013) to consider: (i) future innovations in banking; (ii) how banks should respond to these technological changes; and (iii) what may act as barriers to innovation in the financial service sector.

WPR (2013) suggested there are three major factors that are driving innovation in the financial system, namely customer behaviour, regulation and technological change. The report suggests that regulatory reform and industry initiatives will play a key role in innovation in the financial sector. A number of these reforms (e.g. the new Basel III capital and liquidity requirements) have resulted from specific shocks (e.g. the Global Financial Crisis). Although some of the regulations tend to be country specific, they are more often becoming widely adopted (zone or global initiatives). An example of this is the Single Euro Payments Area (SEPA) which requires individual member countries to pass similar regulations to ensure its effective operation in each country and as a collective. This implies that in a globalised world, a technology breakthrough in one part of the world soon flows on to others. One such example is the introduction in 2004 of the Japanese mobile wallet or the 'Osaifu-Keitai,' pioneered by NTT DOCOMO for which now similar products exist (e.g. Google Wallet amongst others).

5.1 Innovations in Banking

WPR (2012) suggest that banks concentrate on creating customer focussed innovations in the payments area. Table 3 lists some value propositions and the innovations that flow from those propositions, as well as examples of currently developed innovation in each respective area.

The value proportions listed in the table are focussed on enhancing customer experience and providing a service to fill a perceived need. To be truly innovators,

Table 3 Innovation value propositions

	Value proposition	Description
Retail	'Be' the money Virtual currency	Create your own currency in a virtual world (e.g. gaming) for closed-loop payments and align to real-world currency Example: MintChip by the Royal Canadian Mint, other emerging digital currency/social currency, Bitcoin
	'Lend' the money Money lending	Bundle payments with lending and account services, such as Escrow (wholesale), P2P, Micro-finance Examples: M-Pesa, Grameen Bank, Kiva
	'Change' the money Currency conversion	Focus on currency conversion, such as money changing, remittances and changing to virtual currency Examples: Western Union, MoneyGram
	Store' the money Prepaid cards	Create prepaid products and leverage of 'liability base' brought in through quality payment services Examples: Starbucks Mobile Application, Google Wallet, Boku + MasterCard, Greendot—Prepaid Cards
	Move' the money Money transfer	Make online/off-line payment easy through any payment instruction mode such as plastic, mobile or NFC Examples: M-Pesa, iDEAL, Citibank Digital Wallet, Starbucks, Pulse + OboPay, Boku + MasterCard
Corporate	'Risk' of money Risk management	Manage the different types of payment risks such as counterparty, liquidity (including intra-day), foreign exchange and settlement Examples: Deutsche Bank—FX4Cash
	'Time' the money Information VAS	Real-time visibility into payments (balance and transaction) across treasuries and client organization components Examples: Bank of America Merrill Lynch CashPro
	'Match' the money Trade/supply chain management	Matching invoices and supply chain information with money flow to provide value-added services Examples: E-Invoicing (Tieto, Nordea, Bottomline Technologies), American Express OPEN AcceptPay
	'Manage' the money Treasury management	Drive more value out of money through visibility, investment propositions and liquidity solutions (pooling, balancing) Examples: Travelex Global Business Payments, Bank of America Merrill Lynch—Electronic Bank Account Management (eBAM)
Common	'Secure' the money Security services	Focus on security of payment processing such as AML checks, PCI-DSS compliance, fraud management, e-locker for digital storage and provide 'Trust services' Example: SWIFT
	'Process' the money Payment processing	Processing payments including origination, settlement and reporting (most commoditized value space) Examples: Banks, iDEAL, SWIFT, Pulse + OboPay

(continued)

Table 3 (continued)

	Value proposition	Description
	'Analyze' the money Payment Analytics	Focus on information presentation, e.g. cash forecasting for corporates and personal finance management for retail with insights drawn from use of analytics. Examples: Bank of America Merrill Lynch CashPro, Intuit, Amex PAYVE-Spend IQ

Source World Payments Report (2012), Table 3.7, p. 48

banks will have to be less conservative and engage in inspiring and collaborative engagements with other firms to develop customer centric innovations (e.g. M-Pesa and Octopus). One of the obvious areas where this could occur is in the development of applications (Apps) for mobile phones. The Starbucks Mobile App listed in the table is one of many that are being developed. Another example of an application that facilitates payments in the provision of a service is Uber—a car hire or taxi service. New innovation will require risk-taking and banks need to be less conservative in their approach if they are to keep pace with technological change and service innovations.

5.2 How Should Banks Respond to Technological Change?

WPR (2012) suggest four future hot spots for innovation, namely: proposition development; payment instruction; operations processing; and account reporting and invoicing. A number of financial and non-financial firms have had success in these areas such as: Amex Serve; Google Wallet; PayPal; M-Pesa; Pulse + OboPay; Western Union and MasterCard/Visa. For a bank to be an innovator, WPR (2012) suggests banks need to ensure that their "Innovation House" is in order. This means they need to focus on the four key innovation dimensions (or bricks for the Innovation House): Finance, Organisation (Culture/Governance), Customer Engagement and Technology. By strategizing on each of these four innovation dimensions, banks will be able to determine if their innovation is likely to succeed. The WPR (2012) finds from a survey of banks that 70 % suggested that the future entailed a focus on innovation in payment instructions, while 63 % suggested a focus on operations processing. Other areas of innovation included account reporting and invoicing (56 %), and clearing and settlement (48 %).

WPR (2011) drew attention to innovations in other industries as examples for banks to follow. This included telecommunications and energy utilities, where product differentiation is a challenge. One area banks need to concentrate on is scale, operational excellence and value-added services to improve customer experience. In addition to innovating at the customer facing-end as retail payments service providers, banks can also innovate as wholesale service providers. Mid-sized and smaller regional banks tend to concentrate on retail, given they do not

have the economies of scale for wholesale market operations. Australia is ripe for this innovation as the number of players in the settlements system is small, and the move to a real-time-settlement means that the financial strength of the players will be of fundamental importance.

5.3 Barriers to Innovation?

Based on an extensive survey, (WPR 2012) provides a list of drivers and barriers to innovation. The survey results revealed that customer innovation, customer retention, improving efficiency and cost savings were the top four key drivers of innovation; while attitude to change, building the business case, security concerns for new technologies and restrictions on market access were the top four barriers to innovation. Banking by its very nature has tended to be rather conservative. If customer service and retention are key drivers for innovation, but they are met with a conservative bank culture that is highly risk-averse, the outcome may be relatively few innovations. The innovation bricks as suggested earlier need to be well developed and supported by senior management at the bank. Some innovations are not easily supported by the traditional business case because the outcome is more service innovation oriented. Changes in such conservative culture may occur if banks alter their performance metrics away from a heavy focus on return on investment to including customer retention and satisfaction metrics.

Of the four drivers of innovation, technology is the single most important area banks will need to consolidate their efforts on. Cloud technology has the ability to transform the speed with which information can be exchanged, as the information does not have to be retrieved from the bank's data storage systems. The issue for banks will be to ensure the information is secure. Security of information in the cloud is improving, although it is some way before it can be said to be highly secure.

As the mobile (smart) phone market is only young, the development of apps promises to bring significant changes to the way business-to-business and customer-to-business transactions take place. It is already possible for a customer to search for a product at a store and to check online for the same product to determine who provides the best value, and then to purchase the product. In this instance, the costs associated with 'bricks-and mortar' establishments may pose a significant financial risk when alternative, more streamlined access to goods is available. That possibility is here today and the financial pressure on retail stores (more so for those without an online presence) is becoming increasingly challenging. The service innovations in the payments system is the largest single contributor to these outcomes.

6 Conclusion

The last three decades have witnessed significant change in the delivery of banking services in Australia. Service innovation, underpinned by advances in technology with deep penetration in the consumer market, has been a major driver for this change. Deregulation of the banking industry in the early 1980s facilitated increases in productivity and competitiveness in the sector, resulting in an intensity of firm-level innovation in service products and processes. The result has been a significant change in the way consumers and businesses undertake their banking needs as compared to 30 years ago. The use of cash and more so cheques, are gradually being substituted by electronic means of payment, which have lowered transaction costs and increased efficiency and convenience for both consumers and businesses.

Innovation in service products (e.g. ATM's and EFTPOS) has greatly facilitated the adoption of technology for supporting retail transactions, and the diffusion of technological devises such as the mobile (smart) phone and the capabilities from such technologies is likely drive further major changes in banking. Innovation in service processes is the most exciting for banks as it enables cost reduction and improved customer service delivery,while potentially increasing their customer base by offering enhanced competitive services. Early adoption of these technologies was slow for many reasons (limited computer literacy, accessibility of home computers, and uncertainty and insecurity with emerging technologies) but as the younger generation grows accustomed to electronic payments, adaptability to future technological change is unlikely to be as slow. With forecasts showing that 80 % of Australian households will have internet access by 2016,significant opportunities for service innovation in the financial services sector abound.

However, the conservative nature of the banking industry could act as an inhibitor to limit the speed at which the sector innovates. Banks may benefit from a rebalancing of their key performance targets to include service innovation in relation to the traditionally heavily skewed focus on return on equity. In addition, there is a need to create an internal environment to help foster innovation. Banks could do so by potentially partnering with organisations adapted and skilled in innovating to assist throughout this process of change. Banks also need to have their "Innovation House" in order so as to focus on the key drivers of future innovation, including the culture of the organisation, customer engagement and technology.

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Part IV
Designing Service Innovation

Systemic Development of Service Innovation

New values are being created and shaped through a rapid transformation in the service economy. Now more than ever service businesses need new tools, approaches, interdisciplinary thinking and creative methods.

Highlight *David Edwards (2008) developed a special artscience concept to cover collaboration of artists and scientists in solving design problems. Underpinned by this artscience concept, the authors explore the intrinsic characteristics of services and service systems, and present a systemic approach to produce service innovations.*

The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations

With resources rapidly diminishing in our resources finite world, a concept that theoretically and practically represents a promising model to steer our production and consumption systems towards sustainability is the *Product-Service System (PSS)* one. PSSs shifts the business focus from selling products to offering a combination of products and services jointly capable to achieve a final user satisfaction in a sustainable way.

Highlight *An example might be useful to better understand the PSS concept: the Pay-per-Use solution, a PSS developed by Ariston (an Italian appliances producer). Here, rather than selling a washing machine, Ariston offers to clients the possibility to have clean cloths without owning the product. The payment is based on number of washes and includes the delivery of a washing machine at home, electricity supply (not directly paid by the customer), maintenance, and end-of-life collection.*

Servitization as Innovation in Manufacturing—A Review of the Literature

Servitization means all service concepts, systems service, processes and related service activities offered and carried out by, or on behalf of, a manufacturing firm linked to the products produced by this firm. In the 21st century, this means that servitization has become an integral part of manufacturing.

Highlight *By combining product and service offerings and sometimes newly developed service offerings a complete offering can be provided. An example of this is Volvo Trucks Fuelwatch, made up of six different services packaged and sold as one concept with the aim of reducing the customer's fuel consumption and associated costs.*

The Architecture of Service Innovation

The role of architecture shifts from being the locus and enabler of services and innovation to also being the diagram and visualization of service experience (reflecting Mies van der Rohe's "will of the age conceived in spatial terms"). The goal is to understand the relationships between the qualities of architecture and service design and allow one field to inform the other (here "qualities" is defined as the underlying intentions and meanings of outward forms).

Highlight *Sometimes we need to turn to the greatest designers from the past. The Parthenon, the most refined Greek temple, appears to be a very regular form of repetitive standardized components. Upon closer inspection, nothing about this structure is regular. What appears to the viewer as straight and parallel lines are in actuality all curves. What the viewer first sees as standardized components and equal spacing between the columns are all slightly different. They are modulated for effect. The Parthenon is a highly complex design of optical refinement to create the most pleasing view for the observer.*

Innovation or Resuscitation? A Review of Design Integration Programs in Australia

Design integration programs aim to increase the competitiveness of business through the application of design services and design thinking within the business model. Typically design integration programs provide auditing, mentoring and business modelling with selected companies to plan and implement strategies to utilize professional design services and apply design thinking methods to develop new products, services or processes.

Highlight *Preliminary research undertaken by (Bucolo and Matthews 2011) indicated that there was opportunity for further study into the selection process for company participation in design integration programs. A study of the 2008 Business Review Weekly list of "Fast Starter" companies determined that the highest proportion of fast growth start-up companies was in the business and property service sector and that the largest group of start-ups had a net company worth of less than $AU1m. The study identified that fast starter founders acknowledge the value design '...brings to customers and their enterprises, culminating in a sustainable competitive advantage' (Smyrnios 2008).*

Service Innovation Through an Integrative Design Framework

Service innovation is focused on customer value creation. At its core, customer-centric service innovation in an increasingly digital world is technology-enabled, human-centred, and process-oriented. Service innovation requires a cross-disciplinary, holistic, and end-to-end approach to new service design and development (NSD).

Highlight *In an increasingly digital world, information technologies are "liquefying" physical assets into information resources, and transform a service firm into a value-creating service system in which a constellation of economic actors (customers, suppliers, business partners and the like) are able to seamlessly collaborate to co-create value (Normann and Ramirez 1993).*

Services Innovation in a Circular Economy

This paper reviews the literature around service innovation in a circular economy. Circular Economy is a generic term for an industrial economy that is, by design or intention, restorative and in which material flows are of two types, biological nutrients, designed to re-enter the biosphere safely, and technical nutrients, which are designed to circulate at high quality without entering the biosphere (Wikipedia 2014a).

Highlight *The paper identifies the necessity to have an appropriate business model framework for firms engaging in service innovation and delivery within a circular economy framework. It identifies some relevant frameworks and points out some weaknesses in existing frameworks. The paper also explores service innovation in the circular value chain as a growing domain of activity but with many unanswered questions, which indeed is a growing area for future research.*

Systemic Development of Service Innovation

Antti Hautamäki and Kaisa Oksanen

Abstract This chapter explores the intrinsic characteristics of services and service systems and presents systemic approach to produce service innovations. The chapter consists of elaborating the characteristics of services and the principles of systemic development, discussing service matrixes, service systems, service strategies and business models, and special challenges related to the development of services and service innovations. Services are always produced in service systems consisting of combination of service personnel and information systems. Customers are involved in these systems by interacting with the front end of service organization. The key issue in service development and innovation is to build the right architecture to capture all aspects of service systems from customer relations to back office information systems. The desired user experience is created by all aspects of service systems including the contact with personnel, the user interface, and the trustful and efficient information system. In the chapter, we present an approach that starts from the needs of people and through categorization of service types and service strategy types develops understanding about service systems and their dynamics. The proposed approach also provides insights into design thinking and its implications to service development and radical service innovation.

Keywords Business models · Design thinking · Radical innovation · Service design · Service innovation · Service matrix · Service strategies · Systemic innovation

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1 Introduction

This chapter explores the intrinsic characteristics of services and service systems and presents systemic approach to produce service innovations. Because of the great transformation of economy toward service economy, all industries need new approaches, interdisciplinary thinking and creative methods. In the service economy, new values are created by services, thus service business in particular needs new tools and approach, such as design thinking that creates new meanings and offers good experiences for users and customers.

The chapter starts with elaborating the characteristics of services and the principles of systemic development. After that the chapter discusses service systems, service strategies and business models, and special challenges related to the development of services and service innovations. At the end, the chapter provides insights into design thinking and its implications to service development and innovation. The chosen approach emphasizes changes in meaning that come from the service innovation, and maps the systemic relationship between services, innovation, and meaning.

2 Characteristics of Services and Service Innovations

To understand the logic and development of service innovation, we need to elaborate the key characteristics that describe the unique nature of services. First the service literature highlights the differences in the nature of services versus products, which are believed to create special challenges for services marketers and for consumers buying services. For example, Bitran and Lojo (1993) examined different and unique characteristics of service operations and developed a framework to investigate the challenges in providing services. The characteristics include intangibility, interactivity, heterogeneity, perishability, simultaneity, cultural specificity and transferability, and they suggest also the need for new skills in the management process. Especially intangibility has been emphasized as one of the key characteristics of services, and one of the key distinguishers from products (Levitt 1981; Bell 1986). Similarly, service innovation differs from product innovation in many ways, as Berry et al. (2006) have noted. First, for labor-intensive, interactive services, the actual providers—the service delivery staffs—are part of the customer experience and thus part of the innovation. Second, services requiring the physical presence of the customer necessitate local, decentralized production capacity. Third, service innovators usually do not have a tangible product to carry a brand name, except certain service producers such as Walmart in retailing or IBM in information systems.

Second, the literature shows how the importance of services to the global economy has grown steadily while the importance of products has declined. In fact, services now dominate, making up more than 70 % of the aggregate production and

employment in the OECD nations (Berry et al. 2006). Even globally services generate more than two-thirds of gross domestic product (GDP), employ the most workers in major economies and create more new jobs than any other sector (OECD 2013). In the USA, economist Victor Fuchs stated already in 1965 that USA is a service economy (Fuchs 1965). However, the actual value measurement for services is increasingly complex. The operation of services involves more people and touch points than products, and measuring the value depends of the context of the service (Løvlie et al. 2010). The same goes with validating the impact or quality of service innovation. Of course, various returns of investment or gross value added can be tangibly measured but the whole service process is not suitable for measuring in terms of money (ibid.). Service usability, customer satisfaction, and social or environmental impacts add to the mix of measures making it also more meaningful.

The term "service" is used extensively and with different meanings and connotations in different disciplines such as marketing, operations, or computer science. Similarly service types vary from customized to noncustomized, from automated to nonautomated services, from personal to impersonal services, and from long-term to short-term services (Alter 2008). In summary, service is "a change in the condition of a person, or a good belonging to some economic entity, brought about as the result of the activity of some other economic entity, with the approval of the first person or economic entity." The quote is from the Standard Industrial Classification taxonomy developed by the U.S. Department of Commerce, originally by Hill (1977). Another definition, by Spohrer et al. (2008), states that service is the application of resources (including competences, skills, and knowledge) to make changes that have value for another (system).

Research on service innovation has grown steadily from the 1990s and in the last decade the field has gained a prominent position in innovation studies (Miles 2006). The term "service innovation" can be understood to cover innovation in service content, innovation in the service production and delivery systems and in the service firms (Tuominen et al. 2004). In practice, the activities and categories that are filed under service innovation vary among different researchers (e.g., den Hertog 2000). In addition, many new approaches appear underdeveloped when people still apply the traditional manufacturing logic to contemporary innovation such as service innovation (Drejer 2004). Similarly newer approaches to innovation such as open innovation or user innovation have appeared unclear when considering innovation in services.

To generate understanding about the logic and development of service innovation, in this chapter we examine service systems, service strategies, and systemic design of services. Understanding service systems provides not only a strong basis for the creation of service innovation, but also new paradigms of service innovation are needed because our operating environment is becoming more and more unpredictable.

Service managers and innovators have recognized the need to continually develop new services that are timely and responsive to user needs. The interaction with human customers is one of the essences of service (see e.g., Teboul 2006), and

in service innovation the creation process should be increasingly participatory, practical and human-centred.

Simultaneously with the importance of user input, the role of design in addressing the issues and challenges in service innovation has been growing. Design also integrates the tangible and intangible components and thus dispels the dichotomy between products and services (Shostack 1982). At the end of this chapter, we explore the approach of service design which is useful especially with the interactivity, intangibility and meaning dimensions of services.

2.1 The Front End and the Back End

One clue to understand service is to separate the front end and the back end (Fig. 1). The front end or the front stage is a phase of services in which customers are in direct contact with the service provider. This perspective holds that the quality of the service experience is primarily determined during the final service encounter that takes place in the front stage. On the other hand, the back end or the back stage guaranties the efficiency and security of service. The *core function* of the back end is the standardization of internal processes (Teboul 2006).

The two ends have qualitatively different objectives and management characteristics, and they have been studied as unique management processes. Glushko and Tabas (2009) have analyzed service design in the light of these two different mindsets. Service designers with a front stage mindset strive to create service experiences that people find enjoyable, unique, and responsive to their needs and preferences. Front stage designers use techniques and tools from the disciplines of human–computer interaction, anthropology, and sociology such as ethnographic research and the user-centered design approach to specify the desired experience for the service customer.

Service designers with a back stage mindset follow different goals and techniques. They strive for efficiency, robustness, scalability, and standardization. Even though some back stage activities are carried out by people, and others carried out by automated processes or applications, the back stage mindset tends to treat people as abstract actors. So instead of modeling the preferences and interactions of people, back stage designers identify and analyze information requirements, information

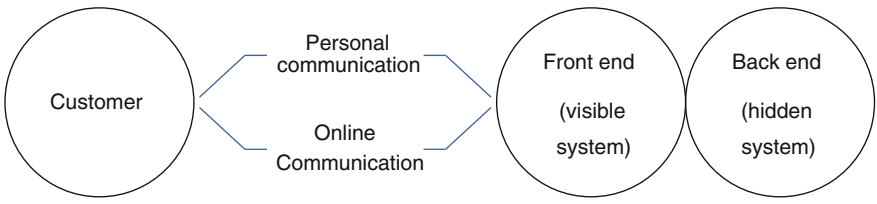

Fig. 1 The front end and the back end

flows and dependencies, and feedback loops. They use concepts and techniques from information architecture, document engineering, data and process modeling, industrial engineering, and software development. Their typical artifacts include use cases, process models, class diagrams, XML schemas, queuing and simulation models, and working software (Glushko and Tabas 2009). Nowadays also big data, cloud computing and data security are in focus.

The front and back ends need to be understood as potentially different processes, but also must be simultaneously coordinated and integrated. In order to avoid conflicts between front and back end designers, a systemic perspective for services is needed. The operations of both ends must be completely reconciled (in time, content etc.). In a service system, front stage service providers have capabilities for capturing information about front stage preferences, contexts, and events. This and other back stage information can then be exploited by the front stage to enhance the service experience (Glushko and Tabas 2009). The architecture of service system is explored in more detail in the next two sections.

3 Toward a Systemic Development of Service Innovation

In this chapter we argue for a systemic approach in creating service innovation. Service systems and strategies are explored more specifically in the next section, but first we take a look at the basic elements of systemic development. As service systems comprise service providers such as firms or government agencies and service clients such as individuals or any organizations co-creating value in complex value chains or networks, successful service innovations occur only when a service system has enough of information about the capabilities and the needs of its clients, its competitors, and itself (Malio and Spohrer 2008). This implies that service innovators should have a holistic approach to innovation. Similarly creating favorable conditions for innovation require long-term, widespread systemic changes. To put it simple, the systemic perspective is emphasized because innovation never occurs alone but always within a context of structured relationships, networks, infrastructures, and in a wider social and economic context (Smith 2000).

In order to manage systemic service innovation, the complexity of services systems and changes following innovation must be understood. Service innovations are usually improvements to an existing service, but systemic innovations such as new health care systems or new transportation systems cause changes e.g., in the market, in the consumer behavior, in politics, and in culture. These changes in general are difficult to predict and this notion challenges leaders at national, regional, and organizational levels to evaluate the impact of innovation systematically. In the case of new products and technology, the evaluation requires analyzing the technology's maturity, costs, resulting changes in legislation, and so forth. In the case of service innovation, the evaluation requires much more user involvement and analysis about the changes in distribution channels, in value chains and in interaction with customers etc. (Chesbrough 2011). In addition, if

innovation is systemic, the whole system is affected by the changing values and norms of the society and by the development of national and international behavioral trends such as sustainable development or the growth of crowdsourcing activities.

When considering the systemic side of service innovation, the theory of complementarities is useful (Brynjolfsson and Saunders 2010; Teece 1987). According to the theory, two practices are complementary when the advantage of one is greater if both of the practices are present. Basically it means that organization benefits more from adopting complementary practices than solitary best practices (Milgrom and Roberts 1995). For example, implementing a new information system is more beneficial if a relevant training service is available. It is also notable that individual changes have very little effect on productivity as a whole. In services, complementarity should be considered especially when dealing with specialization and overlaps in service production, e.g., providing public services in collaboration of authorities and business and voluntary organizations (Dahlberg 2005; Litwak 1985).

Other useful insights into service innovation can be found when studying the dynamics of collaboration. As service innovation changes the service processes, delivery, platforms and business models in many ways, there is a need for systemic action models that include services, operational processes, organizational structures, value chains and technological changes. In many ways, systemic change is a systemic service process. Managing all this requires close cooperation and interaction, and actors in the innovation ecosystem depend on the resources, expertise, and connections of other actors (Kosonen and Doz 2008; Scott and Storper 2003). Dynamic, collaborative competences thus are one of the main sources of service innovation (Ordanini and Parasuraman 2011; Agarwal and Selen 2009). Not to mention that dynamic capabilities are directly linked to the customer- and people-oriented nature of service innovation.

Glushko and Sim (2007) suggest that systemic patterns and models for services should be exploited more in order to invent new or improved services. They focus on dimensions of services and propose a new design framework for services. Some dimensions are only relevant when providers and consumers are people, while others concern the extent of technology and capital and can apply to services that do not involve any people. Following Glushko and Sim (ibid.), different factors in services and in service development can be categorized in the following way:

Human Factors in Services

- Knowledge/Expertise: How much knowledge or expertise must the service provider and service consumer possess to accomplish the service offering?
- Cognitive Capacity: How much intelligence, as opposed to knowledge, must the service provider and service consumer possess?
- Physical Capacity: How much physical efforts are required of the service provider and service consumer?
- Emotional Intensity: To what degree will the service offering require intense emotional experience by the service provider or service consumer?

- Time Intensity: How much of the provider's and consumer's time is required?

Technology and Capital Factors in Services

- Technology and Capital Investments: Which technologies and other fixed-capital resources must the service provider and service consumer control?
- Disposable Resources: Which resources are consumed in carrying out the service and which party must supply them?
- Encoded Information: What encoded information is required and which party must supply it?

These design dimensions enable more nuanced comparisons between services and enable us to develop service innovation through analogy, generalization, induction, and other classical mechanisms.

4 Understanding Service Systems

As service involves at least two interacting entities, in order to develop effective services, a systemic framework for services and for service strategies is needed. Similarly systemic view is needed in order to nourish the development of service innovations. The overall service system abstraction is under development, and in the service literature the service system is articulated within various frameworks. General systems theory provides a framework for understanding complex relations in terms of resources (von Bertalanffy 1976). Also general work system frameworks provide system-oriented views within service organizations and usually emphasize business. Basically these frameworks identify elementary building blocks and organize important attributes and change processes such as moving toward automated service architectures that apply across all service systems.

Figure 2 portrays the basic elements and relations in the service system. The process includes interaction between customers, service personnel and information systems. For example, customer relations can be built in service systems via personal communication (Channel A) or via digital communication (Channel B) or by both depending on the selected service strategy. Service personnel and information systems are usually located within a same company, but they can be located also in different companies, e.g., when information systems are externalized to a web service provider. Nowadays, in many service systems, the Channel B, usually referring to Internet platforms, is selected as a sole service channel.

But service systems are not defined by the relations and interaction of resources alone (Spohrer et al. 2008). Other more specific frameworks add to the general system-oriented approaches; for example, the value chain framework presents a two-sided view of service process and point out that services are typically co-produced by service providers and customers. Another example, the life cycle model looks at how work systems (here service systems) change and evolve over

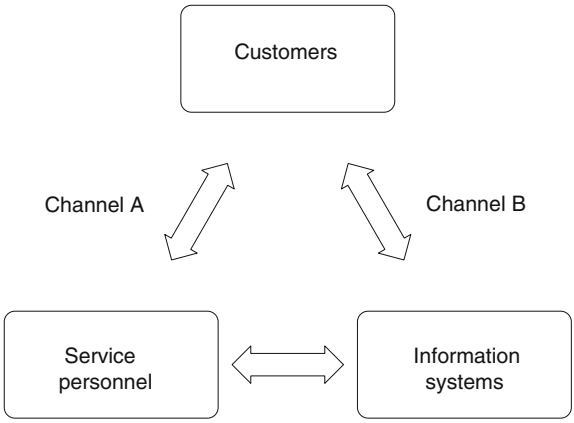

Fig. 2 The structure of service systems

time (Alter 2008). In practice, the different systemic frameworks are used in combination and by different actors such as company managers, strategists, or consultants.

Spohrer et al. (2008) define service system as a dynamic value co-creation configuration of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions. As service is the application of one's competences in order to benefit another, it means that value is created collaboratively in interactive configurations of mutual exchange. These value-creation configurations are called service systems (Vargo et al. 2008).

Value creation, which usually means improvement in a system, indeed is in the core of service system. Spohrer et al. (2008) support that by stating that service system is an open system, which is capable of improving the state of another system through sharing or applying its resources (i.e., the other system sees the interaction as having value). Similarly service system is capable of improving its own state by acquiring external resources (i.e., the system itself sees value in its interaction with other systems).

4.1 Service Matrixes

In the services literature, services are often classified within service matrixes. For example in Schmenner's (1986) matrix, services are classified across two dimensions that have significantly affected the character of the service delivery process. In that matrix, the vertical dimension measures the degree of labor intensity, and the horizontal dimension measures the degree of customer interaction and customization. Another classification considers service act across the dimensions of the direct recipient of the service (people or property), and the tangible or intangible nature of

the service (e.g., people's bodies in health care vs. intangible assets in banking) (Lovelock 1983). Agarwal and Selen (2005) have further developed the matrix approach by introducing the degree of technovation (technology, channels, and organizational structures) and collaboration as a third dimension in the matrix. The service cubicle (as Agarwal and Selen call the framework) emphasizes the dynamic relationships and social infrastructures to which the earlier matrixes did not refer. Schmenner (1986) referred mostly to internal operations, and new kinds of dimensions are useful in the current service classification scheme.

As noted, services are people-intensive and require certain amount of customer-interaction. Service matrixes are usually used in order to develop an optimal service structure by understanding and classifying services through these customer relationships. In this chapter, we present a framework where each service is classified by two variables: the complexity of a service and the intensity of interaction between customer and service provider. The intensity could be measured by the amount of information needed about customer in order to provide service properly. These kinds of categorizations are found in Teboul (2006) and in Apte and Vepsäläinen (1993) who use the term customer relationship instead of intensity of interaction. The variable is justified by the nature of services that implies a negotiated exchange between a supplier and customer for the provision of intangible assets. This lack of a physical product means that each party in the exchange needs the other's knowledge in negotiating the exchange (Chesbrough and Spohrer 2006). Another variable, complexity, includes a number of relevant factors such as the expertise of service provider affecting the success of a service. To put it simple the variable measures the level of difficulty and required competence for providing a certain service. By combining these two variables we get a two-dimensional service matrix. The matrix is useful in differentiating the characteristics of customer relationships that are essential in developing an optimal service structure. Similarly, the matrix is useful in the field of service innovation, as service innovation differs according to the degree to which services are standardized or specialized (Miles 2006).

In the matrix we can identify three generic types of services which are elementary service, standard service, and special service (Fig. 3). For example, to make an appointment with a doctor is an elementary service. The procedure is simple and does not require too much knowledge on the behalf of the client. To measure blood pressure and interpret the results is a standard service that demands some expertise and some information about the client. Finally, to diagnose and treat diabetes is a demanding task and a special service that requires special education and experience and a lot of knowledge about the client.

The matrix contains two problematic areas. One in the top right corner and one in the bottom left corner. The service process in top right corner includes more interaction with clients than is needed in order to successfully provide the service. This generates additional cost to clients: we can call it "over-service." On the other hand, the service in the bottom left corner is based on too little interaction with clients and might lead to errors and misconduct: we can call it "under-service."

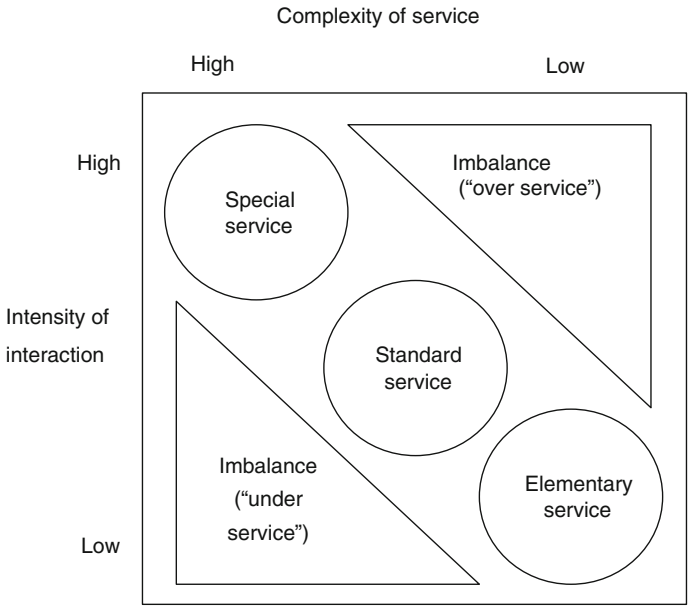

Fig. 3 Service matrix and service types (Hautamäki 2011)

The service matrix is useful in developing different service organizations, platforms, and strategies. For example, elementary services can be organized as self-services and they need both virtual and physical self-service spaces such as self-help stations for simple health care or Internet platforms for making appointments. Standard services require certain amount of personal service and communication. Therefore, an office with service personnel is needed. For providing special services, it is critical to have well-educated experts. Examples of organizations providing special services include hospitals, consultancy firms, various creative firms, etc. We can say that special services are produced by an expert organization. Different organizations also utilize different service strategies and business models, which are explored in the next section.

5 Developing Service Strategies and Business Models

Different sets of the fundamentals or of the core elements of service strategy have been presented especially in the fields of services management, strategic management, or marketing. They include various attributes concerning for example value creation, service assets and structures, service channel types, reliability, and design. Similarly strategy as a whole can be viewed in various ways like as a pattern, plan, position, or perspective (Shafer et al. 2005). Pattern and plan refer usually to the backward or forward-looking sense of strategy. Position refers to a view that relates

to choices about which products or services are offered in which markets based on differentiating features (e.g., Porter 2000). Strategy as perspective refers wider choices about how the business as a whole is conceptualized (e.g., Drucker 2001). Shafer et al. (2005) point out that although these views differ in many respects, they all have in common the element regarding making choices.

In Fig. 4, three optimal service strategies are presented. Focused service strategy is optimal in providing special services by expert organization (e.g., a strategy of a consultancy company). Universal service strategy is optimal in providing standard services in general offices where customer has the possibility to meet personnel (e.g., a strategy of the Department of Motor Vehicles that administers vehicle registration and driver licensing in the U.S.). Online service strategy is optimal for providing elementary services to customers who actively utilize various online options (e.g., the strategy of online retailer Amazon.com, Inc.). The strategies in the figure naturally describe ideal strategy types; in practice, the strategies can contain elements from different areas and from between the optimal types.

The anomaly corners in the matrix again include some challenging situations. If an expert organization wants to provide elementary services, it is usually unviable because it is too expensive. Then again trying to provide special services by self-service is a risky strategy as it may lead to neglect or abandonment of customer.

Going down the vertical axis in the matrix increases possibilities to scale up services; online service strategy provides access to global mass services. Moving to

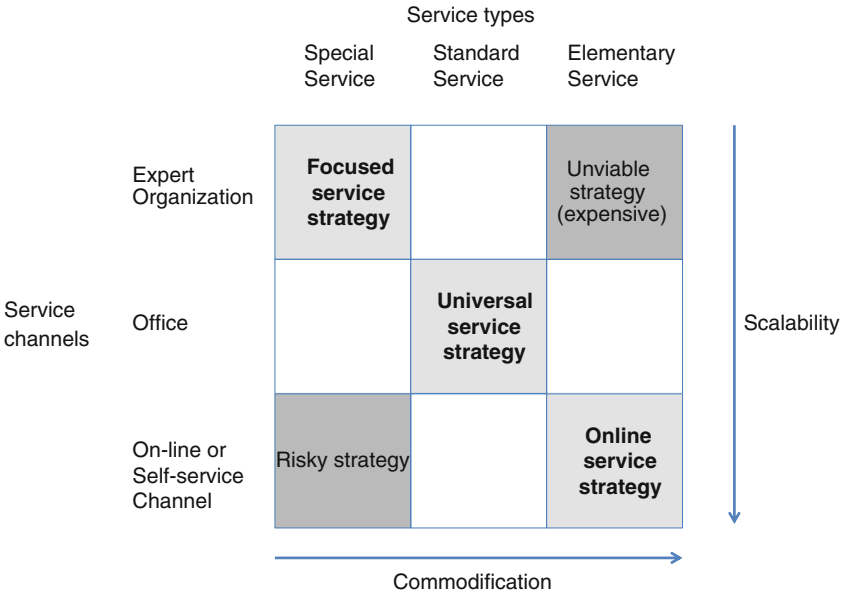

Fig. 4 The service strategy matrix

the right along the horizontal axis presupposes commodification of services; it means providing standardized service packages. On the other hand, moving to the left means increasing the personification of services. These strategic movements are in the core of service business models.

Today, information systems are applicable in all service organizations and offer benefits such as enhanced control, ease of use, and reduced transaction charges. In office type, service organization personnel uses so called back stage systems, which are not open to clients. They may contain a lot of information about clients and their previous history such medical records. Single offices are also digitally connected with each other or to data bases of larger organizations such as hospitals. At the same time, online service systems that customers themselves operate have grown rapidly and have now emerged as the leading edge of the service industry (Yang and Fang 2004).

The architecture of service systems refers to a combination of organizational structure and information systems (Prahalad and Krishnan 2008). The service strategy matrix is a basic tool for developing the service architecture. There are three kinds of service delivery organizations: expert organizations, offices, and online and self-service channels. They all have their own optimal information system solutions. Information systems support the personnel but they also act as a delivery channel for services, especially in the cases of standard or elementary services. Here the scaling of services is related to the ability of information systems to deal effectively a large number of customer interactions. To meet this challenge, information systems must be robust and safe. As an interesting example, a new architecture based on cloud computing or management of big data opens possibilities to customize mass services. According to Prahalad and Krishnan (ibid.), the modern service architecture and global collaboration allows companies to focus on the importance of individual customer experiences and tailor their product accordingly even if there are millions of customers online. Prahalad and Krishnan express that by a formula $N = 1$, the number of customer is always 1.

Business models, on the surface, appear to be similar to strategies. In practice, the field of strategy has evolved substantially in the past few decades but the field of business model lacks theoretical grounding. Business model is usually more generic than a business strategy, and articulates the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers (Teece 2010). Thus a business model describes the design or architecture of the value creation, delivery and capture mechanisms employed. Teece (ibid.) argues for connecting business models with business strategy, innovation management, and economic theory. One key conclusion of Teece's analysis is that to be a source of competitive advantage, a business model must be something more than just a good logical way of doing business.

Business model can be seen as a reflection of the firm's realized strategy and coupling strategy analysis with business model analysis is necessary in order to protect whatever competitive advantage results from the design and implementation of new business models. As an example, Christensen (1997), Hwang and Christensen (2008) have categorized business models into three types: solution

shops, value-adding process businesses, and facilitated user networks. Solution shops are institutions built to diagnose and solve unstructured problems. Consulting firms, advertising agencies, research and development organizations, and many law firms employ this type of business model (Christensen et al. 2013). Value-adding processes refer to businesses that transform inputs of resources, such as people, equipment, raw materials, energy, and capital, into outputs of greater value. Retailing, restaurants, automobile manufacturing, and petroleum refining are examples of this type of business model. Facilitated user networks are enterprises in which the same people buy and sell and deliver and receive things to and from each other. Mutual insurance companies are user-network businesses—customers deposit their insurance premiums into a collective pool, and they take claims out of it. Telecommunications companies, which facilitate calls and data transfers among their customers, as well as the online auction site eBay, stock exchanges, and many activities of banks are also user-network businesses.

5.1 Challenges in Service Business Model Development

Innovation may increase efficiency, status, autonomy or learning but it includes lot of challenges that need to be considered carefully. We will elaborate the changes and challenges related to the economic viability of services and to the development of service business models. Today service firms need to tackle challenges related (1) to the scale and scope of service and (2) to the development of service platforms and online business models. For example, Henry Chesbrough has analyzed these challenges in his book Open Services Innovation (2011). This section provides a few insights into challenges in service development and into new elements of service business models and strategies.

5.1.1 The Scope and Scale of Services

One of the new approaches to service innovation and business model is open innovation. According to Chesbrough (2011), openness brings two important things into a services context and business model development. One is that it can enable economies of scope, which means lowering the average cost for a firm in producing two or more products. In the core of these economies are cross-selling related services. Amazon.com Inc. provides a good example of service that invites in numerous third-party merchants to provide merchandise on its site, thus it can supply a wide variety of products without incurring all the inventory risk. In addition, when Amazon sees all purchases, they get better and better at suggesting new books customers might want to buy. Another way how openness helps is creating economies of scale that refers increasing the size of operation. Amazon.com is again a good example as they have increased remarkably their server infrastructures to handle the transactions their website generates. Essentially, their

innovations in infrastructure and services both get their costs lower and keep the firm on the edge. In addition, openness in services on the customer side creates greater value for the customer and for the firms (Chesbrough 2011; von Hippel 2005).

Quoting Chesbrough (2011, p. 105) the ultimate goal for a service business is to become a platform for other businesses to build on. This way a firm can move from the commodity business model toward "the platform business model". Examples of service platforms are varied and include, e.g., App Store or iTunes in Apple ecosystem, Amazon.com as a platform for different merchants to showcase their wares on Amazon's web site. What is happening here is a twofold business model. Customers may buy more items from the same site and other providers are allowed to use the platform to offer their products and services. Both of these features lead to new revenue to the owner of the platform.

5.1.2 Service Platforms and Internet Business Models

Today, electronic business and information industries have raised many questions concerning the business model development because information is often difficult to price and consumers have many ways to obtain information without paying (Teece 2010). For example, the traditional business models of information providers such as newspapers (inexpensive products and lots of advertising revenue) have been undermined by websites such as eBay and Craigslist that have siphoned off advertising revenues from job and real estate listings and classified ads (ibid.). Netflix Inc. as another example provides on demand Internet streaming of movies, TV-series and other media and sustains itself by monthly fees. Twitter, Instagram, and other free information or photo management, sharing and storage services with hundred millions of users have set more prototypical examples of new social networks, mobile communication, user feedback and advertising tools. Many of these web-based applications, information supply channels, and data transfer and compilation systems also major service innovations.

To put it simple, the Internet has enabled many industries to adopt new kind of web business models. These are usually multiple revenue stream models that involve collecting subscription fees, charging advertisers for contextual advertising, and receiving sponsorship and revenue-sharing fees from partners (Teece 2010). The multiple revenue stream approach is by no means new, and pioneering approaches must include also other special elements. The best examples are often assigned to the companies' and their leaders' capacity to utilize creatively the benefits of advances in technology, new knowledge, and networks of relationships. The success drivers such as a scalable business model, comprehensive customer experience management, or investment in employee performance have been identified in many studies but the key insight is that the different drivers must be featured systemically (Berry et al. 2006).

The logic of service delivery and development has already changed profoundly due to technological and organizational innovations and the discussion no longer

focuses on the impact of new technology or new revenue channels but on the meaning change the new business models and innovations provide. New forms of interaction and socio-economic composition such as collaborative production, networked knowledge creation and new business models are reconfiguring the value and meanings services traditionally offer. In the next section, design thinking as a human-centered approach to innovation provides an interesting framework from which to further consider the future of service innovation.

6 Creating New Meanings Through Service Design

Design thinking and service design are relatively new fields of expertise, but their current evolution is rabid (Kuosa and Koskinen 2012). Similarly, the definitions and approaches to the ensemble of design, services and innovation vary widely. Design covers many service relevant areas such as experience, customer interface or identity and often provides a new interpretative framework from which one can consider the development of service innovation (Maffei et al. 2005). In the literature, design thinking, service design, and co-design co-exist both peacefully and struggling. In addition, terms such as service science and service engineering attempt to define the service discipline that joins the worlds of business, innovation, design, change management, and service economy for a multifaceted approach to development of services (Saco and Goncalves 2010). Service science, in particular, has investigated the service systems and the bases for systematic service innovation (Maglio and Spohrer 2008).

Design thinking is mainly an American approach popularized by design agency IDEO, service design is more of a European approach and co-design a mixture of different origins (Kuosa and Koskinen 2012). Service science, strongly propagated by IBM (Chesbrough 2011), has roots mainly in the academia and especially in the major American universities while design approaches owe part of their origin to design consultancies and public organizations such as the U.K. Design Council or the Köln International School of Design (Saco and Goncalves 2010). The organizing principles of different design practices and methods similarly vary but certain connective points can be found. The design field as a whole is fundamentally interdisciplinary. All definitions include concrete cross-disciplinary practices, rapid prototyping and concept development and human-centered, interpreting and participatory approaches. The tools developed are drawn from social anthropology, linguistics, market research, custom experiences, etc. (ibid). Service science and service design also posit that there is a need for a new coherent language of service and service innovation.

In contrast to design management or design strategy, design thinking is primarily the most suitable to link with innovation. It provides a way to help discover new opportunities and to create new solutions (Lockwood 2010). The players in design thinking are usually grouped into consultants, academics, and practitioners but the boundaries are blurred, and many individuals who work for example in customer

experience management or service operations could be labeled as designers (Saco and Goncalves 2010). Theoretically the field of design thinking is relatively immature and the lack of solid theoretical background naturally limits the field's ability to contribute fully to the academic discussion. Design is also posited as more a practical craft than a formal science. The shared vocabulary, research conventions, methods and techniques include a variety of mindsets from different disciplines from arts to engineering and from architecture to marketing and management. Basically design thinking means solution focused and future oriented methodology aimed at resolving various problems (Cross 1982).

Prior the 1970s design focused mostly on tangible items such as unique furniture, cars and buildings. The role of designer was linked strongly not only to industrial design but also to arts and crafts. As computers became more affordable in the 1970s, computer aided design (CAD) started to gain ground in design. Further in the 1980s, advances in programming and computer hardware allowed more versatile applications of computers in design activities (Myers 1998; Kuosa et al. 2012). Design and services were first connected by Shostack (1982), but design in services was long considered mostly as a part of the marketing and management disciplines. Nowadays design connects academics and professionals worldwide and the field encompasses a variety of competencies (e.g., the Service Design Network launched in 2004 by Köln International School of Design, Carnegie Mellon University, Linköpings Universitet, Politecnico di Milano and Domus Academy).

6.1 Design Thinking and Radical Service Innovation

Design thinking and innovation were first linked together by Richard Buchanan (1992) who also brought "wicked problems" and problem solving into design discourse. As frequent innovation is a key for being relevant in the service economy, the innovation process similarly requires frequent evolution in its methods and action models. There is a recognized desire to innovate, but actually getting innovative new services to market is rare, and to create radical innovation—new services that dramatically change the market, like Airbnb, a website for people to rent out lodging — is even rarer (Jones and Samalionis 2008).

To put it simple, design thinking for service innovation is needed because it helps managing the constantly evolving landscape of service economy. Successful service innovation requires, for example, an organizational culture that supports human performance and innovation and builds human capital (Berry et al. 2006). Design thinking emphasizes this human-oriented side of innovation. To go further, the approach of design-driven innovation has diversified and widened the methods of user-centered innovation and general ways of managing and creating innovation (Verganti 2009).

Service innovation is inherently people-oriented. Generally it means customer-focused orientation but in this section we want to go beyond the traditional user focus into human-centered service innovation. The innovation mindset often

emphasizes the fact that the firm's enhancement of customer value is the all-important factor in the firm's success, but service innovation in particular needs to surpass customers' present expectation of value (Kandampully 2002). General user involvement is indeed deemed inadequate, e.g., for idea generation (Christensen 1997). If we want to investigate radical service innovation, we need to explore and predict the meanings and values users connect with the services. The innovative service provider might, for example, choose to use various technologies, networks, and relationships to extend its competency and knowledge base about the unmet and emerging needs of people (Kandampully 2002). This requires looking beyond features, functions, and performance of innovation, understanding the deeper meanings users give to things, and predicting societal, cultural, and technological changes.

Design thinking is described as human-centered discovery process followed by iterative cycles of prototyping, testing, and refinement (Brown 2009). Service innovation is by nature tied in human behavior, needs, and preferences, thus it is characteristic to link it with design thinking that incorporates similar attributes. Design-driven innovators look for new ways to think about the innovation, spend time with all kinds of consumers, and capture unexpected insights that more precisely reflect what people want. By taking the human-centered approach, design thinkers can imagine solutions that are inherently desirable and meet explicit or latent needs (ibid.). Both design thinkers and service innovators need to imagine the world from multiple and often contradictory perspectives—those of colleagues, clients, end users, and future customers.

Meanings emerge from the contexts by which people understand and assess products. These new products have proposed a different and unsolicited meaning that was what people were actually waiting for. The design-driven innovations introduced by these firms have not come from the market but have created huge markets. They have generated products, services, and systems with long lives, significant and sustainable profit margins, and brand value, and they have spurred company growth. It is remarkable how Verganti (2009) specifies a product to be a twofold entity consisting of a physical item like Apple's iPod and the meaning customers attach to it. This coupling is culturally conditioned and quite complex. In the case of services, the meaning component is even more subtle.

There are several definitions of "meaning," depending on the discipline. Definitions, however, tend to correspond with the purposes and techniques of the individual doing the defining. In linguistics, meaning can be studied, e.g., pragmatically, semantically or contextually, but usually it refers to what the source or sender expresses in their message to the receiver, and what the receiver infers from the current context. Anthropologists and sociologists often define meaning as a signs of common features used in a certain situation. In psychology, meaning connotes something inherently immaterial such as "idea" (Osgood et al. 1975). Designers then again give meaning to products and services by using a specific design language that refers to a certain set of signs, symbols, and icons (Verganti 2008).

In Verganti's (2008) approach design deals with the meanings that people give to products, and with the messages and product languages that one can devise to convey that meaning; he has adopted the one of the original meanings of design:

making sense (of things). The product style or esthetic appearance is but one of many ways a product or service may bring messages to the user. Apart from styling, what matters to the user, in addition to the functionality of a product, is its emotional and symbolic value, i.e., its meaning (Verganti 2008). In order to understand meaning change through service innovation, we have to understand the complexity of meanings in service. The meaning components include elements such as economical (price, brand), environmental (durability, sustainability), societal (communality, ethical values), usability (quality, complexity) and personal (experience, usefulness, life management) aspects, etc. Depending on the case some aspects will prove to be more important while others fade to background.

According to Verganti radical innovation can be done by studying 'interpreters', that is, individuals who understand the potential significance or 'meaning'. This also requires a lot of professionals engaged in design thinking and service design. These professionals are able to utilize various design tools and techniques such as problem identification or creativity methods, and they apply a number of competencies from fields such as sociology, psychology, usability, or arts. For example in the design agency, IDEO they have employed people who are engineers and marketers, anthropologists and industrial designers, architects and psychologists (Brown 2009).

Figure 5 presents a design-driven model for studying emerging life contexts. Studying future contexts of life is important in order to produce radical innovations. In the services context, it means designing services and service systems to fit unmet needs and expectations of customers and to improve customer experience. It is also related to the quality of services that refers to the ability of service to satisfy customers' needs. As an example, there is a growing demand for services that help people to manage their life in the continuously changing global and urban environment.

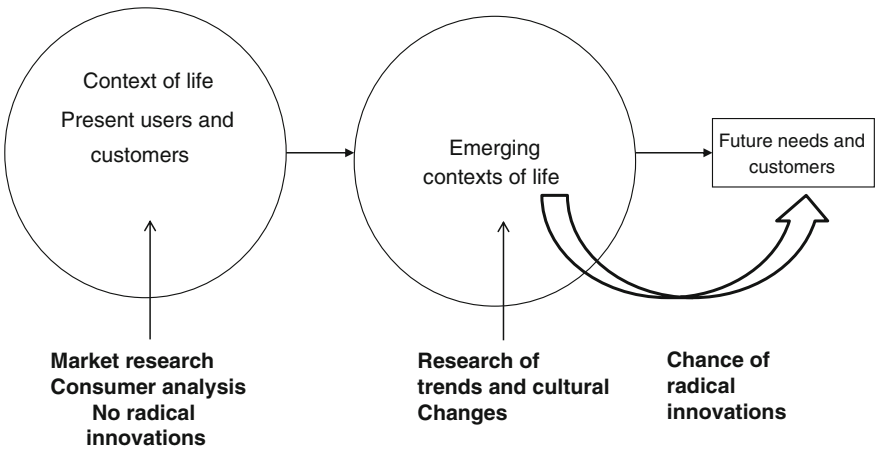

Fig. 5 Looking for radical innovation by studying the emerging contexts of life © Antti Hautamäki 2012

Following the principles of design thinking, the presented approach aims at get a clearer picture of the emerging life context that need to be studied in the radical innovation process, as well as a better understanding of people and what motivates them.

Radical service innovators share the common problem: how to understand cultural evolution and use this understanding to create new visions, solutions, and meanings. Both researchers, technologists and artists are interested in understanding and interpreting possible future environments and habits. In practice, designers may integrate social and psychological scientific knowledge into their expertise, or firms can integrate anthropologists into their teams. Another example developed by Edwards (2008, 2010) is a special artscience concept to cover collaboration of artists and scientists in solving design problems. Edwards is also the initiator of the network of ArtScience Labs (Edwards 2010).

Changes in mindsets and meanings require throughout understanding of societal, cultural, and technological changes and their implications. The required knowledge about the dynamics of social and cultural models is often tacit knowledge; it cannot be found in books or reports or forecast by building forward-looking scenarios. This dynamics consists of numerous unpredictable interactions between different actors (companies, users, designers, media, schools, researchers, artists, and so on). Innovators need to utilize the notion that they are also in a network that constantly reflects different meanings.

7 Conclusion

Service firms are in innovation competition. It means that they compete through innovation not only through improving productivity. The chapter elaborated service systems, strategies and design of services. The portrayal of service systems provided a basis for considering service strategies, business models and platforms. As a new paradigm of service innovation design thinking and its implications to services was also explored.

Services are always produced in service systems consisting of combination of service personnel and information systems. Customers are involved in these systems by interacting with the front end of service organization. The key issue in service development and innovation is to build the right architecture to capture all aspects of service systems from customer relations to back office information systems. The desired user experience is created by all aspects of service systems including the contact with personnel, the user interface and the trustful and efficient information system.

The elements of systemic development of service innovation are presented in Fig. 6.

The innovation process includes lot of challenges that need to be considered carefully and systematically. The presented approach takes into account the needs of people, the categorization of service types and service strategy types, and generates understanding about service systems and their dynamics.

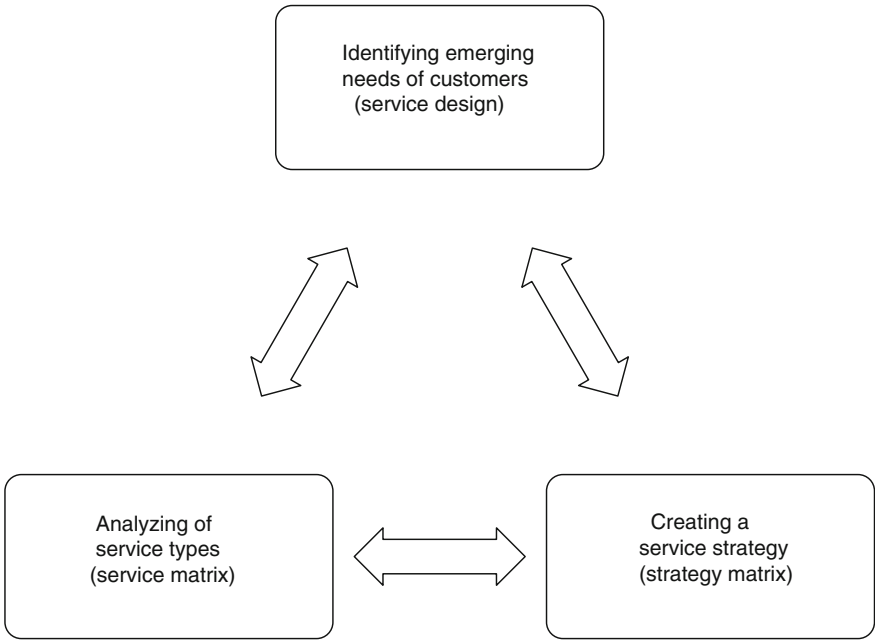

Fig. 6 Systemic development of service innovation

Service managers and innovators have recognized the need to continually develop new services that are timely and responsive to user needs. Similarly in service innovation the creation process is becoming increasingly participatory, practical and human-centered. Simultaneously with the importance of user input, the role of design in addressing the issues and challenges in service innovation has been growing. To implement successful service innovation processes, the service provider has to organize work to interdisciplinary teams and complete its skills by activating networks of experts. In this chapter we have emphasized the importance of understanding emerging contexts of life and understanding the real meanings users give to things. To this design thinking and its methods of insight, observation, empathy, prototyping, experiencing or storytelling make important contributions.

In order to manage systemic service innovation, the chapter presented a service matrix that can be used to develop an optimal service structure. The service matrix classifies services through customer relationships and identifies the generic types of services such as elementary, standard or special service. With a matrix you can also classify service strategies as we did when we explored the optimal service strategies and business models. For example, a focused service strategy is optimal in providing special services by expert organization, and a universal service strategy is optimal in providing standard services in general offices where customer has the possibility to meet personnel.

Business models and strategies articulate the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers (Teece 2010). In the process there a several issues to be considered. Today service firms need to tackle challenges related (1) to scale and scope of service and (2) to the development of service platforms and online business models (Chesbrough 2011).

To conclude, as the field of service innovation is relatively new and underdeveloped, there is a need for developing new methodologies. New approaches require an open and experimental mindset. The models and methodologies presented in this chapter provide insights into developing service systems and systemic service innovation, but they must not be considered as the final truth. They are research-based proposals that can be applied in various ways and in practice need thorough analysis of the unique business, organization, or service contexts.

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The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations

Fabrizio Ceschin

Abstract Product-Service System (PSS) innovations represent a promising approach to sustainability, but their implementation and diffusion are hindered by several cultural, corporate, and regulative barriers. Hence, an important challenge is not only to conceive sustainable PSS concepts, but also to understand how to manage, support, and orient the introduction and diffusion of these concepts. Building upon insights from transition studies (in particular, the concepts of Strategic Niche Management and Transition Management), and through an action research project, the chapter investigates the role of design in introducing sustainable radical service innovations. A key role is given to the implementation of socio-technical experiments, partially protected spaces where innovations can be incubated and tested, become more mature, and potentially favor the implementation and scaling up process.

Keywords Product-service system (PSS) · Transition management · Strategic niche management · Socio-technical experiment · Strategic design

1 Introduction

1.1 Transition Toward Sustainability and the Need of Radical Innovations

After decades in which natural resources were considered inexhaustible and the resilience capacity of the Earth was not an issue, we are now fully aware of the effects that our actions have produced on ecosystems since the beginning of the industrial revolution. The pressure of human beings on the environment has in

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fact profoundly modified natural systems, and today the planet is reaching its limits in the capacity of assimilating environmental effects caused by anthropic activities (Rockström et al. 2009).

In the last few decades, the reaction of humankind to sustainability problems has produced a series of approaches that has evolved from end-of-pipe interventions to cleaner production solutions and product eco-design strategies (Simons et al. 2001). However, although these kinds of interventions are fundamental and necessary, they are not sufficient to lead to the drastic reduction of resources consumption required to achieve sustainability conditions.[1] Although it is true that the adoption of these strategies can improve the environmental performance of products and production processes, it is also true that these improvements are often negatively counterbalanced by continuous population growth and increasing consumption levels (Schmidt-Bleek 1996; Brookes 2000).

For these reasons, under discussion there are not only production processes and artifacts, but also patterns of consumption and access to goods and services (Manzini 1999). This means that if we want to effectively tackle sustainability, there is a need to move from a focus on product and production processes improvements only, toward a wider systemic approach that takes in consideration new potential ways of satisfying the social demand of well-being. A profound radical redefinition of current structures of production and consumption is therefore required.

1.2 Product-Service System Innovation as a Promising Model for Sustainability

A concept that theoretically and practically represents a promising model to steer our production and consumption systems toward sustainability is the *Product-Service System (PSS)* one. PSSs can be described as specific types of value proposition that shift the business focus from selling products to offering a combination of products and services jointly capable to achieve a final user satisfaction (Goedkoop et al. 1999; Mont 2002). In other words, a PSS is oriented to satisfy customers through the delivery of functions (e.g., mobility, having clean clothes, thermal comfort, etc.) rather than the selling of products. (e.g., cars, washing machines and powder, boilers and methane, etc.)

PSS is not a new economic concept: several examples of PSS have in fact been implemented in the last decades by various companies (e.g., Goedkoop et al. 1999; UNEP 2002; Mont 2004). However, the key point to be underlined is that a PSS, if properly conceived, can offer an economic and competitive incentive for stakeholders involved to continuously seek improvements in resource management

[1] Several studies indicate that we can only consider sustainable those socio-technical systems whose use of environmental resources is at least 90 % less than what is currently done in mature industrial contexts (Schmidt-Bleek 1996).

(White et al. 1999; Stahel et al. 2000; Heiskanen and Jalas 2000; UNEP 2002). It is a model that changes the reward system because producers and providers are paid per unit of performance delivered and not per unit of product sold. Thus, it can potentially delink resource consumption from its traditional connection with profit.

An example might be useful to better understand the PSS concept: the Pay-per-Use solution, a PSS developed by Ariston (an Italian appliances producer). Here, rather than selling a washing machine, Ariston offers to clients the possibility to have clean cloths without owning the product. The payment is based on number of washes and includes the delivery of a washing machine at home, electricity supply (not directly paid by the customer), maintenance, and end-of-life collection. Why is this PSS concept promising in terms of sustainability? Because within this business model, Ariston is economically incentivized in reducing as much as possible the washing machine energy consumption (in order to reduce operational costs and maximize profits), and in designing and providing long lasting, reusable, and recyclable washing machines (in order to postpone the disposal costs and reducing the costs for the manufacturing of new washing machines).

In sum, PSS innovations represent a promising approach to sustainability, potentially capable (if properly conceived) to provide a wide range of benefits. For companies, it means the possibility to find new strategic market opportunities (Goedkoop et al. 1999; Manzini et al. 2001; Mont 2002), increase their competitiveness, and establish a longer and stronger relationship with customers (Manzini et al. 2001; UNEP 2002; Mont 2004). For customers/users, it means an increased value through a more personalized offer (Mont 2002; Cook et al. 2006) and the release from the responsibilities of ownership (Mont 2002). For the environment, it means the decoupling of value creation from material and energy consumption.

1.3 Research Challenge

In the last decade a wide number of research projects in the field of PSS and sustainability have been supported by EU funding.[2] This led the research community to deeply investigate this kind of innovation, collecting and analyzing an extensive number of cases in diverse sectors, and increasing the understanding of the potential benefits, drivers, and barriers. Also, several methods and tools have been developed in the last years to orient and support the designing of eco-efficient PSSs.[3]

[2] For instance: *PROSECCO, Product and Service Co-Design process* (2002–2004, FP5); *HiCS, Highly Costumerized Solutions* (2001–2004, FP5); *MEPSS, Method for PSS development* (2001–2004, FP5); *SusProNet, the sustainable product service design network* (2002–2004, FP5); *SCORE!, Sustainable COnsumption Research Exchange!* (2006–2009, FP6).

[3] For an extensive review of PSS design methods and tools see Tukker and Tischner (2006a).

However, despite all the knowledge accumulated, it has to be underlined that the uptake of this business concept by companies is still very limited. The reason is that sustainable PSSs can be considered, in most of the cases, *radical innovations*, because they challenge existing customer habits (cultural barriers), organizational structures (corporate barriers), and regulative frameworks (regulative barriers). In other words, their introduction and scaling up require breaking down the routine behavior that is daily produced by individuals, groups, business communities, policy actors, and society at large.

For this reason the introduction and scaling up of such innovations are not completely under the control of a single actor (or a small network of actors), because changes in the factors that form the boundary conditions (i.e., existing organizations, institutions, networks, dominant practices, interests, etc.), are as well required. Therefore, the challenge is not only to conceive sustainable PSS concepts (several methods and tools can in fact be used to support this task), but also to understand which strategies and development pathways are the most appropriate to favor and hasten their introduction and scaling up. There is in fact *a knowledge gap regarding the dynamics, mechanism, and factors driving the implementation and diffusion of this kind of innovations* and, consequently, there is a lack of strategies, approaches, and tools to enable *strategic designers, project managers*, and *management consultants* in designing, managing, and orienting this process. This study focuses on this unexplored research area.

Recent advancements in the *transition studies* field have provided insights into how to understand, influence, and orient the adoption of radical innovations. According to these theories, the introduction of radical innovations requires the creation of partially protected *socio-technical experiments* (Kemp et al. 1998; Hoogma et al. 2002; Brown et al. 2003; Van den Bosch 2010). Protection allows incubation and maturation of radical socio-technical configurations by partly shielding them from the mainstream market selection environment.

This chapter proposes the adoption and adaptation of concepts and insights from transition studies into PSS design and innovation. In particular, the chapter seeks to explore the potential contribution that socio-technical experiments can make in stimulating, supporting, and hastening the process of introduction and scaling up of sustainable PSS innovations. A particular emphasis is on the design approaches and capabilities required to develop and manage this kind of socio-technical experiments.

1.4 Chapter Organization

The chapter begins by illustrating the barriers which hinder the implementation and diffusion of sustainable PSS innovations. Then it presents how concepts and theories from transition studies (in particular, the concept of socio-technical experiment) could provide a framework to understand and orient radical innovations. After illustrating the research questions and approach, the chapter continues by

presenting an action research project, called *Cape Town sustainable mobility*, aimed at designing and implementing a radical innovation: a sustainable mobility PSS for the disabled and elderly people in the suburban areas of Cape Town. Building upon the project experience, the chapter discusses the implications for design and management. In this respect, the chapter provides a first framework of action by suggesting the adoption of key approaches and principles.

2 The Challenge of Implementing Sustainable Product-Service System Innovations

Despite all the knowledge accumulated on understanding how to develop sustainable PSSs, and despite their potential win-win characteristics, the diffusion of this concept is still very limited. The reason is that sustainable PSSs are intrinsically radical innovations, and the adoption of such business strategies brings with significant corporate, cultural, and regulatory challenges.

For *companies* the adoption of a sustainable PSS strategy is more complex to be managed than the traditional way of delivering products alone. In fact there is the need to implement changes in corporate culture and organization in order to support a more systemic innovation and service-oriented business (UNEP 2002), and the need to cope with an internal resistance to extend the involvement with a product beyond point-of-sale (Stoughton et al. 1998). Moreover, since PSSs determine the changing of systems and sources of gaining profit, this could deter producers from employing this concept (Mont 2002): PSSs in fact require medium-long-term investments and are connected with uncertainties about cash flows (Mont 2004). A further obstacle is the difficulty of quantifying the savings arising from PSS in economic and environmental terms, in order to market the innovation to stakeholders both inside and outside the company, or to the company's strategic partners (UNEP 2002). In synthesis companies require, as a consequence, new design and management knowledge and skills.

For *customers*, the main barrier is the cultural shift necessary to value an ownerless way of having a satisfaction fulfilled, as opposed to owning a product (Goedkoop et al. 1999; Mont 2002; UNEP 2002). In fact, as argued by Behrendt et al. (2003), the problem is that solutions based on sharing and access contradict the dominant and well established norm of ownership, and requires new customer habits and behaviors. It has also to be underlined that product ownership not only provides function to private users, but also status, image, and a sense of control (James and Hopkinson 2002); elements which are sometimes missing in ownerless based solutions. Another obstacle is the lack of knowledge about life cycle costs (White et al. 1999), which makes it difficult for a user to understand the economic advantages of ownerless based solutions.

On the *regulatory* side, environmental innovation is often not rewarded at the company level due to lack of internalization of environmental impacts (Mont and Lindhqvist 2003). In addition, governments face difficulties in implementing

appropriate policies to create corporate drivers to facilitate the promotion and diffusion of this kind of innovations (Mont and Lindhqvist 2003; Ceschin and Vezzoli 2010).

In sum, sustainable PSS innovations usually encounter the opposition of the existing socio-technical context because in most of the cases they require a profound redefinition of the production and consumption modalities. Therefore, they may cope with the current and dominant socio-technical systems (and their established and relatively stable set of rules and networks of actors) (Tukker and Tischner 2006b; Ceschin 2013). In other words they can be usually considered radical innovations, and as such they may involve fundamental changes in *culture* (the sum of norms and values that together constitute the perspective from which actors think and act), *practice* (the sum of routines and behaviors), *institutional structures* (rules, regulations, power structures), and *economic structures* (market, financing, consumption, production) (Rotmans and Loorbach 2010).

As a result sustainable PSS innovations are often immature when they enter the market and therefore have high probability not to survive under the mainstream selection environment. Since the diffusion of sustainable PSSs requires changes in contextual factors conditions, a much broader system approach is therefore needed to facilitate the societal embedding of this kind of innovations.

3 Insights from Transition Studies

The challenge of understanding radical innovations has been addressed by innovation studies. Recent developments in this field (in particular the Strategic Niche Management and Transition Management approaches) have focused on socio-technical transitions and have brought insights on how to facilitate the introduction and diffusion of radical innovations.

3.1 Dynamics in Socio-Technical Transitions

Transition theorists refer to system or radical innovations as major changes in the ways societal functions such as transportation, communication, housing, and feeding are fulfilled (Rip and Kemp 1998; Geels 2002). System innovations are complex and long-term processes that require changes in the social, economic, technological, and policy domains. Through historical socio-technical case studies, transition scholars have analyzed how system innovations take place and have elaborated a model called the multilevel perspective on transitions (Geels 2002) that describes the dynamics regulating these complex and long-term processes. The multilevel perspective distinguishes three analytical concepts (ibid.):

- the *socio-technical regime*, which can be defined as the dominant way of innovating, producing, distributing, consuming, etc. It refers to a dynamically stable set of culture, practices, and institutions (Rotmans et al. 2001) related to a specific field (e.g., mobility or energy). Regimes are relatively stable and resistant to change because their practices, rules, and institutions guide regime actors in a specific direction discouraging the development of alternatives;
- the *niche*, a protected space that is "isolated" from the influence of the dominant regime, where radical innovations can be tested and nurtured, become more mature, and potentially challenge and change regime practices and institutions; and
- the *landscape*, that is, the relatively stable social, economic, and political context in which actors interact, and regimes and niches evolve. It represents the background for regimes and niches. It includes structural socioeconomic, demographic, political, and international developments, but also events such as wars or environmental disasters. It can influence the regime and the niches but cannot be influenced by them (at least in the short term).

Transitions take place through the fruitful coupling of developments at all three levels (Rip and Kemp 1998; Geels 2002): when the regime is sufficiently open to accept radical innovations; when there is enough pressure from the landscape; and when radical innovations developed in niches can exploit the opportunities for change.

Niches are therefore a crucial step toward a regime shift because they can shield radical innovations from market competition and allow continuous experimentation to lead innovations to mature (Schot and Hoogma 1996). In other words, niches can act as "*incubation rooms*" for radical novelties (Geels 2002), where socio-technical experimentation and learning processes take place. Thus, it clearly emerges that an important prerequisite to the introduction of radical innovations is the creation of partially protected environments where to conduct *socio-technical experiments*.

3.2 The Role of Socio-Technical Experiments in Triggering Radical Innovations

Several concepts referring to socio-technical experimentation have been elaborated in the last years.[4] Even if each concept presents its own peculiarities, a socio-technical experiment can be described as a partially protected environment where a broad network of actors can learn and explore (I) how to incubate and improve radical innovations and (II) how to contribute to their societal embedding. Its main characteristics are as follows.

[4] The most diffused ones are: *social experiments* (Verheul and Vergragt 1995), *experiments in Strategic Niche Management* (Kemp et al. 1998), *transition experiments* (Rotmans et al. 2000; Van den Bosch 2010), *bounded socio-technical experiments* (Brown et al. 2003).

Firstly, *experiments are conducted with radical innovations*: innovations that require substantial changes on various dimensions (sociocultural, technological, regulative, and institutional).

Secondly, experiments are not simple tests undertaken inside a company's laboratory but are implemented in *real life settings*. The idea is that only this kind of experience, outside the R&D settings, can truly lead to testing and improving radical innovations. Moreover, these experiments take place at a small-scale but strive to trigger changes at a wider scale.

Thirdly, these experiments do not include only the actors more strictly linked to the innovation (such as producers, partners and suppliers). Instead, *a broad variety of actors is involved*, including also users, policy makers, local administrations, NGOs, consumer groups, industrial associations, research centers, etc. In other words the aim is to recreate a whole socio-technical environment in a small-scale. In this sense these experiments are characterized by a broad participatory approach (i.e., a variety of actors is involved in discussing, negotiating, cocreating, and developing the innovation).

Fourthly, the experiment is implemented in a *space protected from the mainstream selection environment*. The idea is to temporarily shield the innovation from the selection pressure (which consists of markets and institutional factors), creating an alternative selection environment. There are different forms of protection: financial protection (such as strategic investments by companies, tax exemptions, and investment grants) and socio-institutional protection (such as the adoption of specific regulations).[5]

The aim of these experiments is to *learn about and improve the innovation on multiple dimensions*, not only the technical, economic, market demand, and usability aspects, but also the political, regulative, environmental, cultural, and social dimensions. In this sense the innovation is maintained open to continuous adjustments and refinements. In general, experiments can also serve to identify the various resistances and barriers (institutional, regulative, economic, etc.) that can potentially hinder the future implementation and diffusion and understand how to address them.

Moreover, and this is a crucial aspect, socio-technical experiments are not only aimed at testing and improving the innovation, but also at *stimulating changes in the socio-technical context*, in order to create the most favorable conditions for the innovation. In other words experiments are also strategically used to influence contextual conditions in order to favor and hasten the societal embedding process (for example, by influencing local administrations to adopt policy measures that support the innovation, or stimulating potential users to change their behaviors and routines).

[5] The crucial dilemma of protection measures is to find the right balance between the need to nurture the innovation and the need to prepare it for the selection pressures of a market environment (Weber et al. 1999).

In sum, socio-technical experiments can enhance the process of transitioning to sustainable radical innovations because they can simultaneously act as (Ceschin 2012, 2014b):

- *Labs*, to test, learn about, and improve the innovation on multiple dimensions (technical, usability, regulative, political, economic, and sociocultural). This entails a *"deepening"* process (Van den Bosch 2010), which means learning as much as possible about an innovation within a specific context, enabling actors to learn about local shifts in culture (ways of thinking, values, reference frameworks, etc.), practices (habits, ways of doing things, etc.), and institutions (norms, rules, etc.). The result is a continuous development and reinforcement of the new set of culture, practices, and institutions related to the new innovation.
- *Windows*, to raise interest in the innovation project and the related actors, disseminate results, build up synergies with existing similar projects/initiatives, and attract and enroll new actors (e.g., new users or potential partners). In other words experiments can be used as communication and conversation tools to stimulate and facilitate interaction with new social actors.
- *Agents of Change*, to influence contextual conditions in order to promote and quicken the transitioning process. Experiments should be conceived to create and diffuse new ideas and knowledge, and stimulate various social groups (users, public institutions, companies, etc.) to change their perspectives, beliefs, and behavior. Learning processes are seen as drivers for radical changes, and socio-technical experiments should represent a stimulus to induce these processes, and lead actors to reframe their behaviors and attitudes (for example, they can stimulate users to rethink and change their behaviors and routines).

It has however to be stressed out that single experiments do not result in regime changes. Sequences of articulated local experiments are needed to gradually reinforce themselves and lead to wider changes (Raven 2005; Geels and Raven 2006). This is the process that Van den Bosch (2010) calls "*broadening*", which means replicating the experiment in different contexts and linking it to other projects and initiatives. Since learning within an experiment is limited, experiments should be repeated in other contexts, in order to learn about different designs in different settings. It is also important to strengthen synergies with other local similar projects and initiatives. In this respect, Meroni (2008) and Jegou (2011) speak about "*synergizing*" or "*acupunctural planning*", a set of synergic self-standing local initiatives that, adopting as a metaphor the practice of the traditional Chinese medicine, aim to generate changes in large and complex systems operating on some of their sensible nodes.

From what it has been said above, it appears promising to create a bridge between the disciplines of PSS design and transition studies. The hypothesis is that the adoption and adaptation of principles and concepts from transition studies can enrich and advance the current debate on the role of design in PSS innovation.

4 Research Questions and Approach

If transition studies can provide insights on how radical innovations can be initiated and supported, the questions at this point are: how lessons from transition studies can be integrated into PSS design and innovation? What role can PSS designers play in initiating, supporting, and developing socio-technical experiments? What design approach and capabilities do they require?

When aiming at addressing this kind of research questions, the main challenge is related to the timeframe of sustainable radical innovations. In fact the process of introduction and scaling up of sustainable PSSs and sustainable social innovations might require several years. Therefore, the implementation and testing of design approaches/strategies cannot be studied in a real time perspective. In order to tackle this challenge, the adopted methodology was based on the combination of three different research approaches[6] (Fig. 1).

- The first step was a *case study research aimed at verifying if principles and concepts from transition studies were also valid for PSS innovations* (the case study is not described in this paper but in Ceschin (2012, 2013). The process of implementation and scaling up of six sustainable PSSs was analyzed.[7] The case study research showed that the setting up of sequences of socio-technical experiments (capable to act as *Labs*, *Windows*, and *Agents of change*) represents a crucial step to support and hasten the incubation, testing, and maturation of sustainable PSS innovations, and potentially their scaling up.
- Building upon the results of the case study research, the second step focused on exploring the implications for design. An *action research project*, aimed at designing, introducing, and diffusing a sustainable mobility system in the sub-urban areas of Cape Town, was undertaken. The project was used to reflect on the design approach adopted, and constantly develop insights on how to refine and make it more effectively applicable to practice. This was an iterative process in which researchers were continuously involved in applying the design approach and reflecting on how to improve it. In fact action research seeks to *"bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people"* (Reason and Bradbury 2001), in an iterative cycle of planning, acting, observing, and reflecting (Kemmis and McTaggart 1988). The author was part of a research team directly involved in the project management, participating in the design activities as well as interacting with the other actors and practitioners involved in the project.

[6] For a detailed description of the research methodology see Ceschin (2012).

[7] In particular the analysis focused on: the role of socio-technical experiments; the socio-economic actors involved during the process; the negotiation processes and alignment of actors' expectations; the actors learning processes.

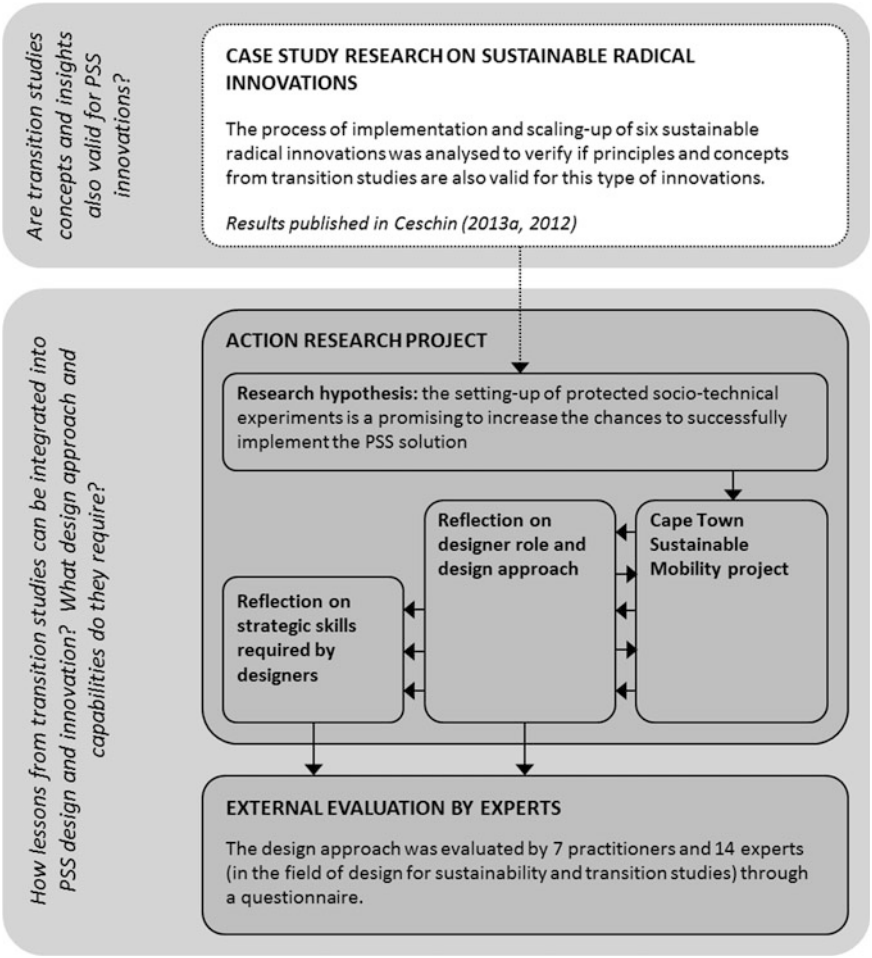

Fig. 1 Research questions and approach

- The third step was an external assessment made by academic experts and practitioners in the field of PSS innovation and transition studies. The results of the action research project were used to elaborate a design approach. This design approach was evaluated by 7 practitioners and 14 academic experts through a questionnaire. In particular participants were asked to evaluate the design approach in relation to its potential practicality (how much the approach is usable in the settings for which it has been conceived), and effectiveness (how much the use of the approach might led to desired outcomes). Both open-ended and closed-ended questions were included in the questionnaire. 6 out of 7 practitioners affirmed that they could use the approach (partly or entirely) as guidelines for on-the-job application. Regarding academic experts, 13 out of 14 stated that the approach and the action research project are useful as reference

material (in particular as a teaching resource), and 9 out of 14 affirmed that they could use it as guidelines for on-the-job application (in particular in applied research projects).

In sum, the process to answer to the research questions was not linear but rather *iterative* and *interactive*. *Iterative*, because the design approach was implemented in a practical design experience and continuously developed, adjusted, and refined during the whole design process. *Interactive*, because the process was characterized by a continuous collaboration among researchers, practitioners, and experts (who continuously brought input on how to improve the design approach). Even if the research had a nonlinear (iterative) character, the choice is to not present the activities undertaken in a completely chronological way. Rather, for the sake of clarity, the choice is to firstly present the action research project and then the reflection on the design role and approach.

5 Implications for PSS Design and Management

5.1 Cape Town Sustainable Mobility Project

5.1.1 Project Background

The Cape Town Sustainable Mobility project currently involves, as main actors, *Shonaquip* (a small South African company producing wheelchairs and mobility equipment for disabled people), *Bicycle Empowerment Network* (BEN Bikes, a local association aimed at promoting sustainable mobility projects and initiatives), the *Cape Peninsula University of Technology* (CPUT), and *Politecnico di Milano* (Polimi).

The aim of the project is to introduce and diffuse a sustainable mobility PSS for the disabled and elderly people in the suburban areas of Cape Town. In particular, the system is expected to offer disabled and elderly people increased mobility services from their homes to the nearest public transport stops, or to local schools, hospitals, etc. Technically, the mobility system is designed around a solar, electric, and human powered light vehicle.[8] This mobility system is especially conceived to create benefits in suburbs such as those in Cape Town, which are often characterized by substantial mobility problems due to a lack of high quality public transport services. The initial PSS concept was developed by Hazal Gumus for her Master's degree thesis,[9] conducted in collaboration with Polimi and CPUT.

[8] Prototyped by IPSIA "A. Ferrari" Maranello and Politecnico di Milano in 2006.

[9] Gumus, H. (2009) Kanga: a sustainable system design for the transportation of learners with disabilities in Cape Town—South Africa. Master's degree thesis. Politecnico di Milano.

The thesis project raised the interest of Shonaquip and in July 2009, a process to socially embed the PSS innovation officially started.

The initial assumption which drove the implementation strategy was that the setting up of protected socio-technical experiments (with the characteristics described in Sect. 3.2) would have been promising to increase the chances to successfully implement the PSS solution.

The activities undertaken in the project can be grouped in three main phases:

- *incubation*, aimed at setting up the conditions needed to start the societal embedding process;
- *socio-technical experimentation*, aimed at implementing the first socio-technical experiments, to learn and explore how to improve the PSS innovation and how to favor and support its societal embedding;
- and *scaling up*, aimed at removing protection and transforming the experiments in a fully operative service.

At the time of the writing of this chapter, the project consortium is in between the second and the third phases.

5.1.2 Incubation

The project started with the first formalization of the project vision. The aim was to translate the initial project idea into a set of visual artifacts to clearly and effectively communicate the PSS innovation characteristics and its potential benefits to different types of actors. A set of visualization tools was used to support this task.[10]

Starting from the PSS vision, the next step was the development of a draft transition path (action plan), to identify the main steps between the present situation and a future situation with the PSS implemented. Actors involved in these first two steps were the research team (made up of academics and research students from *Polimi* and *CPUT*) and *Shonaquip*.

The following step was the identification of actors to be involved in strategic discussions. It was decided to firstly include a restricted group of actors (the ones considered crucial to start discussing and strengthening the PSS concept and the transition path) and later extend participation to a wider variety of actors such as the Cape Town municipality, the local public transport company, and local media. Actors initially involved were potential users, local citizens, technology experts from CPUT, and two local NGOs: *Disability Workshop Enterprise Development, DWDE* (active in providing job opportunities to disabled people) and *the*

[10] Among them: (I) the *offering diagram*, to succinctly visualize what the PSS offers to customers; (II) the *interaction table*, to visualize how the PSS offer is delivered to customers (sequence of interactions occurring at front-desk level and back-stage level); (III) the *system map*, to visualize the structure of the value chain; (IV) the *sustainability diagram*, to visualize the environmental, socio-ethical and economic benefits delivered by the PSS.

Reconstructed Team (an association aimed at reintegrating into society former drug addicts and criminals).

A two-day workshop was organized in September 2009. The workshop began with the illustration of the project vision and the draft action plan; project promoters used the visual artifacts elaborated in the previous steps as a basis for the presentation. The first day focused on discussing and adjusting the project vision. In order to stimulate discussion, participants were asked to analyze the vision in relation to different socio-technical dimensions (technological, political, cultural, etc.) and identify conflicting issues. Participants were then asked to think about potential alternatives to solve the conflicting issues that had emerged. The collective discussion about the PSS concept and the context opportunities and barriers resulted in adjusting and refining the project vision at the end of the first day. The second day of the workshop focused on discussing the transition path, identifying: (I) steps and actions to be undertaken; (II) actors to be involved in the different steps; and (III) roles and tasks to be assigned to each actor. In sum, the workshop led to:

- *Adjust the PSS concept* It was decided to also offer a transportation service for tourists within the city center (in order to increase the sources of revenue). In relation to the vehicle, the design requirements were specified.
- *Adjust the transition path* In particular, it was agreed that the next step would have been the implementation of a small-scale experiment in the Athlone district (focused only on the transportation of elderly people), to be later extended to other suburban areas of Cape Town.
- *Identify implementation barriers* The main problem that emerged was the unavailability of financial resources to entirely finance the vehicles' production and the pilot implementation. Moreover, another concern was related to the local availability of solar panels and lithium batteries. Finally, it emerged that local regulations did not allow the use of human powered vehicles for public mobility services.
- *Identify new actors to be involved* It was recommended to establish connections with Cape Town municipality (and in particular the transport department) to solve the previously mentioned regulative issues and develop synergies with the public transport service. Moreover, it was suggested to identify and involve an actor that could manage the tourist transportation service in the city center.
- *Agree on the tasks to be assigned to each actor* In particular it was agreed that Shonaquip would have managed the production of the vehicles (in collaboration with DWDE) and managed the service (in collaboration with the Reconstructed Team). CPUT would have redesigned the vehicle and contacted the actors to be involved. Polimi would have collaborated in the vehicle redesign and in seeking financial resources for the pilot project.

In sum, the result of this phase was the building up of a first network of actors and the development of a shared project vision and a first hypothesis of transition strategy. The involvement in this first phase of a broad variety of actors was crucial in order to allow the project consortium to focus on different dimensions of the problem (technical, economic, sustainability, usability, etc.). On the other hand, it

emerged the difficulty to coordinate and manage discussions among a variety of actors, and the need of a network manager capable to act to manage controversies and conflicts within the network and establish bridges between different actors' expectations.

5.1.3 Socio-technical experimentation

In the second phase two socio-technical experiments were designed and implemented. The first experiment was implemented in the Athlone district (Bridgetown), in collaboration with the *Reconstructed Team*, and was aimed only at testing and improving the technical and usability aspects of the PSS innovation. In the first stage, before concluding the vehicle construction, an existing rickshaw was used to test the service of transporting the elderly in the neighborhood, involving them in identifying critical issues, and suggesting potential improvements (Figs. 2 and 3). In the second stage, once the vehicle prototype was completed, a series of technical tests took place (Figs. 4 and 5). After having settled the vehicle's technical problems and collected the first feedback on the service, the project consortium was ready to start the experimentation with users and the new vehicle. However, at this stage the *Reconstructed Team* decided to leave the consortium. It was an unexpected decision, even because of the positive response given by users during the service test. They explained the decision saying that due to other activities there were no personnel available to manage the complexity of this experimentation. On the other hand they confirmed the interest to implement in future, after the experimentation phase, a full operational service with a fleet of vehicle.

At this stage the project consortium needed to find another actor willing to continue the experimentation and manage the implementation of a fully operative service. A contact was established with *BEN Bikes (Bicycle Empowerment Network)*. BEN Bikes is a local association aimed at addressing promoting sustainable

Fig. 2 First socio-technical experiment: photos taken during the service test (July 2011) (Reproduced from Ceschin 2012)

Fig. 3 First socio-technical experiment: photos taken during the service test (July 2011) (Reproduced from Ceschin 2012)

Fig. 4 First socio-technical experiment: photo taken during technical test of the vehicle (August 2011) (Reproduced from Ceschin 2012)

Fig. 5 First socio-technical experiment: photo taken during technical test of the vehicle (August 2011) (Reproduced from Ceschin 2012)

mobility projects and initiatives and providing job opportunities for low-income people. For this purpose they have several centers located in the suburban areas of Cape Town. The defection of the Reconstructed Team and the involvement of BEN Bikes led to the adjustment of the project vision. In particular, BEN Bikes proposed to use their suburban hubs as operative centers to manage local mobility services and vehicle maintenance. For this reason the second socio-technical experiment was undertaken in collaboration with one of these hubs, and in particular the one placed in the Lavender Hill suburban area. This second experiment was implemented in October 2011 and is still running. It was designed and organized in order to act as a *Lab, Window*, and *Agent of Change*.

The first aim of the experiment was to test and improve the PSS innovation (***experiment as Lab***). A service for the transportation of elderly, sick, and disabled people from their home to any point of interest around the Lavender Hill community (such as to the hospital, church, or the post office) was implemented and is currently running (Fig. 6). The main role of the local BEN Bikes center is to manage the service as well as take care of vehicle maintenance. The experiment is currently used to:

- *Test and improve the vehicle* the role of BEN Bikes is to check the vehicle on a daily basis, in order to report the technical problems and identify potential solutions (in collaboration with Shonaquip, CPUT, and Polimi);

Fig. 6 Second socio-technical experiment: testing the PSS (October 2011) (Reproduced from Ceschin 2012)

- *Test and improve the service* the quality of the service is assessed using questionnaires and semi-structured interviews. Test users are asked to evaluate the service, identify critical aspects, but also to propose potential alternatives and improvements;
- *Test and improve the PSS configuration* verify the PSS configuration in terms of stakeholder value chain and business model and identify potential improvements to be implemented. Meetings involving project promoters are scheduled on a monthly basis to discuss these issues;
- *Identify barriers* the pilot is also used to identify potential implementation and diffusion barriers on multiple dimensions (e.g., sociocultural and regulative). For this reason various actors (such as the local community, local institutions, and NGOs) are involved to express their opinions, remarks, and suggestions (regarding this see also experiment as a Window and Agent of Change). Of course most of the barriers were identified in the previous steps (during the incubation and the first experiment). However, project promoters considered it crucial to use the experiment to identify any further potential barriers.

The experiment was also designed to raise interest in the innovation project and attract and enroll new potential users and other relevant actors (***experiment as Window***). It represented a working prototype of how things could work, a conversation tool aimed at enhancing participation and enabling discussions with a larger audience of relevant socioeconomic actors. With respect to this, the BEN Bikes center has been conceived as a sort of "open gallery" to allow visitors to see, touch, and acquire information about the project (Fig. 7). Interested people can freely visit the center and better understand the features of the project and its environmental, socio-ethical, and economic benefits. Moreover, demonstration visits are organized with specific actors (for example potential users but also potential future partners, local institutions, etc.). BEN Bikes personnel have been trained to be able to effectively describe the project and in particular to illustrate the potential advantages for different kinds of actors. This was considered particularly important by project promoters because there was the need not only to disseminate information about the project but also to stimulate changes in actors' behavior and routines (for example stimulate potential users to reflect on their mobility habits and consider the benefits that the solution could provide to them). This is strictly connected to the third function of the experiment: experiment as Agent of Change.

The experiment was also conceived to stimulate changes in actors' behavior and habits and create favorable conditions for the introduction and diffusion of the PSS (***experiment as Agent of Change***). Therefore, in October 2011 an event for relevant actors was organized. The aim of this event was to officially launch the experiment, illustrate the potential future developments, and discuss with invited actors how to support and create the conditions to accelerate the project. The event took place at the Lavender Hill BEN Bikes center.

The actors invited to the event were:

Fig. 7 Second socio-technical experiment: interested people visiting the Lavender Hill BEN Bikes center (October 2011) (Reproduced from Ceschin 2012)

- the *Cape Town municipality* (in particular the Transport department and the Environmental Resource Management department), because of their potential interest in the project and their direct influence on local transport regulation;
- *local actors* potentially interested in implementing specific mobility services based on the MULO vehicle: in particular local schools and the local clinic (Philiza Abafazi Bethu);
- and *local media*.

The event was structured in four parts:

- a first part aimed at illustrating the project (economic, environmental, and socio-ethical benefits) and presenting the socio-technical experiment;
- a second part aimed at illustrating the project future opportunities;
- a vehicle ride demonstration;
- and a workshop with participants to discuss the potential synergies that could be built to sustain and expedite the project.

The results of the event were positive. Firstly, local actors evaluated the project as valuable for local communities, because of its potential to bring tangible economic, environmental, and socio-ethical benefits. Secondly, one of the actors involved, the local clinic, stated their interest in implementing a service for the transportation of patients as soon as possible. Thirdly, the Transport department of Cape Town confirmed its interest in strengthening synergies between the PSS and

the suburban bus lines. In addition, the Transport department stated they would have planned meetings in their agenda to discuss the policy measures needed to support and foster the particular vehicle typology adopted in the PSS.

5.1.4 Main Intermediate Project Results and Next Steps

Starting from an initial PSS concept proposed by a small network of actors, the first project result is the building up of a broad network of actors and the alignment of their expectations toward the achievement of a shared vision. Currently, the main actors committed to the project are a company (Shonaquip), a NGO (BEN Bikes), a local institution (the Cape Town municipality), and two universities (Polimi and CPUT).

The second project result is the implementation of two socio-technical experiments in suburban areas of Cape Town. The first, in the Athlone district, tested a service for the transportation of elderly people and the technical aspects of the vehicle. The second, at Lavender Hill, is much more articulated and is still running. It is currently aimed at: testing and improving the whole PSS, raising interest in the project and enrolling new relevant actors, stimulating actors (such as potential users) to change their behavior and routines, and stimulating changes in the socio-technical context (such as changes in the regulative framework).

Because the second socio-technical experiment is still ongoing, it is currently not possible to develop definitive conclusions. Nevertheless, it is possible to say that the whole journey strengthened the stakeholder network, served to refine and improve the PSS concept, and created important opportunities for future developments. In this regard it can be mentioned that:

- local actors located at Lavender Hill (the clinic and the school) stated their interest in implementing mobility services specifically dedicated to their needs;
- the 14 BEN Bikes centers, located in the Cape Town suburbs, could represent crucial hubs to replicate the experiment in other areas of the city;
- BEN Bikes is also interested in implementing a service for tourist transportation in the city center;
- the Cape Town municipality is interested in creating synergies with the PSS and the public transport services (in particular in relation to the suburban bus lines).

5.2 A New Design and Management Approach: Designing Transition Paths and Socio-Technical Experiments

In the Cape Town Sustainable Mobility project, the first important consideration to be done is that *design* had a role not only in conceiving and developing the PSS innovation but also in supporting and catalyzing the process of transitioning toward the implementation and scaling up of the innovation. We can say that the approach adopted in the project was characterized by a broad design scope. In fact, in

addition to the ideation and development of the PSS concept (the long-term project vision), the focus has been in the *designing of a transition path* (Fig. 8).

In particular the design scope focused on: (i) the *design of the sequence of steps* to gradually reinforce/improve the innovation and foster its societal embedding (incubation, socio-technical experimentation, and scaling up), and (ii) the *identification and involvement of the actors* that can support the societal embedding process in the various steps of the transition path.

In other words, design focused not only on generating a vision of how a mobility need could be met in an alternative and more sustainable way, but also on how to achieve that vision. And in this transition path a crucial role is played by socio-technical experiments, conceived not only as *labs* and *windows*, but also as *agents of change*.

The first consequence of this design approach is that design should simultaneously focus on different time frames. The Cape Town Sustainable Mobility experience showed that project actors adopted a *multiterm design attitude* (Fig. 9), because they simultaneously focused on:

- the *project long-term goal (project vision)* the achievement of a future in which the Cape Town Sustainable Mobility system is part of the usual way in which a particular mobility need is fulfilled; and

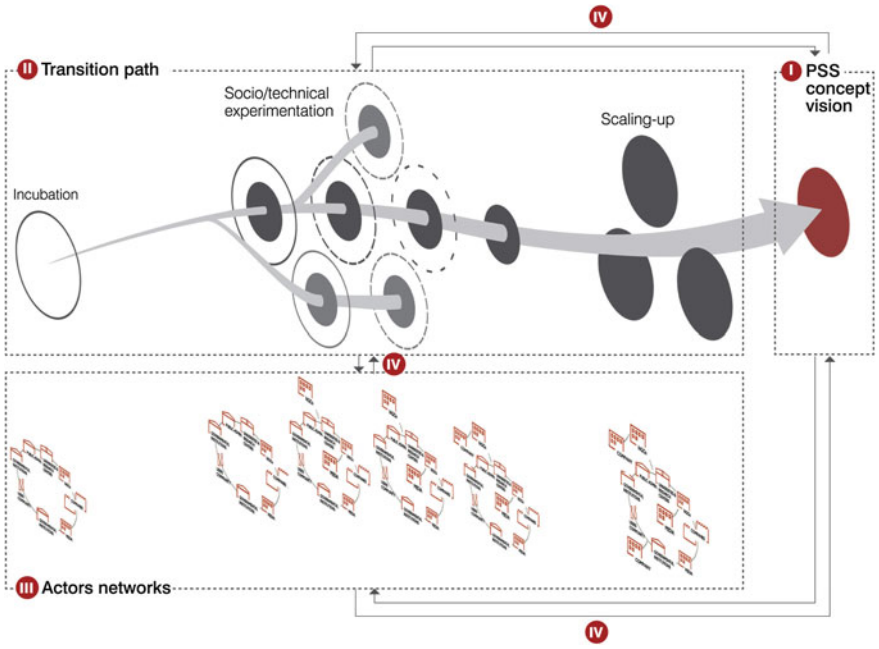

Fig. 8 A broader design scope. Design has a role not only in ideating and developing sustainable innovation concepts (*1*), but also in triggering and orienting transitioning processes through the designing of the sequence of phases and steps (*2*), and identification of the actors to be involved along the whole process (*3*) (Reproduced from Ceschin 2012)

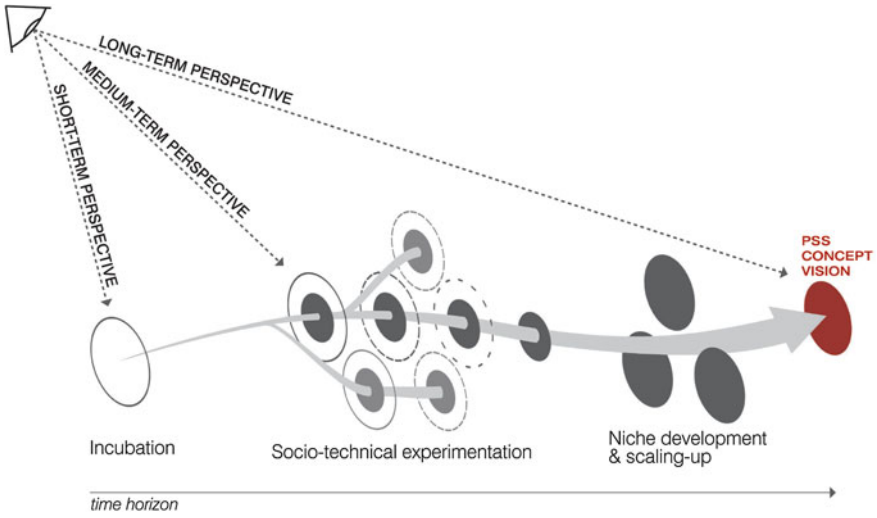

Fig. 9 The multiterm design attitude. The focus is simultaneously on different time frames (Reproduced from Ceschin 2012)

- the *short- and medium-term actions* to be undertaken in order to orient the innovation journey toward the achievement of the project vision: the incubation of the innovation and the implementation of two socio-technical experiments.

The project vision and the strategy to achieve the vision are not designed separately. Traditionally, the design of a solution is seen as a separate activity from the realization of that solution. Here, there is not this dichotomy: the design of the project vision requires to be done simultaneously with the design of the transition path.

We can also observe that a strategic design approach has been adopted by project promoters (Fig. 10). In fact the project actors focused not only on the solution (the PSS innovation) but also on the technical, sociocultural, institutional, and organizational contextual conditions that might have favored or hindered the societal embedding process. The project consortium tried to trigger changes in the socio-technical context, in order to create the most favorable conditions for the innovation. This was achieved by involving those actors that, directly or indirectly, could have affected regime practices and institutions, and by stimulating changes in their behaviors, attitudes, and practices. For example, one of the identified contextual barriers for the introduction of the PSS was related to the local road regulation. In order to solve this problem, PSS promoters involved in the project, the municipality of Cape Town, to stimulate the Transport department to modify such regulation. Moreover, the involvement of the transport department was also important to start developing proposals for the integration of the PSS concept with the local suburban public transport system.

Transition studies' scholars suggest that establishing and developing a broad and heterogeneous socioeconomic network is crucial to protect, support, and foster radical innovations (Raven 2005). In particular it is crucial to involve outsiders and

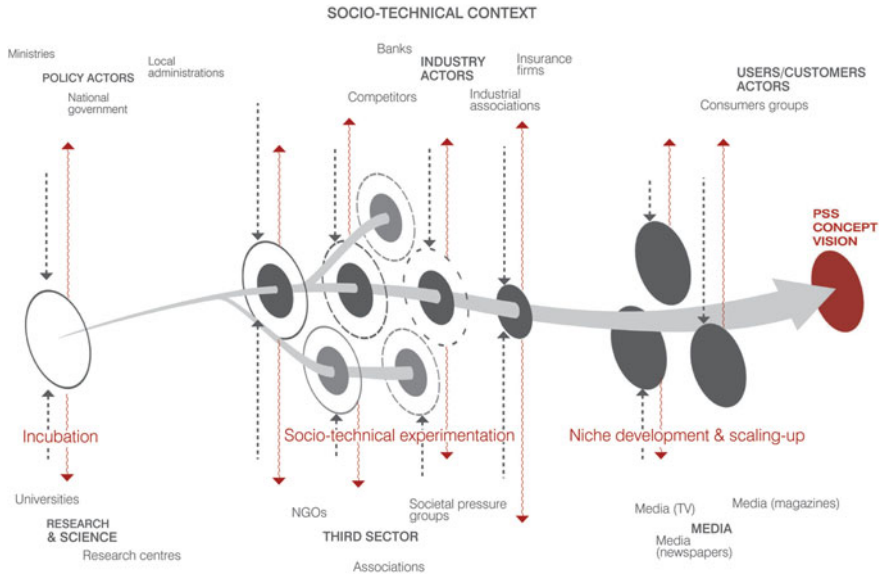

Fig. 10 A strategic attitude should be adopted in the designing and management of societal embedding processes. In this sense, the transition path is aimed at influencing changes in the socio-technical context in order to create favorable conditions for the introduction and scaling up of the innovation (*red arrows*) (Reproduced from Ceschin 2012)

insiders actors (with respect to the dominant socio-technical regime): *outsiders* (e.g., outsider firms, scientists, societal pressure groups) are needed in a network because they do not share the current regime institutions and practices and therefore they may contribute in the development of innovations that deviate from that regime (Van de Poel 2000); *insiders* (e.g., policy makers, governmental institutions) should be involved because they can support and protect the innovation in the start-up phase (in order to give experiments legitimacy and stability) and in the subsequent phases (in order to create widespread support for scaling up the new practices and institutions related to those experiments) (Weber et al. 1999). In other words, it is required the involvement of a broader network of actors (Fig. 11). This is what the project actors tried to do during the Cape Town Sustainable Mobility design experience. In fact, they focused not only on involving the actors that could have played a role in the value chain (Shonaquip, BEN Bikes, suppliers, users, etc.), but also on other relevant actors belonging to the socio-technical context in which the PSS was being introduced (NGOs such as DWDE, the Cape Town municipality, local media, etc.). In other words they focused on creating a broad network characterized by scientific, social, economic, politic, and cultural linkages. Thus, when designing transition paths (and sequences of socio-technical experiments), it is crucial to involve those actors that can start a bottom-up process of change, but also those actors that can create favorable conditions to protect and support the innovation through top-down processes.

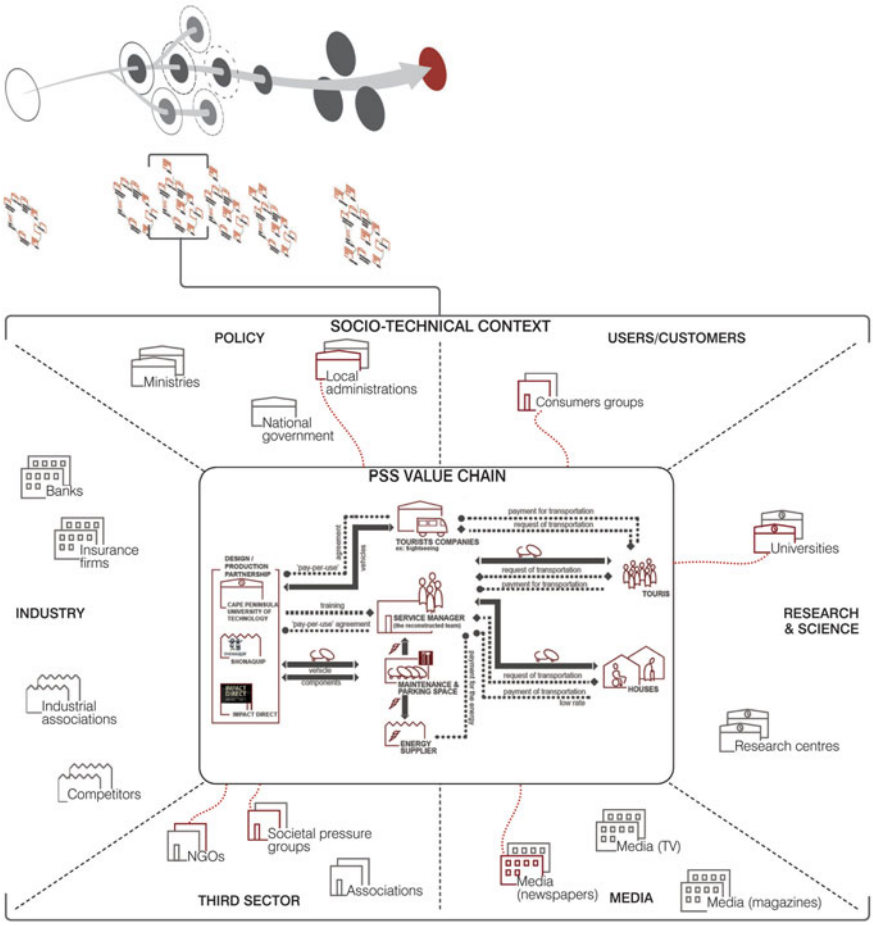

Fig. 11 The actors involved in the process of transitioning are not only the ones that are more directly linked with the innovation (value chain), but also the ones that could have an influence in the socio-technical context (Reproduced from Ceschin 2012)

Finally, it is possible to say that the approach adopted in the project was characterized by a dynamic design and management attitude (Fig. 12). The project vision was not a static outcome to be achieved; it was continuously adjusted as a result of changes in internal and contextual conditions and as a result of what was learnt by actors during the societal embedding process. For example, the defection of the Reconstructed Team led to the involvement of BEN Bikes in the project network, which in turn led to adjusting the project vision. Adjustments in the project vision led of course to modifications in the transition strategy. Even the network of actors involved in the societal embedding process was dynamic: the composition, as well as the required tasks for each actor, continuously evolved in time. For example, the Cape Town municipality was involved only in the second

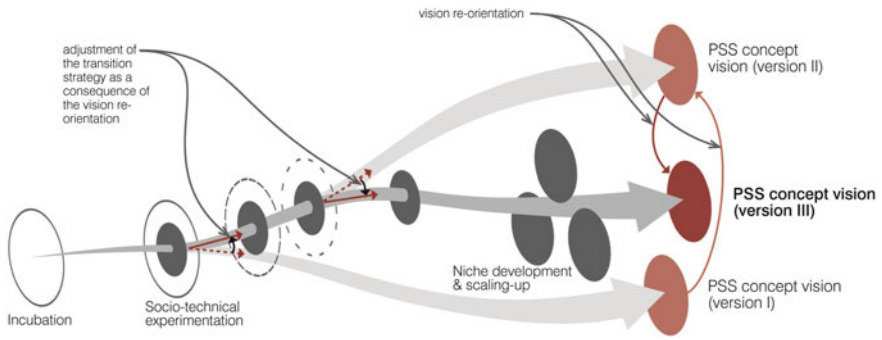

Fig. 12 A dynamic design and management attitude should be adopted. The project vision is not a static outcome to be achieved, and the transition strategy is not a fixed roadmap to be covered. Changes in internal and contextual factors, unpredictable events, learning process by project actors during the societal embedding process can lead to adjusting the project vision and, as a consequence, to reorient the transition strategy (Reproduced from Ceschin 2012)

phase of the societal embedding process, when institutional protection for the experiment was required.

In sum, in the project it was therefore crucial to adopt a flexible and dynamic approach. An open-ended approach (Hillgren et al. 2011) is required because of uncertainty, unpredictable events, changes in contextual conditions, and conflicting and alterable actors' expectations and views.

A New Set of Strategic Skills

Based on the discussion above, it emerges that new strategic skills are required to design and manage the implementation and scaling up of sustainable PSS innovation (Ceschin 2014a, b):

- **Translating the project vision into a transition strategy**. PSS designers should learn to translate a vision into the steps needed to support its implementation and scaling up. In other words they must learn to design transition paths. Within these transition paths a crucial role is played by socio-technical experiments. PSS designers should therefore learn to design these kinds of experiments and in particular to design sequences of experiments capable to act as *labs*, *windows*, and *agents of change*.
- **Identifying and involving a broad variety of actors** to support the societal embedding process. PSS designers should learn to identify the proper actors to be involved in the various phases of the process. Since the different phases of a transition path require different network compositions, PSS designers should be capable to design a dynamic network of actors: a network in which the composition, as well as the required tasks of each actor, continuously evolve in time. Moreover, PSS designers should be capable of thinking not only about the actors that could be part of the value chain, but also about the actors that could have the power and willingness to directly influence the dominant socio-technical regime. PSS designers should thus be able to act as *networkers* (capable of establishing

bridges and links between different actors) and as *negotiator* (capable of managing controversies and conflicts within the network);

- **Facilitating the building up of a shared project vision and transition path**. PSS designers must learn to facilitate the strategic conversation between the actors involved, in order to develop (and adapt in time) a shared project vision and transition path. PSS designers should therefore be able to facilitate a participatory approach, involving a variety of stakeholders in discussing, negotiating, cocreating, and developing alternatives. It is therefore crucial for them to be able to: organize the complexity of the information that must be exchanged and support effective communication activities among stakeholders; encourage and stimulate the various actors in taking part in strategic conversations; ensuring mutual understanding; and managing the diversity of their expectations as well as their negotiation and alignment. These skills are thus fundamental: being a *communicator* (capable of effectively illustrating complex information such as project visions and action plans) and a *facilitator* (capable of activating codesign processes and facilitating the convergence of actors' expectations);
- **Managing the dynamic adaptation of the societal embedding process**. PSS designers should learn to manage the continuous adaptation and evolution of the project vision, the transition path, and the actor network. The societal embedding of an innovation should therefore be managed not as a project with a fixed outcome, but rather as an open search and learning process. Design, development, experimentation, and implementation should be carried out simultaneously and in continuous interaction.

6 Conclusion

Sustainable PSS innovations represent a valuable concept for enhancing company competitiveness and at the same time providing environmental benefits. However, these innovations are in most cases radical, and their introduction and diffusion usually encounter the opposition of existing customers' habits, companies' organizational structures, and regulative frameworks. Hence, if immediately exposed to the mainstream market environment, it is highly probable they will not survive. An important challenge is therefore not only to conceive sustainable PSS concepts, but also to understand the contextual conditions in which they are introduced and explore the most suitable strategies and development pathways to embed these concepts in society.

This raises important questions on the role of design in addressing this challenge. The original contribution of this chapter is to build up synergies between concepts from two different research streams: the one on *PSS innovation*, and the one on *transition studies*.

Through an action research project, the chapter has explored the integration of design thinking and transition studies in dealing with the societal embedding of PSS

innovations. A crucial role is given to the implementation of sequences of socio-technical experiments, partially protected spaces where broad networks of actors incubate, test, develop, and bring the innovation to maturity. Theoretical and empirical evidence supports the proposal that, in order to effectively contribute to transition processes, socio-technical experiments should be conceived as *Labs*, *Windows*, and *Agents of Change.*

PSS designers could thereby play a role not only in generating sustainable PSS concepts, but also in designing transition paths to support and facilitate the introduction and scaling up of the concept itself. To operate at such a level, new strategic skills are required by PSS designers and project managers.

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Servitization as Innovation in Manufacturing—A Review of the Literature

Göran Roos

Abstract This chapter provides an overview of select literature on servitization, introduces and defines the concept of servitization, and shows why servitization is becoming a required strategy for manufacturing firms. It discusses the key aspects of servitization as innovation along several different dimensions. The chapter also touches upon what type of services manufacturing firms can offer, as well as the key journeys towards a fully servitized manufacturing firm, and key challenges on these journeys. Servitization is increasing rapidly, and is likely to continue to do so since both the defensive and offensive drivers of servitization are increasing in strength. The literature also points out that the transformation process into a servitized manufacturing firm is both a complex and complicated one, and failure rates are not insignificant. On the positive side, opportunities abound to offer services throughout the value chain, but care has to be taken to ensure that the manufacturing firms' business model is modified to ensure the implemented service activities are profitable.

Keywords Servitization · Manufacturing · Value chain · Business model · Integrated products · Services · Strategy

This chapter is a selection out of a complete 200 page literature review of the field done by the author.

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1 Concept Introduction

Servitization describes the growing trend for manufacturing firms to use their physical product as a vehicle for service provision.[1] The term was first used by Vandermerwe and Rada (1988, p. 314) who defined servitization as 'the increased offering of fuller market packages or "bundles" of customer focussed combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings'.

More recently, servitization has been defined by Baines et al. (2009a) as 'the innovation of an organisation's capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use'.

Thus servitization means all service concepts, systems service, processes and related service activities offered and carried out by, or on behalf of, a manufacturing firm linked to the products produced by this firm. In the twenty-first century, this means that servitization has become an integral part of manufacturing.

2 Why Do Firms Servitize?

As industries mature and increasingly compete on cost, manufacturing activities tend to move to lower cost jurisdictions. In order to retain activities in their original location, manufacturing firms need to compete on value for money rather than cost. This results in increased pressure on innovative productivity and on broadening the offering to include also pre- and post- production services (Kinnunen 2011) and as a consequence it becomes increasingly difficult to maintain solely product-based competitive advantages (Bowen et al. 1989; Mathieu 2001b; Porter and Ketels 2003).

Figure 1 illustrates the potential of different parts of the value chain to add value and how this has changed over time. This smiley curve concept, introduced by Shih (1992), was used with reference to hardware production in the IT industry. Shih observed that the beginning and end of the value chain contributed higher value added than the production activities in the middle[2] and that this difference became stronger over time.

From Fig. 1, we can see that if the value-adding of the firm is to remain constant, the production activities must be complemented with activities in the pre-production and/or the post-production domains of the value chain. This will enable firms to achieve competitive advantage strategically, financially and in terms of market position, since a competitive strategy based on service differentiation is more

[1] Please note that other terms exist in the academic literature, albeit the servitization term seems to dominate.

[2] If this phenomenon is presented in a graph with a Y-axis for the value-added and an X-axis for the value chain, the resulting curve appears like a "smile" and hence the name.

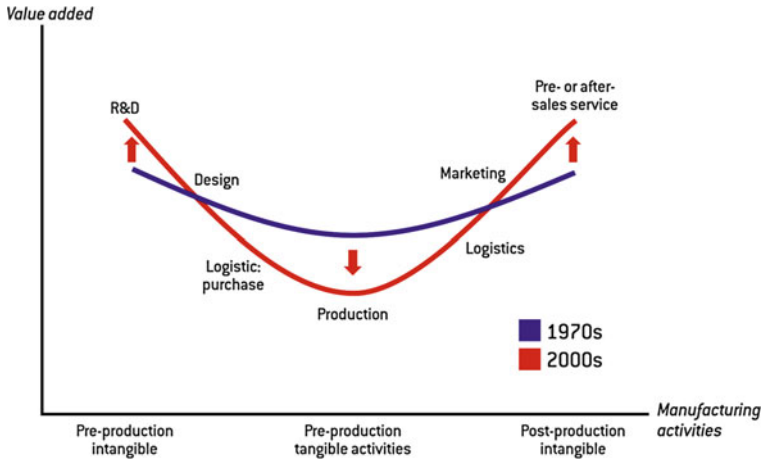

Fig. 1 The shift in value-adding over time across the key value chain steps (Veugelers 2013, p. 27 after original concept by Shih 1992)

difficult for competitors to imitate and enables firms to build stronger customer relationships. This means that manufacturing firms will both offer and provide the services required to maintain, upgrade and sometimes operate the equipment they manufacture and that is required to increase customers' overall performance.[3]

There are six key driver-groups for manufacturing firms to move into services[4]:

1. Financial

   - Services provide a new source of revenue with lower volatility grounded in lower-cost economies.
   - The revenue generation motive is specifically relevant for companies with large installed product bases and with long life cycles.

[3] For a further discussion of this see Anderson and Narus 1995; Auramo and Ala-Risku 2005; Davies 2004; Gebauer et al. 2005; Gebauer and Friedli 2005; Goffin 1999; Howells 2004; Lele 1997; Mathieu 2001a; Mathieu 2001b; Matthyssens and Vandenbempt 1998a; Matthyssens and Vandenbempt 2008; Oliva and Kallenberg 2003; Penttinen and Palmer 2007; Phillips et al. 1999.

[4] These drivers are synthesised out of the following studies: Lewis 1942; Levitt 1983; Coyne 1989; Reichheld and Sasser 1990; Knecht et al. 1993; Anderson and Narus 1995; Kalwani and Narayandas 1995; Reichheld 1996; Frambach et al. 1997; van Looy et al. 1998; Goffin 1999; Wise and Baumgartner 1999; Goffin and New 2001; Mathieu 2001b; Nambisan 2001; Munos2002; Homburg et al. 2003; Krishnamurthy et al. 2003; Davies 2003; Oliva and Kallenberg 2003; Henkel et al. 2004; Kalliokoski et al. 2004; Mont 2004; Sawhney et al. 2004; Vargo and Lusch 2004; Windahl et al. 2004; Brax, 2005; Gebauer et al. 2005; Gebauer and Friedli 2005; Slack 2005a, 2005b; Ward and Graves 2005; Malleret 2006; Breunig et al. 2007; Gebauer and Fleisch 2007; Kim et al. 2007; Matthyssens and Vandenbempt 2008; Neely 2008; Reinartz and Ulaga 2008; Baines et al. 2009a, b; Brax and Jonsson 2009; Brege et al. 2009; Schmenner 2009; Kindström and Kowalkowski 2009; Aurich et al. 2010; Slepniov et al. 2010a, b; Isaksson et al. 2011, Neely 2013.

- Economies of Loyalty, i.e. loyal customers are much more profitable than new customers, particularly in a service setting, since they are easier to serve in cost terms, engage more complex and profitable services, have lower price sensitivity, and provide positive referrals to other potential customers.

2. Strategic

- Services are more difficult to imitate and consequently can form a basis for competitive advantage as well as a barrier to entry for competitors.
- Services require a closer relationship between producer and buyer which can increase customer loyalty and form the basis for competitive advantage.
- The product can lead to a monopolistic market of co-created services.[5] Through their ongoing relationship the customer and the firm co-create value, and physical products act as vehicles for the delivery of these services.
- A customer may want a value-creating process with a product (e.g. driving somewhere), but does not require the product itself (e.g. a car), so a servitization strategy is required (e.g. car rental).
- Pre-sales service as a driver of product purchase: A car manufacturer runs an active programme with its dealers to show them that every service encounter is also an opportunity to build customer loyalty and hence secure a repeat purchase. Repeat business for the car manufacturer is a function of product quality and service quality.

3. Marketing

- The market demands outcomes that require service delivery.
- Products and services are frequently inseparable and the sale of a product can lead to a relationship where services can be sold over an extended period of time.

4. Offshored and/or Outsourced Operations

- The active pursuit of a transition from products to services with the aim of developing new higher-value activities to substitute for manufacturing operations at risk of being offshored or outsourced.

5. Regulations that enforce producer responsibility

- Post-delivery responsibility can most easily be managed through service offerings

6. Environmental

- Services as substitutes for transfer of ownership to reduce the environmental footprint, e.g. car sharing schemes.

A UK manufacturing industry study (Tether and Bascavusoglu-Moreau 2011) found that defensive motivations tended to be more significant than offensive

[5] In the Service-Dominant Logic field of study.

motivations, with the 'environmental' motivations less important still. However, further analysis showed that firms tended to provide services for a mix of offensive and defensive reasons (see Fig. 2)

Many manufacturing firms have very ambitious growth targets for their service activities, frequently aiming for a share of turnover of 30 % or more. This is often a strategic response to perceived threats and opportunities, as discussed above, but does fit with the research findings of Feng et al. (2008), that servitization strategies typically require building a critical mass in sales of 20–30 % of turnover, before having a positive effect on firm value. If anything, a limited push into services may detract from firm value. It takes time to attain this critical mass, but time may be in short supply given the short-term focus of many managers (Steenkamp et al. 2005). Acquisitions or aggressive pricing may accelerate the growth trajectory of services, whilst hiring experienced outsiders, reducing internal organisational conflicts by, e.g. separating product and service groups or instituting incentives to increase cooperative efforts may help address the downside (Feng et al. 2008). Managers should focus their service initiatives on closely related businesses to enhance

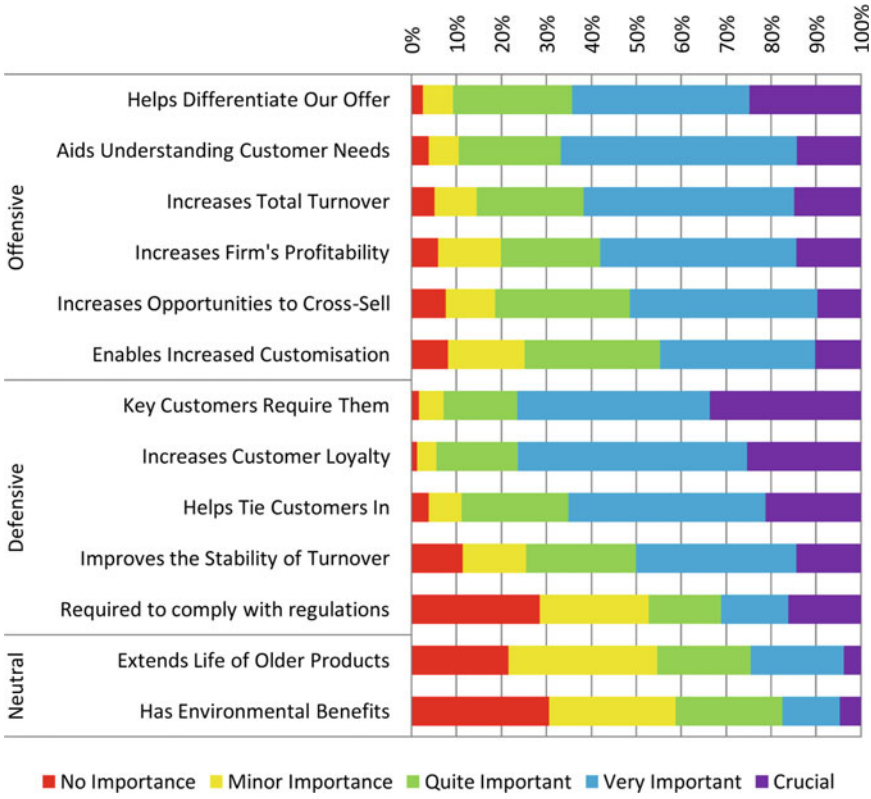

Fig. 2 Motivations for providing services. Tether and Bascavusoglu-Moreau (2011)

synergistic spillover benefits, e.g. solution selling (involving the combining of products and service offerings). This kind of business logic, referred to as solution business, is often linked to the ability to create 'unique value' (Miller et al. 2002; Brady et al. 2006).

The share of jobs that are service jobs in EU based manufacturing firms is around 40 % and increasing (Veugelers 2013). A recent Swedish study (National Board of Trade 2010) shows that export of qualified services by *manufacturing* companies has risen over 230 % (1998–2006), compared with a rise of 160 % for services exports by *services* companies (excluding financial services). This fits with the findings of Santamaría et al. (2012). Manufacturing companies represent almost 30 % of Swedish services exports. Transport accounts for about 30 % and other services for the rest, i.e. almost 40 % (Gozzo 2009). The most commonly offered services are business services, wholesale, retail and repair services. This aligns with the findings of Witell et al. (2009) who in their study of the Swedish automotive industry identified the typical company as having 280 employees with 85 % of its turnover in the B2B market; of this turnover 24 % is made up of services and this was estimated to increase by about 10 % per year; the service offering provided a profit margin of 24 % with an estimated annual increase of around 5 %. This clearly illustrates the importance of services for manufacturing companies.

Yet implementing service strategies and offering more extensive industrial services has proven to be a challenging task for many manufacturers (Kowalkowski 2008). From a marketing perspective, the provision of industrial services is hindered not only by the manufacturing firms' own traditional marketing approaches, but also by dominant industry logics and mindsets among customers and other network actors (Matthyssens and Vandenbempt 2008).

From a customer's perspective, costs can be reduced by outsourcing services to the manufacturer if it results in a lower price (Teece 1980, 1982). The ability to do this will depend on the presence of economies of scale and scope as well as learning effects (Chase 1981; Panzar and Willig 1981; Akan et al. 2011). Economies of scale and learning effects arise if the manufacturer is providing services for its entire installed base, whereas normally the customer will be investing in service resources and capabilities for a much smaller number of units of purchased product. Economies of scope are achieved by leveraging technological capabilities when defining and implementing service processes (Gebauer et al. 2008). In addition, manufacturing firms can capitalise on existing Customer Relationship Management (CRM) information and sales channel infrastructure developed for traditional product activities (Quin and Gagnon 1986) so that transaction costs are reduced by spreading them over products and services (Williamson 1975). In addition, sourcing products and services from one and the same supplier can enhance productivity (e.g. simultaneously signing product and service contracts or indeed bundling them into one contract for both) and reduce information asymmetries of customers (Nayyar 1993). Furthermore, customers may experience complementarities in use, such as interoperability, which have been studied as an important source of competitive advantage in IT markets (Nambisan 2002; Tanriverdi and Venkatraman 2005; Tanriverdi and Lee 2008; Lee et al. 2010). Customers also have an interest in

using products more effectively and extending their useful life which also drives servitization of product suppliers. Visnjic and Van Looy (2011) claim that customers may also be inclined to purchase related life cycle services from the product manufacturer. The term life cycle implies that the service offering that the manufacturer devises is related to the product offering and, hence, the manufacturer's competence base.

Like in any other business, service margins are also being exposed to increasing pressure from low-cost service providers (Henkel et al. 2004) so offering extensive services and solutions is no guarantee for a sustainable competitive advantage, as illustrated by a Bain & Co survey where only 21 % of the firms responding reported success in terms of revenue growth, profit margins, stock performance, etc., with their service strategies (Baveja et al. 2004). A study of German and Swiss equipment manufacturing firms that had extended their service business found that (Gebauer et al. 2005):

> most companies find it extremely difficult to exploit successfully the financial potential of an extended service business. Most product manufacturers are confronted with the following phenomenon: companies which invest heavily in extending their service business, increase their service offerings and incur higher costs, but this does not result in the expected correspondingly higher returns. Because of increasing costs and a lack of corresponding returns, the growth in service revenue fails to meet its intended objectives. We term this phenomenon the "service paradox in manufacturing companies." Instead of achieving a transition from products to services, product manufacturers leave the transition line and move into the "service paradox".

Neely (2008) finds that in smaller firms servitization appears to pay off while in larger firms it proves more problematic. In a later study, Benedettini and Neely (2010) focussed on the set of bankrupt firms identified in Neely's (2008) study and used qualitative data to investigate the reasons for their bankruptcy. This revealed a complex situation that could be interpreted as: those firms which had servitized by offering additional services that were not closely related to their core offering were those which had gone out of business, whilst those that had offered closely integrated services had not been as badly affected.

3 Servitization as Innovation in Manufacturing Firms

To succeed with ambitious service growth objectives, manufacturing firms need to be able to innovate in the services domain to the same extent that they innovate in the product domain (Gremyr et al. 2012).

This necessary strategic focus is frequently not matched by the internal resource allocation in manufacturing firms as evidenced by a Service Research and Innovation Institute study referenced in Gremyr et al. (2012), showing more than 90 % of development and innovation in manufacturing firms was focussed on products whereas services were allocated only a few percent. This imbalance is made worse by the relative imbalance in competence levels around service innovation and

product innovation that exists in manufacturing firms. In particular, the ability of an organisation to deliver service that may include intangible value propositions that are perishable by nature and heterogeneous in characteristic is clearly deficient (Ng et al. 2011a). So in spite of services frequently being looked to as the saviour of many manufacturing firms from a strategic perspective, they are frequently treated as a low priority activity within the firm from a tactical perspective.

This disparity is normally due to a misunderstanding of what it takes to succeed in innovating both to become a servitized manufacturing firm, and to maintain competitiveness as a servitized manufacturing firm. The misconception around becoming a servitized firm lies in the assumption that it is only about adding a few services to the existing good product portfolio and the existing installed base. This view overlooks the required move from product-based logic to a service-based logic which will require changes to strategy, structure, processes, relationships and relationship management as well as culture. The complexity of these changes is frequently underestimated among already servitized manufacturing firms especially since these changes must of course not impact any of the existing or non-service business aspects of the firm in a negative way.

The processes for service development are often absent in manufacturing firms entering the servitisation path. Development work often comes from ideas triggered by interaction between employees of the servitizing manufacturing firm and employees of the customer; and the investments that follow from these ideas are normally minimal. This is due to servitizing manufacturing firms frequently copying existing product development and innovation processes into service development and service innovation processes, which normally does not work. (Martin and Horne 1992)

Findings from German, Swiss and Swedish industry show that a service project takes on average nine months to complete and involves less than five people in the project team. It is obvious that such projects do not work well in rigid structures and processes developed for managing large, complex and capital intensive product development projects. Servitizing manufacturing organisations have to create support systems and organisational structures suitable for service innovations originating in the interaction with customers. Normally, this encompasses a simple process supporting the solving of a specific customer problem followed by a clear development process encompassing methods and ways of working focussing on modifying existing resource deployment systems (see Roos 2005; Roos et al. 2005; Roos 2012; Roos and O'Connor 2014), customer experiences and business models that support the transformation of this customer specific service into a generic service that can be offered to many customers.

Santamaría et al. (2012) in their study of 12,334 Spanish manufacturing firms found that:

- Investment in human resources plays a critical role in service innovations, particularly for the development of new skills in manufacturing firms involved in servitisation processes (Raja et al. 2010). This finding is in line with the previous literature (Miles 2001; Pires et al. 2008).

- Training has a significant effect on process innovation but not on product innovation.
- The use of advanced equipment is relevant for all types of innovation but more so for service innovations than for product and process innovations. This finding supports the view that traditional service-innovation-related factors such as advanced machinery and information technologies (Hipp and Grupp 2005; Pires et al. 2008) will be decisive also for the achievement of service innovations in manufacturing firms.
- Collaboration with customers has a marked effect on the achievement of service innovations in manufacturing firms. Although this result was expected given that interaction with customers is a key feature of servitisation (Baines et al. 2009a), it is surprising to observe that collaboration with customers is not significant for other innovation outcomes. Once again, this finding reveals the need to analyse service, product and process innovations together in order to understand the innovation processes of servitized manufacturing firms better.
- Collaboration with research organisations seems to have the largest impact on product innovations in manufacturing firms.
- The significant impact of R&D on service innovation is a somewhat unexpected but notable result. According to Gebauer et al. (2008), innovation in product-related services can be integrated into the development process of new products. If R&D is a critical factor for achieving product innovations in manufacturing firms, it should also exert a positive impact on service innovations in these firms. Indeed, the empirical models reveal a high correlation between product and service innovations. Therefore, the specific role played by external R&D on service innovations is worth noting. The findings allow Santamaría et al. (2012) to conclude that it is an even more important determinant of service innovation than it is of product innovation. This could reflect the lack of expertise of manufacturing firms in developing new services, a factor that would make external sources of knowledge particularly useful.

Tether and Bascavusoglu-Moreau (2012) in their study using data from 2,272 manufacturing firms that responded to both the UK Innovation Survey of 2005 and that of 2007 found that:

- Firms with an external market orientation were more likely to innovate, especially in goods, with a weaker but still positive and significant result for service innovation.
- Firms with an external market orientation did not have an increased propensity to introduce process innovations. Instead, an internal orientation was positively and significantly associated with the introduction of process innovations. This was negatively associated with goods innovations, but had no significant impact on service innovation.
- Innovation intensity was positively related to the introduction of product, process and service innovation.
- Engaging in R&D had a positive and significant impact on the propensity to introduce goods innovation, but had no significant impact on either service or

process innovations. The same is true of investments in design and other external knowledge acquisition.

- The strength of the appropriation regime (i.e. the effectiveness of patents and other forms of intellectual property protection) had a weakly significant impact on the propensity to introduce goods innovations, but no impact on either service or process innovations.
- Investments in training were positively and significantly related to the introduction of service and process innovations, but not goods innovations.
- Firms that invested in marketing were significantly more likely to introduce goods and, to a lesser extent, services innovations, but marketing had no significant effect on process innovations.
- Size is positively correlated with process innovation and also, but weaker, correlated with goods innovation but no significant correlation between size and service innovation. This suggests that smaller firms are not disadvantaged in the introduction of service innovations relative to their larger counterparts.
- Firms that are engaged in international markets are more likely to introduce goods and (less likely) process innovations; this is not the case with service innovations. This suggests that firms that focus solely on the domestic market are not disadvantaged in the development of service innovations.
- The share of scientists and engineers in the workforce is positively related to introducing goods innovations whilst having no significant impact on either service or process innovation.
- There is no evidence that firms that had collaborated with their customers and those that drew strongly on their customers as a source of information for innovation were more likely to introduce service (and goods) innovations
- There is no evidence that firms that collaborate with their suppliers and/or use suppliers as an important source of information for innovation were more likely to introduce process innovations.
- That firms that cooperate with customers were more likely to introduce process innovations.
- There is no evidence to support the notion that start-ups are more likely to introduce service innovations.
- There is no difference between the propensity to innovate between independent firms and firms that are part of a larger group.
- That goods, services and process innovations are not independent, but more likely to be co-incidental and possibly interrelated and complementary. This is consistent with recent literature that emphasises the increasing interconnections between goods, services and processes (Kim and Mauborgne 2004a, b).

Visnjic et al. (2012) in their study using data from 133 servitized manufacturing firms found that:

- Servitization, to the advantage of the manufacturing firms, seems to begin by exploiting existing product resources and competence base, as well as the elementary service resources that usually exist in every manufacturing firm. Once a manufacturer starts to perceive services as a market opportunity, it starts to

exploit these existing resources instead of having to secure these investments up front.

- Service-specific investments remain necessary if a firm wants to enact service growth. Manufacturers need to invest in, for example, service information systems that support transparent reporting practices and help efficiently plan service provision; further investment in resources and capabilities for service sales, pricing and business development are warranted as well.
- Visnjic et al. (2012) results suggest that extending the breadth of service offering by expanding in the spectrum of service portfolio may result in diminishing efficiency. More specifically, for firms that intend to grow by expanding the scope of service offering, adding more and more services to the portfolio may decrease profit margins.
- Growing by deepening the relationships with customers may be a more lucrative service avenue. Manufacturers that offer knowledge-intensive service components—such as consulting or training—may realise superior margins and even market value (Visnjic et al. 2012) but even this strategic choice has its challenges: It seems that firms need to take into consideration the interdependencies with product innovation investments when deciding on a degree of completeness of service offering.
- Combining sophisticated service offering with product innovation strategy may result in higher profit margins, once the initial investment period passes. It seems that while a product–service provider would face higher investment costs initially and therefore a dip in profit margin, combining knowledge-intensive services with product innovation may result in economies of scope and an increase in profitability in the long term.
- Interdependency between product innovation and service completeness doesn't seem to be rewarded by the markets. Though product innovation and service completeness both seem to be viable strategies when considered individually, joint implementation of both strategies results in a loss of market value.
- Once the service portfolio is limited to the provision of moderately sophisticated service components, yet remains complete within the boundaries of product-related service offering, the impact of the product–service interrelationship on performance becomes positive.
- Markets reward parallel product-service developments as long as they remain technically and functionally connected. Once this relation is lost, a firm is advised to choose its focus strategy and either to remain a product innovation expert or transition to become a full-scope service expert.

Service innovation is primarily oriented to addressing customer's needs, rather than achieving optimal efficiency (Tether and Bascavusoglu-Moreau 2012). Baines et al. (2009a) argue that manufacturing firms with a strong service orientation are often willing to maintain excess capacity, and therefore some apparent inefficiency, in order to enhance customer satisfaction. This is because, unlike physical products, service outputs cannot be stocked; only the demand for a service can be 'stocked' as customers wait to be served, at some cost, including inconvenience, to themselves.

Service providers therefore tend to have a different attitude to capacity utilisation, maintaining excess capacity, or having the ability to expand and contract capacity rapidly, particularly where demand is unpredictable and/or customers place high value on having their needs met at their convenience (Tether and Bascavusoglu-Moreau 2012). This contrasts with classic manufacturing production operations, where the ability to stock outputs for later sale means that firms seek to achieve high capacity utilisation, particularly of expensive resources (Hayes and Wheelwright 1984).

Services are generally considered to be highly interactive, and even co-produced by the provider and the customer or client acting together (Hayes and Wheelwright 1984). This leads to a high degree of customisation to particular client needs (Miles 2006). Similarly, Johne and Storey (1998) argue that nearly all service products involve close interaction with customers as the distinguishing feature of service offerings.

Meanwhile, the servitization literature emphasises that, rather than focus on producing and selling in volume, servitized firms often focus on understanding and satisfying particular users' needs, which may be idiosyncratic, and their new services may be highly tailored to these customer needs and indeed often co-developed with them (Tether and Bascavusoglu-Moreau 2012). Furthermore, testing, refinement and improvement to new services is done 'in the field' with the customer (Baines et al. 2009).

Manufacturing firms need to develop well defined service concepts during the business development phase in order to create both new business models and value from the customer perspective. This requires a broader perspective than just service or product attributes and will include customer activities and experience from interaction with the service, the service delivery process and the service provider as well as an understanding of those values perceived by the customer who is also the co-creator of said service.

The concepts of value co-creation and value co-production become important and the distinction is that value co-creation is viewed as the customer's realisation of the value proposition to obtain value-in-use (Ng et al. 2008) whereas value co-production is viewed as the customer's involvement in the realisation of the company's value proposition, rather than the value outcome. Under this distinction, customers are always co-creators but they may not always be co-producers of service.

This value creation perspective on services will not reduce the importance of the product portfolio, product leadership, technical leadership, productivity leadership but they will gain an additional dimension, that of the customer's reality, needs, processes and business models. Successful business is about creating resource deployment systems (Roos and Roos 1997; Bainbridge et al. 2001; Burton et al. 2013) that fit the customer's value-creating process and business model and to develop the manufacturing firm's own business model so that it can appropriate a share of the value created for the customer (Roos 2012).

Gremyr et al. (2012) cites a study by the Doblin group where service and product innovations were compared, concluding that whereas product innovation primarily

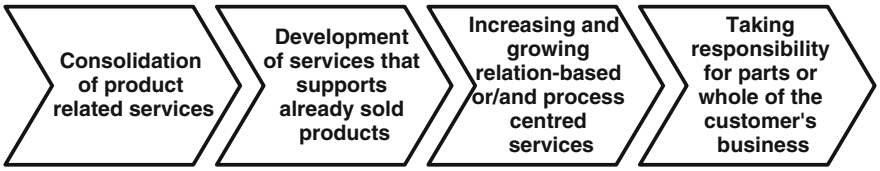

Fig. 3 Servitization phases with progressively higher service content. Oliva and Kallenberg (2003)

results in improved product performance, service innovation frequently results in changed resource deployment systems,[6] changed customer experience, changed business models, changed service delivery processes and changes in the customer's role as user, buyer, payer or role in the value (co-) creating ecosystem (Michel et al. 2008). Gremyr et al. (2012) have in their research found that firms that focus on either product innovation or service innovation within a given organisational unit achieve higher return on investment than those that try to combine and do both within a given organisational unit. This means that the servitizing manufacturing firm must find a way to separate product and service innovation within the firm so that each can optimise its performance within its own paradigm (Gebauer et al. 2011).

The need to engage customers in design and/or implementation of innovations is a fundamental aspect of service innovations (Coombs and Miles 2000; Hipp and Grupp 2005). Proximity to users and customers strengthens the competitiveness of the service provider. Service renewal primarily takes the form of incremental innovation (Chesbrough and Spohrer 2006). One of the key differentiators for service production is that service production and service consumption take place simultaneously (Kowalkowski 2008).

Oliva and Kallenberg (2003) describe the servitization journey as a sequence of phases with increasing service content (see Fig. 3)

Every step to the right in the figure above requires a change in the organisation, culture, processes and customer interaction as well as the development of new competencies and capabilities. It is vital for employees in the servitized manufacturing firm to understand their customers, their issues and how they create value for and appropriate value from their customers, in order to develop services that enhance the customers' business. It follows from this, that only with a high degree of service orientation can service innovations that support the customers' business, as opposed to supporting a delivered product, be created (Gebauer and Fleisch 2007). Sometimes, as pointed out by Turunen (2011) increasing user orientation can drive the servitization process—so it seems that increased user orientation drives servitization at the same time as successful servitisation requires increased

[6] see Roos et al. (2005) Chap. "Open Service Innovation: Literature Review and Directions for Future Research" for an in-depth discussion on how to capture and evaluate resource deployment systems in firms.

user orientation. This service orientation must, in order to be effective and efficient build on strong and positive relations with customer on all levels—operational, tactical and strategic (Mathieu 2001a). If this service orientation is not present it may lead to lacking engagement in the service part of the business, low level of acceptance for service innovations, difficulties in receiving internal resources.

Deployment of an integrated service business model not only ensures the effective deployment of a service business but service activities also act as a driver of the product business. This reciprocal relationship between service and product activities is achieved in spite of the inherent substitution-type relationship that characterises products and related service offerings since successful service provisioning frequently leads to an extension of the product life cycle (of existing products) and limits the potential sales of replacement products. Here, paradoxically, service-product relatedness could lead to product cannibalization, if it was not for the aforementioned managerial practices that ensure service-to-product complementarity (Visnjic and Van Looy 2011).

The dimensions that need to be covered in a servitized business model for manufacturing firms can be identified by combining the findings of Salkari et al. (2007) and Roos (2013).

Visnjic and van Looy (2011) argue that servitization represents a specific innovation of the business model: by offering service activities that span the life cycle of a product, a manufacturing firm extends the content of its transactions with customers, leaving customers to directly benefit from the utility that the product provides (Amit and Zott 2001; Spring and Araújo 2009). As servitization effectively represents a transition of service activities from the customer side of the business model to the manufacturer side, it is necessary to first understand customer gains in order to appreciate the implications in terms of manufacturer gains (Visnjic and van Looy 2011).

By combining product and service offerings (and sometimes newly developed service offerings) a complete offering can be provided. An example of this is Volvo Trucks Fuelwatch, made up of six different services packaged and sold as one concept with the aim of reducing the customer's fuel consumption and associated costs (Fig. 4),

This concept required a new business model (including new distribution channels and new pricing mechanisms) to both overcome internal issues as well as maximising value creation from the customer's point of view as well as the value appropriation from Volvo's point of view (Davidsson et al. 2009).

Another way is to leverage the technology and engineering knowledge in the servitizing manufacturing firm by creating new services through advances in technology. This can either take the form of a supply driven offering (e.g. equipment suppliers to process industries) or a demand driven offering originating in a precisely articulated problem that matters to the customer (these solutions frequently start by deploying cheap and mature technology to verify the feasibility of the solution and the actual impact on the customer's business before deploying more advanced and sophisticated technology once the principle solution is verified). To enhance the probability of success many servitizing manufacturing firms first

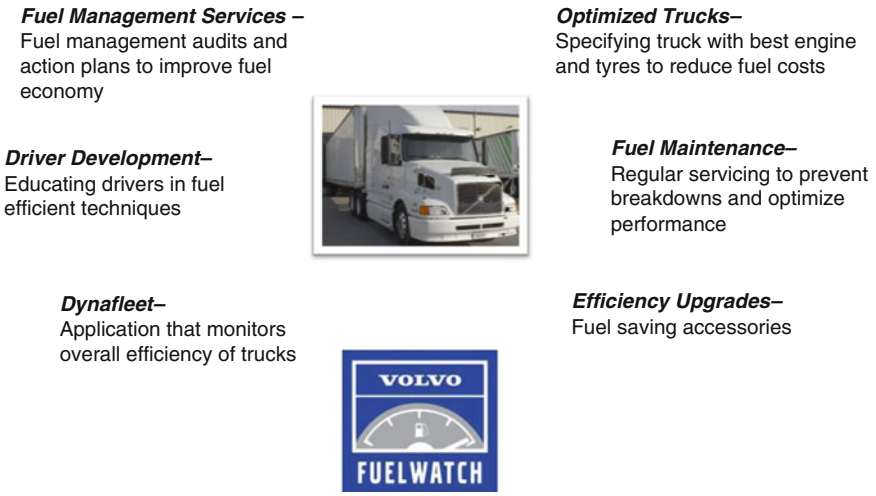

Fig. 4 Overview of the volvo fuelwatch service offering (based on presentation by Stephen Brown at the ASU center for services leadership and VolvoAB annual reports)

develop pilot services for use inside their own organisations (Davidsson et al. 2009).

Viitamo's (2013) framework for servitization is shown in Fig. 5. It elegantly integrates several key theories[7] and helps us understand the servitization concept from different angles.

4 What Services to Offer?

Figure 6 illustrates the many different types of service-based innovations.

These different types of service innovations are further refined in the work by Ren (2009) who identified and classified the different activities that users, frequently customers, of capital goods have to execute. His findings are illustrated in Fig. 7, classified into:

- Objectives that are achieved through operational and business processes.
- Operational and business processes which rely on assets.
- The asset as a system, relying on the performance of individual pieces of equipment.
- The individual pieces of equipment.

[7] The structuralist view and the resource-based view of the firm's competitive advantage; the dynamic capabilities theory; service-based theory of the firm; service-dominant logic and goods-dominant logic; strategic management and the socio-economic view; organizational design.

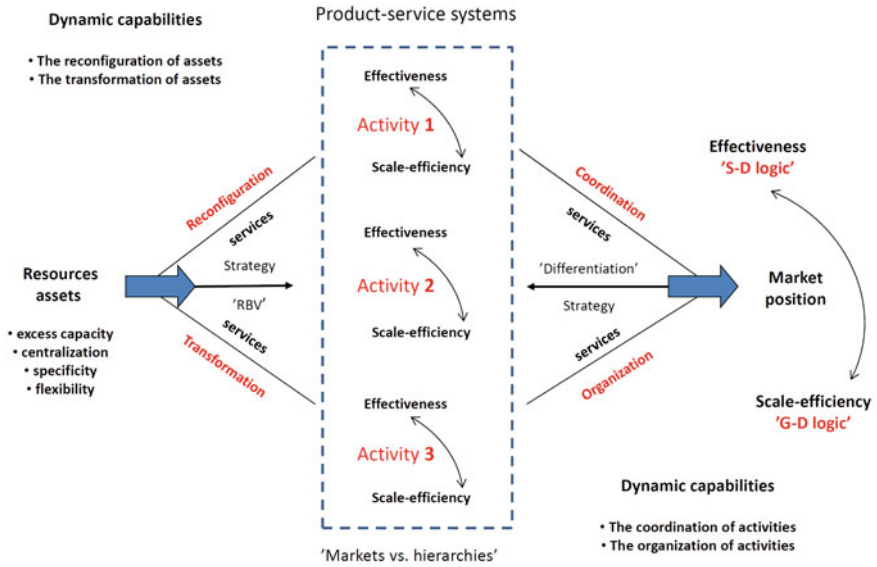

Fig. 5 The integrative framework of strategy, productivity and servitization (Viitamo 2013 p. 26)

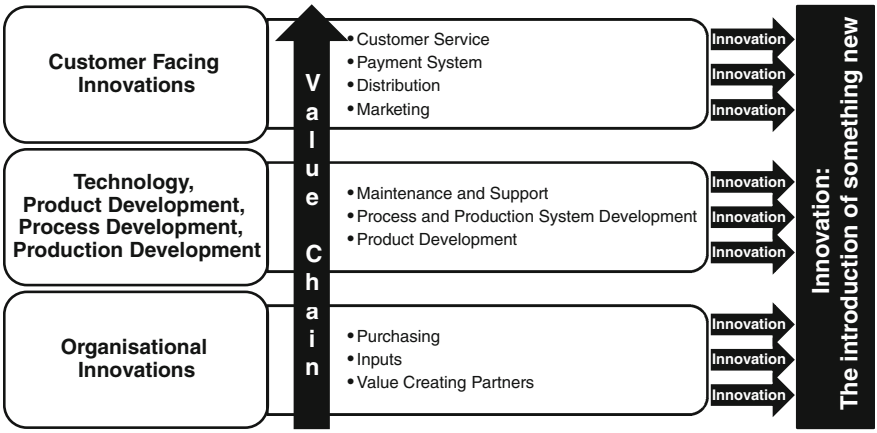

Fig. 6 Illustration of different types of innovations along the value chain, based on Berggren et al. (2008)

All of these categories provide opportunities for service provision but manufacturing firms have historically limited themselves to the supply of equipment and the associated basic support. When firms servitize they expand their offerings into (as illustrated in Fig. 7):

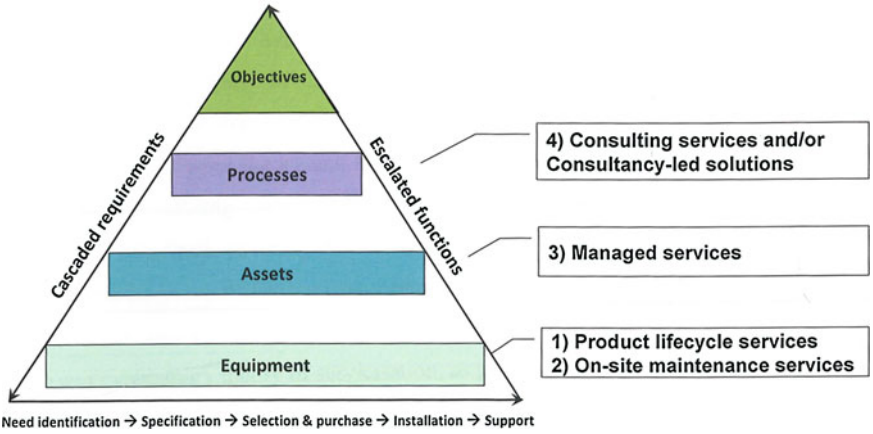

Fig. 7 Classification of activities in the user, which is frequently the customer organisation Ren (2009)

- *Equipment focussed product life cycle offerings including maintenance services*
  These include need recognition, product specification, supplier selection, purchase transaction, delivery, installation, training and ongoing support. Given the long life cycle of B2B capital goods and the critical nature of this good to the user's or customer's activities there are considerable opportunities for service offerings in the ongoing support domain. When the customer procures and uses more than one piece of given equipment offering, the ongoing support tends to change characteristics and becomes on-site maintenance.
- *Asset focussed managed services*
  Assets are a system made up of different pieces of equipment, purchased from different suppliers at different points in time but interlinked and/or interdependent in their use. This creates a higher level of complexity than dealing with a given piece of equipment and when the complexity level becomes sufficiently high, users normally establish a dedicated organisational function to manage the assets and to coordinate any support activities. This provides an opportunity for servitizing manufacturing firms to enter the area of managed services where they would take over this function and offer maintenance, equipment replacement, operation and asset optimisation, etc.
- *Process focussed advisory or consulting services*
  When putting the equipment to use with a specific intent the user may need technical advice, management advice and both proactive problem solving (i.e. co-innovation) as well as reactive problem solving. This provides opportunities for servitizing manufacturing firms to offer chargeable advisory or consulting services or to migrate all the way, given sufficient understanding of their customer's/user's world, to offering solutions and even to implementing these solutions using their own monetary resources, their own equipment and other physical assets, their own relationships, their own competence embodied in their

own people and processes, their own brands and any other resources that the servitized manufacturing firm can bring to bear.

Products that are cheap and that are of a stand-alone nature (in either their nature or in how they are deployed) provide few opportunities for service offerings whereas expensive products that are part of a larger integrated system that is critical to the customer's business provide substantial opportunities for service provision Ren (2009).

The potential opportunities for providing services must be evaluated against the servitizing manufacturer's capability and strategic focus, as illustrated in Table 1.

Leading on from work by Kowalkowski (2008) and Tukker (2004), Neely (2008) added two new categories to the Tukker (2004) classification, namely:

- Integration-oriented product-service-systems, which result when firms seek to add services by going up- or downstream and vertically integrating (e.g. consulting services, financial services, retail and distribution, transportation and trucking services and property and real estate services)
- Service-oriented product-service-systems result when firms incorporate services into the product itself (e.g. systems and solutions).

Ren (2009) developed and synthesised the above findings with his own research findings into a pictorial representation of the different service offerings, as shown in Fig. 8.

5 How to Servitize

Oliva and Kallenberg (2003) have identified the following recurring pattern of actions among firms with successful transitions along the goods-services continuum:

- The firms consolidate their product-related services and often relocate services to a newly created service business unit.
- The firms enter their installed base with service offerings based on an analysis of the service market present among their installed base followed by the creation of an infrastructure for marketing and delivering services and for responding to local service demands.
- The firms then expand to either relationship-based services or to process-centred services.
- Finally, the firms take over parts of the end-users' (installed base's) operations.

Santamaría et al. (2012) identified the following three ways in which the move into product-service-systems offerings can occur for manufacturing firms:

- Offering the manufactured products together with closely related services in a single package aiming to increase its attractiveness above and beyond that of

Table 1 Key dimensions along which to evaluate servitization opportunities (Ren 2009)

Dimensions	Definition	Key questions
Motives	Reasons and rationale behind the decision to develop a particular service offering	What benefits does the service offering provide for the customer and the manufacturer respectively?
		What circumstances or incidents triggered the decision to create the service offering?
Service offering	Characteristics of the offering	What is the value proposition of the offering?
Sales and marketing	Ways in which a particular service offering is created, promoted, priced, sold and renewed in its target markets, and the infrastructure that is behind the marketing activities	What are the target markets for the service offering?
		How is the service offering promoted?
		How is the service offering priced and sold?
		How is the service offering renewed?
		What are the key decisions regarding service marketing?
Service operations	Ways in which a particular service offering is delivered to the customer, and the infrastructure that supports the operations	What is the delivery process for the service offering?
		What physical and information systems are in place to support the delivery process?
		What are the key decisions regarding service operations?
Product design and operations	Changes that are made to product design, production, and research and development in order to support the development of service business	How have product operations changed as part of service business development?
		What processes and mechanisms have been put in place to encourage these changes?
Organisational arrangements	Ways in which the service function is structured, measured, staffed, and ways in which its external relationship is managed within the manufacturing organisation	How is the service function structured and measured?
		What is the relationship between the service function and the rest of the organisation?
International	Ways in which similarities and differences in service marketing and operations between country markets are managed	What complexities and synergies exist between different types of products?
		How are the complexities and synergies managed?

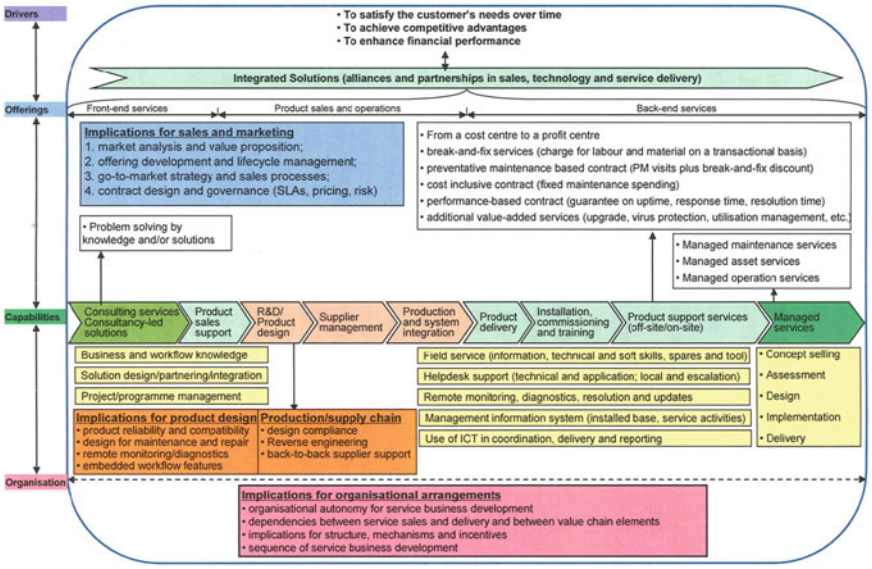

Fig. 8 An integrated view of servitization (Ren 2009, p. 159)

product competitors. Examples would be products packaged together with services linked to financing, insurance, maintenance, leasing or disposal.

- Offering a package that achieves the customer's desired outcomes. Examples would be computer services rather than computer hardware or Mathe and Shapiro's (1993) example of Tetra Pak: as well as licencing to others the right to produce juice cartons, Tetra Pak produces and sells the equipment to package the beverage, along with the computerised control system and software to run the packaging operations, and also consulting services based on its domain expertise.
- Improving the acceptability of a product by overcoming obstacles to its adoption or use. An example is Greif Packaging, a supplier of metal drums for shipping bulk chemicals. The firm realised that customers did not want to buy their own steel drums, but did need to move toxic chemicals efficiently and safely. To meet these needs, Greif converted its business model to become a trip leasing company for specialty chemicals, drum supply, cleaning, refurbishing, regulatory compliance, transportation and tracking (Warren and Susman 2004).

Slepniov et al. (2010a, b) used a set of case studies to identify the steps of the journey from manufacturing to service firm, as outlined in Fig. 9:

Zolkiewski et al. (2012) in their study found clear evidence that service infusion acts as a mechanism for changing network position in an ecosystem or value chain and thus illustrates the strategic role of the decision to invest in service provision. It also illustrates the criticality of managing relationships throughout the process. They described their findings under the following headlines:

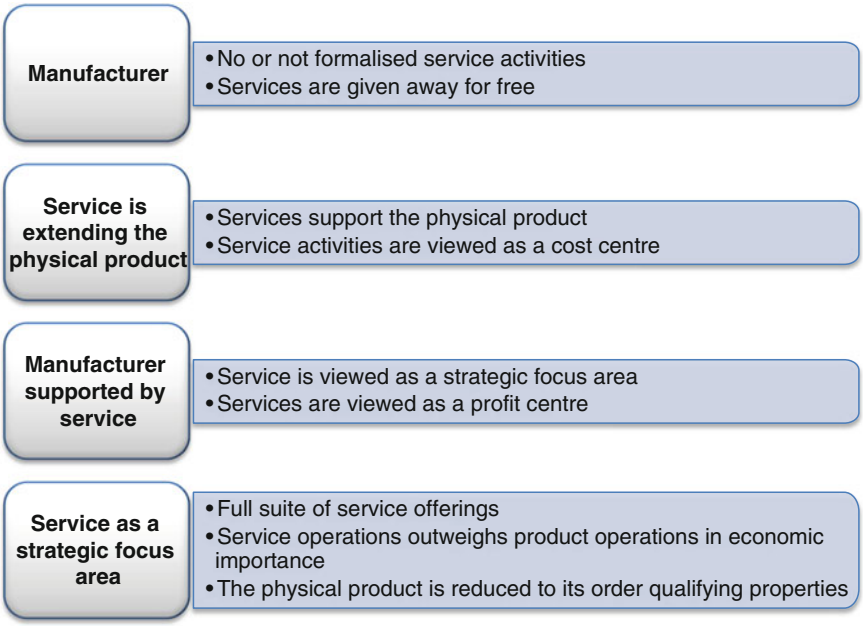

Fig. 9 Servitization continuum. Based on Slepniov et al. (2010a, b, p. 7)

- *Internal and External Network Friction*
  This friction leads to a focus on managing relationships both within the firm and across the network.
- *The Importance of Orchestrating*
  In developing innovative service solutions there is a balance between what is shared with the customer and what is provided for them.
- *Development of New Network Partners*
  In attempting to manage the friction, the organisation is looking to develop a much stronger network of stakeholders than was necessary for traditional product sales.
- *Training and Solutions Capabilities*
  Investment in developing complex solutions does not necessarily mean that the firm is moving away from more basic services.
- *The Service Provision Continuum*
  The empirical findings support the notion of a continuum of offers available from the firm. This is reflected in literature suggesting that firms have multiple capabilities (Baines et al. 2009a, b; Kowalkowski et al. 2011) that are context dependent. This refutes the idea that as service capabilities are developed, traditional advantages tend to diminish (Salonen 2011) and suggests that a complete transition to a customer oriented 'service' structure for the whole

organisation may not be appropriate or feasible for some firms. This is especially the case where there are problems associated with motivating the customer to co-produce the service, as identified by Brax (2005).

- *Customer Interactions*
  The importance of relationships with the customer are highlighted in some instances, but, in contrast to the literature on solutions as relational, and interactively designed (Evanschitzky et al. 2011; Tuli et al. 2007) this importance is not universal. In line with existing literature (e.g. Sawhney 2006), many of the service development projects start with a customer problem and lead to the development of customised solutions, but there are also a number of examples of services where a specific customer problem was not the starting point for the project, nor did it seem to be the case that all services were developed interactively 'with' the customer. A key area where working with the customer is critical to success is during the post-deployment phase (Edvardsson et al. 1995; Tuli et al. 2007). What is clear is that particular members of staff are important for delivering these benefits.
- *Boundary Spanning Staff*
  In line with the work of Storbacka (2011), the research data also highlight the need for totally new boundary spanning individuals, who have to span intra-firm and inter-firm functions, and further data highlight the importance of these boundary spanning staff for ensuring the ultimate profitability of the service and the delivery of win-win gains that support long-term relationships.

In their study, Tuli et al. (2007) presented a four-stage process-centric model of solution business where a solution provider must succeed in four process phases:

- *Requirements definition* is about understanding a customer's broader business needs, including its internal operating processes, its labour situation, its business model and so on. Customers frequently are not fully cognizant of their business needs and cannot easily articulate them to a supplier. This highlights the importance of developing social capital in the form of relational ties with a customer's stakeholders to generate valuable information. Defining the requirements involves delineating a customer's current and future needs, such that these can be taken into account in the development of goods and services for the customer. In order to create a sustainable competitive advantage in offering product-service-systems, the product development times must be minimised whilst still keeping the product development process optimised to meeting the customer's needs (Weber 2004). One way that Weber (2004) recommends is to continuously collect and analyse information relating to customer needs during the sales process.
- *Customising and integration* Customization involves designing, modifying, or selecting products to fit into a customer's environment. Integration entails designing, modifying, or selecting goods and services that work well with one another.

- *Deployment* refers to the delivery of products and their installation into a customer's environment. The installation process frequently surfaces new customer requirements that call for additional modification of products at this stage. Importantly, deployment processes include the management of 'people aspects' in a customer firm. This involves understanding customer personnel's capabilities and providing them with appropriate information and training to enhance the utility they derive from a solution.
- *Post-deployment* support in the case of solutions is more than providing spare parts, operating information, and routine maintenance. Post-deployment support also includes deploying new products in response to evolving requirements of a customer. Customer emphasis on post-deployment support suggests that delivering solutions is better viewed as an ongoing relationship between a supplier and a customer than as a 'one-off' project. This is consistent with the service-dominant logic that argues for a shift in marketing thought from transactions to relationships (Gunter and Bonaccorsi 1996; Rust 2004).

Studies of developing co-creation relationships between Finnish solution providers and their clients (e.g. Ojanen et al. 2010; Ahonen et al. 2010) have revealed some focus areas related to value co-creation of large industrial solution offerings:

- *Identification of the potential of the common value* is essential to strengthen the customer perspective. This is based on deriving customer needs, potential customer benefits and solution provider benefits, to give a clear picture of mutual benefits.
- *Building a full understanding of the common value* means understanding all the elements of value and their causal relationships. Often the emphasis in related literature has been on the required capabilities of suppliers (e.g. Feeny et al. 2005), but in co-creation of value, it is also essential to note that customers should develop and leverage their capabilities to fully understand the benefits, processes and cost structures involved. This can be promoted via moving step by step towards more advanced services and solutions.
- *Communicating the value* in many cases may be the most crucial step in the process. In complex and large solution entities, the amount of information and participating people is large. Therefore, systematic tools to construct the holistic view of the whole solution and to support the decision-making are necessary for structuring the message to all parties involved.
- *Realisation of the common value* by measuring the relationship development. The relationship evolves dynamically, and situations and participating people may change. In order to develop the mutual trust and the co-creation procedure, there have to be both qualitative and quantitative measures from both supplier's and customer's perspectives.

Antioco et al. (2008) in their study of 137 companies in The Netherlands, Belgium and Denmark found that a greater emphasis on product-support services increases service volume, whereas an emphasis on activity-support does not have a direct effect on service volume. The former blend more naturally in product/service

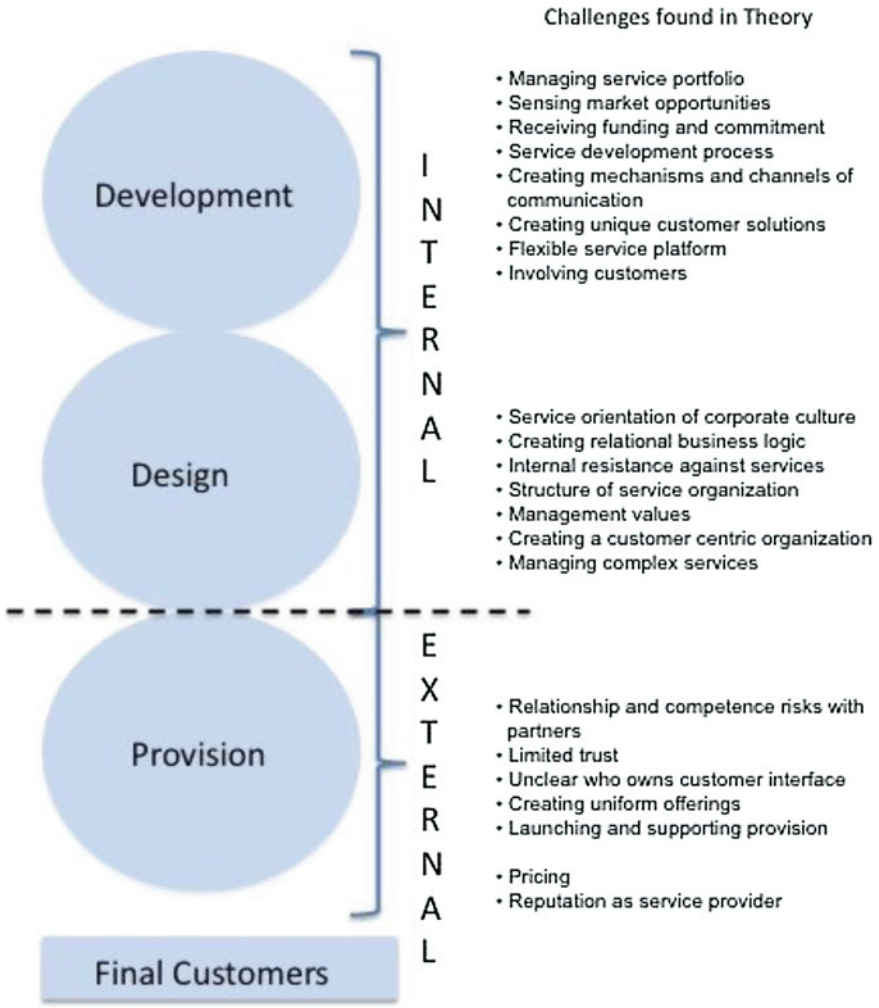

Fig. 10 Challenges facing servitizing manufacturing firms based on the existing literature (Aurich and Öhman 2012, p. 82)

bundles (Mathieu 2001a, b), e.g. delivery, technical after-sales, repair, warranties, etc. making it easier to charge for the service.[8] When a manufacturing company offers 'higher value-added services' (frequently activity-supporting services,) it runs the risk of entering into direct competition with professional service organisations such as financial institutions (e.g. when offering financial services) or consulting

[8] See e.g. Patankar and Mitra 1995; Jack and Murthy 2001; Balachander 2001; Murthy et al. 2004; Balachandran and Radhakrishnan 2005; Cohen et al. 2006; Jack and Murthy 2007; Allon and Federgruen 2009.

firms (e.g. when offering logistics or process management services). This may drastically reduce the service volume potential. One finding from the research is that activity-supporting service-business orientation leverages the relative sales of industrial products, while a product-support service—business orientation generates service volume. These findings suggest a changing focus over time in the implementation of service business orientations. Manufacturing firms should first implement activity-supporting service-business orientation to leverage their product sales. Subsequently, they can proactively offer product-supporting services to their customer base in order to increase service volume.

6 Challenges in Servitizing

Aurich and Öhman (2012) draw on the literature to put together a framework with key challenges facing manufacturing firms that servitize, using the service lens as a starting point. The framework is outlined in Fig. 10.

The conclusion is that there are many challenges for firms that embark upon the servitization route and that success is a function of how well these challenges are met.

7 Conclusions

The imperatives for servitizing the manufacturing business are growing stronger. A coherent approach to servitization that integrates the financial, strategic, marketing, regulatory and environmental drivers as well as the drivers that respond to the structural changes of outsourcing and offshoring has to be developed. This normally means balancing defensive and offensive reasons for servitizing.

When servitizing the manufacturing firm should aim for growing the service business to at least 30 % of the total business turnover.

As an example the average manufacturing SME in Sweden has 24 % of their turnover made up of services and this is increasing by 10 % per year. The profit margin of the services is around 24 % with a 5 % annual growth illustrating the importance of services to manufacturing firms.

To avoid the service paradox of higher costs due to servitization without the associated higher returns, it is essential that the manufacturing firm is able to leverage economies of scale, scope and learning in their service business. Those firms which servitize by offering additional services that are not closely related to their core offering are those which risk going out of business, whilst those that offer closely integrated services do not face the same risk.

For most manufacturing firms, servitization is an innovation around both increased value creation and increased value appropriation. The challenge is to have a balance in the necessary innovation investments across both products and services

and not under-invest in the service domain due to its apparent difference in both structure and resource requirement.

As the manufacturing firm embarks upon servitization it is essential to realise that every step towards increased servitization maturity requires a change in the organisation, culture, processes and customer interaction as well as the development of new competencies and capabilities.

Developing a servitization strategy will be assisted by the work of Ren (2009) outlining the choices in many dimensions.

When a firm adds services to its products, there is a strong probability that the firm will be able to change its position in an ecosystem, a value chain or a network. Such a change provides increased opportunities for growth and profit but at the same time challenges the firm in requiring the development of new capabilities, new relationships, new organisational resources and sometimes even new physical resources. There are several studies around servitizing manufacturing firms that can serve as both inspiration and assistance in the process.

There are of course many challenges when embarking upon a servitization journey and the most common ones are outlined in Fig. 10.

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The Architecture of Service Innovation

James Moustafellos

Abstract Innovation is about introducing something new. It occurs when we see the possibilities and opportunities others are missing. Sometimes, in order to see and understand our world better, we have to remove ourselves from a direct relationship with the subject we are observing and instead rely upon abstractions for needed distance, a new perspective and objectivity. For this study, an ARCHITECTURAL lens is applied to the field of Service Design to provide a new perspective on the subject and create the needed conditions for innovation. First, products and services are defined and architecture is positioned as a hybrid field with qualities of both. Next, architectural lessons from the Greeks and Romans are related to service design to provide criteria for approaching and assessing services. Finally, five architectural typologies are analyzed and used as service design models. These typologies offer insights and considerations not found in current service design methodologies, ideally providing the newness needed to foster innovation.

Keywords Service innovation · Service models · Service architecture · Service design · Experience design

1 Prolegomena

Innovation is about introducing something new—an idea, method, device, or artifact.[1] Innovation occurs when we see the possibilities and opportunities others are

[1] From http://www.merriam-webster.com/dictionary/innovation accessed 30 April 2013 10:13 am for "artifact".

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missing, especially those relevant to our activity domain. This is the result of seeing more and understanding deeper meanings. To begin our investigation, we are confronted with two important considerations:

1. How can one create the conditions needed to see the world anew to foster innovation?
2. Is service innovation a science (thus providing a replicable methodology), is it an art (founded upon individual inspiration) or somewhere in between?

These considerations are not the focus of the study, but instead form an underlying subtext to the inquiry, guiding intellectual choices, and framing its structure. Understanding this subtext will help one to understand how the following argument unfolds.

2 The Innovator's Lens

One method to see and understand our world better is to remove ourselves from a direct relationship with the subject we are observing and instead rely upon abstractions for needed distance and a new perspective. The seventeenth century French landscape painter Claude Lorraine and his followers into the nineteenth century used a black convex mirror to reflect the natural landscape and produce images to reflect upon nature through the simplified reduced tonal compositions created by the black glass. This artifact produced subjective abstractions to better understand the scene observed. The mirror was a tool, an enabling device for seeing. (Maillet 2004) Claude Lorraine's mirror was a form of a lens—"something that facilitates and influences perception, comprehension, or evaluation".[2] It is an artist's lens to see the world not as it is, but as it might be based upon a selective set of filters, many of which are in the user's mind. It provides a subjective point of view where the subjectivity is that of the creator of the artifact (in this case the choice to eliminate color) as well as the user's individual interpretation of nature reframed in the glass. Grounded in art, it enables one to question reality and provides a more individual understanding of the scene observed.[3]

A lens can also be used to bring into focus information that is not initially visible. White light seen through the lens of a dispersive prism reveals to the human eye the visible spectrum of its color composition. This lens is an artifact to reveal some of the hidden structure and richness of the situation. Grounded in science, it provides a more objective point of view. This lens seeks to explain reality and provide a more universal understanding of the phenomenon observed (Roos 2011).

The use of lenses is more than simply a metaphor derived from art and optical science. Lenses have been applied to understanding a diverse range of fields and innovation and service design are not exempt. Some examples include

[2] From http://www.merriam-webster.com/dictionary/lens accessed 23 April 2013 12:04 pm.

[3] For an explanatory diagram of innovation related to science, art and design, see Roos (2011).

epistemological lenses being used to better understand complex service systems (Biscoe et al. 2012) and theoretical lenses providing previously unseen insights into the very research of innovation itself (Harmancioglu et al. 2009).

Can the same approach be applied to the field of Service Design to understand and create the needed conditions for innovation?

2.1 *Understanding Service Innovation Through the Lens of Architecture*

The lens I propose is ARCHITECTURE. Architecture is an interesting lens in that it raises the question, "*Is it an art or a science?*" It is defined as "the art or science of building,"[4] making it both and neither and its value for this study lies in this otherness. Similarly, in relation to service innovation, architecture presents another conundrum, "Is architecture a thing or an activity?" (Hillier 2004, 2007).

As the field of service design develops a body of research and literature, tenuous connections are being made between services and architecture. Up to now, the connections to architecture, or more specifically buildings and spaces, focus primarily on the design of spatial configurations and environments to accommodate and improve service interactions (Bitner 1992). Similarly, connections are also being made between architecture, again particularly from the perspective of spatial constructs, as an enabler of innovation (Allen and Henn 2007).

Clearly, relationships exist between services, innovation, and architecture, but are these relationships only limited to the way we occupy and interact in space? What if we include the conceptual frameworks, underlying theories, and sociocultural motivations of architecture? For Mies van der Rohe, one of the leading architects of the modern period, architecture is much more than space; it is a reflection of society. "Architecture is the will of the age conceived in spatial terms" (Mies van der Rohe 1923). It is, as Georges Bataille states, "the expression of the very being of societies…" (Bataille 1997). As such, can the deeper meaning embedded in architecture reveal unseen meanings and insights embedded in service design?

The focus of this study is to use the formal and theoretical qualities of architecture as a lens to address this question and provide a new perspective to understand service design and encourage innovation. Since innovation is about creating something new, an approach to innovation must consider the creation process. Thus, the architectural lens will also be applied to see how to approach service design and how to establish design criteria in addition to understanding meaning and form in potential service models. Through this lens, the criteria for good Service Design can be reframed and made visible from our known everyday experience of buildings to yield new and innovative outcomes.

[4] From http://www.merriam-webster.com/dictionary/architecture accessed 17 December 2013 9: 55 pm.

2.2 Structure: Approach

> In order to create something new we need a method, that is to say, an objective system. If we discover the same qualities in different things, we have found an objective scale. For example, one of the basic laws is that the modern constructor, by the means proper to his particular field of activity, brings to light not the relationship between things themselves, but the relationship between their qualities.[5]
> (van Doesburg and van Eesteren, Toward Collective Building, Commentary on Manifesto V)

The role of architecture in this study shifts from being the locus and enabler of services and innovation to also being the diagram and visualization of service experience (reflecting Mies van der Rohe's "will of the age conceived in spatial terms"). The goal is to understand the relationships between the qualities of architecture and service design and allow one field to inform the other (here "qualities" is defined as the underlying intentions and meanings of outward forms). This approach bears influences from the structuralist approach to anthropology used by Claude Levi-Strauss (Levi-Strauss 1955), Christopher Alexander's pattern language (Alexander et al. 1977), and Hillier and Hanson's space syntax (Hillier and Hanson 1984). Understanding service design through this lens raises different questions and uses different assessment criteria from those in the current service design discourse, potentially providing one approach to the newness needed for service innovation.

Grounding this approach in current service design practice, Kimbell's recent study of the working process of three professional service design consultancies (Kimbell 2011) will be used as a structural reference. Kimbell identified four main themes that can be applied here to understand the relevance of using an architectural lens. The four themes are:

1. Services are social and material, a combination of interactions and artifacts.
2. Services are both relational and temporal, the engagement of artifacts and people over time and space.
3. Service designers approach their work from the point of view of customers, end users, and the service organization.
4. Designers actively engage members of the service organization in the design process and emphasize the importance of making the service visible through prototypes and visual representations.

Using these four themes as a reference, this study will first establish a foundation for using an architectural lens by defining products and services and positioning

[5] This passage taken from van Doesburg and van Eesteren's "Commentary on Manifesto V" reflects the De Stijl movement's origins in mathematics (through the influence of Schoenmakers' writings) and the attempt to reframe architecture not as an art but instead as a discipline based upon objective and universal truths (hence the limited vocabulary of horizontal and vertical directions, primary colors, and black, white and gray). As stated by van Doesburg at the International Artists Congress in Dusseldorf in May 1922, "We are preparing the way for the use of an objective universal means of creation." (Conrads 1970) This passage represents art and architectural theory influenced by science, rather than true scientific theory.

architecture as a hybrid field with characteristics of both. Next, historical precedents are explored to ground the study in architectural tradition by first learning the value of dynamic perspective from the Greeks and then design criteria from the Romans. Lastly, five architectural paradigms are analyzed from both spatial and theoretical perspectives and used to illustrate conceptual models for service innovation. These conceptual models address service innovation as it relates to service priorities, form and structure, imagery and effect, space/time relationships, access, power and flexibility.

2.3 Foundation: From Products and Services to Architecture

The debate between products and services and the refinement of their respective definitions has been an ongoing process for centuries. Beginning with Adam Smith's Wealth of Nations (1776), many have attempted to establish a codified set of definitions. Since the definition of products and services is outside the scope of this particular study, the following is a summary outlined in recent literature. Products are physical, can be owned and exchanged, preserved over time (stored), and exist independently of their owners (Parry et al. 2011). Services, unlike products, are intangible, cannot be owned or stored, are inseparable from their provider and consumer and unfold in time and space (Kimbell 2009). Services are created through interactions and relationships between the provider and the user and they are emotional experiences.

So what is architecture, a product or a service?

2.3.1 Architecture as a Product

The product of architecture as a practice, the building, has all of the tangible, physical qualities of a product. A building is preserved over time, it exists independently of its owner and it is readily bought and sold. For many, it is the physicality of buildings that people think of most when they think of architecture. However, it is all of the intangible qualities of a building that make it Architecture. These are the qualities that incite intellectual and emotional reactions through the user's experience. These qualities are in part the manifestations of architecture as a service.

2.3.2 Architecture as a Service

Intangible. Architecture as a service is intangible and is experienced in multiple ways. It is found first (and most readily) in the collaborative working relationship between the architect and client and is inherent in the building and design process. It is also found in the interaction of a person with the building or space over time. In

both cases, the experience is intellectual and emotional and cannot be separated from it nor stored.

Ownership. Buildings are owned, bought, and sold. Architecture is not. The American Institute of Architects stipulates in the "Abbreviated Standard Form of Agreement Between Owner and Architect," a standard contract used in the United States, that an architect's drawings, specifications, and other documents are legally considered "instruments of service" and all ownership and rights to the design are retained by the architect. A client has the right to use the design only for the particular project for which the architect was engaged. This right expires upon completion of the project construction.[6]

Co-creation. An essential component of service design is the co-creation of the service between the provider and the customer/client. Historically, architecture has always been a process of cocreation. Good architecture is the result of effective communication and collaboration between the architect, client, and builder. Many architects cite this collaboration as an essential component of a project's success (Edgell and Moustafellos 2013). Although one could argue that this more appropriately falls into the realm of codesign, as a result of collaboration during the design process (Steen et al. 2011), I would argue that the service experience continues through the ongoing dialog between the architecture and occupant over time, expanding into the broader relationship of cocreation.

Space and Time. Like a service, architecture is also a constructed experience designed to meet the user's needs, shape interactions, and unfold over space and time. As delineated by Theo van Doesburg in his 1924 manifesto *Towards a Plastic Architecture*, "The new architecture takes account not only of space but also of the magnitude time" (van Doesburg 1924). Architecture, for van Doesburg and his fellow modernists, is a dynamic experience in which space and time are essential building materials.

Another way to understand the temporality of architecture is to view it as a field "designing for services" rather than designing services, as described by Kimbell. Designing for services "recognizes that what is being designed is not an end result, but rather a platform for action with which diverse actors will engage over time… [It] points to the impossibility of being able to fully imagine, plan or define any complete design for a service since new kinds of value relation are instantiated by actors engaging within a service context. Designing for service remains always

[6] As stipulated in the American Institute of Architects' standard contract "Abbreviated Standard Form of Agreement Between Owner and Architect (No. B151)/Article 6: Use of Architect's Instruments of Service: "Upon execution of this Agreement, the Architect grants to the Owner a nonexclusive license to reproduce the Architect's Instruments of Service solely for purposes of constructing, using and maintaining the Project, provided that the Owner shall comply with all obligations, including prompt payment of all sums when due, under this Agreement. The Architect shall obtain similar nonexclusive licenses from the Architect's consultants consistent with this Agreement. Any termination of this Agreement prior to completion of the Project shall terminate this license. Upon such termination, the Owner shall refrain from making further reproductions of Instruments of Service and shall return to the Architect within seven days of termination all originals and reproductions in the Owner's possession or control.".

incomplete" (Kimbell 2011). This definition provides a perfect understanding of the dynamic relationship between architecture and its occupants and the evolution of architecture as a platform for living that changes over time. This also further supports the cocreation of architecture between architect and client/occupant.

Emotions. Architecture is an emotional experience. "The business of Architecture is to establish emotional relationships by means of raw materials. Architecture goes beyond utilitarian needs" (Le Corbusier 1931). This is the root of the debate between functionalism and art in architecture. This tension, present in the writings of Le Corbusier who advocates for both, is part of what makes architecture an interesting lens for the functional/emotional duality of services. Vitruvius, considered to be the first architectural theorist, included both function and emotions as integral parts of architecture in his seminal treatise *De Architectura* in the first century AD.[7]

2.3.3 Architecture as a Bifocal Lens

Ultimately, architecture is a hybrid straddling the realms of products and services. It transcends the physical and hovers between the functional, experiential, and phenomenological. A house is for its inhabitant simultaneously Le Corbusiers's "machine for living" (Le Corbusier 1931) and Gaston Bachelard's "embodiment of dreams" (Bachelard 1958). This is what makes architecture an appropriate lens for exploring service innovation. Furthermore, it is a bifocal lens. It enables one to see a range of points of view: near and far, physical and experiential, what is and what could be.

3 What the Greeks Knew

To begin to explore the architecture of service innovation, it is helpful to start with a historical grounding—the architecture of Greece and Rome. The Greeks provide lessons to understand Kimbell's themes regarding services as both relational and temporal, engaging artifacts and people over time and space, and that service designers approach their work from multiple points of view—customers, end users, and the service organization.

[7] Vitruvius (born c. 80–70 BC, died after c. 15 BC) is known for his multi-volume architectural treatise *De Architectura* in which he established 3 essential components for architecture: Firmitas, Commoditas, Venustas. Venustas is traditionally translated as *delight*, the realm of emotions in architecture.

3.1 The Parthenon: A Service Innovation

Design from the User's Perspective. First, let's begin with the importance of placing the emphasis on design from the user's perspective. The Parthenon, the most refined Greek temple, appears to be a very regular form of repetitive standardized components. Upon closer inspection, nothing about this structure is regular. What appears to the viewer as straight and parallel lines are in actuality all curves. What the viewer first sees as standardized components and equal spacing between the columns are all slightly different. They are modulated for effect. The Parthenon is a highly complex design of optical refinement to create the most pleasing view for the observer.

The design of the Parthenon considered how the user's eyes see the building (the user's visual experience) and then worked back to a form that reflects that point of view. It is a marvel of perception—"a mental image" or "a physical sensation interpreted in the light of experience".[8]

"Mental images" and "interpretation" are all about what the viewer subjectively sees and perceives. "Sensations" are all about what the viewer feels. Both are about personal experience. To achieve this effect, the builders of the Parthenon prioritized the user's experience over construction efficiency, convenience, and cost. This goes against all construction logic but makes sense regarding experience logic. From a business perspective, this provides an important lesson: *design services from the user's point of view*.

Briefly returning to the question of architecture as an *art* or *science*, the Parthenon presents a third option. If science seeks a universal understanding and art seeks an individual understanding, the subjective understanding of the user is the domain of *design* (Roos 2011). Beginning with the user's point of view is the fundamental starting point of a design methodology.

Experience is not static; Design for a dynamic point of view. Returning to the Parthenon, recent research pushes the argument of optical refinement further to posit that the forms of the Parthenon are adjusted to accommodate a roaming point of view rather than a static one (Duddy 2008). Each component is uniquely and deliberately calibrated to yield the greatest effect for the user in motion. A roaming point of view integrates space and time and acknowledges the user's changing perception with movement. It is a very sophisticated approach to designing an experience, combining actors, artifacts, and actions with their relational positioning, starting with the user's subjective perception of reality.

Ultimately, the Parthenon is not really a building. It is an *instrument for experience*.

[8] From http://www.merriam-webster.com/dictionary/perception accessed 29 April 2013 10: 25 pm.

3.2 Services as Instruments for Experience

Using the Parthenon as a service model, services can be reframed as instruments for experience. An instrument is "a means whereby something is achieved, performed, or furthered" and is "designed for precision work."[9] An experience is "something personally encountered, undergone, or lived through." It involves direct observation or participation and includes "the conscious events that make up an individual life" or collective past of a community.[10] As an instrument for experience, a service can be conceived as a precision tool to calibrate or tune encounters to heighten participation and further personal and collective engagement. To function properly, precision is important. Recent restoration work has shown that the stone joints of the Parthenon display extreme precision to one thousandth of a millimeter (Korres 1994).

Typically, when we consider services, the services are envisioned as dynamic while the spaces in which they are delivered are often considered static containers or frames. For Bitner's *Servicescapes*, environment plays an important role in influencing consumer and employee behaviors, interactions, emotions, and perceptions of service value. The relevant environmental dimensions considered include ambient conditions, spatial layout, functionality and signs, symbols, artifacts (Bitner 1992). As important influencers of experience, these components provide a starting point for service calibration. In addition, a service *instrument for experience* should include the following:

- Begin with the user perspective, accepting that it is subjective and unique. By prioritizing service from the user's point of view it is calibrated for their experience. Think about what the user perceives rather than what is actual. Work back from the perception you would like the user to have and design an infrastructure and building components (artifacts, sequences, touchpoints, servicescape) that are aligned to support this point of view.
- Think of the user as an active participant moving through the service in time and space. Consider a dynamic point of view. The user's perception will change based upon time, duration and their relative position. Design the service to respond to these changes.

4 What the Romans Knew

Develop the right design criteria. In the first century BC, Vitruvius, a Roman architect and engineer, wrote *De Architectura*, a multivolume treatise on architecture. In this seminal work, he developed his theory of the essential components

[9] From http://www.merriam-webster.com/dictionary/instrument accessed 30 April 2013 3:14 pm.

[10] From http://www.merriam-webster.com/dictionary/experience accessed 2 May 2013 10:16 pm.

of architectural design: Firmitas, Commoditas, and Venustas, traditionally translated as Firmness, Commodity, and Delight.[11] For the purpose of Service Design, these criteria can be reinterpreted as Structure and Sustainability, Function and Experience. Each is an essential component of the design and together they can form a framework for service design generation and assessment.[12]

4.1 (Firmitas) Structure and Sustainability

This first criterion asks the question, *"Is the service structurally stable and durable?"* It focuses on the infrastructure needed to construct, support, and perform the service and its ability to sustain the service over time.

Structures are systems that include the arrangement of components in a "definite pattern of organization," the components' relationships to each other, and their formation of a coherent whole to achieve a specific intent.[13] In architecture, the structure is what allows the assembly of building components to stand. It can either be concealed or revealed. Structure can be integrated into the materials themselves, in which they are self-supporting or load bearing, or it is an external armature for support.

The building components of a service include all of the touchpoints and artifacts employed, the actors, time duration and sequence, and the environment of the service (Bitner's *servicescape*). These are the basic elements of systems theory. The structural system of the service will determine the assembly of these components, the roles each will play and their relationship to each other.

Load bearing versus External armature. If the service components are conceived of as self-supporting, the structure is fully integrated and their arrangement determines the way the load will be distributed. Since one service component may support another, changes or adjustments in one area will affect others. Each component plays an essential role and flexibility is limited once the service structure is in place. If instead, a service structure is conceived as an external armature, it is separate from the service itself. Service components are modular, making their arrangement more flexible, easily changed, and less disruptive to adjacent components. In either case, the structure can be concealed from view or fully revealed. This can be an esthetic choice or a performance choice. These choices will be further developed in the typologies explored as service innovation models below.

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[11] Translations of Firmitas, Commoditas and Venustas vary. Also translated as Durability, Convenience and Beauty by Morgan (1914).

[12] In 2011 Lucy Kimbell introduced me to the concept of applying Vitruvian principles to assessing other disciplines related to experience and innovation. Our conversation is the root of developing the idea and reinterpreting the Vitruvian principles into a model for assessing service innovation here.

[13] From http://www.merriam-webster.com/dictionary/structure accessed 9 May 2013 3:31 pm.

The integrity of the structure—"the condition of being unified, unimpaired, or sound in construction"[14]—will determine the quality of the service experience and its long-term viability. The components of quality assessment can be measured across the dimensions outlined in the SERVQUAL method: Tangibles, Reliability, Responsiveness, Assurance, and Empathy (Parasuraman et al. 1991). An unsound service structure, like a building, is conceptually subject to settling and instability. Settling will result in cracking and misalignment of components over time. Cracking can be considered stresses on the service system made visible. Misalignments cause unwanted shifts, rough surfaces, and tripping points. Extreme cases can lead to failure. Instability or inadequate structure can lead to vibrations, swaying, and noise. All detract from the satisfaction of the experience. Remediation is disruptive, costly, and rarely satisfying. A structure that is well built can last for years—or in the case of architecture, millennia. Poorly built structures (and services) will collapse—unable to support the burden of their own weight over time.

An excellent model for service innovation through structure is ironically the Swiss engineer Robert Maillart, who consciously broke away from the Roman tradition of masonry construction. Working in reinforced concrete in the early years of the twentieth century, his structures, predominantly bridges, are innovative by today's standards—nearly a century later. Maillart's innovations are based on carefully observing the structure's performance over time and learning from past mistakes. After completion, Maillart would continue to visit his projects to observe stresses in the structure. He would then modify his future forms to reduce or eliminate these stresses. He allowed the forces in the structure to dictate the forms. In addition, Maillart's forms reflect the strengths of the material used. His revolutionary break from the past was to design forms appropriate to concrete rather than stone, creating a whole new vocabulary in the process. He designed for the integrity of concrete and did not think of it as an inexpensive substitute for stone (Billington 1990).

Services are much more malleable than reinforced concrete. Maillart's method of *construct/observe/adjust* is an excellent methodology for service innovation. Based upon a classic control theory loop, it builds in feedback for system improvement and his innovative forms derived from performance rather than preconceived ideas. For the service designer, this raises the question "*What are the stresses on the service system telling me?*" Following Maillart's model, the cracks can be read and the structure adjusted to eliminate them from the system. Similarly, designing a system based on the strengths and qualities of a particular material is also a very valuable service lesson. *Design for the strengths of what the service is, not as a substitute for what it is not*.

[14] From http://www.oxforddictionaries.com/us/definition/american_english/integrity accessed 23 December 2013 2:00 pm.

4.2 (Commoditas) Function

The second criterion asks the question, *"How well does the service function and does it fulfill the user's needs?"* The focus on functional need is important because it places the emphasis on user value, specifically the instrumental value of the service. This is a critical component of the way users assess services. It is also an opportunity to foster innovation. In his study of how to bring open innovation to services, Henry Chesbrough cites Theodore Levitt and Peter Drucker for their emphasis on the effect a product produces as the object of customer desire rather than the product itself, leading him to recommend focusing on customer value to approach service oriented innovation. Two of his recommendations are: to work closely with customers to develop new solutions; and to focus offers on utility rather than the product (Chesbrough 2011).

4.3 (Venustas) Experience

The last criterion asks "*Is the service satisfying*?" and "*Does it give pleasure, enjoyment, and delight to the user*?" This aspect emphasizes the importance of esthetics and emotions and their role in defining a user's experience. Function fills a need, but experience engages the user, influences satisfaction and builds a long-term relationship. Emotions also influence decision-making and are essential for determining value for an individual. Here, the service may have instrumental value in eliciting satisfaction and an emotional response but intrinsic value becomes more important in the realm of esthetics (beauty) and delight. Dhaliwal, Macintyre, and Parry provide an extensive review of research on emotions in the decision process and conclude "the core essence of 'value' depends upon the human emotions that a service excites (or fails to excite) (Dhaliwal et al. 2011)." Similarly, Angelis and de Lima conclude that customers derive greater value from experiences and value is determined in part by customer perceptions (Angelis and de Lima 2011). Each touchpoint is an opportunity to influence user perception and create instances of user delight to build a value proposition.

Building a value proposition beginning with user delight is a reverse process of innovation that uses a hermeneutic methodology according to Roos (2011). He describes the goal of this methodology as "to generate, as a creator of an object, in the mind of the interpreter (consumer/customer) a specific set of emotions, intentions and thoughts." Thus in the service domain, generating a predetermined set of emotions in the mind of the user becomes the focal point of the design process, rather than the service system itself.

5 Five Models for Service Design and Innovation

Select the right approach. According to Kimbell, professional service design firms strive to make the service visible during the design process (Kimbell 2011). Using architectural case studies, the following five design approaches use particular building types to diagram different service models and make their respective qualities visible. Each is analyzed and applied to service design and includes an architectural reference to illustrate the concepts and ideas.

5.1 The Primacy of Effect and Experience

> The distinguishing mark of the Baroque age is the method of thinking and feeling that prevails in it; its outstanding feature is the development of a specific kind of universality. In [architecture], this manifests itself as a new power to mold space, and to produce an astonishing and unified whole from the most various parts. (Giedion 1941)

The first model is based upon the Baroque period and prioritizes user experience. In this example, structure is typically hidden in favor of emphasizing molded spaces and surface effect. A masterpiece of the Baroque period is Francesco Borromini's church Sant'Ivo alla Sapienza, Rome (1642–1660). It reflects the tension between science and art in its mathematic precision and undulating sculptural surfaces (Giedion). Like many buildings of this period, plans reveal the great thickness of the walls to accommodate the carving out of spaces. The structure is contained within this thickness, and conceptually the structural system and wall surface act independently—one purely functional and the other purely experiential.

Materiality and surface are important experiential interfaces. This period considers the building "a total work of art" in which all of the components are carefully designed to work together to create a unified experience—as Giedion states, "an astonishing and unified whole from the most various parts". Wall surfaces are shaped and embellished to heighten the drama of the experience through theatrical effects. These spaces push the limits of reality and cross over into artifice and illusion, often employing scenographic effects and perspectival distortions borrowed from the theater (Zanlungo and Tarabra 2012).

Returning to the concept of *instruments for experience*, the Baroque architects were masters of using buildings to create finely tuned user experiences. Although mathematically precise, innovation here lies more in the domain of art. This instrument is calibrated to express a very controlled and individual view of a perfect world of the architect's creation. Referencing Roos' definition of an art based approach to innovation; the creator's subjective view here ultimately makes observers question their own subjective view of reality (Roos 2011).

As a model for service, the Baroque period introduces concepts of theatricality, fantasy and illusion over reality. It also emphasizes the integration of all of the components into a unified concept and coordinated whole. The service becomes a closed illusory world. Typical applications are the luxury sector, entertainment and

hospitality industries. One obvious modern-day equivalent is Las Vegas. From an innovation perspective, however, relegating this model to only these domains is too limiting. Its application in less obvious service domains has great potential for differentiation.

An example of this is the success of IKEA. IKEA embraces theatricality and illusion through their showrooms replicating complete living environments to engage shoppers in the experience of a simulated reality. They convey the message "This is what your life could be" and engage shoppers to question their own reality and envision life as an IKEA reality. In addition, IKEA represents a global/low budget approach to living as *a total work of art* through its product line covering every aspect of domestic need, including food, creating Giedion's "astonishing and unified whole from the most various parts." This is furthered in the design of the store and service in which every component contributes toward creating a complete and satisfying experience for the entire family. Edvardsson, Gustafsson, and Enquist describe this as a holistic approach to services (Edvardsson et al. 2007).

5.2 The Fetish of Structure/Process/Systems

> Beaubourg-Effect…Beaubourg-Machine…Beaubourg-*Thing*—how can we name it? The puzzle of this carcass of signs and flux, of networks and circuits…the ultimate gesture toward translation of an unnameable structure: that of social relations consigned to a system of surface ventilation…[15]
> Jean Beaudrillard, "The Beaubourg-Effect: Implosion and Deterrence"

The second model is based upon high technology architecture and an emphasis on systems and the esthetics of performance. The Pompidou Center in Paris (Richard Rogers and Renzo Piano 1972–1976) illustrates the use of the structure, networks, and mechanical systems to create the visual imagery and experience of the building. As with any fetish, defined as "an object of irrational reverence or obsessive devotion,"[16] the exposure of all of the mechanics is not based on any rational need but instead on desire—an obsessive devotion to technology. The workings and mechanics of the building create a spectacle and an event. They heighten the experience and foster an emotional connection. Color-coded and stylized, these systems serve as signs and symbols of an idealized vision of functionality and the building as a machine.

As a service model, the mechanics of the service are exposed not in their true form but in an idealized form. This is a hyperestheticized version of systems as spectacle. Two different service domains that illustrate this model are restaurants and car washes. The trend in restaurant design to make the preparation of food visible to diners through open kitchens shifts the preparation period from waiting to

[15] Leach (1997) 'Rethinking Architecture: A reader in cultural theory' Routledge; London and New York pp. 210.

[16] From http://www.merriam-webster.com/dictionary/fetish accessed 2 May 2013 10:26 pm.

entertainment. Similarly, car washes that enable one to either remain in the car during the process or to watch the process behind glass involve the customer in each step of the process and transform a banal task into a mechanical spectacle. In both, a potentially negative experience—waiting—is reframed as an opportunity to engage and delight (in the Vitruvian sense) the customer. Furthermore, as in the Pompidou Center, by revealing systems or components that are typically concealed from view, they are idealized in their forms and execution. Food preparation becomes theater with cooking as a choreographed narrative unfolding in a gleaming set piece of stainless steel, smoke, and steam.

5.3 The Primacy of Power and Sequence

The third model explores the interconnected spatial sequence of rooms arranged *enfilade*. Spatially, an enfilade is a series of rooms in which one opens into another in sequence with all of the entry points aligned on axis. The beginning of the sequence and the end of the sequence are visible at each end of a circulation spine. There is no choice of movement in the sequence other than forward or backward. Circulation is controlled. Traditionally, an enfilade sequence represents a model based upon power structures (possession of control, authority, or influence over others[17]).

Deep structures like an enfilade, as characterized by Dovey and Hillier and Hanson, are built upon access, privilege, and one's relative position in space paralleling one's social position. Deeper access typically equals greater privilege. In the social dynamic between inhabitants and visitors, deeper spaces are accessible only to inhabitants and shallower space to visitors (Dovey 1999; Hillier and Hanson 1984). Depth of space signifies belonging. The palace of Versailles represents the epitome of an enfilade power structure. This is particularly evident in the sequence of rooms leading to the King's bedroom. In this carefully orchestrated approach, spatial structure and narrative structure combine to reinforce the position of the King in the cosmos. One passes through rooms dedicated to Venus, Mars, and Mercury before arriving at the throne room to the Sun King (Dovey 1999). As space unfolds, so does the story.

As a service model, there are two interrelated conceptual directions for exploring experience: power and sequence. Beginning with power, services that employ this model influence and control the basic human need of belonging. Abraham Maslow theorized that the fulfillment of the need for love and belonging is fundamental and essential before attainment of esteem and self-actualization. Humans hunger for "a place in his group, and he will strive with great intensity to achieve this goal." (Maslow 1943) Services modeled on an enfilade power structure affect this need by

[17] From http://www.merriam-webster.com/dictionary/power accessed 29 November 2013 11:37 am.

creating a world behind "velvet ropes," existing by "invitation only," and thriving on the privilege of membership. This model is founded upon limited access, aspiration, and fear of denial.

Sequence prioritizes the rhythm and order of steps evident throughout the service experience. The beginning, end, and all steps between are simultaneously visible and highly structured. In this model, movement is constrained to forward and backward but order is always maintained and position or "status" is clearly evident. Returning to Maslow, rhythm, order, and predictability contribute to satisfying the basic need for safety. In addition, he acknowledges the importance of the "desires to know and to understand" toward attaining basic safety as well as the higher need for self-actualization. (Maslow 1943) Within the service domain, typical manifestations of enfilade sequence models are courier service tracking systems and online purchasing. Although space here is defined as a series of virtual spaces, each step in the process is clearly articulated along the chain from the beginning to the end. The view of the whole, often provided through a tracking progress bar, becomes an essential tool for orientation and navigation with a system that would be otherwise invisible. This creates a sense of safety for the user and helps to eliminate anxiety through understanding the whole.

One could also reframe the sequence model to shift the focus from *power* to a model based on *empower*. Through its clearly articulated positioning, the user is empowered through information. The clarity and visibility of one's position relative to the whole makes the process transparent and the end goal evident. Furthermore, information and power sharing have been shown to be important factors in innovation (Edgell and Vogl 2013).

5.4 Dynamic Experience

> There is a mode of vital experience—experience of space and time, of the self and others, of life's possibilities and perils—that is shared by men and women all over the world today. I will call this body of experience "modernity." To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world—and, at the same time, that threatens to destroy everything we have, everything we know, everything we are. Modern environments and experiences cut across all boundaries of geography and ethnicity, of class and nationality, of religion and ideology: in this sense, modernity can be said to unite all mankind. But it is a paradoxical unity, a unity of disunity: it pours us all into a maelstrom of perpetual disintegration and renewal, of struggle and contradiction, of ambiguity and anguish. To be modern is to be part of a universe in which, as Marx said, "all that is solid melts into air."
> Marshall Berman (1982) All that is Solid Melts into Air

The fourth model is the antithesis of the prescribed sequence, axial organization and power structure of an enfilade and represents a modernist interpretation of space. A dynamic spatial experience removes strictly defined boundaries in favor of blurred boundaries, intersections, choice, and multiple entry and exit points. In this model, the experience is a conflation of multiple dimensions at once.

An architectural example of a dynamic space is Mies van der Rohe's Barcelona Pavilion, Barcelona (1928–1929). A taut composition of intersecting planes, clear boundaries erode between inside and outside, building and garden, enclosed and open space.

Seventy years later, Bernard Tschumi pushes the concept of dynamic experience further to introduce the concept of simultaneity of movements, forms and experiences. He advocates for an architecture in which time and history collapse and for antinarrative space (Tschumi 1999).

As a service model, dynamic experience represents service in the digital age. In a postglobalization and postinternet world, all that is solid truly melts into air. Services are rendered 24/7/365 and local time is replaced by universal time. With organizations existing simultaneously in the real world and online, there are multiple opportunities and multiple thresholds of entry into a service experience. Unfortunately, for many organizations these are considered parallel experiences rather than the same experience. The potential for service innovation lies in the collapse of the real and virtual into a simultaneous experience. Virtual reality's realistic simulation of physical experience and augmented reality's overlay of digital experience in the real world exemplify the dynamic potential for service simultaneity. Similarly, the emergence of additive manufacturing blurs the boundaries of service and product domains

The blurred boundaries and open access of this dynamic spatial model also serve as a model for considering innovation in services. Henry Chesbrough cites two kinds of openness in his concept of open innovation: "outside in," in which an organization incorporates external ideas and technologies in its services; and "inside out," in which an organization allows others to use its ideas, technologies, or processes (Chesbrough 2011). Both of these approaches require permeable organizational boundaries to allow the flow of knowledge in or out as needed. They also require a conceptual spatial questioning of where does a service begin and where does it end, as well as where does one organization's domain begin and another's end.

5.5 Structure and Skin

> The interior walls may be placed wherever required, each floor being entirely independent of the rest. There are no longer any supporting walls but only membranes of any thickness required. The result of this is absolute freedom in designing the ground plan; that is to say, free utilization of the available means, which makes it easy to offset the rather high cost of reinforced concrete construction.
> Le Corbusier/Pierre Jeanneret, Five points toward a new architecture

The fifth model focuses on the separation between structure and skin. In the late nineteenth century, Chicago pioneered the skeletal frame of iron and steel in its early skyscrapers, reducing enclosure to an independent skin. Market forces recognized the value of frame construction and the freedom it provided for interior walls. By the late 1920s, Le Corbusier championed the separation of structure and

enclosure by reducing building structure to a regular grid of points and walls to freely placed lines.

An example of this model is the open floor plan of typical office buildings. Separating the walls from the structure opens the space to infinite possibilities to suit the needs of different occupants. From a service perspective, this model separates the components of the service that are fixed from those that are flexible. It provides a design strategy for standardization w/local or individual specificity, mass customization and rapid change. The structural components provide a standardized platform for infinite, interchangeable service experiences.

6 Conclusion

> building is the deliberate organization of the processes of life…
> building is nothing but organization:
> social, technical, economic, psychological organization.
> Hannes Meyer, Building (1928)

At the height of modernism's fervor, Hannes Meyer strove to remove architecture from the world of art and unknowingly grounded it firmly in service design. His emphasis on its social, technical, economic, and psychological aspects reflect many of the essential components and considerations of services. By rejecting art and embracing a more quantifiable scientific and engineering approach, his goal was to make architecture more universal and innovative.

The universality of the underlying principles that inform architecture make it an appropriate lens for understanding services from a different perspective. Employing an architectural lens, through historical precedents and the five service models, provides new insights, concepts, and strategies for service design not included in current methodologies. Understanding, approaching, and assessing services in new ways through architecture can lead to new outcomes and foster the conditions needed for service innovation.

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Innovation or Resuscitation? A Review of Design Integration Programs in Australia

Joanne Cys and Jane Andrew

Abstract Design integration programs have been established and supported by governments of nations around the world, including the UK, Korea, Denmark, Taiwan and New Zealand. The UK's 2005 Review of Creativity in Business, commissioned by the Chancellor of the Exchequer and conducted by Sir George Cox of the Design Council, alerted attentive countries to the idea that design can enable innovation as the conduit between creativity and application. Design integration programs aim to increase the competitiveness of business through the application of design services and design thinking within the business model. Typically design integration programs provide auditing, mentoring and business modelling with selected companies to plan and implement strategies to utilise professional design services and apply design thinking methods to develop new products, services or processes. This chapter will review four government supported programs in Australia aiming to integrate design capabilities to stimulate business innovation and contribute to economic growth. The program reviews will consider the policy discourse, strategies, and instruments used within the four design integration programs. The chapter will conclude with a discussion of opportunities and limitations of design integration programs and provide some recommendations for the development of future programs.

Keywords Design integration · Creativity · Innovation · Creative economy

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1 Introduction

Acknowledged as an enabler of innovation, design is increasingly being harnessed by the public sector as a service that may assist to build private sector business competitiveness and to advance sector development, by extension, contributing to economic growth.

Economic development and regional innovation systems theory published over the last two decades has argued for the benefits to business gained by utilising design as a service to embed innovation, increase competitiveness and develop markets in a range of business and industry sectors. Since the mid 1990s governments in the UK, Singapore, Denmark and New Zealand have supported the establishment of design integration programs to stimulate business innovation and industry development.

In these countries, it is recognised that for some businesses, the use of design services has had a significant influence on the products, systems and services of companies. As Blake (2013) the National Design Integration Program Manager of Australia's Creative Industries Innovation Centre (CIIC) recently stated, 'Design has emerged as a serious tool for business growth in the high cost economy…you only need to look at the success of design-led firms in Scandinavia, Germany and Northern Europe to realise that design delivers a significant return on investment.'

As is recognised by Miles et al. (2006) 'Innovation policies span a huge range of actions and targets, and there is much learning needed about how to act effectively in diverse and changing conditions. Evaluations of those interventions that have been made is thus a vital tool' (Miles et al. p. 28). This chapter will review four government-supported programs in Australia aiming to integrate design capabilities to stimulate business innovation and contribute to economic growth. The adoption of a case study method allowed exploration of differing strands of academic, advocacy and policy discourse and the ways in which it is articulated through design integration program publications and activities to support design integration. This study utilises a combination of Ex-post Evaluation and Intermediate evaluation, as discussed by Miles et al. (2006).

The program reviews will consider the policy discourse, the stated objectives of the program, strategies and delivery agents, published outcomes of the program and the status of the program within the four design integration programs. The analysis will provide a comparison of international best-practice design integration programs against the Australian case studies highlighting the opportunities and limitations of each of the programs, and consider opportunities for 'design' engaged as a professional service to stimulate innovation.

1.1 The Changing Role of the Designer

In 2005, the UK *Review of Creativity in Business* report, commissioned by the Chancellor of the Exchequer and conducted by Sir George Cox of the British Design Council, alerted attentive nations to the idea that design, as the conduit

between creative ideas and the application of those ideas in business endeavour and can enable innovation (Cox 2005). For some nations, this recognition provided an expanded opportunity beyond the traditional understanding of science and technology as the main driver of innovation.

Henton and Walesh highlighted the important role of design and the design process within economic development strategies. In a paper published by the James Irvine Foundation, *Linking the New Economy to the Liveable Community,* (Henton and Walesh 1998) argued that:

> The New Economy is not about high tech. The idea that the New Economy means high tech has held back real understanding of the New Economy. … The New Economy is design thinking.

The above statement reflects a growing body of discourse weaving together arguments for the inclusion of creativity, design and innovation, within regional economic development policy and programs.

The argument from these types of organisations has tended to emphasise the value of good design as a business investment. The potential for increasing engagement between designers and business prompted the recognition that designers need to be more aware of, and responsive to, the needs of business. Kelly and Litman (2005, cited Raijmakers et al. 2012) describe the role of global design firms such as IDEO as experimenters, cross-pollinators and hurdlers. Lauren Tan's research of the role of the designer in the context of public and social sector services identifies seven roles, namely: strategist; facilitator; researcher; co-creator; provocateur; social entrepreneur and capability builder (Tan 2010, p. 40).

In 2007, Beckman and Barry observed that as organisations are confronted with increasingly complex business challenges, many have sought to understand the more fundamental principles underlying the innovation process, in which design plays an important role. Within the context of enhancing business performance, creativity, innovation and design are commonly defined thus:

- *Creativity* is the generation of new ideas—either new ways of looking at existing problems, or seeing new opportunities, perhaps by exploiting new technologies or changes in markets.
- *Innovation* is the successful exploitation of new ideas. It is the processes that carry them through to new products, new services, new ways of running the business or even new ways of doing business.
- *Design* is what links creativity and innovation. It shapes ideas to become practical and attractive propositions for users or customers. Design may be described as creativity deployed to a specific end (DTI 2005, UK Treasury 2005, cited Howard 2008).

Drawing from academic discourse on knowledge and learning, Charles Owen (2007) developed a model that considered design as a process of knowledge development, in which both analytic and synthetic knowledge are of equal importance in the translation of theoretical observations and developments into practice in the form of artefacts and institutions (Owen, 27). Similarly Australian academic

Green (2009) observed that the design process is increasingly being considered and applied for its ability to draw together knowledge from all fields in developing the most appropriate solution to the issue at hand. The growing awareness of the way the design professions approach considering and resolving problems and developing new products and processes has meant that the term *design thinking* has become as popular in both the business and policy domains as the term creativity has been over the last 20 years. Design thinking is considered as an integrated view of design as a problem-solving process that involves players from multiple disciplines.

Dong highlights however that the process of facilitating design thinking across multidisciplinary teams means designers must learn the language of business' (2012, p. 70). Conversely, to derive increasing value from designers, businesses needed to move away from the historically embedded conceptualisation that design is concerned with aspects of the look and feel of two-dimensional symbols and three-dimensional things. Increasingly the role of designers is being acknowledged by business and governments as a stimulator for innovation across the organisation, not just as a tool for new product development or branding, drawing design in from the organisational periphery towards the organisational core or strategic apex (Mintzberg 1983).

Some examples of influential discussion of the business benefits of utilising design as a service to embed innovation, increase competitiveness and develop markets in a range of business and industry sectors, have made their way into respected business media publications including the Harvard Business Review, Fortune and Forbes magazines. Gianfranco Zaccai, CEO of global multidisciplinary design consultancy Continuum observed in an interview for the Design Management Institute in the US that:

> design thinking is a name for something that has been around for a long time…executives are increasingly looking for other ways to look at their businesses because they've seen that the seemingly pragmatic linear, analytical, quantitative approach of business thinking has not yielded the hope-for—results (Lockwood 2010).

As Tim Brown, president and CEO of internationally regarded design firm IDEO states: 'Leaders now look to innovation as a principal source of differentiation and competitive advantage; they would do well to incorporate design thinking into all phases of the process' (Brown 2008). Brown describes design thinking as a 'human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success' (http://www.ideo.com/about/).

Such discussion aims to penetrate the historical scepticism of many business leaders who view design as primarily about making objects beautiful and cannot contribute to strategic aspects of business for example developing new products and markets, and increasing competitiveness.

Gradually, the two streams of discourse regarding conceptualisations of what design is and does, and how it can support business innovation have converged and with it a growing popularity of notions of 'design-led business' and the development of government programs seeking to integrate design-led approaches to achieve innovation across the organisation. In Australia, state-specific design

integration programs have adopted and adapted policy rhetoric and elements of design innovation programs strategies and instruments from the UK, Singapore, Denmark and New Zealand, however to date little has been done to examine the tangible benefits of integrating the services of designers within such programs.

2 Design Integration

2.1 What Is Design Integration?

The discourse surrounding the importance of design to industry and economic development is not new. The adage that 'good design is good business' has been most actively promoted from within the design sector itself, by semi-public representative organisations such as the UK Design Council, a significant influence in Australia's design integration policy discourse and implementation strategies, Helsinki Design Lab and Design Singapore and by professional design membership organisations themselves.

In essence, design integration programs aim to increase the competitiveness of SMEs through the application of design services and design thinking within the business model. Typically, design integration programs provide auditing, mentoring and business modelling with selected businesses to plan and implement strategies to utilise professional design services and apply design thinking methods to develop new products, services or processes.

2.1.1 The Problem of Evaluation

In Europe, the SEE Network of 11 EU nations (Sharing Experience Europe: Policy, Innovation, Design) (Whicher et al. 2010) advocates for the acknowledgement of design capability and for its contribution to innovation. The literature produced by SEE contains recurring reference to the challenge of evaluating the economic return on design investment across both the public and private sectors. This is identified as a reason for the lack of government design policy, 'Evaluation is a vital part of the evidence to support decision-making and in the context of government cuts needs to be able to stand up to rigorous scrutiny' (ibid. p. 3).

A comprehensive international study of the design sector, the *International Design Scoreboard* (Moultrie and Livesey 2009) employed seven absolute and relative indicators to determine the design capability of 12 nations. The first indicator, public investment in design, was defined in absolute terms as 'total public investment in design promotion and support' and in relative terms as 'total public investment in design promotion and support as a percentage of GDP' (Moultrie and Livesey 2009, p. 17). A key enabling condition for design to impact on innovation is government support in the form of design integration programs. The *Design Scoreboard* highlighted that programs existed, or had existed in seven of the 12

nations, including the two highest ranked nations for public investment (in both relative and absolute terms), Singapore and South Korea.

However, data collection is not consistent internationally. As noted by Moultrie and Livesey (2009, p. 17), few nations actively collect design-related data as part of their national statistics. In most nations, design itself tends to fall between different government bodies. Some aspects of design are encompassed in government departments related to culture, media, and the arts. Other aspects of design fall under the department responsible for industry, technology or innovation. In either case, specific statistics on design are rarely collected.

This view reflects the recommendations of the *International Design Scoreboard* (Moultrie and Livesey 2009) to establish an internationally agreed, defined set of data measures as a basis for ongoing documentation of evidence to demonstrate that design is 'a vital component for economic prosperity' (David Kester, cited in Foreword, Moultrie and Livesey 2009, p. 3).

3 Identifying International Best-Practice

3.1 Europe

In Europe, the SEE Network financed by the European Regional Development Fund, advocates for a broadening of the understanding of innovation as a response to the financial crisis. They note that:

> Innovation has long been narrowly considered a matter for technology and manufacturing companies. However, with the economic exigencies, intensified global competition and the current financial crisis, this is no longer the case. Innovation is now understood to include non-technological and service industries…Design is increasingly being recognised and proved as a tool for innovation, one that can be exploited by both private companies and the government sector (Whicher et al. 2009, p. 14).

The SEE Network champions, researches and disseminates the outcomes of design integration initiatives of its network member nations, including the UK's *Designing Demand* program that addresses lack of SME uptake of design services and Denmark's *Economic Effects of Design*, an initiative to assess the economic benefits of design.

3.1.1 Denmark

One of the earliest international examples of publicly funded enabling support for design was Denmark's *Design Icebreaker Scheme*. Established in 1998, the program provided a 50 % salary subsidy to assist SMEs to employ a staff designer for 2 years. The program was funded by the government to the value of €0.5 million per year until 2001.

Evaluation of the *Design Icebreaker Scheme* indicated that about 90 % of companies that cooperated with designers for the first time felt that design

reinforces competitiveness. (Denmark 2003, p. 35), and that '40 % of participating companies elected to retain those designers at full cost' at the conclusion of their participation' (Geoff Fitzpatrick cited Gower 2006, p. 56).

3.1.2 United Kingdom

Analysis by the UK Design Council World Economic Forum, *Global Competitiveness Report*, (2005) found that a portfolio of design-led companies outperformed the stock market average by 200 % over a 10 year period. There is a strong relationship between a company's ability to launch new products, services or processes and the importance it places on design (*Design Victoria* 2007, p. 2).

The UK Design Council's *Designing Demand* program was initiated in 2008. Funded by the UK government department for Business, Innovation and Skills, the program was established to redress the relatively low uptake of design by smaller UK businesses in their daily operations (See Policy Booklet 03, 'Evaluating Design', Anna Whicher, Gisele Raulik-Murphy and Gavin Cawood (eds), SEE Policy Research Group 2009, p. 13). The program provides up to 10 days of mentoring support for SMEs to help them 'understand how design can be used strategically to boost company performance.' Trained design mentors (called Design Associates) work with SME management teams to 'identify opportunities, implement cultural and process changes, and instigate projects including commissioning designers.' (Design Council 2011, p. 10)

In 2012 a review of *Designing Demand* revealed that based upon the outcomes of the program, for every £1 invested in design, businesses could expect over £20 in increased revenues; over £4 increase in net operating profits; and a return of over £5 in increased exports (Design Council 2012, p. 2).

Further, the review indicated that businesses went on to integrate design services into their company operations beyond the program, 'once they have been exposed to design tools and good design management practice, they are equipped to do it again themselves. Forty-Eight percent of businesses surveyed have invested in further design projects since completing the programme' (Design Council 2012, p. 3). Interestingly *Designing Demand* includes a start-up program, which is different from any of the Australian pilots that are directed towards established, 'likely-success' companies.

3.2 Asia Pacific

3.2.1 Asia

In the Asian region, nations that historically based their economies on mass production such as Japan, Taiwan, South Korea and China have recognised that design are keys to product and service differentiation. Countries such as Singapore and

Hong Kong have determinedly fostered design as fundamental to their knowledge economies and India has changed product branding from 'Made in India' to 'Designed in India' (Smart State Council 2008).

Of the 12 nations included in the 2009 *International Design Scoreboard* study, four (South Korea, Japan, Singapore and Hong Kong) are located within the Asian region. Of these four, South Korea (2), Japan (3) and Singapore (6) ranked in the top half in absolute terms with Hong Kong ranked 8. The *Scoreboard* report discusses six additional nations which, due to insufficient data were not included in the scoreboard evaluation but were deemed worthy of inclusion by the authors because of the potential escalation in the status of design in those countries. The Asian nations of China and Taiwan were included amongst the six.

It needs to be highlighted that the absorption of design capacity for other regions as well as a growing investment focus on developing local skills sees the predominance of Asian nations in the *Scoreboard* both within the 12 ranked countries and within the group of additional countries also discussed in the report. In a highly competitive international marketplace, this is of great significance to Australia in terms of its future economic competitiveness within its own region.

3.2.2 New Zealand

In New Zealand, the *Better By Design* program has been running since 2004. *Better By Design* is an entity within the New Zealand Government's Trade and Enterprise department. The program's publications advise that it:

> …teaches design thinking and the tools of design integration to management teams through a sequence of learning activities. Companies are partnered with experts from the private sector and activities address real company challenges and opportunities (New Zealand Trade and Enterprise 2011).

The model comprises of a six-stage program that can take up to 2 years to complete. Stage 1 is enrolment. Stage 2 is a "design thinking experience" that assists companies to ascertain their desire and suitability to undertake the full program. Stage 3, called "discover, define, design" is a 1–3 month phase during which time the company's operations are analysed. A design plan is the outcome of the analysis. During stage 4 a series of design activities are applied to various challenges within the company to "build capability by addressing real problems and market opportunities". Stage 5 is the evaluation stage where plans and activities are reviewed and re-directed if required. During stages 4 and 5 a *Better By Design* integration coach works closely with company personnel to embed design thinking within all levels of the company structure and all elements of the company's operations.

Although the final stage, stage 6, is called the "completion" stage, the *Better By Design* model enables companies that have graduated from the program to remain connected to 'Better by Design's learning community and gain access to events and resources that provide continued inspiration and development.' Stages 1 and 2 are

fully funded by the New Zealand Government and the remaining stages require a 50 % company contribution. The program cites that the entire process enables companies to shift from an initial position of 'getting design ready', through to 'getting integrated' and finally to a position where participating companies are capable of 'continuous [design] integration' (New Zealand Trade and Enterprise).

Better By Design set out to increase New Zealand's manufacturing exports by $500 million within 5 years, yet the program exceeded this target in just three and a half years.

The UK Design Council's *Designing Demand* and New Zealand's *Better By Design* are two current international models of design integration programs that have reported significant economic return. Both have been referenced in the publicity for the Australian design integration models discussed in this chapter published by the CIIC (Department of Innovation Industry Science and Research 2012) as international examples of successful design integration programs.

4 Design Integration Programs in Australia: A Case Study

In 1995, the Australian National Design Review identified the potential for design to increase the international competitiveness of Australian manufactured products (The Australian Academy of Design 1995). In 2008, the report resulting from the National Innovation System (NIS) Review, Venturous Australia (Cutler and Company Pty Ltd), while not mentioning design specifically, makes a case for public intervention to increase innovation and importantly, identifies that innovation is not always based upon scientific and technological development.

> Innovation is more widespread than is often imagined, occurring every day in the way business enterprises operate, meet the need of customers and organise their people and processes. This is not traditional science and research-led innovation, rather it is the non-technological innovation that occurs and transforms businesses as they engage with their customers and markets (ibid. p. 17).

In 2008, the Australian Design Alliance (AdA) was formed, comprised of representation from 12 peak professional design organisations with the aim of 'advancing design's strategic role in strengthening Australian economic competitiveness and sustainability' (AdA). Around the same time, the Council of the Humanities, Arts and Social Sciences (CHASS) argued for government acknowledgement of design as a key element of the creative industries with the potential to enable innovation within both manufacturing and service industries (Howard 2008). The potential of innovation in business was recognised to some extent in one of the seven national innovation priorities that resulted from Terry Cutler's NIS Review.

The *Australian Innovation System Report* 2011 claimed that at least 62 % of Australia's long-term productivity growth can be:

> attributed to investment in 'intangible capital (innovation-related activities such as skills development, design and organisational improvements) and multifactor productivity

> (spill-over impacts of these intangible investments)… However, a comparison of Australia's investment in intangibles with that of other countries shows that we are more than twice as likely to adopt existing technology embodied in physical machinery and equipment, than we are to invest in our own intangible innovation capabilities (Department of Innovation Industry Science and Research 2011, p. 1).

Despite the identification of these opportunities from national design and non-design sources over the past 20 years, there has been no national strategic or policy acknowledgement of design as an enabler of innovation and contributor to the Australian economy.

More recently, the Prime Minister's Manufacturing Taskforce Report of the Non-Government Members responded to the challenges (and opportunities) facing Australia's manufacturing sector with a series of recommendations; including the recommendation that:

> design be seen as a ubiquitous capability for innovation…and…that the Commonwealth Government commission an independent panel to advise on the changes needed to maximise the potential of design thinking on innovation in Australia (Department of Industry Innovation Science Research and Tertiary Education (DIISRTE) and Prime Ministers Manufacturing Task Force 2012, p. 93).

The Australian Government has acknowledged the dire situation of the manufacturing industry as acknowledged by the Prime Minister's Manufacturing Leaders Group (MLG) and Göran Roos' report to the South Australian government *Manufacturing into the Future* (Roos 2012). Both of these reports considered design, and design integration as an essential service to assist the revival of underperforming sectors.

In Australia, the emphasis of design integration programs has been to assist *existing* businesses, mostly manufacturing sector SMEs, to assist businesses to innovate, to transform business *through* design. The focus has been on design as the provider of an innovation service to business. Across States and Territories, there is significant variance in the awareness, acceptance and support of design as an enabler of innovation. Where this acknowledgement exists, there is also significant variance in the level of support and the departmental sources of this support, as evidenced by the differences in state government commitment to create enabling conditions for design integration into business. It is important to note that there has been less focus on incubator schemes to assist business start-ups with design integration. The following sections of this chapter provide a review of the policy conditions, funding support and structure of design integration programs that, at the time of writing, exist in four Australian states. Design integration programs have been established in Victoria and Queensland, and pilot programs are currently underway in South Australia and New South Wales. The Victorian government's *Business Design Immersion program* started in 2007 and was later re-defined and re-funded as a design integration program for manufacturing businesses.

4.1 Victoria

4.1.1 Victorian Design Integration Policy Discourse

Within Australia, the Victorian Government was the first to acknowledge the potential economic benefit from the design sector with its identification of design as one of the State's five a strategic innovation capabilities in its 2002 innovation strategy statement: *Victorians Bright Ideas Brilliant Future*. In his foreword to the document, the then Minister for Innovation John Brumby explained that 'innovation is not the exclusive domain of scientists and researchers' (Victoria Department of Innovation Industry and Regional Development 2002). The document identified five strategic capabilities: information and communications technologies (ICT), biotechnology, new manufacturing technologies, environment technologies and design. The Victorian Government Innovation Statement states:

> Design is a critical step in transforming ideas into practical and commercial realities and plays a vital role in boosting the competitiveness of both existing and emerging industries. While Victoria has great strengths in design, our overall design effort is uncoordinated and fragmented and Victoria needs to do more to market our talents and achievements to the rest of the world. The Victorian Government is working with industry to ensure Victoria is recognised as an international centre of design excellence, opening up new employment and investment opportunities in industries as diverse as automotive, aerospace, fashion, entertainment, architecture, ICT and publishing (Victoria Department of Innovation Industry and Regional Development 2002, p. 56).

An early and significant initiative was the 2003 commissioning of initial research to measure the design sector, *Victorian Design: Facts and Figures, Developing Victoria's Design Capability* (Allen et al. 2003).

4.1.2 Victoria's Design Integration Program Objectives and Delivery Method

Between 2003 and 2009 millions of dollars of funding enabled the establishment of the Government's Design Victoria entity to champion design in the State through a range of promotional and business development programs including the organisation of an annual Design Festival and awards program. The Government proclaimed Victoria 'The State of Design' and formally identified a Minister with responsibility for design amongst other portfolios.

The Design Victoria strategy aimed to create:

- innovative Victorian industries, where design is a value driver underpinning competitiveness and export performance
- a more creative and commercial design sector
- new markets for Victorian design and designers

It intended to achieve this achieve through three main strategies:

1. Build awareness and new markets for design
   - By increasing industry awareness of the importance of design to generating competitive businesses and reaping economic, social and environmental benefits
   - By increasing domestic and international consumer awareness of Victorian design capabilities
2. Build capabilities in the design sector
   - By increasing the competitive skills of Victorian designers in local and export markets
   - By exploiting the strengths of design education
3. Design Ready Business Immersions
   - Business Immersions provide hands-on experience of design to firms in competitive industries. A facilitator brings together a business and a designer to solve a business challenge. At least 12 immersions will be funded each year. Case studies developed from each project build awareness of the importance and impact of design.

(Design Victoria 2007, p. 2–4)

Design Victoria used a staged model, called the "Design Innovation Ladder" to communicate the transformation that can occur within businesses that embed design into their operations. Companies were invited climb the 4-step "Ladder": step 1, non-design; step 2, design as styling; step 3, design as processes; and step 4, design as innovation. Atop the ladder, on the 'design as innovation" step, companies are deemed to be "mature in their use of design in all stages of the innovation process (ibid.).

In partnership with RMIT University, an entity called Lab 3000 was established to deliver programs to embed design capability within industry. These programs included:

- *Design Ready* aimed at promoting the use of design by business. One of the key elements is 12 Business Immersions, the objective of which is to match companies with designers to undertake projects.
- *Design Knowledge* aimed at building local case studies and industry know-how.

Design Victoria stated the objective of the *Design Ready* program was to target SMEs and manufacturers in competitive Victorian industries. Through 'business immersions' the Design Ready program provided direct funding through grants for selected SMEs to 'engage a designer on a project aimed at improving the business' performance and competitiveness' (Design Victoria).

Participating design practices were identified through their membership of Australia's two peak professional design organisations, the Design Institute of Australia (DIA) and the Australian Graphic Design Association (AGDA). Following

four Design Ready pilots, 12 business immersions were funded per year from 2007. The immersion projects were documented as case studies and made publicly available on the Design Victoria website. To participate in the Design Ready program, businesses had to be small to medium enterprise, located in Victoria and willing to 'embrace the input of a designer to solve a challenge and deliver an outcome that is clearly linked to its business strategy'. Unlike other design integration programs discussed later in this chapter, there is no evidence that a minimum annual company turnover was required to participate in the program (Design Victoria).

One of the most successful and best publicised outcomes of the Design Ready immersion program was the reusable takeaway coffee cup product, Keep Cup a result of sandwich company Bluebag's collaboration with industrial design practice Cobalt Niche and identity and website design practice South southwest. Six months after the launch of the reusable keep cup product, Design Victoria reported that over 250,000 units had been sold globally and that the number of Bluebag employees had increased from two to 16 personnel in Melbourne and two employees in the company's new London office (Design Victoria 2007).

4.1.3 Current Status of Victoria's Design Integration Program

A 2008 report by Wallis Consulting Group, *Five Years On: Victoria's Design Sector 2003–2008* identified through survey of design consultancies and design and non-design user businesses that since 2003 there had been 35 % growth in the number of design consultancies; 17 % growth in total employment associated with design; and 46 % increase in the total expenditure on design (Wallis Consulting Group 2008, p. 14).

In 2010, Design Victoria was disestablished and the Design Ready program ceased operation. Aside from the case study material, the authors have been unable to find any specific evaluation of the Design Ready program. Following from the design sector research reported in *Victorian Design: Facts and Figures*, and *Five Years On,* the Victorian Government, has continued to commission independent surveys to provide snapshots of the design sector and its contribution to the Victorian economy.

In late 2010, the Victorian Government engaged Equip Design Integration Consultants to conduct a pilot Design Integration Program based upon New Zealand's *Better By Design* with two Victorian Businesses in 2011. Equip is a New Zealand consultancy that was one of the delivery agents of *Better By Design*. The Equip consultancy includes personnel who were founding members of the *Better By Design* initiative. The outcomes of this pilot are not known.

The result of a 2012 survey, also undertaken by Wallis, *Developing Victoria's Design Capability* reports the proportion of all businesses making some use of design (steps 2, 3 and 4) of the Design Innovation Ladder has increased since 2008. The greatest increase in proportions of businesses is at steps 2 and 3 and the proportion of businesses at step 4 remains, as it was in 2008, at 4 %. Large

businesses show the clearest progression in their position on the Ladder. The report interprets this as an indication 'that the 'message' about design has been better grasped by this group than by small or medium organisations' (Wallis Consulting Group 2012, p. 5)

In 2012 the Victorian Government renewed its commitment to design with the announcement of the $AU10m *Victorian Design Initiatives 2012–2015: Business By Design*. The webpage outlining the Victorian Design Initiative and Business by Design states:

> …Businesses will become more sophisticated and strategic in their use of design across all business activities including product and market development to deliver greater revenue growth and export capabilities (Business Victoria 2012).

The program is oriented towards export-focussed firms. At the time of writing, tenders had been called to for the delivery of the *Business By Design* program, to accommodate participation by 40 Victorian businesses. Importantly the promotion of the program not only acknowledges design's role in product development but also innovation in business services. The summary of the design Initiatives state:

> The program will help firms to apply leading design practices and processes to improve their products and services and develop greater market presence. Businesses will become more sophisticated and strategic in their use of design across all business activities including product and market development to deliver greater revenue growth and export capabilities.
> The Design Master Class will offer firms practical steps on how to develop and apply innovative management models and systems to generate sustainable growth. Firms participating in the Master Class will review their business objectives and identify opportunities to develop and apply new capabilities and business models culminating in a design strategy specific to their needs.
> Smart Design Vouchers will provide practical assistance to Victorian firms seeking design research expertise to test and improve their products or services. The vouchers will facilitate greater design collaboration between Victorian firms and design researchers to improve firms' ability to produce more innovative and highly refined products and services for a specific market (Business Victoria).

4.2 Design Integration Initiative in Queensland

In February 2009, the Queensland Government launched the *Queensland Design Strategy 2020*. The strategy document is prefaced with an excerpt from the UK Design Council's Good Design Plan (2008) that provides a definition of design:

> Good design is a quantifiable benefit, not a cost. Its value can be measured economically, socially and environmentally …Creativity generates ideas and innovation exploits them. Good design connects the two. It links ideas to markets, shaping them to become practical and attractive propositions for customers or users…(Arts Queensland and Visual Arts Craft and Design 2009, p. 2).

The then Premier of Queensland, Anna Bligh, followed with her own message affirming the value of design to the State's economy: 'Not only is design fundamental to innovation, it is a wealth-producing industry sector in its own right. Good design is the key to making Queensland businesses internationally competitive' (ibid. p. 6)

4.2.1 Queensland's Design Integration Program Objectives and Delivery Method

The *Strategy 2020* comprised of four key objectives, the first being to strengthen the Queensland economy by increasing the procurement of design services by businesses 'to ensure global competitiveness' (25). The *Ulysses: Transforming Business Through Design* program was one of two actions to improve Queensland business competitiveness through design.

The *Ulysses* design integration program was licensed from Equip, a New Zealand consultancy group that had been one of the delivery agencies of the *Better By Design* program, (Queensland Design Council 2011, p. 18). Implemented in 2009, it was delivered by the (then) not for profit entity QMI Solutions that had evolved from the defunct Queensland Manufacturing Institute and was funded to the value of $1.1 million by Queensland's Department for Employment and Economic Development and Innovation (DEEDI). Participation in Ulysses was restricted to companies in the manufacturing sector with an annual turnover between $AU2 and $200 million.

Promotion of Ulysses was based on the promise of helping businesses to become 'design-led' with 'truly spectacular business results' (QMI Solutions and Queensland Government 2010). The process was explained as a '…practical, pure business program with a design focus', and potential participants were provided with the following reassurance:

> Don't worry—it's not about turning your business operations upside down. And it's certainly not about replacing your existing business model. Ulysses will simply augment your business model to help you make the best use of design throughout your business (QMI Solutions and Queensland Government 2010).

As a licensed Equip program, the *Ulysses* model was similar to the *Better By Design* program. Companies were assessed for inclusion in the program based upon their annual turnover and demonstrated evidence of procuring some aspect of design expertise previously, such as the commissioning of a graphic designer to create a company identity. Accepted companies would then progress through the audit, planning and mentoring stages to accelerate the process of becoming a design-led company.

The pathway to a design-led company model was called 'The design journey'. Similar to Design Victoria's 'Design Innovation Ladder', 'The Design Journey' was diagrammatically described as an upward trajectory for initially 'design blind' companies to transform through the stages of becoming 'design aware', 'design

benefitting', 'design committed' and finally reaching the top of the scale as a 'design led' company, "integrating design into all aspects of…operations and corporate culture" (QMI Solutions and Queensland Government 2010).

4.2.2 Current Status of Design Integration Programs in Queensland

During its operation from 2009–2012, 12 Queensland companies participated in the government subsidised Ulysses program. In 2012 the Queensland Government made the decision not to renew the Equip licence and *Ulysses* ceased operation in June 2012. Although at its inception in 2009, Queensland Treasurer and Minister for Employment and Economic Development, Andrew Fraser explained the economic benefit to be gained from *Ulysses*. There is no current Queensland government supported design integration program.

In 2011, the Queensland Design Council identified the flow-on effect of design sector growth into other key business sectors including manufacturing and construction as well as service sectors such as tourism and education. The statement, however, was qualified with an acknowledgement that '…more economic data on the value of design in Australia's economy is yet to be sourced' (Queensland Design Council 2011, p. 18) reinforcing the global call for measurement of the design sector. Although an evaluation of Ulysses was prepared for the Queensland Government, the document was not publicly available at the time of writing.

The Queensland Government business and industry portal still displays *Ulysses* information but links to the QMI Solutions website where design integration services are offered via a new commercial program called Velocis, developed independently by QMI Solutions. Velocis commenced operation in 2013 and at the time of writing, one Queensland Company is participating in Velocis. The promotion of the new program states:

> This program will transform the way business potential is realised in Queensland by using the power of good design to turn ideas into commercially viable products…This new design program is just one of the government's targeted initiatives designed to grow this high-energy, high-value sector…In the past four years, the Queensland Government has garnered more than $80 million in return on its investment in the creative industries. Through our programs, we will continue to improve the business skills of Queensland's creative businesses, and encourage creativity and innovation across the economy (Fraser 2013).

Fraser's words indicate the Government's intent to harness design to enhance the competitiveness of Queensland businesses and to develop the design sector itself as a significant economic contributor.

In May 2012, the AdA, in conjunction with the South Australian government's Integrated Design Commission and the Queensland Government's Queensland Design Council convened a seminar in Brisbane to discuss the opportunity for a national design policy. Two speakers at the seminar were directors of companies that had previously participated in *Ulysses*. John Hogan, Managing Director of Superior Jetties described how *Ulysses* had enabled him to see '…the potential

growth opportunities in pursuing design-led innovation and is currently re-designing his entire business operations around this philosophy to provide an absolute point of difference for his company globally' (Australian Design Alliance 2012, p. 4).

This outcome indicates at least one company did turn its "business operations upside down" and did replace its existing business model as a result of participation in the Ulysses program. Another *Ulysses* participant, Nigel Spork, managing Director of Centor Architectural also confirmed his commitment to a design-led business model and called for the manufacturing sector to 'Make design-led thinking part of business and revive manufacturing in this country' (Australian Design Alliance 2012, p. 4).

4.3 Design Integration Programs in New South Wales and South Australia

Parallel design integration pilots are currently underway in South Australia and New South Wales with two companies participating in each State's pilot. Initiated in 2011, the Design Integration Pilot is licensed from Equip Design Integration Consultants and is hosted by the Federal Government's CIIC as a joint Commonwealth and State partnership.

The pilots are funded through the Commonwealth Department of Industry, Innovation, Science, Research and Tertiary Education's Enterprise Connect entity, the South Australian Government's (now disestablished) Integrated Design Commission and the New South Wales Government's Department of Trade and Investment.

As an Equip licensed program, the pilots are based upon the New Zealand *Better By Design* model. Promotional literature for the program describes design integration as "a proven strategy for success" and references the outcomes of the New Zealand program. Further it states:

> Properly applied, design can give you a sustainable advantage, help you command a premium price, gain market share and even reduce production costs. The proof is well documented in New Zealand…The Better By Design program in New Zealand, on which this pilot is based, has assisted companies…to significantly increase revenue, profits and product awareness (Department of Innovation Industry Science and Research 2012).

The pilot acknowledges that unlike, Europe, Australia does not have a deep tradition of design-led business. To that end, the description of the pilot explains that it '…unites designers and manufacturers in South Australia and New South Wales with the goal of driving innovation, profitability and global competitiveness' (Department of Innovation Industry Science and Research 2012).

The Design Integration Pilot model has four stages: engage, audit, plan and enable. In the first stage, 'engage' the potential benefit of the program is identified. In stage two, the audit team, comprising of design and business experts, undertakes an analysis of the company in collaboration with key company personnel to identify

design capability gaps and opportunities. During stage 3, the audit team agrees on the action plan and identifies the resources required to achieve the plan. Stage four is the execution stage, led by a design mentor. (Equip Integration Design Consultants, Design Integration Program: Program Outline, Equip, 2010). The design mentor's role is to advise the company on the execution of the action plan and '…in doing so, assists the Company to integrate design thinking and practices and grow internal design culture, knowledge and capabilities' (Designshift Design Integration Program, 'Roles: Role Classification', Equip, 2011, p. 70.). The design mentor also assists the company to appoint design consultants to undertake the design services required to achieve the action plan.

4.3.1 Current Status of the Program

The South Australian Government's Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) released an 'Innovation Voucher Program' in late 2012 in response to the Manufacturing Into The Future report by Thinker in Residence Professor Göran Roos and the Department's own manufacturing strategy, *Manufacturing Works*: A strategy for driving high-value manufacturing in South Australia. The vouchers are valued between $10,000 and $20, 000 and are to be used to fund collaborations between SMEs and research providers to:

> … facilitate and encourage technological innovation and industry diversification in priority areas…high-value manufacturing, mining and resources, and products and services such as medical devices, engineering and design, food processing and production, environmental monitoring and clean technologies (Department for Manufacturing Innovation Trade Resources and Energy (DMITRE) 2012).

The program is funded by two government departments, DMITRE and the Department of Further Education, Employment, Science and Technology and relies upon a pro-rata contribution from the SME based on annual turnover.

At the time of writing the New South Wales and South Australian design integration pilots were still underway and no information was available on their progress. There is no indication from the South Australian government that it will continue this or any other design integration program.

5 Conclusion

The emphasis of the Australian design integration programs discussed within this chapter has been to assist existing companies, almost exclusively manufacturing sector SMEs, to innovate by transforming their business through the utilisation of design expertise. The focus of these programs has been on design as the provider of an innovative service to increase the competitiveness of manufacturing business by improving or diversifying the products they produce. This approach has restricted

the scope of the 'design' content of the integration programs to industrial design for product design expertise and visual communication design for brand identity and website design expertise.

There is an opportunity for design integration programs to broaden the disciplinary focus of the design expertise they offer to also include spatial design disciplines such as interior, landscape and architectural design, and in some cases, it may be appropriate to include more specialised disciplinary expertise such as exhibition design, and furniture design. The recent success of the CIIC supported One Third project in Tasmania and the many examples of production efficiencies achieved through factory floor redesign demonstrate how business transformation, and indeed innovation, have been achieved through the embedding of furniture and interior design expertise, respectively. Broadening the scope of design services within design integration programs may also serve to broaden the type of companies that may benefit from the programs; thus extending the participation beyond manufacturing sector SMEs to include larger scale operations, service provision companies and even sole-trader entrepreneurial start-up businesses.

Preliminary research undertaken by Bucolo and Matthews (2011) indicated that there was opportunity for further study into the selection process for company participation in design integration programs. A study of the 2008 Business Review Weekly list of "Fast Starter" companies determined that the highest proportion of fast growth start-up companies was in the business and property service sector and that the largest group of start-ups had a net company worth of less than $AU1m. The study identified that fast starter founders acknowledge the value design '… brings to customers and their enterprises, culminating in a sustainable competitive advantage' (Smyrnios 2008).

Based on the characteristics of most of the design integration programs reviewed in this chapter, these fast starter companies would not qualify to participate based either on the annual turnover threshold or the fact they were not manufacturing sector companies. The experience of *Ulysses* participant company Superior Jetties is also interesting to consider in relation to the appropriate level of establishment of a company that participates in a design integration program. Superior Jetties, an established company, made the willing decision to reconsider and restart its entire operation following its *Ulysses* experience.

Greater specification of the industry sector participation in design integration programs would enable governments to focus support on particular areas appropriate to their regional economic strategies. These may vary greatly from state to state, or region to region. Once again, this could broaden the role of design integration programs beyond revival of the underperforming manufacturing sector to include design integration within sectors such as service industry, primary production, education, health and tourism and other areas that have not 'traditionally' utilised design services.

The predominance of Asian nations in the International Design Scoreboard also has relevance for future design integration programs in Australia. The selection of participating companies and the focus of design audit and mentoring aspects of programs could be tailored to capitalise on the growing design capability of Asian

countries to assist the economic competitiveness of companies within the Asian region.

When design integration programs are considered holistically within the context of a particular state or region's entire economy, there is evidence that the programs can contribute to the growth of the design sector itself, in addition to the respective industry sectors of the companies undergoing the programs. This has been recognised by the Queensland Design Council in relation to national growth of the design sector.

When documented and well publicised, it is possible for the uptake of design services as modelled by design integration programs to positively influence mainstream uptake of design services. The recurrent research commissioned by the Victorian Government to measure the design sector in 2003, 2008 and 2012 demonstrates growth in the numbers of design consultancies and growth in the proportion of businesses making use of design services. To date most documentation of the outcomes of design integration programs in Australia has focussed on individual company case studies. Measurement and evaluation of design as a sector has been identified as a challenge to the creation of design policy worldwide. Future design integration programs should include a requirement for independent evaluation at micro and macro levels to provide greater quantitative data of the economic and employment outcomes of the program. Such data would contribute to the understanding not only of design's contribution to the economic performance of various sectors, but also the understanding of the economic contribution of the design sector itself.

The move to innovation voucher programs to subsidise research collaborations between companies and research provider organisations, as per the recent initiative in South Australia and the Smart Design Vouchers announced as part of the Victorian Design Initiatives 2012–2015, should not be seen as a replacement for design integration programs, but rather as a complimentary activity. Design is not the same as traditional research and development and there is a danger that the innovation research voucher model will return us once again to the traditional acceptance of innovation as only a product of science and technology. As identified by the Design Institute of Australia in its 2008 submission to the National Innovation System Review, there should be an additional and distinct 'D' in R&D, transforming it into RD&D: research, design and development (Design Institute of Australia 2008).

Innovation is not exclusively the product of science and technology. Design is a key enabler of innovation, however, evaluating the contribution of design (both tangible and intangible) to a business overall has been acknowledged internationally. The lack of evidence of the contribution of design to business innovation, competitiveness and economic growth has rendered it difficult to embed design in government policy. Design integration programs have gained traction around the world, including Australia, but rigorous evaluation is required to help to overcome the scepticism that still exists within governments and business organisations about the value and contribution of design.

Design Integration programs are facilitating a shift in the view of design from an aesthetic application provided by a professional sector, that was often perceived as

removed from business operations, to a capability of business itself, provided either through in-house design thinking expertise or serviced by business-minded design consultants. In Australia, there is great scope for state governments to utilise design integration programs to do more than resuscitate the failing SME manufacturing sector through the design of new products or brand identity. Targeted participants from strategically selected, regionally specific industry sectors and the inclusion of broader areas of design knowledge in audit team and mentor expertise could all contribute to the greater effectiveness of future design integration programs.

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Service Innovation Through an Integrative Design Framework

Eng K. Chew

Abstract Service innovation is focused on customer value creation. At its core, customer-centric service innovation in an increasingly digital world is technology-enabled, human-centred, and process-oriented. Service innovation requires a cross-disciplinary, holistic, and end-to-end approach to new service design and development (NSD). In particular, it calls for a service strategy-aligned integrative design framework for NSD. This chapter proposes such a framework to systematize service innovation design steps, end-to-end, from strategy to customer experience design to deliver on the espoused customer value proposition. From analysis of the extant literature, the paper correlates the underlying theories and principles of disparate, but interrelated, aspects of service design thinking: service strategy, concept, design, experience and architecture into a coherent framework for NSD, consistent with the brand value. Application of the framework to NSD is envisioned to be iterative and holistic, accentuated on continuous organizational and customer learning. The preliminary framework's efficacy is illustrated using a simplified telecom case example.

Keywords Service concept · Service design · Service architecture · Customer experience · New service development · Service innovation

1 Introduction

With *service science* maturing and gaining wider acceptance by academics and practitioners alike, a growing interest in the theories and practices of service systems design and implementation (Demirkan et al. 2011a, b) has emerged, as

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exemplified by recent work on conceptual frameworks for guiding service systems design (Tan et al. 2011) and service networks innovation (Agarwal and Selen 2011). However, the observations that "the narrowness of much writing on service design" and "the dilemma of service design [as to] whether it is a product or a process that is being designed" have led Voss and Hsuan (2011, p. 232) to argue for the need to rethink *service design* from a *cross-disciplinary* (including marketing, operations and information technology) *holistic* perspective, in the context of New Service Development (NSD) (Alam 2006; Edvardsson et al. 2007; Edvardsson and Olsson 1996). However, whether and how the disparate views of service design seen by marketing, operations and systems experts within a firm could logically be integrated to coherently design new services remains a knowledge gap in the literature.

This chapter discusses how the business and technical views of service design could be integrated to ensure end-to-end design integrity. In particular, inspired by our initial informal dialogues with practitioners from large and new start-up enterprises concerning NSD challenges, this chapter defines a new integrative service design *framework* that will allow cross-disciplinary experts in a firm to systematically co-conceptualize, co-design and co-implement new services, in line with the service strategy, to meet current or emergent customer needs, efficiently and effectively. We conduct an exploratory review of the extant literature and correlate, holistically and integratively, the underlying theories and principles of various disparate, but interrelated, *aspects of design thinking* for NSD, namely, service strategy (Bettencourt 2010; Goldstein et al. 2002), service concept (Bettencourt 2010; Fynes and Lally 2008; Goldstein et al. 2002; Clark et al. 2002), service design (Goldstein et al. 2002; Clark et al. 2002; Fitzsimmons and Fitzsimmons 2010; Maglio et al. 2006; Holmlid and Evenson 2008; Bitner et al. 2008; Glushko and Tabas 2009), customer experience (Bitner et al. 2008; Glushko and Tabas 2009; Fitzsimmons and Fitzsimmons 2007; Lusch et al. 2007; Schneider and Bowen 2010; Womack and Jones 2005; Patricio et al. 2008; Zomerdijk and Voss 2010; Payne et al. 2008; Stickdorn and Schneider 2010), and service architecture (Voss and Hsuan 2011; Voss and Hsuan 2009; Fixson 2005; Roth and Menor 2003; TMF 2004; Chew 2010) which hitherto have often been analyzed individually in a somewhat fragmented manner. Using the basic principles and theories of service science, we correlate these different *aspects* of service design thinking and integrate them into a *coherent framework*. The purpose of the integrative design framework is to facilitate cross-disciplinary NSD by marketing, operations and IT experts, ensuring new service offerings and associated customer experience will be consistently and systematically designed to fulfill the firm's strategy and brand value. The efficacy of the framework is illustrated using a simplified telecom NSD case example (Chew 2010).

This chapter reviews the basic service science conceptual building blocks for constructing the proposed integrative service design framework. From the extant literature, the integrative design framework is then synthesized. Design *aspect* by design *aspect*, with the *inter-aspect* relationships, are clearly articulated to ensure conceptual alignment and minimize design conflicts or contradictions. The chapter

then explores an exemplar telecom integrative design practice. and a preliminary operationalization of the framework. Finally, the chapter concludes by summarizing the framework's benefits and limitations; and suggests areas for further study to address the limitations.

2 Conceptual Building Blocks

2.1 Process for Capabilities Integration

A service is defined as *a process* of applying the competencies and skills of a provider for the benefit of, and in conjunction with, the customer (Vargo and Lusch 2004, 2008). A service offering is produced using the firm's resources including both tangible (such as goods) and intangible (such as knowledge, competence and relationship) assets (Arnold 2008). The value characteristics of the service provisioned, however, are *co-created* through the interactions of the client's competences with that of the service provider (Gallouj 2002). Thus the client is *active* in a service interaction; it co-creates value (for itself) with the provider by *integrating* the provider's competences with its own (Gallouj 2002; Gadrey and Gallouj 2002; Fitzsimmons and Fitzsimmons 2010). Therefore, service is about "*the process* of parties doing things for and with each other, rather than trading units of output, tangible or intangible" (Vargo and Lusch 2008). Consequently, from the NSD perspective, service design is about designing the *processes* to facilitate resource or competence/capability integration by the customer.

A service firm (such as a telecom provider) is conceptualized as a service system which is defined as a complex adaptive system of people, and technologies working together to create value for its constituents (Spohrer et al. 2007). Thus, service innovation by a service system (firm) using NSD must be cross-disciplinary (Voss and Hsuan 2011), and is only possible when the service system (firm) has information about *the capabilities and the needs of its clients*, its competitors, and itself (Maglio et al. 2009).

2.2 Value Co-creation in a Digital Ecosystem

In an increasingly digital world, information technologies are "*liquefying*" physical assets into *information* resources, and transform a service firm into a *value-creating* service system in which a *constellation of economic actors* (customers, suppliers, business partners and the like) are able to seamlessly *collaborate* to co-create value (Normann and Ramirez 1993). So the firm must establish *collaborative processes* with customers, partners, and employees to engage in the co-creation of value (Lusch et al. 2007). And the customer is regarded as an *operant resource*—a dynamic proactive resource that is capable of acting on other resources to create value for itself (Vargo and Lusch 2008).

Value co-creation and innovation in the digital world would require firms to institute *individualized and immediate customer feedback* (to and from the customers) to engender customer and organizational *learning* (Johannessen and Olsen 2010).This requires a *new* IT-enabled *organizational logic* which encompasses modular (multi-sourcing) flexibility, front-line (customer learning) focus, IT-enabled individualization and "connect and develop" innovation practices (Johannessen and Olsen 2010; Chesbrough and Davies 2010). In addition, the firm needs *new cooperation structures* by partaking in global competence clusters and practicing coopetition (Johannessen and Olsen 2010). This means the service design framework must support selective participation by suppliers, partners and customers in the overall co-design process. And, customer experience design must incorporate customer learning and facilitate two-way feedback between client and provider.

Above all, to *be agile and adaptable as* they *learn of changing customer needs*, firms need to develop dynamic operant resources—the *dynamic capabilities* (Teece 2007). The dynamic capabilities allow firms to continually align their competences to create, build and maintain relationships *with* (thus the value propositions to) *customers* (the ultimate source of revenue) *and suppliers* (the source of resource inputs). Thus, the service design framework must institute agile organizational and customer learning to sustain the service system's (firm's) dynamic capabilities and thus its evolutionary fitness.

2.3 Customer Centricity for Service Excellence

The customer is at the *heart* of value creation, and service is about relationship with the customer (Edvardsson et al. 2005). The customer interacts with the service provider via the interface through which information /knowledge, emotions and civilities are exchanged to co-create value (Gallouj 2002). Value is wholly determined by the customer upon, and in the *context* of, service usage (and resultant customer experience), in which the competence of the provider is *integrated* with the competence of the customer to (perform 'a job' to) create (business) value with the customer (Vargo and Lusch 2008; Edvardsson et al. 2005). To win the service game, the value proposition must consistently meet the customer expectations and behavioral needs (Schneider and Bowen 2010). This can be assured by co-opting the customer competence in co-creating the service offering with the provider (Prahalad and Ramaswamy 2000)—e.g. user toolkits for innovation (von Hippel 2001). However, the customer would collaborate with the provider in co-creation of core *service offerings* (in the context of service conceptualization and design practices) only if they would gain benefits, such as: expertise, control, physical capital, risk taking, psychic benefits, and economic benefits (Lusch et al. 2007). The service design framework must therefore support the potential for engaging customers in service offering co-conceptualization, service co-design and customer experience experimentation.

3 Proposed Integrative Service Design Framework

To create new innovative services that sustainably co-create superior customer value in the constantly evolving digital ecosystem, an integrated design framework is proposed. It is synthesized from the extant literature in accordance with the preceding conceptual building blocks. First and foremost, the proposed integrated design framework is founded on (SGoldstein et al. 2002; Clark et al. 2002), (b) service design which defines the service delivery mechanisms to consistently satisfy customer needs (Goldstein et al. 2002; Fitzsimmons and Fitzsimmons 2010; Maglio et al. 2006; Holmlid and Evenson 2008; Bitner et al. 2008; Glushko and Tabas 2009), (c) customer experience and value creation which guides service design to align the provider's competences and learning regime to those of the customers to ensure superior experience (Bitner et al. 2008; Glushko and Tabas 2009; Fitzsimmons and Fitzsimmons 2007; Lusch et al. 2007; Schneider and Bowen 2010; Womack and Jones 2005; Patricio et al. 2008; Zomerdijk and Voss 2010; Payne et al. 2008; Stickdorn and Schneider 2010), and (d) service architecture which systematizes service concept, service design and innovation (Voss and Hsuan 2009, 2011; (Step 0 in Fig. 1) the firm's mission and service strategy focused on meeting the customers' existing and emerging needs. In particular, the firm's *brand value* and its subordinate service value proposition must resonate and align with the customers' requirements (or value expectations).

The integrative design framework for NSD (see Fig. 1) consists of *closely interrelated practices* of: (a) *service concept* which defines what the service is and how it satisfies customer needs (Bettencourt 2010; Fynes and Lally 2008; Goldstein et al. 2002; Clark et al. 2002), (b) *service design* which defines the service delivery mechanisms to consistently satisfy customer needs (Goldstein et al. 2002; Fitzsimmons and Fitzsimmons 2010; Maglio et al. 2006; Holmlid and Evenson 2008; Bitner et al. 2008; Glushko and Tabas 2009), (c) *customer experience* and value creation which guides service design *to align* the provider's competences

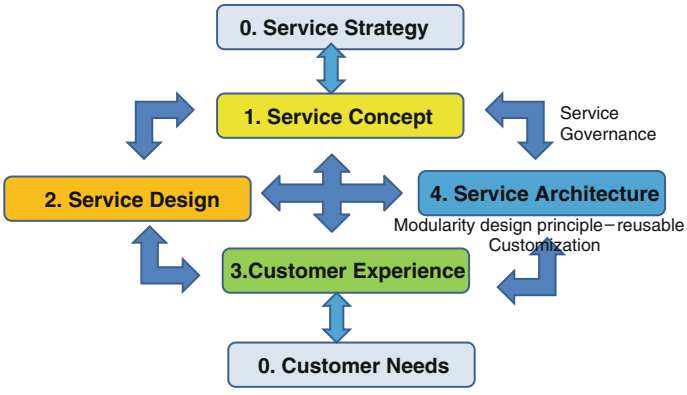

Fig. 1 An integrative service design framework (*Source* Chew 2013)

and learning regime to those of the customers to ensure superior experience (Bitner et al. 2008; Glushko and Tabas 2009; Fitzsimmons and Fitzsimmons 2007; Lusch et al. 2007; Schneider and Bowen 2010; Womack and Jones 2005; Patricio et al. 2008; Zomerdijk and Voss 2010; Payne et al. 2008; Stickdorn and Schneider 2010), and (d) *service architecture* which *systematizes* service concept, service design and innovation (Voss and Hsuan; 2011; Voss and Hsuan 2009; Fixson 2005; Roth and Menor 2003; TMF 2004; Chew 2010). These four interrelated practices and their underlying theories and principles are detailed below individually, but are typically practiced in the real-world *iteratively* and *holistically*—accentuated on agile organizational and customer learning for each and every iterative step, such that the integrated design practice becomes the firm's dynamic capability enabling it to attain evolutionary fitness with the turbulent external market environment (Teece 2007).

3.1 Service Strategy

Strategy (Step 0) is designed to fulfill the firm's vision and mission. There is a four-step approach to developing a successful service strategy:

(1) Select the innovation focus, such as new service innovation or service delivery innovation, and the target customer group(s);
(2) Uncover customer needs in terms of jobs to get done and outcomes expected;
(3) Prioritize customer needs;
(4) Develop a service strategy (and attendant service concept) to fulfill the high priority customer needs (Bettencourt 2010).

A successful service strategy fits what the customer will value with what the company can deliver. This means aligning the *service concept* (what it would take to deliver on the customer value propositions), and hence the service architecture, with firm's capabilities, resources, culture and strategy.

3.2 Service Concept

A service concept (Step 1) defines the conceptual model of the service. It describes *what* the service is and *how* it satisfies *customer needs* (Bettencourt 2010). Service concept is the most critical component of *service strategy*, and reflects the alignment of the customer needs (job and outcome opportunities) with the company capabilities. It reinforces the firm's brand strategy/value. Service concept also forms the fundamental requirements for *service design*, service development and service innovation (Fynes and Lally 2008). It is developed as the *end-result* of the activities of strategic positioning, idea generation and concept development/refinement—a *marketing-led* cross-disciplinary endeavor. The conceptual model of a service consists of seven components which together define the *desired customer outcomes*

(value propositions) of the service: service benefits, participation activities, emotional component, perception component, service process, physical environment, and people/employee (Fynes and Lally 2008).

To define an *innovative* service concept, Bettencourt (2010) recommends that a service firm should:

- focus creative energies on specific job and outcome opportunities;
- identify where the key problems lie in satisfying high-opportunity jobs and outcomes;
- systematically consider a diverse set of new service ideas to satisfy the opportunities; and
- build a *detailed concept* with service *strategy* and service *delivery* in mind.

Service concept is the principal driver of *service design decisions* at all levels of planning and implementation. It relates to *service architecture* or service blueprinting which guides service design, and to *service governance* which defines the decision rights and the decision making process for service design, planning and implementation (Goldstein et al. 2002). For example, at the strategic planning level (*marketing-led*), the service concept drives design decision for new or redesigned services. At the operational level (*IT/operations-led*) it defines how the service delivery system implements the service strategy and how to determine appropriate performance measures for evaluating service design. At the service recovery level (*operations-led*), it defines how to design and enhance service encounter interactions. Thus the service concept, along with the overarching service architecture, is the *common foundation* for new service development, service design and service innovation. For instance, service concept development and testing is at the *heart of service design* in new service development. Central to service conceptualization is declaring what the *customer value proposition* is in relation to the firm's *strategic intent*, how it meets the customer needs, and what is the service logic required to deliver the value proposition (Goldstein et al. 2002). Service concept articulates the service operation—why and how the service is delivered (in line with the brand value); the service experience—i.e. customer experience; the service outcome—i.e. customer benefits; and the service value—i.e. the perceived customer benefits minus the service cost (Clark et al. 2002). Service concept and the corresponding service design (described below) are intended to *reflect the service firm's business strategy* and brand value, and therefore directly impact the firm's financial performance.

3.3 Service Design

Service design (Step 2)—an *IT/operations-led* cross-disciplinary endeavor—starts with the customer/user, and defines how the service will be performed using human-centred and user-participatory methods to model the service performance (Holmlid and Evenson 2008).

We distinguish service design at two levels: new service development (NSD) at the individual service offering level (akin to new product development in manufacturing), and service system at the service firm level (akin to enterprise design).

From a NSD perspective, a service is conceptualized as an open system with customers being present everywhere. Service design must address strategic service issues, such as marketing positioning and the preferred type of customer relationship, in line with the strategic intent of the service organization. Service governance is also required to monitor the service qualities and financial performance against the design outputs. The framework for designing the *service delivery system* must address multiple interrelated factors: standardization; transaction volume per time period; locus of profit control; types of operating personnel; types of customer contacts; quality control; orientation of facilities; and motivational characteristics of management and operating personnel (Goldstein et al. 2002). The service delivery system fulfills the firm's strategic service vision and is designed/specified by means of service blueprinting (Bitner et al. 2008; Fitzsimmons and Fitzsimmons 2007). Service blueprinting is a map or flowchart of all the transactions constituting the service delivery process. The map identifies: *the* potential *'fail-points'*; *the* line of interaction between client and provider known as *service encounters*; *the line of visibility*—above it employees actions are visible to the customer (directly affecting customer experience); below it is the 'back-stage'; and *the* internal line of interactions below the line of visibility (Bitner et al. 2008; Fitzsimmons and Fitzsimmons 2007). The *service encounter* design is a critical element of service design, because from the customer's viewpoint "*these encounters ARE the service*" (Bitner et al. 2008). The design focuses on maximizing the quality of 'service experience' by the customer. However, service experience is the result of the combined efforts of the 'back stage' information and processes and the 'front stage' customer handling—both must work *seamlessly in unison* in satisfying the customer request (Glushko and Tabas 2009).

Taking an end-to-end view of service process allows designers to analyze the stakeholders' requirements, pain points and performance metrics from which service design (or redesign for an existing service) could be developed, in collaboration with the stakeholders (including suppliers and partners), incorporating a combination of changes across process, organization, technology, and tools in an integrative manner (Maglio et al. 2006).

NSD service design must include strategies for handling service variability to ensure sustained level of service quality expected by customers (Glushko and Tabas 2009). For instance, to manage an unexpected deviation from a normal service encounter, the service design (per service strategy and governance) may incorporate the notion of service personnel *'empowerment'*, which grants them the *discretion to recover* from service deviation (failure) by offering 'compensations', or alternative solutions to the customer to minimize adverse impacts to the customer (Normann and Rameriz Normann and Ramirez 1993). Moreover, where multichannel services are provided, the design must ensure *consistent* service experience across all channels. Finally, service design needs to incorporate the requirements of *lean consumption* by the customers (Womack and Jones 2005) (in accordance with the

customer experience design principles described in the next section) and achieve the objectives of *service profit chain* (Heskett et al. 2008).

At the service firm level, service design is concerned with designing the service system (which offers the service)—akin to enterprise or organization design—to achieve the firm's mission and strategy, a C-level executive-led cross-disciplinary endeavour. Service system design must address the roles of people, technology, shared information, as well as the role of customer input in production processes and the application of competences to benefit others. Consequently, it will influence the design of service delivery system for each service offering created by NSD. This design interrelationship will be managed through the modularity principles of the attendant *service architecture* (see later). The design must also address the service systems' requirements for agility and adaptability in alignment with their environments (Spohrer et al. 2007). *A learning framework* is necessary to sustain the firm's creative design ability, and improve and scale the service systems. The framework is designed to achieve three critical requirements: *effectiveness*—the *right things* get done; *efficiency*—things are done in the *right way*; *sustainability*—the *right relationships* exist with other service systems to ensure the system's long term sustainability (Spohrer et al. 2007; Maglio et al. 2009). Sustainability is achieved through the service system's (brand) *reputation*, because excellent reputations naturally attract value propositions from other service systems wanting to co-create value. It also requires appropriate amount of *shared information* to be available to all service systems (the principle of information symmetry) to enhance coordination and mutual sustainability within the service ecosystem. The design is however inherently challenged by the *people factor*, as people are complex and adaptive.

In sum, service system design, broadly, must address *four* variables:

- *physical setting*;
- *process design*—the service blueprinting or mapping which designs 'quality' into the service delivery system;
- *job design*—the social technical job design which include addressing the employee motivational requirements; and
- *people*—the staff (competence) selection (Goldstein et al. 2002).

3.4 Customer Experience

Service design excellence strives to achieve superior customer experience (Step 3), where the design practice is focused on the usability and pleasurability of the service interactions (Stickdorn and Schneider 2010, p. 84). Service organizations are increasingly managing customer experiences to promote differentiation and customer loyalty. Due to its strategic significance as a competitive differentiator, this specialist design practice, whilst being an integral part of service design, is factored out as a crucial step deserving special attention in the overall design

framework. Customer experience requirements of each service type are usually analyzed using use-case scenarios similar to that of service blueprint (Bitner et al. 2008; Patricio et al. 2008).

Customer experience is influenced by the *service intensity*, which is defined in terms of the number of actions (frequency and sequence) initiated by the service provider, or the amount (and importance) of *information exchanged* in a service encounter or the duration of the service encounter (Glushko and Tabas 2009; Stickdorn and Schneider 2010). The service design of a multi-interface system must unify service management, human computer interface, and software engineering perspectives into an integrated design embodying the customer experience requirements (Bitner et al. 2008). The experience-centric service providers design the *activity and context* of the experience to engage customers in a personal, memorable way.

Customer experience is contingent on the efficacy of service encounter design, which in turn is guided by the possible relationships between the *three parties* in the service encounter: the *service organization* (whether to pursue a service strategy of efficiency (cost leadership) or effective (customer satisfaction) or both); the *contact personnel* (following strict rules/order or empowered with autonomy and discretion); and the interaction between contact personnel and the *customer* (balancing conflicting "perceived control" by both parties) (Fitzsimmons and Fitzsimmons 2010). Technology could be designed into the service encounter in four ways: (a) technology-assisted service encounter—only the contact personnel has access to the technology; (b) technology-facilitated service encounter—both the customer and the contact personnel have access to the technology; (c) technology-mediated service encounter—the customer and contact personnel are not physically co-located and their interaction is mediated through the (online) technology; (d) technology-generated service encounter—i.e. self-service, the contact personnel is completely replaced by technology (Fitzsimmons and Fitzsimmons 2010; Froehle and Roth 2004). Thus technological innovation in services could require a change in the role a customer plays in the service delivery process. Therefore it is critical to take into account the role of the potential customer (as well as employee) reaction to the new technology in the design phase to avoid future problems of acceptance (Fitzsimmons and Fitzsimmons 2007).

The customer experience design must therefore address the complete "customer journey" with the firm (from presales marketing to purchase, to usage, to expiry, end-to-end) (Rawson et al. 2013), and address the *dynamic* and ongoing *engagement process* between customers and the service organization. The engagement can be emotional, physical, intellectual, or even spiritual, depending on the level of customer participation and the connection with the environment (Zomerdijk and Voss 2010). The experience is influenced by the effectiveness of value co-creation between the provider and beneficiary. The proposed value by the provider, in the context of the client, is actually a composite of benefits (utility of the service) and burdens (or costs), which can be evaluated using a *customer value equation* (Fitzsimmons and Fitzsimmons 2007). Burdens relate to the service's usability (or its relative ease-of-integration with the client's resources or activities to "*perform*

the job the service is hired to do")—the more user-friendly, the lesser the burden (lean consumption (Womack and Jones 2005)) and the greater the user experience; and the greater the customer efficiency (Xue and Harker 2002). Thus, the most compelling service with the best "value for money" to the client is one that has the largest "benefit-to-costs" ratio. This suggests that user involvement in co-creating the service offerings (or co-designing the value propositions at the service concept stage) with the provider would more likely create 'fit-for-purpose' service for the client, and thereby maximizing the benefit. Service firms must therefore "consider not only the employees' productivity, but also the 'productivity' and experience of the customer." (Fitzsimmons and Fitzsimmons 2007; Lusch et al. 2007; Schneider and Bowen 2010; Womack and Jones 2005) From a service system viewpoint, value, created as a result of integrating the provider's resources with the client's, increases the client system's adaptability and survivability to fit with its changing environment (Vargo et al. 2008).

Customer value creation is a dynamic, interactive, non-linear, and often unconscious, process (Payne et al. 2008). Value is defined in the context of the performance outcome of the customer's *resource (and capability) integration* practice. To ensure optimal value co-creation, the *three contiguous processes*: the customer value-creating processes; the *supplier* value-creating processes and the interfacing service *encounter* processes, must all be aligned (Payne et al. 2008). The process design must be congruent with the overall service architecture (see next section) to ensure consistent experience across all services and all channels (and devices). The *customer experience* is a culmination of the customer's *cognitions, emotions and behavior* during the relationship, across the entire customer journey end-to-end (Rawson et al. 2013), with the provider. These elements *are interdependent* and involve the customer in thinking, feeling and doing—leading to customer learning—in the process of value co-creation (Payne et al. 2008). More research is required on "*the need for appropriate metrics for the cognitive and emotional demands*" of customer experience imposed by different service interaction designs (Glushko and Tabas 2009; Shaw 2007).

3.5 Service Architecture

Service architecture is conceptualized to systematize service design and innovation. Leveraging concepts from product architecture, service architecture aims to create a common language (comprised of nodes and linkages) across different views on service design and a systematic way to operationalize and measure the degree of service architecture modularity (Voss and Hsuan 2009). For a start-up service firm, service architecture practice is likely to be non-existent (or relatively immature) in its initial organizational survival phase. Service architecture capability emerges as the firm becomes more stable financially, and growth is accelerating. This is when service architecture becomes an indispensable organizational practice—indeed a dynamic organizational capability of the firm—as an integral part of the integrative

design practice. Thus for mature firms such as banks or telcos, service architecture features centrally as a reference framework for design governance (to assure customer-effectiveness and efficiency of all new services)—as illustrated in a telco case example described in a later section—in the firms' overall service design practices.

Service architecture is constituted in accordance with the principle of *modularity*, which in turn is characterized by five dimensions: *components* and systems as the basic modular units, the *interfaces, degree of coupling*, and *commonality sharing* between components, and *platform* as the overarching configuration of components and interfaces that make up the service architecture (Fixson 2005). Modularity refers to the degrees by which interfaces between components are standardized and specified to allow for greater reusability and sharing of (common) components among service families. It provides the basis for mixing and matching of components to meet mass-customization requirements; yields economies of scale and scope, and can help structure services to facilitate outsourcing. Platform strategies are the vehicles for realization of mass customization (Fixson 2005). As platform decisions often cut across several service lines or divisional boundaries, platform strategic decisions must belong in the top management team who need to and can resolve cross-functional conflicts to jointly achieve the firm's overall strategy.

An important and challenging aspect of service architecture is the interface. Interfaces in services can include *people, information, and rules governing the flow of information*. Service interface can also include the flow of people. In general, an active role in service customization would be played by both the front-end employees and the customers themselves. This would suggest the service components need to be more loosely coupled than product components (Roth and Menor 2003). The customer-provider service encounter process design principles must incorporate due consideration for the customer's *cognitions, emotions and behavior* (Payne et al. 2008) during the relationship across the customer journey (Rawson et al. 2013).

A service system can be analyzed for the purpose of service architecture in terms of four levels of increasing detail in specification:

- industry level (level 0),
- service company/supply chain level (level 1),
- service bundle level (level 2), and
- service package/component level (level 3) (Voss and Hsuan 2009).

At level 0, the industry architectural template defines the value creation and the division of labour, as well as value appropriation and the division of surplus or revenue among the different players. (This is the financial or commercial view of service design as seen from the Chief Executive Officer/Chief Financial Officer-level.)

At level 1, the service company and its supply chain(s) are modeled both upstream and downstream. Both shared (internal cross-functional) service components, and outsourcing of service components, are important considerations for economic and resource flexibility reasons, in line with the company's business

strategy. (This is the operations management view of service design as seen from the Chief Operating Officer level.)

At levels 2 and 3, the service concept and service design activities of service innovation practice are harmonized and integrated to assure service agility. (This is the Chief Marketing Officer and Chief Information Officer view of detailed service design, and operational and management levels.) At level 2, the individual service bundles of the service offering at the company level are analyzed—each bundle is viewed as a set of modules of service delivery, comprising the front- and back-office functions (and associated capabilities). The front-office design must comply with the above-mentioned customer-provider service encounter process design principles to ensure superior customer experience and optimal value creation. At level 3, the service package and component level, the characteristics of the building blocks (components) are specified that contribute to the overall systems architecture, namely: standardization, uniqueness, degree of coupling, and replicability (Voss and Hsuan 2009). Thus, service architecture enables *service agility* as new services can be designed and provisioned with minimal cost and little internal change, and the architecture can be dynamically adapted in response to external stimuli, enabled by a corresponding modular organizational architecture, as well as IS architecture (Voss and Hsuan 2009).

4 Exemplar Integrative Service Design Practices

Telecom companies (telcos), like banks, compete on customer service (experience) differentiation. Their missions, strategies and brand values are highly customer-centric which, through disciplined strategic alignment, strongly influence the ways their services are conceptualized, designed and operationalized.

A simplified telecom service system can be conceptualized as shown in Fig. 2. The telecom service system is composed of four service system entities (SSEs): the service provider-SSE in collaboration with its IT supplier-SSE and network supplier/partner-SSE delivers telecom service to its customer- SSE. The telecom service provider-SSE consists of a collection of network- and systems-capabilities that, together with the resources or capabilities of its partners and suppliers, are configured (by service design) to create a differentiated service offering (composed of an internally-standardized set of "service encounter" capability components/bundles: fulfillment, assurance, billing and in-service usage) for the customer-SSE.

We illustrate below an *exemplar application* of the proposed integrative service design framework to a telecom NSD, based on the service design model that was illustrated in Fig. 1.

In *Step 0*, telecom business executives define the competitive service strategy, often founded on the customer intimacy value discipline (Tracy and Wiersema Treacy and Wiersema 1995), which is purposefully designed to satisfy the emerging or unmet needs of the chosen (existing and new) customer segments.

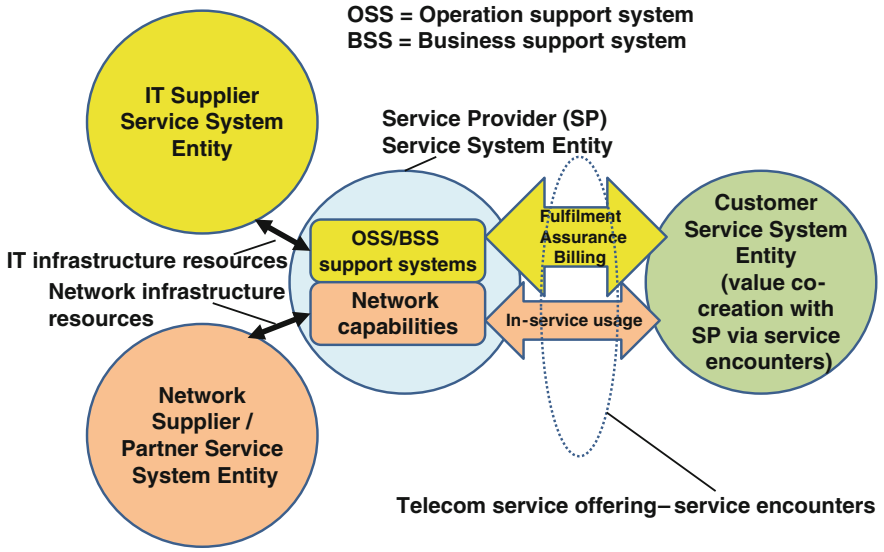

Fig. 2 A simplified telecom service system (Adapted from Chew 2010)

In *Step 1*, the product manager from marketing envisions and leads the definition of a new *service concept* (supported by customer operations and IT/IS), informed by the firm's superior customer insights, to meet an emerging customer need or an underserved customer segment. For instance, the product manager may envision education institutions' emerging need for a virtual classroom service (in support of an innovative remote education service). This new service would allow geographical separated students from anywhere to participate in a real-time lecture from their home or office, using any device over any network of their choice, while still experiencing the same level of intimate interpersonal interactivity as if they were co-located in the classroom. At the service concept level, the focus is on conceptual (functional) requirements for the utility, usability and pleasurability (including exception handling) of the proposed service concept.

In *Step 2 service design*, IT/IS and network experts will lead (supported by marketing and operations experts) the design endeavor developing the integrated network and systems solution that satisfies the service concept requirements. For instance, using the service architecture (*Step 4*) as a reference framework to leverage service component reusability and ensure the solution's fitness with the telco's overall portfolio of services, the IT/IS/network experts may design, on one hand, a quadruple-play service solution (for "*in-service usage*" by the customer—see Fig. 2), combining broadband, mobile, IPTV and multi-media contents in an integrated service delivery (by configuring the appropriate network capabilities in collaboration of network partners/suppliers—see Fig. 2); and, on the other hand, design the appropriate accompanying customer "service encounter" capability components of fulfillment, assurance and billing (by configuring the OSS/BSS

systems capabilities—Fig. 2), ensuring end-to-end service integrity in line with the customer service strategy (Step 0) and the attendant customer experience criteria (Step 3).

In *Step 3, customer experience design* is typically led by systems designers with human factors engineering expertise (Shaw 2007), who are skillful in designing service encounter interfaces to satisfy the customer's cognitive, emotive and behavioral requirements. Customer experience design is focused on crafting pleasurable (often technology-facilitated) customer interactions (touch-points) with the "service encounter" capability components: fulfillment, assurance, billing and usage throughout the end-to-end customer journey (Rawson et al. 2013) with the telecom provider—from presales, service provision, service usage, service assurance (failure/recovery), bill payment, and finally service exit. Increasingly, telco customer experience design effectiveness is linked to the measure of Net Promoter ® Score, which in turn has been shown to influence directly the service firm's financial performance (Shaw 2007). This entails aligning the end-to-end service encounter processes (Payne et al. 2008; Rawson et al. 2013), as well as the alignment of service capabilities between the provider and the customers, to enhance the experience and productivity of each customer in using the said service (Fitzsimmons and Fitzsimmons 2007; Lusch et al. 2007; Schneider and Bowen 2010; Womack and Jones 2005).

In *Step 4*, the firm-specific *service architecture* is used as a reference model for governing the overall aforementioned service design practices. Telecom service design depends critically on the designer's understanding of the provider's service process (underpinned by the OSS/BSS systems and digital network capabilities—Fig. 2) to ensure effective value co-creation, accompanied by excellent customer experience. This requires an end-to-end modeling of the provider's (OSS/BSS) operations across all organizational functions. The end-to-end model will ensure seamless linking of inter- and intra-organizational processes which constitute the service process for *effective* value co-creation with the customers—in accordance with their distinctive customer value proposition (Kaplan and Norton 2004; Anderson et al. 2006). To that end, the telecom industry has specified a standard framework of telecom service provider business processes, known as eTOM (enhanced Telecommunications Operations Map) (TMF 2004).

The eTOM is a generic telecommunications reference framework for categorizing all the business activities that a service provider will use. The reference framework has been adopted as generic telecom *service architecture*, and can be used to specify firm-specific service processes, and to source commercial-off-the-shelf standards-based OSS/BSS software systems to support, and, where appropriate, automate the specified service processes (business operations such as fulfillment, assurance and billing). As shown in Fig. 3, the telecom service architecture has three core process domains (Chew 2010): (A) strategy, infrastructure and product process domain which addresses infrastructure and product planning and lifecycle management (associated with development and delivery); (B) operations process domain which addresses the core of customer (and network) operational management and forms the heart of telecom service delivery business; and (C) enterprise management process

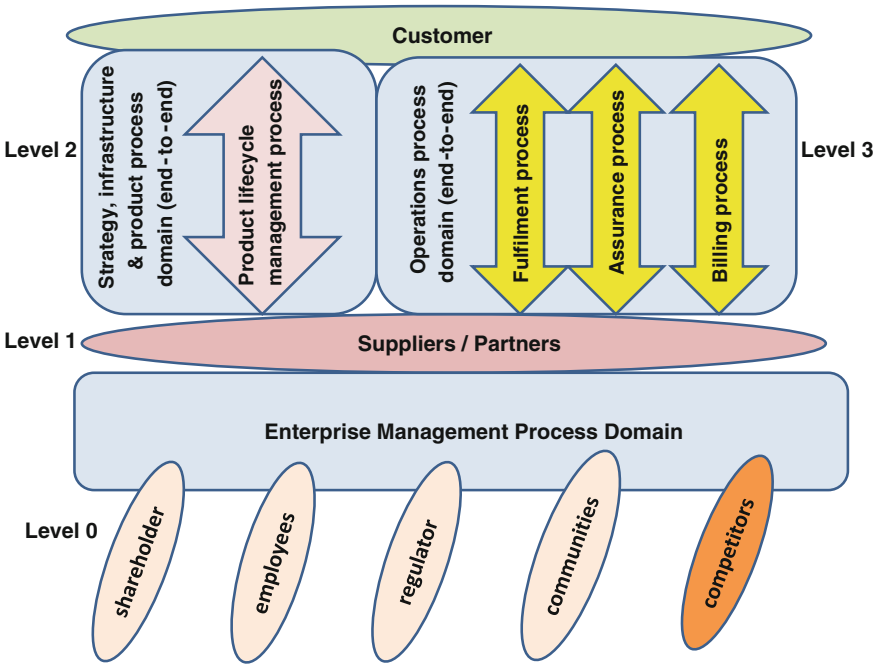

Fig. 3 Telecom service architecture (Adapted from Chew 2010)

domain which addresses corporate or business support management (managing the provider's end-to-end engagement processes with shareholders, employees, communities, regulator and competitors)—in the context of the firm's Industry Architecture. The *former two* core process domains are of primary interest to service design.

The telecom service architecture facilitates the practices of service conceptualization, service design, and customer experience design (iteratively and holistically in an agile development manner) as follows:

Level 0 of the telecom service architecture addresses the telecom industry perspective (as seen by the provider), and Level 1 addresses the telecom provider's company perspective, including its networks of partners and suppliers upon whose resources and capabilities (e.g. see Fig. 2) it relies to sustainably develop new service offerings for its customers.

Level 2 embodies the new service design (NSD lifecycle) process, end-to-end from conceptualization of service bundles (to meet customer needs) to design to operations, and eventually service exit or withdrawal. Level 3 defines the specific requisite detailed design (Step 2) for "service encounter" capability components (in compliance with the customer-provider encounter process alignment and organizational learning principles) in order to deliver the service bundles (Level 3) seamlessly to achieve (Step 3) superior customer experience.

To design (Step 2) and implement the virtual classroom service, the service architecture (via the product lifecycle management process—Level 2 service architecture) would have initiated the development of the quadruple-play convergent network technology platform to provide the requisite flexible integration of diverse technological capabilities for *service in-use*. The Level 2 service architecture would prescribe the evolving modularized telecom network architecture, which allows differing service bundles (such as the quadruple-play multimedia service) to be easily configured by systems engineers (in Step 2 service design) to provision new innovative service concepts imagined by creative product managers in marketing (Step 1).

Level 3 service architecture defines the modular telecom service process (OSS/BSS) architecture. It serves as a reference model for Step 2 design of the service encounter processes (fulfillment, assurance and billing processes) of the virtual classroom service, and for Step 3 customer experience design of the service encounters; addressing the cognitive, emotive and behavioral requirements of the customer associated with using the virtual classroom service.

The four steps of the integrative service design framework are applied iteratively and holistically, accompanied by agile organizational and customer learning, such that the design practice becomes a core service innovation capability of the telco.

5 Conclusion

Service innovation is focused on creating customer value. Customers co-create value with the provider by integrating their competences/capabilities with those of the provider. Thus, customer productivity is as important as that of the provider in service provision, as it impacts directly on the service experience. At its core, customer-centric service innovation in an increasingly digital world is technology-enabled, but more human-centred and process-oriented. It needs a multi-disciplinary holistic end-to-end approach to service design, which, however, is not well addressed by the extant literature. This chapter proposed such a new service design approach to support systematic service innovation by cross-disciplinary experts from business, operations, and IT.

The chapter uses service science principles and theories to re-examine the different aspects of service design from the literature and highlight their logical and conceptual interrelationships. The theoretical analysis shows that disparate business and IT views of service design can indeed be logically and conceptually integrated to create the new proposed *integrative service design framework*.

The strategy-aligned framework comprises four *closely interrelated practices* of: (a) *service concept* which defines what the service is and how it satisfies customer needs, (b) *service design* which defines the service delivery mechanisms to consistently satisfy customer needs, (c) *customer experience* and value creation which guides service design *to align* the provider's competences and learning regime to those of the customers to ensure superior experience and (d) *service architecture*

which *systematizes* service concept, service design and innovation. These four interrelated practices are typically practiced *iteratively and holistically*—accentuated on agile organizational and customer learning for each and every iterative step, such that the integrated design practice becomes the firm's dynamic capability enabling it to attain evolutionary fitness within the turbulent external market environment.

The efficacy of the proposed integrative service design framework has been preliminarily validated by applying it to an exemplar telecom NSD, in which a particular telecom service environment is modeled as a service system. More case examples from diverse industries, however, need to be developed to fully validate the industry applicability of the framework.

Service innovation commercialization is contingent on careful alignment of the firm's *service strategy, service design* and *business model design* (Chew and Gottschalk 2013). The proposed framework could therefore be further extended by incorporating business model design principles in the overall service design thinking. We envision such enhanced framework would facilitate rapid business model experimentation of any new service concept to test its commercial viability, before committing financially to the comprehensive detailed design process.

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Services Innovation in a Circular Economy

Göran Roos and Renu Agarwal

Abstract This chapter reviews various concepts captured under the term Circular Economy, drawn together from various service innovation perspectives. The circular economy is built on the principle that all intermediary outputs that are of no further use in the firm's value-creating activities are provided as inputs into other firm's value-creating activities. The chapter identifies complexities around monetising value, monetising non-monetary benefits, different attributes that consumers and customers' value in the services space, and the substitution effects that services can have on product sales. From insights and methodologies developed in the service design area, combined with the ability to measure and compare alternative attributes from a value performance point of view, it is identified that further research is needed to facilitate both a higher adoption and a greater success rate among services developed. The chapter explores service innovation in the circular value chain as a growing domain of activity, and points towards a need for development of an appropriate business model framework within a circular economy for firms to engage in service innovation and delivery.

Keywords Circular economy · Business model framework · Service innovation · Circular value chains · Environment · Sustainability · Industrial systems

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1 Introduction

It has been estimated that an extra three billion new middle class consumers will emerge into the global economy by the year 2030 (Ellen MacArthur Foundation 2013, p. 19). In turn, our resources are limited and new ways need to be identified to address a number of ecological, environmental and industrial challenges that follow from increased consumer demands as well as increased number of consumers. The concept of innovation carries the brunt of addressing some of these concerns (Hall and Wagner 2012) but the question remains, how far can innovation go in handling these issues, some of which can be described as wicked problems? "Innovation has been widely regarded as a panacea for sustainable development, but there remains considerable uncertainty about how it will lead to a more sustainable society" (Hall and Wagner 2012, p. 183).

The circular economy is not a new concept (Boulding 1966), but it has been identified as a concept worthy of revisiting as a possible approach to the issues facing our global economy and environment and limited resources. The concept acts by gathering concerns articulated in today's society and addressing these by attending to what is a combination of prudence, resourcefulness and innovation. The circular economy is built on the principle that all intermediary outputs that are of no further use in a given firm's value-creating activities are provided as inputs into other firm's value-creating activities.

2 Concepts Captured by the Circular Economy

In this section, the various concepts that fall under the term circular economy are drawn together from various service innovation perspectives. "As circular economy thinker, Walter Stahel explains, 'the linear model turned services into products that can be sold, but this throughput approach is a wasteful one. […] In the past, reuse and service-life extension were often strategies in situations of scarcity or poverty and frequently led to products of inferior quality. Today, they are signs of good resource husbandry and smart management' (Ellen MacArthur Foundation 2013, p. 22).

Roos (2014a) summarises the key terminologies that are used to describe the concepts captured wholly or partially by the concept of the circular economy as:

Circular Economy (concept introduced by Boulding (1966)): is a generic term for an industrial economy that is, by design or intention, restorative and in which material flows are of two types, biological nutrients, designed to re-enter the biosphere safely, and technical nutrients, which are designed to circulate at high quality without entering the biosphere (Wikipedia 2014a). The principle is illustrated in Fig. 1. Bechtel et al. (2013) provides an interesting discussion around the weaknesses and applicability of the concept.

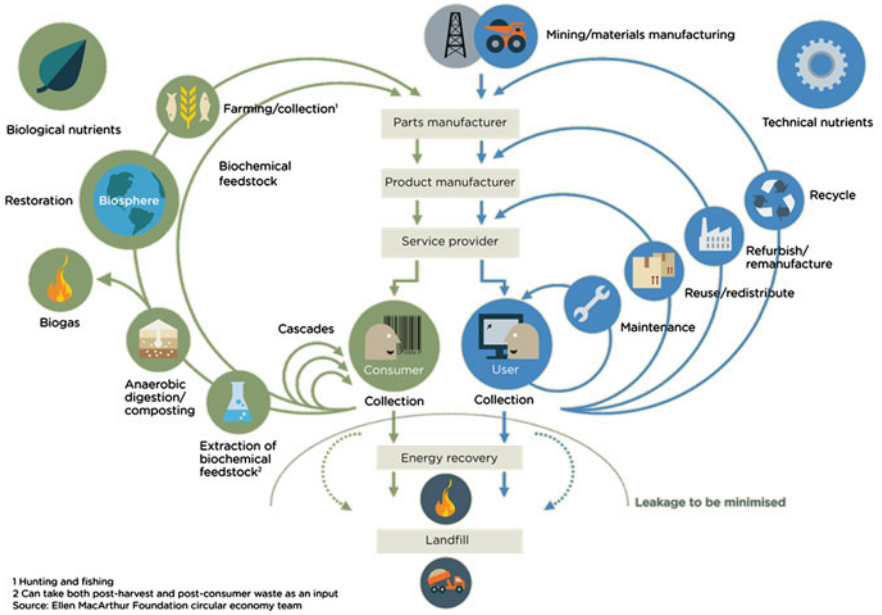

Fig. 1 The circular economy—an industrial system that is restorative by design (Ellen MacArthur Foundation 2013, p. 24)

Closed-loop Economy (concept introduced by Scheidt and Zong (1994), Brandrup (1995)): is aiming at a high recycling ratio and maximum economic efficiency (Hesselbach and Herrmann 2001).

Ecological economics (concept introduced by Georgescu-Roegen (1971), Meadows et al. (1972) and further developed by Daly and Townsend (1993), Daly (1994, 1996)): is a transdisciplinary field of study that addresses the relationships between ecosystems and economic systems in the broadest sense (Costanza et al. 1989). Ecological economics is the study of the interactions and co-evolution in time and space of human economies and the ecosystems in which human economies are embedded. It uncovers the links and feedbacks between human economies and ecosystems, and so provides a unified picture of ecology and economy. The link between ecology and human economies has been manifested in the development of resource management or bioeconomic models, in which the main focus has been on fishery or forestry management where the impact of humans on ecosystems is realised through harvesting. More closed links have been developed, however, as both disciplines evolve (Xepapadeas 2008).

Industrial Ecology (concept introduced by Frosch and Gallopoulos 1989): is the study of material and energy flows through industrial systems. The global industrial economy can be modelled as a network of industrial processes that extract resources

from the Earth and transform those resources into commodities which can be bought and sold to meet the needs of humanity. Industrial ecology seeks to quantify the material flows and document the industrial processes that make modern society function. Industrial ecologists are often concerned with the impacts that industrial activities have on the environment, with use of the planet's supply of natural resources, and with problems of waste disposal. Industrial ecology is a young but growing multidisciplinary field of research which combines aspects of engineering, economics, sociology, toxicology and the natural sciences. Industrial ecology has been defined as a "systems-based, multidisciplinary discourse that seeks to understand emergent behaviour of complex integrated human/natural systems" (Allenby 2006). The field approaches issues of sustainability by examining problems from multiple perspectives, usually involving aspects of sociology, the environment, economy and technology. The name comes from the idea that we should use the analogy of natural systems as an aid in understanding how to design sustainable industrial systems (Frosch and Gallopoulos 1989). The associated concept of Industrial ecosystem is based on a natural paradigm, claiming that an industrial ecosystem may behave in a similar way to the natural ecosystem wherein everything gets recycled (Wikipedia 2014b).

Industrial Metabolism (concept introduced by Ayres 1989): covers the whole integrated collection of physical processes that convert raw materials and energy, plus labour, into finished products and wastes (Ayres 1994). The goal is to study the flow of materials through society in order to better understand the sources and causes of emissions, along with the effects of the linkages in sociotechnological systems (Anderberg 1998; Wikipedia 2014c).

Industrial Symbiosis (concept introduced by Renner (1947) in the economic sense and Spilhaus (1966) in the waste sense): is the sharing of services, utility, and by-product resources among industries in order to add value, reduce costs and improve the environment (Agarwal and Strachan 2008). Industrial symbiosis is a subset of industrial ecology, with a particular focus on material and energy exchange (China Joint Research Center for Industrial Ecology 2008).

Integrated Chain Management also known as Integral Chain Management (Krozer 1990), is an approach for the reduction of environmental impact of product chains. Such a product chain exists out of an extraction phase, a production phase, a use phase and a waste phase. The ultimate goal of Integrated/Integral Chain Management is a reduction of environmental load over the whole chain (Wikipedia 2014d).

3 Identifying Services: Minimising and Value Adding

Based on the above, we can identify services in a circular economy as those services that contribute to a number of areas. These include minimising the inputs needed for one unit of output in the economy, i.e. what drives the economy towards

maximum efficiency. Losses that originate in any value adding activities that are executed within the economy are also minimised. These losses can take the form of physical losses, e.g. water, raw materials, etc.; energy losses, e.g. electricity, heat, kinetic energy, etc. information losses, e.g. data collected but not used before dumped or overwritten, etc.

Another significant area is minimising of any waste originating in the value adding activities that are executed within the economy. This waste can take the form of (modified based on Moura and Botter 2012) unnecessary transportation events; the production of outputs that have to be reworked due to non-conformance; the storage and retrieval due to temporally misaligned production systems or temporally misaligned demand and supply; production surplus for which there is no demand; non- or under-utilisation of resources that consume inputs when not in use; avoidable activities that does not contribute to the value adding; avoidable processes that forces avoidable activities that does not contribute to the value adding; unused opportunities for innovating that would contribute to minimising waste; skill misalignment between task requirement and task executor. A circular economy takes into account the realisation of any economic profit potential inherent in value added "waste" products.

Other value adding activities include:

- Value adding to unavoidable side streams from the processing and unutilised inputs and outputs (both colloquially known as waste) into and from the processing to maximise their inherent value adding potential for other value adding economic agents in the economy using the waste hierarchy approach.
- Complementing the existing value adding system in the economy with missing value adding economic actors or contributing to the removal of existing value adding economic actors from the existing economy, which would contribute to the systemic effectiveness and efficiency of the economy as a whole.

The initiatives and approaches conceptualise resources and waste in an alternative functional paradigm. They involve the development of new service-driven business models that through a design approaches change the service consumer's behaviour in a way that makes the economy more restorative in a multitude of ways. A shift in consumers from renting rather than buying is one such simple approach that embraces the aspects of the circular economy in encouraging sustainability.

4 Environmental Sustainability

This aligns well with the categories of design for environmental sustainability presented in the literature (Manzini and Vezzoli 2002; Sherwin 2004; Vezzoli 2007) which, if converted to the service space are integral to the environment in a

number of contexts. At its core, this embraces the notion of a holistic approach that assists in the environmental improvement of flows of processes and operations. The concept of redesigning products for environmental concerns also becomes a factor where services that assist in the design of new products are inherently sustainable including cases where the product is being substituted. This also includes services that assist in system innovation.

Brezet and van Hemel (1997) (again converted to the service space) outline services that assist in new concept development and the selection of low-impact materials and the reduction of material usage where possible. Product techniques are optimised as are the processes and the distribution system. Other services include those that assist in the reduction of environmental impact during use and assist in the optimisation of end-of-life systems.

Lewis et al. (2001) (again converted to the service space) throw a focus on services that assist in selection of low-impact materials and the avoidance of hazardous materials. These services embrace the selection of cleaner production process and maximising energy and water efficiency.

Fiksel (2009) (again converted to the service space) discusses services that assist in designing for dematerialisation, detoxification, revalorisation and for capital protection and renewal.

The discussion around the need to achieve a positive outcome through activities and services aligned with those listed above is not new. Already in 1997, the Club of Rome published a vibrant call to reach the "factor 4" objective, i.e. doubling wealth by halving natural resource use (von Weizsäcker et al. 1997). Albeit this objective have in principle support by a number of governments, there are arguments put forward that this is not high enough as an objective and that an improvement factor of 10 or higher is needed by 2025 (Mont and Emtairah 2008).

Shamah (2012) in a study on Egyptian hotels found that it is possible to assist managers in thinking about adding value relating to green service supply chains. That an increased level of improvements can be reached through the development of sustainable service systems (Tukker et al. 2008) is a basis for why services in a circular economy is important and why they frequently have to be linked to the physical products produced. Such a service system is based on an evolving adaptive process where a potential disruptive offer and its corresponding more sustainable demand emerges out of an iterative co-creation process within the boundaries of the ecosystem within which it operates. These services are sustainable because resource use reduction is a normative guideline during the whole life cycle of the offering; and systemic because such a reconfiguration is not possible at the level of a sole economic agent, it necessarily includes a network of agents integrated and coordinated into a new value creating constellation (Sempels and Hoffmann 2011).

5 Product-Service Systems and the Circular Economy

Tukker (2013) finds that since the 1990s, Product-Service Systems (PSS) have been heralded as one of the most effective instruments for moving society towards a resource-efficient, circular economy and creating a much needed 'resource revolution'.[1]

Tukker (2013) finds that for consumers, having control over things, artefacts, and life itself is one of the most valued attributes and that PSS are often less accessible, or have less intangible value, than the competing product, in part because PSS usually do not allow consumers as much behavioural freedom or even leave them with the impression that the product-service system provider could prescribe how they should behave. Already Foster and Green (2002) raised the issue that there needs to be a demand for sustainability related services before there can be a successful supply and these issues are further discussed in Ceschin (2013) who empirically studied factors that influence the implementation and diffusion of sustainable innovations in and by firms and conclude that companies also must focus on the contextual conditions that may favour or hinder the societal embedding of these offerings. This raises an issue around the appropriateness of developed PSS vis-a-vis the desired objective and the desired changed behaviour. This is likely due to a lack of design-based innovation in the product-service system development process. Design is frequently misunderstood. The simplest definition (by Roos 2011) is that design is a system-level optimisation intended to change the behaviour —and, as such, the preferences—of the user. Whereas technology-based innovation tends to take a "component improvement leads to system improvement" view, design-based innovation tends to take a "system optimisation leads to user-behaviour change" view. In other words, the objective of design-based service innovation is to achieve behavioural change in the user which is desirable from the user's point of view (i.e. they are better off in their own opinion after the change). Other significant factors include benefits to the supplier and a positive impact on other stakeholders involved in the process.

The process logic of design-based service development in its simplest form is shown in Fig. 2.[2]

Given that design is about changing the behaviour through an artefact (in our context, this artefact is a service), it is important to know what the present behaviour is (hence the importance of observation) and what the desired behaviour is, so that this can form the basis for the service development. This design-based

[1] for examples of such services see, e.g. Goedkoop et al. (1999), Hockerts (1999), Meijkamp (2000), Kerr and Ryan (2001), Mont (2002), Manzini and Vezzoli (2003), Mont (2004), Bourg and Buclet (2005); Sempels and Vandercammen (2009), Hu and Seliger (2013), Sempels and Hoffmann (2013).

[2] a more detailed discussion can be found in, e.g. Chaves (2009), Bucolo and Matthews (2011a, b, 2012), Brunswicker et al. (2013), Matthews et al. (2013), Price et al. (2013).

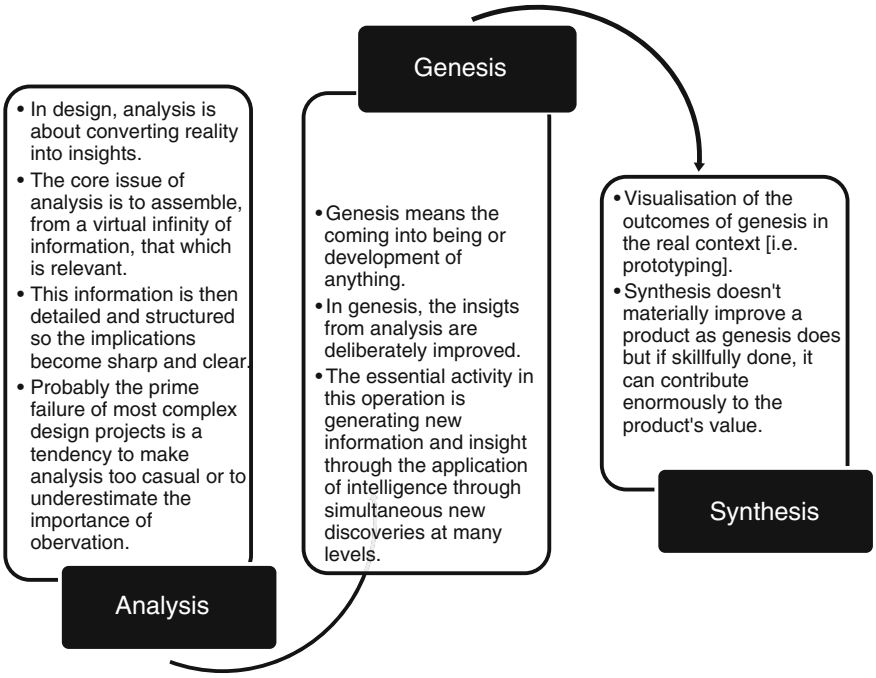

Fig. 2 The process logic of design-based service development

approach will normally also need to take into account a detailed understanding of what it is that the customer/consumer/user values in the offering. The attributes that can be valued falls under three key headings (Roos 2014b): The value derived from the deployment of the offering (known collectively as instrumental value); the value derived from the possession of the offering (known collectively as intrinsic value); the value derived from the appreciation of the offering (known collectively as extrinsic value). Practical examples of methodologies and outcomes of this can be seen in, e.g. Fletcher et al. 2003.[3]

Allwood et al. (2011) find that four major strategies for reducing material demand through material efficiency exist: longer lasting products; modularisation and remanufacturing; component reuse; designing products with less material. They define material efficiency as providing material services with less material production and processing and contrast this with the pursuit of energy efficiency in the energy intensive industries (as outlined in Fig. 3). As can be seen from Fig. 3, most

[3] And more examples in Burgman and Roos (2004), Garnett et al. (2006), Pike and Roos (2006), McCallum et al. (2007), Rødseth et al. (2007), Millar et al. (2010) and the details around the methodology is outlined in Pike and Roos (2004, 2007).

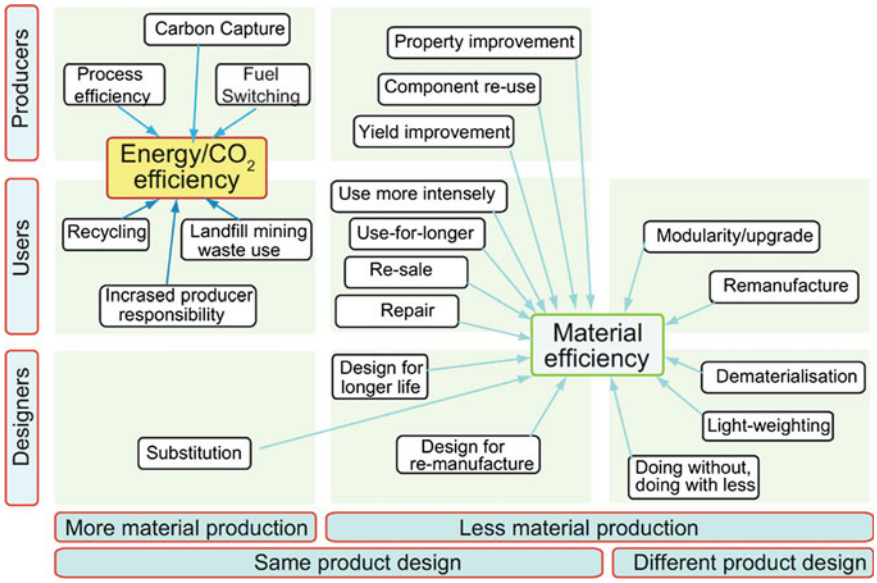

Fig. 3 Material efficiency contrasted with energy efficiency (Allwood et al. 2011, p. 363)

of the strategies around material efficiency are dependent on services and align with the definitions of services that align with the circular economy.

They also find that these strategies have had little attention in most industrialised countries due to economic, regulatory and social barriers. Based on their analysis Allwood et al. (2011) identify the following business opportunities in the material efficiency space:

- New revenue streams, such as primary metals producers developing a 'second-hand' supply chain (for instance reconditioning, re-certifying and reselling used I-beams) exactly as car makers aim to control their resale chains.
- Leasehold as a new business model—taking the example of Rolls Royce 'power by the hour' contracts for aeroengines, or Xerox's leasing of copiers, to retain materials on the balance sheet and hence nurture their value.
- Brand benefits of environmental leadership, as currently being pursued by large UK retail chains for example.
- Vertical integration providing the ability to draw value from business streams other than growth in physical output.
- Embodied energy becoming a higher priority as use-phase energy efficiency improves—for instance as buildings become more passive and vehicles more efficient, so their production energy becomes a higher priority.
- Learning lessons from developing countries—where the ratio between labour and energy/material costs is different. New supply chain partnerships—for instance between design and demolition in buildings, or design, repair and end-of-life in appliances.

It is also worth mentioning that there are additional barriers to entering this service space from a product producer's point of view. Services—such as repair, maintenance, and even complete overhauls—are to a considerable extent oriented towards prolonging the product life cycle with implications for the manufacturer's core product business. As the life of an existing product is extended, the replacement—and therefore sale—of a new product is postponed (Visnjic and Van Looy 2013) and hence some but not all services have the potential to become substitutes for products (Siggelkow 2002) and may be resisted by the product producer unless the economic business case stacks up. On the other hand a number of services have entirely complementary relationships with products (e.g. financial services, monitoring or optimization of the product in use) and do not compete with replacement products (Visnjic and Van Looy 2013). Based on this, servitization may pose a risk to product sales overall but there are simultaneous arguments for complementary effects from services to products (Visnjic and Van Looy 2013): Customers who are satisfied with the services delivered will be more likely to purchase product replacements from the same manufacturer, thereby increasing the product renewal rate (Heskett and Schlesinger 1994; Heskett et al. 2008) and by engaging in service activities, manufacturing firms become much more informed about customers' needs: this information can be instrumental in enlarging the scope of the product offering, resulting in additional product sales (Visnjic and Van Looy 2013) as well as providing input to the innovation process. Furthermore, additional product sales may accrue from extending the relationship into substituting equipment previously provided by competitors (Visnjic and Van Looy 2013).

In order to develop services in this domain information need to be captured and the above examples have illustrated some of the information needed and captured. Kurdve et al. (2012) illustrate the waste stream mapping approach as a basis for service interventions in a production process.

6 Service Development Frameworks

Several frameworks for service development exist to address sustainability considerations.[4] In Fig. 4 the framework developed by Cucuzzella and de Coninck (2008) is illustrated and they further define the three principles around this framework:

[4] See Maxwell and Van der Vorst (2003), Durgin and Grierson (2005), O'Rafferty et al. (2009), Shih et al. (2009a, b), Moffat (2010), Adams et al. (2012), Anttonen (2012), Müller (2012), Thompson (2012), Trevisan et al. (2012), Bhamra et al. (2013), Jing and Jiang (2013), Komoto and Mishima (2013), Yang et al. (2013), Ceschin (2014), Kota and Chakrabarti (2014).

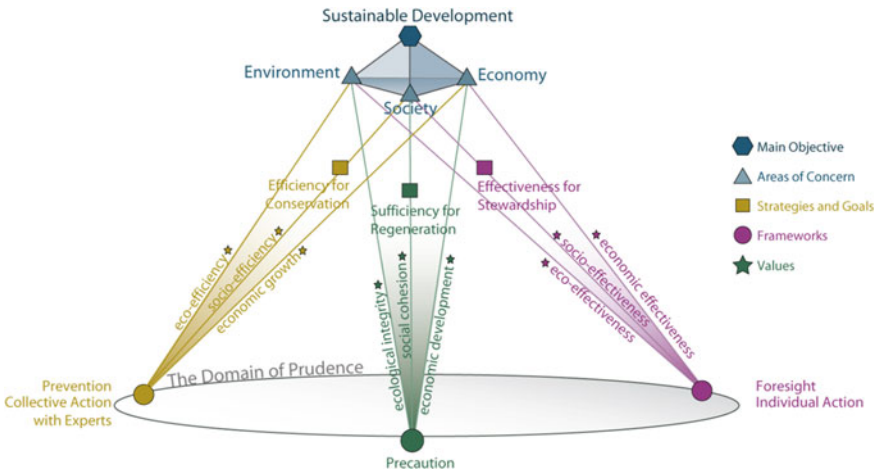

Fig. 4 Specific values and goals within a prudent framework for sustainable service development, (Cucuzzella 2008, p. 39 as illustrated in Cucuzzella and De Coninck 2008, p. 8)

(a) The prevention framework is an established framework for supporting decision-making. Examples of tools are: Life Cycle Assessment, Risk Assessment, Substance Flow Analysis, and Environmental Impact Assessment, Social Life Cycle Analysis and Life Cycle Costing. This framework considers short- and medium-term solutions.
(b) The precaution framework is anticipatory in nature and examples of tools are: Participatory Design, Co-Governance, Co-Decision Making Processes, Most of which are not yet developed for the context of sustainable design albeit an interesting example can be found in Murto et al. (2013).
(c) The foresight framework base decisions on a fundamental desire to respect environmental limitations and the well-being of society. This principle allows citizens to understand the relationship between responsibility, freedom and social organisation and is why effectiveness with respect to both environment and society is the main strategy in this framework. Many existing tools can be used in this framework as long as they take a holistic system view.

7 Sustainability and Business Models

All the services must take place within the framework of a business model that encourages sustainability. Lüdeke-Freund (2010) develops a conceptual framework that combines sustainability strategies, eco-innovation, the role of business models and pivotal ideas about value creation with regard to private and public benefit (see

Table 1 Idea triggers for service development in the circular economy (modified based on Girotra and Netessine (2013, p. 10))

What	When	Who	Why
Select focused versus flexible service	Delay decisions as much as possible	Transfer decisions to best informed players	Change the profit/revenue streams to align incentives
Change the scope of decisions	Change the sequence of decisions	Transfer decision rights to the party for which consequences are the least	Replace short-term relationships with long-term relationships
Hedge/complement decisions with each other	Split decisions to obtain partial information before decision is completed	Move the consequences (costs) of the decision to the party that benefits the most	Integrate misaligned parts of the value chain

also, e.g. Verhulst and Boks 2012). Roos (2014a) provide a framework for developing business models that enable the capture of value in circular material chains.[5]

Girotra and Netessine (2013) identify idea triggers for sustainable business model innovation (Table 1) that can also be used for service development in a circular economy, enabling the question "what would my service or business model look like if I take the current business model or service of the industry/company and apply technique in cell X of Table 1?" to be asked.

Kindström and Kowalkowski (2014) identify a service business model and a framework for resources and capabilities linked to successful service innovation (Table 2). They conclude, like Salkari et al. (2007), that service business model frameworks must contain dimensions not normal in either the ICT business-based frameworks developed by Osterwalder (2004) or Manufacturing-based business model frameworks developed by Roos (2013) (Fig. 5).

Cordier et al. (2014) in their development of a framework for monetary valuation techniques that contribute to the understanding of the impact of economic activities on changes in ecosystems services and the feedback impact of these changes on economic activities identify and discuss the complexities encountered in achieving this outcome. This problem of converting non-monetary value to a comparable monetary value has been addressed through the Conjoint Value Hierarchy method developed by Pike and Roos (2004; 2007) and its application in an analogue case is discussed in Garnett et al. (2006).

[5] See also e.g. Wimmer et al. (2010), Henriksen et al. (2012), Joller (2012), Niemi and Burén (2012), Verhulst et al. (2012), Boons et al. (2013), Holgado et al. (2013), Jing and Jiang (2013a, b), Bocken et al. (2014), Sharpe and Agarwal (2014).

Table 2 Framework for resources and capabilities linked to successful service innovation (Kindström and Kowalkowski 2014)

Business model element	Resources for service innovation	Capabilities for service innovation
Offering	Customer base	Offering portfolio management capability
	Product usage and process data	Product-service integration capability
	ICT deftness	Design-to-service capability
		Customer needing interpretation capability
Revenue model	Product usage and process data	Pricing capability
	System knowledge	Value visualisation capability
	Seamless offering	Risk assessment and mitigation capability
Development process	Service development process and strategy	User involvement and engagement capability
	Lead customers	Internal sensing capability
	Dedicated service development roles	Formalisation and replication capability
Sales process	Service-oriented incentive system	Value visualisation capability
	Customer involvement Field service organisation	Internal coordination capability
	Back-office specialist support	Customer needing interpretation capability
Delivery process	Field service network	Capacity utilisation and prognostication capability
	Back-office infrastructure	Internal-external design capability
	Customer involvement	
Customer relationships	Customer interactor stability Field service organisation	Customer embeddedness capability
	Customer counselling and adaptiveness	Proactive-reactive balancing capability
		Customer portfolio management capability
Value network	Distributor network	Orchestration capability
	Customer interface	Partner knowledge capability
	Specialist supplier base	Network dynamics understanding capability
	Influencer relationships	

(continued)

Table 2 (continued)

Business model element	Resources for service innovation	Capabilities for service innovation
Culture	Service awareness	Service leadership capability
	Long-term orientation	Service logic translation capability
	Service champions	Product-service balancing capability
	Service-oriented incentive system	

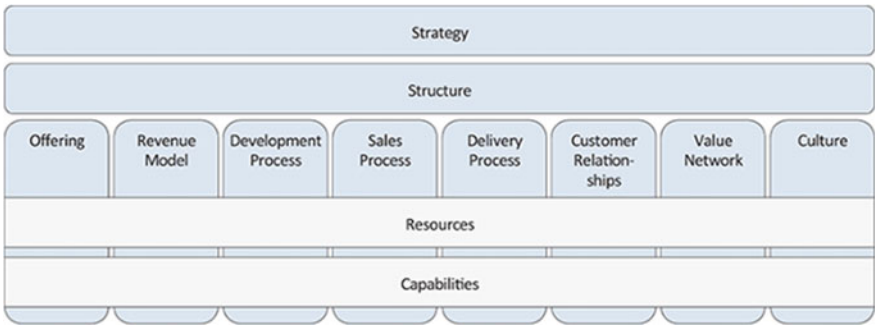

Fig. 5 Service business model framework (Kindström and Kowalkowski 2014)

8 Conclusions

Through reviewing the current literature on service development, service innovation and the circular economy, a number of conclusions emerge. Primarily, it became evident that there is a lack of clarity that exists due to the many partially overlapping concepts used in the domain of the circular economy.

Complexities around assessing value for money also became a key conclusion. Methodologies that exist are not necessarily widespread in their use and without deploying these methodologies; it is difficult to justify some of the activities on financial grounds on the firm level. Hence, there is a slower than necessary engagement in service innovation in these domains as well as a slower than necessary adoption of the services that do exist in this domain.

Another major conclusion is closely linked to the issue of monetising value and the necessity to understand the different attributes that consumers and customers' value in the services in the circular economy domain. Here, it is clear that the insights and methodologies developed in the design area combined with the ability to measure and compare alternative attributes from a value performance point of view must become more widespread in their use to facilitate both a higher adoption and a higher success rate among services developed.

What emerged through the literature were a number of areas that require further research. This research relates to the necessity to have an appropriate business model framework for firms engaging in service innovation and delivery within a circular economy framework. There are some frameworks starting to appear but more work is needed in this area. In addition, service innovation in a circular economy context is growing and as is to be expected, there are still many unanswered questions making it a fertile area for research over the coming years.

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Part V
Management Issues in Service Innovation

Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation

The pursuit and achievement of success in service innovation, constitutes a critical strategic imperative for many organizations. Yet, service providers typically encounter a myriad of issues and challenges when attempting to develop and deploy new strategies, means and offerings.

Highlight *Tepavac (2010), in a League of American Orchestras' sponsored study that profiled the innovations of five American orchestras, prescriptively identified and advocated that institutions build a "house of innovation" founded upon leadership, vision, artistic excellence, an open artistic model, prolific partnerships and effective integration.*

Leveraging empirical findings obtained through field-based examination of the innovative initiatives of North American symphony orchestras, we highlight critical service firm operations strategy and operational system-related principles that providers must collectively manage in an orchestrated manner in order to strategically benefit from their systematic services and servicing innovation efforts.

Co-creative Practices in Service Innovation

Designing is about exploring future alternatives and articulating solutions in a concrete way. Collaborative designing in turn means to do this together with others. In such explorations, identifying the problem and finding the solution often go hand in hand by making sense of the current systems, experiences, solutions and practices and at the same time seeking insights for future ideas.

Highlight *In Italy, Politecnico di Milano service researchers have initiated and been strongly involved with creating strategic plans in a project called Feeding Milan—Energies for change. The project focuses on designing system of services and infrastructures and transforming the food chains and consumption into more sustainable ones by engaging regional food producers and citizens.*

Managing Online User Co-creation in Service Innovation

In many economic sectors the users of existing products are the largest source of innovation, particularly so in the service industries. Users as an important source for innovations combined with the advent of web 2.0 have increased interest in online innovation tools.

Highlight *Innovation World (IW) was the web innovation site for a major Nordic telecom operator. IW was an initiative from the central R&D-unit aiming to get closer to users and customers and to accelerate innovation in mobile services. The IW site had three user forums. The first forum was for user ideas, comments and dialogues. The second forum was the prototype testing forum and the third forum was for independent developers, or lead users, of software where software developers could get information and support about Application Programming Interfaces (APIs) and other relevant information and support material.*

Practices for Involving Organizational Customers in Service Innovation

This study aims to increase understanding of the practices of service co-innovation with customers and users. There is a focus on service innovation in the business to business (B2B) context, whereas previous literature has mainly analyzed individual users or communities of devoted users. *Why do companies involve organizational customers in service innovation, and how do they utilize different practices in achieving these goals*?.

Highlight *Case companies were interviewed about their Open Innovation practices, emphasizing customer collaboration. Material from research meetings and publicly available information were also studied. Initial analysis was conducted by looking for things that could be seen as a practice or an aim, a positive or negative outcome of open or closed innovation or customer involvement. A number of interesting conclusions emerged from the case studies.*

Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation

Larry J. Menor

Abstract The pursuit and achievement of success in service innovation constitutes a critical strategic imperative for many organizations. Yet, service providers typically encounter a myriad of issues and challenges when attempting to develop and deploy new strategies, means, and offerings. Among the most vexing of issues and challenges for service providers is the determination of how best to manage their services and servicing innovation efforts. Leveraging empirical findings obtained through field-based examination of the innovative initiatives of North American symphony orchestras, we highlight critical service firm operations strategy and operational system-related principles that providers must collectively manage in an orchestrated manner in order to strategically benefit from their systematic services and servicing innovation efforts.

Keywords Services and servicing innovation · Service firm operations strategy · Service firm operational system management

1 Introduction

Executives in many service firms often confront daunting and evolving operational, marketplace, and financial demands. As a result, these executives' strategic and tactical decisions and actions are notably influenced by the perennial challenge and threat to "innovate or die". While the consequences of not being innovative may not be that dire, service providers spanning diverse industries and operating contexts are frequently mandated to find new offerings and approaches that deliver apt quality and enable value realization for and from customers. Service innovation is a critical research priority for the advancement of service science (Ostrom et al. 2010), yet efforts to advance knowledge on service innovation are fraught with a

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number of distinct challenges. Viewed specifically as a core business activity rather than solely as an outcome (cf. den Hertog et al. 2010; Garud et al. 2013), service innovation is challenging given its often multi-faceted and complex nature that necessitates simultaneous consideration of (1) provider and customer issues, concerns, and roles associated with real-time deployment; (2) both strategic offering and tactical processing specificities; (3) objective, perceptual, and behavioral performance outcomes; and—inevitably—(4) organizational culture and cross-functional priorities and trade-offs impacting service provision. Service innovation management requires providers to go beyond thinking solely about the newness of offerings (i.e., services) and their delivery (i.e., servicing) and to also consider critical managerial issues such as the degree of connection and engagement established with, or quality and value delivered to, customers during their entire consumption journey.

While there has been growing interest in, and research undertaken with the objective of, advancing insights on service innovation both in academia and practice, much of the noteworthy published efforts intended to further scholarly theory and managerial understanding has surprisingly not yielded much in the way of a clear consensus on what truly constitutes service innovation, what are its critical antecedents and consequences, and how it should most productively be undertaken. While recent studies have begun to rigorously test the association between relevant service innovation and performance constructs (e.g., Menor and Roth 2008), there exists the need for additional descriptive and explanatory research that meaningfully and productively coalesces and galvanizes future efforts to generate theory and good science on service innovation. Toward that end, this research examines a unique service management setting, the performing arts (i.e., symphony orchestras), in order to address the following questions. First, what types of service innovations are symphony orchestras undertaking and how are these innovations accomplished? Second, what symphony orchestra outcomes benefits are achieved through development and deployment of these service innovations? Third, what mechanisms are required for successful diffusion of innovations within, and between, symphony orchestras?

Leveraging field-based findings obtained from examination of the innovation strategies, practices, and outcomes of North American symphony orchestras, we offer a set of complementary provider-based principles related to the management and renewal of service encounters and experiences, and their associated outcomes, that form the basis for advancing theory and managerial understanding on *systematic service innovation*. Systematic service innovation constitutes a logically ordered, methodical, and mindful approach to undertaking both new services and new servicing development initiatives primarily—if not specifically—undertaken to create and capture additional value for and from customers. These service firm operations strategy- and operational systems-focused principles highlight the criticality of the service provider's mandate to meaningfully design and deliver apt quality service encounters and experiences that hold the potential to satisfy, and enable value realization for and from, customers (Cho and Menor 2010). While consensus around the "why?" of services innovation was easily identified in this

investigation, we also discovered common themes underlying orchestra key informant responses to the "who?", "what?", "where?", "when?" and "how?" questions related to the innovation of servicing encounters and servicing experiences, an area of study and practice where productive insights are notably varied and surprisingly underdeveloped (Teixeira et al. 2012). As will be highlighted in this chapter, the provider-based principles we gleaned about systematic service innovation have broader application beyond the context of managing the renewal of orchestra encounters, experiences, and offerings.

The remainder of this chapter is structured into four major sections. First we briefly assess the current state of scholarly research on service innovation and new service development (NSD). We then highlight how the leveraging of critical operations strategy and operational system facets of service operations management (SOM) logic can better frame an investigation on, and provide more meaningful managerial insights related to, this investigation's focal construct: systematic service innovation. Second, for contextualization purposes, we provide an overview of various research literatures substantiating the utility in undertaking rigorous scrutiny of symphony orchestra management issues and challenges. Third, we discuss the research method employed in this investigation, one founded upon a grounded theory-based approach. Fourth, we highlight a number of the more significant symphony orchestra systematic service innovation insights (e.g., principles and descriptive models) emanating from careful scrutiny of the multiple case studies data collected in this investigation before offering our concluding observations.

2 Service Innovation, New Service Development, and Service Operations Management Logic

While the recognized need for meaningfully insightful scholarly examination of service innovation and new service development is long standing, there is surprisingly sparse theoretical precision or empirical support for a unifying framework, model or theory especially as it relates to what and how considerations (Menor et al. 2002; Droege et al. 2009; den Hartog et al. 2010). Among the pragmatic reasons for this are (1) the diverse disciplinary orientations and approaches undertaken in the study of service innovation and new service development and (2) the lack of cumulative and integrative study in the research literature (Gallouj and Savona 2010; Papastathopoulou and Hultink 2012). The impact of both of these reasons is immediately reflected by the apparent bifurcation of what should be complementary research sub-domains into two distinct research streams. Scholars investigating service innovation, as highlighted in a number of recent review papers (see Miles 2010; Droege et al. 2009), generally adopt more of an economics-oriented, industry strategy perspective focused on advancing understanding of the critical antecedents and competitive consequences of the innovative endeavors of service firms. In contrast, scholars investigating new service development (Johne and Story 1998;

Menor et al. 2002) generally possess more of a management-oriented, firm strategy perspective focused on bettering processual and related outcomes understanding of the innovative efforts of service firm personnel. While there has been much research in both distinct research streams, scholars in each seem to represent, metaphorically speaking, ships passing closely in the night with little knowledge—or attempt to become aware—of the other's presence. This has resulted in few studies that simultaneously offer meaningful and prescient descriptive or normative industry competitiveness and firm management (e.g., planning, analysis, and execution) insights vis-à-vis creating and capturing value for both customers and the firm through service innovation.

For this study, we adopt and leverage what can be described as a SOM logic with the intention of advancing both scholarly and managerial understanding on the industry competitiveness and firm management ramifications associated with the service firm's innovation endeavors and new service development efforts. As a provider-based view of service that articulates with greater explicitness the operational elements corresponding to the service system's organizing principles initially described by Kingman-Brundage et al. (1995), SOM logic is built upon the belief that operations strategy and operational systems and their respective capabilities and functionalities constitute important managerial determinants as to whether mutual value creation is realized for both customers and the firm (see Fig. 1).

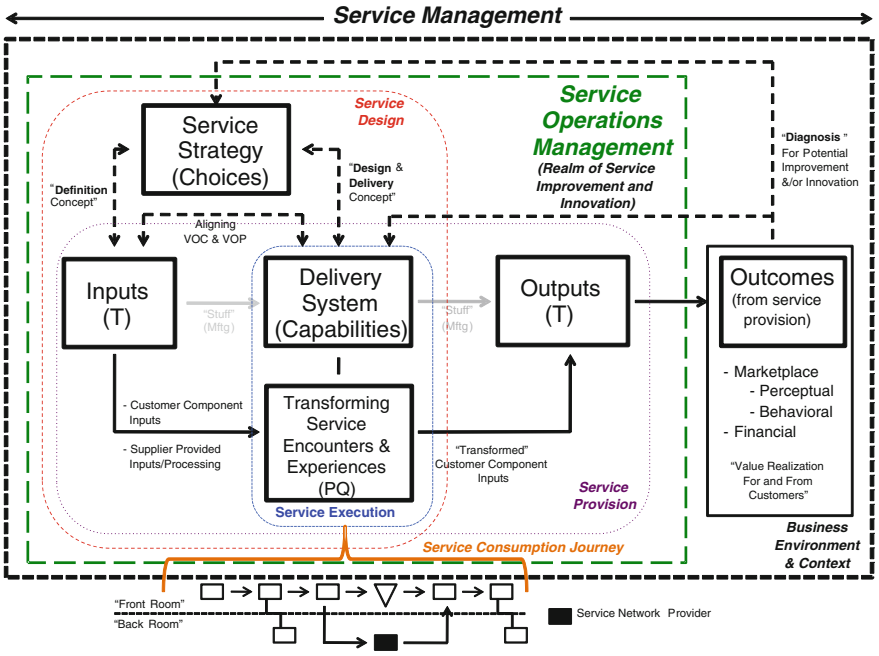

Fig. 1 Service operations management (SOM) and its constitutive elements

SOM logic also serves as a basis for conceptually grounding Cho and Menor's (2010) articulation of the service provider mandate. The service provider mandate specifies that the primary responsibility of the firm is to design and deliver apt quality offerings and outcomes that hold the potential to satisfy customers and enable value realization both for and from them. What determines apt quality design and delivery are the varying services and servicing demands of customers and the unique service concerns of the firm. SOM elements (i.e., primarily service design and service provision; see Fig. 1, also discussion below) and the service provider mandate—each representing a uniquely informative and reflective facet of SOM logic—dictate that productive decision making and action related to service innovation, which is the descriptor we will use henceforth that also encompasses new service development, should not be primarily driven by customer satisfaction perceptions as there are many factors influencing these views that are not directly manageable by the firm's personnel. Rather, managers engaging in service innovation efforts would benefit most from mindful administration over critical service design and service provision considerations.

Figure 1 highlights the distinctive boundary between SOM and the broader, cross-disciplinary domain of service management and identifies three constitutive and complementary elements of particular SOM interest. The focal element for all SOM investigation is service execution, which consists of the configured delivery system and its corresponding processing and coordination capabilities along with the value-adding encounters and experiences that constitute the service consumption journey. Operational functionality issues of resource productivity (P) and processing quality (Q) are central service execution performance considerations. A third operational functionality performance issue is throughput (T) and its determination is embedded in the distinct SOM element depicted as service provision, which ostensibly represents the realized servicing effort. Service provision considerations include those related to service execution, and also encompass the nature of inputs to and outputs from service execution. The key service provision outputs are transformed customer component inputs (i.e., changes in state to the customer, or his/her information or possessions); these operational outputs are conceptualized as being distinct from non-operational outcomes resulting from service provision (e.g., satisfaction, loyalty, repeat patronage, etc.). The last SOM constitutive element is service design, which plays an important orchestrating role between service execution and service provision decision-making and action. Specifically, service design encompasses the critical service operations strategy decisions that result in the realized service delivery system; it represents the intended servicing effort of the firm. Scholars examining service innovation for both industry competitiveness and firm management insights would benefit from further focusing and framing their investigatory efforts around salient SOM design and provision elements (cf. Roth and Menor 2003).

3 The Symphony Orchestra: A Context for Studying Service Innovation Management

Concern over the fate of arts and cultural organizations is long standing and nowhere has this concern been more apparent than in the management of symphony orchestras. Time magazine's 1993 article titled "Is the symphony orchestra dying?" sensitized many to the plight of the modern orchestra. Over the following decades, the anecdotal evidence cited in the popular press (e.g., Oestreich 2003; Campo-Flores 2012; Grannis 2012), along with commissioned studies conducted by organizations like the Andrew W. Mellon Foundation's "Orchestra Forum" established in 1999 or the John S. and James L. Knight Foundation's "Magic of Music" initiative commenced in 1994, highlighted the ongoing struggles of a large number of professional and community orchestras. Most notably, modern symphony orchestras face challenges including shrinking endowments and funding, declining and aging audiences, decreasing emphasis on musical education, competition for the entertainment dollar, and adversarial relations between musicians and management (Lubow 2004). The general conclusion from these reports is that the existing concert format, and artistic and business models, will have to change if symphony orchestras are to remain economically viable and artistically relevant. However, despite all the extant work related to arts and cultural policy, what that change—or innovation—will result in, and what is required to effectively achieve that innovation, remains uncertain and has become an ongoing, urgent concern for the management of orchestras.

Scholars in economics, sociology, psychology, and public policy have examined a myriad of issues that impact the management of symphony orchestras. For example, Baumol and Bowen (1967) found that endowment investment income would be insufficient to cover the rampant inflationary costs for most orchestras. As a result, DiMaggio (1987) and others recommended that professional management of symphony orchestras was required given that internal operations and the external environment were becoming increasingly difficult to coordinate. From the practitioner's perspective, Swoboda (1967) provided the first detailed description of critical orchestral management issues such as funding and endowments, artistic planning, programming, and patron management. Many of these issues, spanning market conditions to organizational processes, have continued to be discussed and debated by symphony orchestra managers, consultants, and scholars. Despite all the extant research on arts and cultural organizations, managerially meaningful scholarly solutions to this symphony orchestra innovation dilemma alluded to earlier are difficult to find.

The extant management literature examining symphony orchestras has largely focused, to varying degrees of insight, on specific aspects of these performing arts institutions' organizational processes. Economic and financial challenges for performing arts organizations complicate the management of symphony orchestras (Hager and Pollak 2004) and are ongoing obstacles for the administration of

nonprofit organizations in general (Hammack 2002). Strategic planning and governance issues that impact both artistic and business decisions (Maitlis and Lawrence 2003), along with those related to managing the marketing and patron side of arts (Scheff and Kotler 1996; Andreasen and Belk 1980), continue to be a source of concern for symphony orchestra managers (Flanagan 2012). Perhaps the greatest academic insights, to date, in the management of symphony orchestras have focused on leadership (Vredenburgh and He 2003), organizational conflict (Glynn 2000), and workplace design (Allmendinger and Hackman 1996) issues.

Of greater salience to this research is the nascent literature on innovation and development activities in the arts. Castañer and Campos (2002) define artistic innovation as the introduction in the market of something new, and such innovation could be in terms of content and form. Content innovation, applied to symphony orchestras, would refer to new repertoire and programming issues, while form innovation would refer to the newness or novelty of the means of presentation (Pierce 2000). This definition focuses solely on innovations occurring onstage. Symphony orchestras commonly engage in content innovation through the commissioning, premier, and performance of recently composed music. However, it is the area of form innovations that most symphony orchestra administrators have found most challenging. Oft cited examples of symphony orchestra form innovations include conductors lecturing audiences about the work to be performed and video presentations to accompany musical performances. The success of these types of innovations has been mixed (Lubow 2004). More recent form innovations undergoing trial and experimentation by a few orchestras rely heavily on information technology and include among others the Concert Companion, which was a hand-held device that helps listeners learn more about the music they are listening to during the concert, and the Organization Relationship Building Invitation Tool, which allows concert attendees to use an orchestra's website to create social event opportunities (e.g., inviting friends to a cocktail prior to a particular concert).

In short, symphony orchestras provide a unique context for examining the management of service innovation given the widely recognized need for such performing arts institutions to be innovative and the past challenges encountered when their management and personnel embark upon and sustain any effort to innovate (i.e., there is as yet no industry best practices identified upon which to advance scholarly theorization on service innovation). Indeed, the systematic examination of the service innovation initiatives of symphony orchestras provides a unique context for applying strategic research insights to the services and servicing context (Huff and Möslein 2009). Further, while the nature of symphony orchestras' artistic services and servicing experiences—which implicitly requires a co-production, if not a co-creation, of value perspective vis-à-vis salient characteristics of the customer's consumption journey (Moeller 2010)—are highly differentiated from the offerings and value drivers of most other service firms, the motivations and mechanisms for successful services and servicing innovation are likely consistent across most service providers. This suggests that examination of the motivations underlying, and mechanisms enabling, symphony orchestra innovations should

yield analytically generalizable and substantively representative insights that could meaningfully advance strategic and operational understanding and theorization on services and servicing innovation.

4 Research Method

In order to address our research questions, we utilized in this descriptive and explanatory, yet exploratory by design, investigation a multiple case-study research design. We adopted an information-oriented selection approach whereby "critical case" organizations sampled in this study were chosen based upon expectations about their likely utility and representativeness in terms of information content (Flyvbjerg 2011). Symphony orchestra industry experts' judgments influenced the identification and selection of specific organizations spanning multiple North American geographic regions and sizes (measured in terms of annual operating budget) that were engaged in innovative endeavors. Twelve orchestras were included in the study sample, and a series of individual and group interviews with senior administrative key informants (e.g., President/CEO, CFO, VP of Artistic Administration, VP of Marketing, VP of Operations, etc.) were conducted with the agreement that the reporting of the study's findings would maintain participating institutions' confidentiality. Direct observation of service innovation-related planning meetings was also arranged and carried out with nine of the orchestras (this provided the only investigator contact during the study with each organization's Principal Conductor or Music Director).

All scripted interview and emergent observational data that were collected, again with the assurance of full confidentiality in terms of subsequent analyses and reporting, were tape recorded and transcribed and subsequently assimilated which resulted in lengthy research case write-ups on each symphony orchestra included in the sample. These research cases were then shared with specific senior administration key informants at each institution in order to ensure the accuracy of what was discussed/observed and collect when necessary additional information to strengthen descriptive and explanatory understanding of the service innovation endeavors and new service development efforts being studied. This sampling and data collection approach provided confidence in the reliability, construct validity and external validity—thought of in terms of analytical generalization (Gibbert and Ruigrok 2010)—of this grounded theory-based multiple case-study investigation. Concerns over internal validity were addressed, as highlighted in Figs. 3, 4 below, through leveraging existing SOM logic-based and resource-based theorization, principles and concepts to generate coherent and compelling descriptive and explanatory understanding of the data collected. In the end, an integrative cross-case comparison and contrast of the twelve research case studies, which serves as the basis for the following articulation and discussion of the research findings, was additionally assessed in terms of Tracy's (2010) eight excellent qualitative research criteria (i.e., worthy topic, rich rigor, sincerity, credibility, resonance, significant

contribution, ethical, meaningful coherence). As a matter of full disclosure, and for reasons outside of the investigator's control, this descriptive and explanatory qualitative study was not supplemented for the purpose of further confirming the field-based research findings with a planned survey of a larger number of North American symphony orchestras. As such, the current investigation provides only exploratory, but meaningful, scholarly theorization and argumentation insights.

5 Research Findings to Advance Service Innovation Understanding and Theorization

Given the grounded theory-based nature of this exploratory examination of North American symphony orchestra services and servicing innovation, and for theoretical sampling and theoretical sensitivity purposes (O'Reilly et al. 2012), we commenced this investigation with four overarching and scholarly-based presumptive research suppositions:

Supposition 1: Symphony orchestras can accrue marketplace, financial, and strategic benefits through service innovation (Andreasen and Belk 1980; Lange et al. 1986; Scheff and Kotler 1996; Tepavec 2010).

Supposition 2: Service innovation requires that symphony orchestras be competent in new service development (NSD) (cf. Castañer and Campos 2001; Camarero and José Garrido 2012).

Supposition 3: Symphony orchestras that are competent in NSD will exhibit higher market acuity, craft, and follow a specific service innovation strategy, employ technology internally/externally, and utilize a formal NSD process (Menor and Roth 2008).

Supposition 4: Service innovation success requires that symphony orchestras address, if not overcome, a number of critical operational and business constraints (e.g., structural deficits, changing economic conditions, marketplace demands, organizational rigidities, etc.) (Baumol and Bowen 1967; DiMaggio 1987; Glynn 2000; Hammack 2002; Hager and Pollak 2004; Flanagan 2012).

These research suppositions provided initial directive guidance in terms of salient key informant data collection, coding, and analyses. For example, while this study attempts to elucidate and elaborate upon the constitutive and consequential elements associated with service innovation, research suppositions 2 and 3 ground this construct in terms of relevant theory-based NSD competence research (Menor and Roth 2008).

We first queried our key informants about what types of service innovations their respective symphony orchestras were undertaking and how these innovations were accomplished. We also asked about what benefits were achieved through the successful deployment of service innovations. While each of the twelve orchestras examined were—based upon discussions with industry experts and various media coverage (e.g., Bambarger et al. 2011)—selected given their recognized and noteworthy efforts at being innovative, what became immediately apparent during

the interviewing process was that these institutions varied in terms of the focus of their innovation initiatives in order to generate greater stakeholder perceptions that they were, as one key informant noted, "alive, adventuresome and alluring."

Specifically, there were three overarching types of innovations that were identified during the key informant interviews: service innovations, organizational innovations and operational innovations. Service innovation, viewed from the provider's perspective, occurs when either new service encounters/experiences and offerings (i.e., services) and/or new approaches to executing requisite activities involved with the delivery of those encounters/experiences and offerings (i.e., servicing) were introduced with the expressed and primary intent of benefiting the concertgoer. Service innovations identified in this research spanned novel and meaningful on-stage artistic presentations (e.g., co-created experiences such as "audience choice" concerts, live educational presentations accompanying musical performances, etc.) and off-stage servicing efforts (e.g., youth and educational programs, targeted segment appeals through socializing offerings, etc.). Organizational innovation, by contrast, was largely reflected in the identification and introduction of new administrative structures of authority and decision making that oversaw the allocation, utilization and control of firm resources which were specifically developed by the orchestra primarily for its own benefit (e.g., new means of planning future concert seasons). Finally, operational innovation constituted the identification and deployment of new means of (1) task execution that impacted the efficacy of work efforts and (2) coordination of work-related decisions and actions undertaken by symphony personnel for the primary benefit of the institution (e.g., introduction of new departmental communication tools).

While all key informants invariably highlighted the occurrence of each of these types of innovations, we noted that the primary innovation emphasis, motivation and benefits attributed to such endeavors differed consistently depending on the size of the orchestra. For the five smaller orchestras studied (annual operating budgets not exceeding US$15 million), there seemed to be ongoing preoccupation with introducing and institutionalizing organizational and operational innovations for the primary purposes of enhancing the commitment and engagement of critical internal and/or institutional stakeholders and further advancing the firm's stated mission. Key informants at the seven larger symphony orchestras studied also highlighted these same motivations for the organizational and operational innovations they had undertaken and in some instances continued to struggle with. However, these institutions seemed to be equally if not more so preoccupied with improving and innovating the quality of its artistic offerings in order to better connect and engage its live performance external and individual stakeholders (i.e., the concert-goer). Achieving these additional objectives required explicit consideration and management of services and servicing innovation initiatives having specific on-stage and experiential ramifications (cf. Hume et al. 2006).

Generally speaking, and to address the second research question, it was the perception of many of the key informants interviewed at these larger symphony orchestras that there were positive earned income and contributed income returns associated with their innovation initiatives that would likely help to attenuate the

impact of the pervasive structural deficits that these institutions perennially face (Flanagan 2012). When asked for specific objective evidence for these benefits, none of the key informant teams were able to readily provide convincing statistical support for the perceived financial benefits given the particular challenge in partitioning out the specific effect that service innovations introductions have on changes to earned and contributed income. As noted by one symphony orchestra President, "diagnosing the returns on our innovation attempts remains vexing." The key informant teams of five of these larger symphony orchestras collected customer survey data that showed compelling marketplace traction related to a number of the service innovations introduced (e.g., increased media coverage of the orchestra, etc.). Figure 2 highlights the logically descriptive associations key informants generally made between innovation emphasis, motivations and benefits.

The dashed box around the emphasis on productive service execution, improvement and innovation, and the motivation of designing and delivering quality offerings highlights what was found to be the major distinctions in views of symphony orchestras executives in terms of the benefit of pursuing systematic service innovation. As defined earlier, systematic service innovation constitutes a logically ordered, methodical and mindful approach to undertaking both new services and new servicing development initiatives primarily—if not specifically—undertaken to create and capture additional value for and from customers These systematic service innovation-based benefits accruing to managing the design and delivery of quality offerings (or servicing encounters and experiences) are consistent and complementary with the separate findings by Camarero and José Garrido (2011) and Hume et al. (2006) who note the importance, respectively, of fostering a

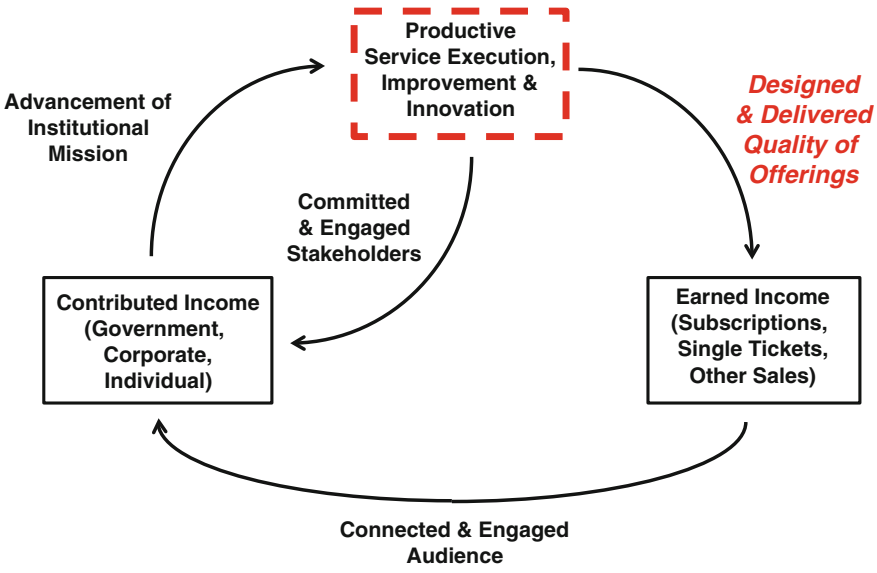

Fig. 2 Virtuous cycle of value realization and exchange

service orientation and improving service execution. Additionally, based upon a general review of the study's findings with industry experts, it turned out that the vast majority of symphony orchestras that specifically espoused and followed such a virtuous cycle were also classified by these experts as being in their view more service innovation competent. Generally speaking, the specific focus these symphony orchestra key informants placed on designing and providing apt services and servicing quality was noteworthy as it further reinforced the importance of past (Bitran and Lojo 1993) and recent efforts in the scholarly literature to advance insights on planning and controlling service encounters and experiences quality in an integrative manner (Cho and Menor 2010; Golder et al. 2012).

Interestingly, when considering both SOM logic and the service provider mandate, service innovation was not the only salient issue many of these larger symphony orchestra administrators found problematic. For example, cultivating and institutionalizing a strong service orientation was commonly cited as a critical administrative challenge across most of the symphony orchestras studied (cf. Oliveira and Roth 2012). Efforts to build and leverage a strong service orientation often required some undertaking of a form-related servicing innovative endeavor, though not always necessarily a content-related service innovation. What was striking was how a number of the larger symphony orchestra key informants highlighted that they viewed their service innovation initiatives as experiments that could still be organizationally and strategically beneficial irrespective of any perceived or realized marketplace or financial "failures" so long as the organization learned from these endeavors to improve future initiatives. As such, service innovation for these symphony orchestras can be viewed not only as a critical development competence (Menor and Roth 2008) but also as a distinct organizational resource (Hunt and Morgan 2005) that contributes to the production of potentially valuable offerings for particular stakeholder groups (Hunt 2000).

While the virtuous cycle of value realization and exchange noted in Fig. 2 provides a more informed appreciation for why symphony orchestras undertake service innovation, focusing more specifically on the processual characteristics of the service innovation initiatives investigated in this study afforded the investigator with a further nuanced understanding of how service innovation—viewed as a distinct business activity—occurs. None of the key informant teams reported the use of a prescribed systematic process for developing and introducing their new services, even those having in place a specific service development strategy (Edvardsson et al. 2013). However, several commonly held key informants' views and beliefs were highlighted that collectively constitute five complementary managerial principles underlying North American symphony orchestra service innovation initiatives.

Principle 1: "Who?" – Balancing the innovation requirements, and leveraging the roles, of customers and requisite stakeholders to fulfill the institutional mandate.

Principle 2: "What?" – Configuring the service operations strategy and operational system for seemingly platforms-based flexible and customizable delivery.

Principle 3: "Where?" – Scripting and choreographing the quality of each servicing encounter and experience along the consumption journey.

Principle 4: "When?" – Ongoing renewal of the service consumption journey.

Principle 5: "How?" – Realizing apt quality and value productively and at the right price.

Viewed collectively, these five service innovation principles complement and extend Barcet's (2010) layered model of service innovation. For example, Principle 2 highlights the criticality of considering both service design and service provision specificities (see Fig. 1) associated with each service innovation. Principle 3 highlights the need to manage the experiential element implicit in the offerings of the orchestra. Symphony orchestras are not only service providers, they are also experience providers (i.e., customers patronize primarily to spend time with these service firms to partake of a memorable, enriching and sometimes personal happening, see Manning and Bodine 2012). As such, experience-centric design issues and approaches are relevant to symphony orchestra efforts in service innovation (Patrício et al. 2011; Zomerdijk and Voss 2010), even though these experiential service innovations are more co-produced in actuality than co-created (Rubalcaba et al. 2012; Bettencourt et al. 2013). Principle 4 highlights the need to consider the ongoing renewal of the service consumption journey, some of which requires involvement of service network partners for both service design and provision (Tax et al. 2013). Finally, as per Principle 5 and consistent with the sentiments expressed by Voss et al. (2008), managing the innovation effort of an experience-centric service provider like an orchestra requires explicit management of strategic and operational choices (Roth and Menor 2003; Ponsignon et al. 2011) in order to increase the likelihood of satisfying customers and enabling the simultaneous realization of value for, and from, them (i.e., fulfillment of the service provider mandate).

Tepavac (2010), in a separately completed League of American Orchestras' sponsored study that profiled the innovations of five American orchestras, prescriptively identified and advocated that institutions build a "house of innovation" founded upon leadership, vision, artistic excellence, an open artistic model, prolific partnerships and effective integration. Alas, these building blocks generally are managerial characteristics one would associate with any good performing arts organization and, generally, lack requisite specificity that would guide productive service innovation decision-making or action as depicted in Fig. 2. In further considering the interview and observational data underlying the previous noted principles and the nature and scope of their complementarity, an insightful opportunity arose to leverage SOM logic as a means for orchestrating (i.e., arranging elements to achieve a desired and harmonious end) these principle-based themes in a coherent and compelling fashion which resulted in descriptive and explanatory models for the observed symphony orchestras' tactical and strategic benefits associated with service innovation (see Figs. 3 and 4).

Both of these figures, from an internal validity of qualitative research standpoint, facilitate the analytical generalization of systematic service innovation management insights beyond the symphony orchestra context.

Figure 3 summarizes the symphony orchestra key informants' general views on their respective institutions' service innovation initiatives and business environment

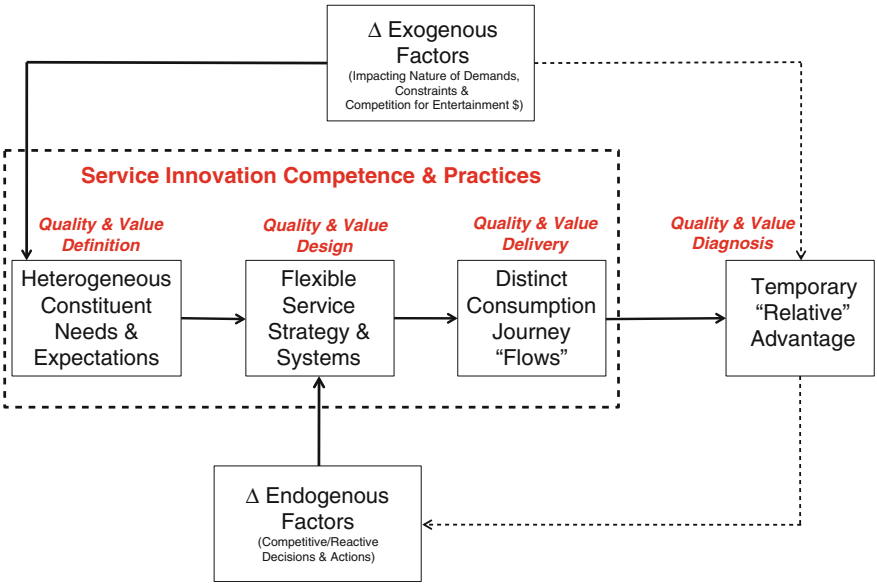

Fig. 3 Conceptual model of service innovation and temporary advantage

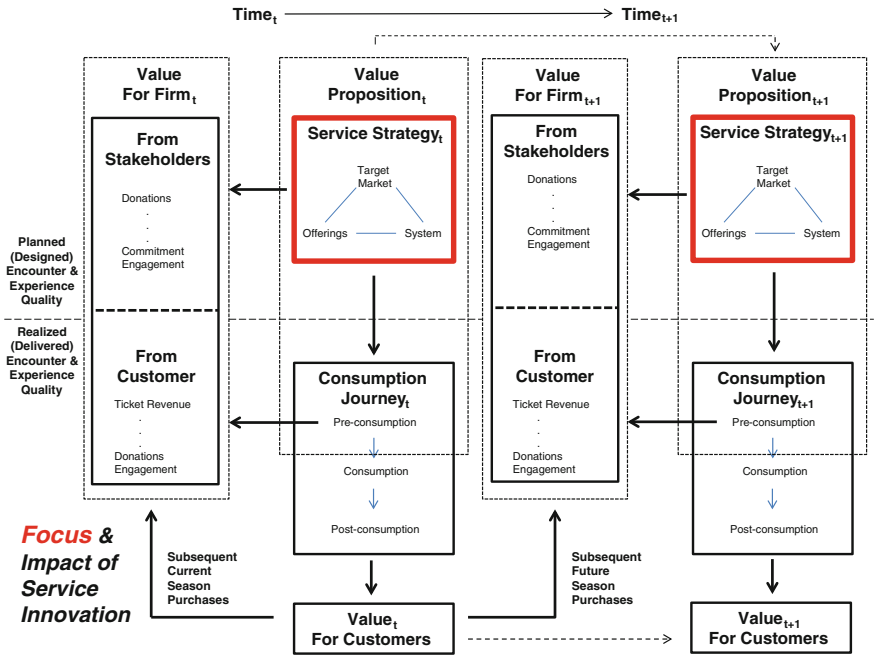

Fig. 4 Service innovation blueprint for North American symphony Orchestras

realities in a way that is consistent with the workings of the service design and service provision elements highlighted in Fig. 1 and the fulfillment of the service provider mandate. Specifically, the service innovation competence and practices of the larger symphony orchestras examined could be depicted as a systematic sequence encompassing the management of quality and value definition, design, and delivery which is generally consistent with the conceptualization of service quality management offered by Cho and Menor (2010).[1] Considering service innovation competence as a single construct, as opposed to distinct dynamic capabilities as per den Hertog et al. (2010), provides a better depiction and understanding of why the "who?", "what?", "when?" and "where?" principles identified earlier are collectively critical from operational and strategic perspectives vis-à-vis fulfillment of the service provider mandate and other symphony orchestra administrators' managerial objectives (cf. Lange et al. 1986). Note that Principle 1 relates to quality and value definition, Principle 2 informs both quality and value definition and design, Principle 3 is associated primarily with quality and value design, and Principle 4 corresponds to the criticality of quality and value delivery in this particular performing arts context (cf. Hume and Sullivan Mort 2010). As such, Fig. 3 highlights the need to undertake and adhere to a logically sequenced approach that encompasses the first four themed principles in order to cultivate a service innovation competence and deploy appropriate practices. All this provides a more nuanced understanding of the "how?" (i.e., Principle 5) to service innovation. Figure 3 also denotes the influence of both exogenous and endogenous factors on the service innovation efforts of symphony orchestras.

Consistent with the views expressed by the North American symphony orchestra key informants that were interviewed, leveraging services and servicing innovations —as per resource-advantage theory (Hunt and Morgan 2005)—will likely only result in establishing a temporary relative competitive advantage (D'Aveni et al. 2010). Under resource-advantage theory, which intrinsically considers factors within and beyond the firm in generating understanding of the salient determinants of comparative—and not necessarily just competitive—advantage, service innovation competence would constitute an organizational resource that could provide the service firm with a basis for a comparative advantage. This resource comparative advantage, which presumes that not all organizations can be competent in innovation (cf. Menor and Roth 2008), then forms as we gleaned from our examination of systematic service innovation of symphony orchestras the basis for key informants' beliefs of the market position-related competitive advantage that likely results in increased earned and contributed income (see Fig. 2). Given that service innovation outcomes, both content and form, are generally easily replicated (Miles 2010), any service innovation competence-based comparative and marketplace competitive advantages are likely temporary in nature. This, in turn, suggests the need for the continual reconfiguration of existing firm resources (e.g., organizational and operational innovations) and market positions when faced with changes in the business

[1] See Golder et al. 2012 for an alternative perspective on managing integrative quality.

environment and operating context (cf. Flanagan 2012; D'Aveni et al. 2010). Systematic service innovation, as per resource-advantage theory arguments, should increase the efficiency and effectiveness with which such continual reconfiguration, or orchestration (Sirmon et al. 2011), of resources could benefit symphony orchestras. This theorization on symphony orchestra service innovation constitutes a potentially informative general blueprint for understanding the dynamics of managing service innovation for ongoing value realization (see Fig. 4).

Figure 4, whose specification increases confidence in the internal validity of this research and which provides an alternative SOM logic sense-making of the qualitative data collected in this study, elaborates further on the dynamics of service innovation value creation and capture as it relates to the symphony orchestras examined. The suggested focus of service innovation efforts, as inferred by Roth and Menor (2003), should be on better managing the service strategy triad (i.e., the alignment of the target market, service concept and delivery system) and its subsequent consumption journey quality and value realization ramifications. From a scholarly understanding perspective, this particular descriptive and explanatory model provides an even greater nuanced understanding of the "why?" of service innovation—both why service innovation should be pursued and why it is so challenging. Regarding the former view of "why?", service innovation can serve as a basis for better realizing the service provider mandate over time (i.e., be a foundation for generating a series of ongoing temporary advantage as per Fig. 3). Regarding the latter take on "why?", service innovation requires explicit consideration of supply and demand issues that have to be aligned from a service design and service provision standpoint for apt productive throughput and quality throughput functionality performance. Such alignment requires the management of service innovation functionalities and operational system considerations (see Table 1), which the key informants data, viewed collectively, identified as being critical to their own innovation efforts. This alignment of functionalities and system considerations, consistent with earlier frameworks-related observations, ostensibly implies that service innovation constitutes a distinct type of service firm strategic competence (cf. Menor and Roth 2008).

Our final research question asked about what mechanisms are required for successful diffusion of innovations within, and between, orchestras. Table 1 highlights the overarching service innovation functionalities and "3S, 3C, and 6P" systems considerations that the orchestra key informants identified as being important to their initiatives' success. In terms of diffusion of innovations between orchestras, there seemed to be a consensus view that openness and transparency should guide service innovation concepts and best practices exchanges, especially since most symphony orchestras compete for consumers' entertainment dollars in a localized (e.g., metropolitan) or at most regional (e.g., megalopolis, see Lang and Knox 2009) setting. Even though such exchanges may lead to a state of competitive convergence in terms of innovation content and forms, orchestras spanning the entire industry would collectively benefit from improved service innovation competence, practices and outcomes. On the whole, such competitive convergence

Table 1 Service innovation functionalities and systems considerations

Functionality	Operational and organizational considerations
Enabling ("3S")	Support/Steering: Who can provide productive guidance to advance the institution's mission and vision vis-à-vis pursuit of innovative initiatives?
	Structure: What organizational and governance model would best fit the institution's culture and needs for systematic and ongoing renewal/revitalization of offerings?
	Strategy: How should the institution decide upon the basis for, and gauge progress toward, attaining cultural resonance in the markets in which it operates through pursuit of (potentially risky) experimentation?
Expediting ("3C")	Commitment: How dedicated and steadfast are the institution's personnel vis-à-vis being innovative and/or entrepreneurial in its efforts to strive toward being relevant? Are our customers and requisite stakeholders similarly connected and engaged?
	Capacity: What can the institution accomplish on its own or in conjunction with others? Are there sufficient resources available for use at management's discretion in order to make/undertake productive innovation-based decisions/action?
	Culture: What choices are encouraged and behaviors condoned regarding efforts to systematically pursue, in a disciplined manner, innovative, and/or entrepreneurial initiatives? What organizational values underlie the advocacy of those behaviors?
Execution ("6P")	Aligned operational and organizational systems founded upon –
	Plant: Does the institution's performance venue allow for the delivery of meaningful on-stage quality and value?
	People: How skilled are the institution's personnel in designing and delivering apt quality service quality and experiential value? How engaged are our customers and or requisite stakeholders?
	Products/Parts: What types of offerings need to be delivered to increase the likelihood of providing meaningful quality results and achieving desirable engagement with patrons?
	Processes: How are requisite service activities/tasks executed in order to deliver apt quality outcomes?
	Planning: How does the institution determine what offerings and processes are necessary to realize value for/from customers?
	Partnerships: What types of collaborations would the institution benefit from? With whom, and how, should those collaborations be established and maintained?

would only provide for greater likelihood that a greater number of North American orchestras would be able, from a SOM logic perspective, to fulfill their service provider and strategic mandates.

To date there is limited scholarly research examining service innovation for arts and cultural institutions and, more generally, for creative services or industries (Miles and Green 2010). As highlighted by these exploratory, field-based research findings, there is much in the way of intriguing and productively meaningful service innovations insights to be obtained from careful scrutiny of the endeavors and

efforts of North American symphony orchestras. The SOM logic-based principles presented earlier and the resource-advantage theory focused orchestrated approach employed to interpret the findings, and descriptively model in coherent and compelling explanatory fashion the service innovation initiatives of the institutions examined here, provide service management scholars with productive possibilities to further advance argumentation/theorization content validity, improve context and processual understanding, and foster new research questions and propositions.

6 Conclusion

While service innovation represents a strategic imperative for the firm, fulfillment of the service provider mandate constitutes a consequentially corresponding operational imperative for the firm's personnel vis-à-vis productive service design and service provision. The issues and challenges related to how best to undertake and manage systematic service innovation, based upon our understanding of the field-based empirical data gathered during this study, can also be viewed and more beneficially addressed through a reframing of the strategic imperative for the firm into an operational imperative for the firm's personnel. As such, we posit that a more productive approach to managing the "how" of systematic service innovation—one that encompasses the related concerns of "who", "what", "when" and "where"—would be to focus simply on developing new offerings and means to fulfilling the service provider's mandate. We have highlighted and advocated the position that service providers can more productively and meaningfully manage their service innovation efforts through explicit consideration of requisite operational elements related to service design and service provision. Ultimately, such a service innovation focus or, more suitably framed, fulfilment of the service provider mandate emphasis forms the basis—as in the case for the North American symphony orchestras examined in this study—for achieving three immediately desirable business outcomes: better engagement and enrichment of requisite stakeholders; provision of apt quality service encounters, experiences, and outcomes that hold the potential to satisfy; and, despite daunting challenges and dynamics in the business environment, "sustainably" enabling value realization for/from customers.

Conventional wisdom suggests that successfully managing service innovation should be straightforward—it is about meeting and exceeding your customers' evolving expectations and requirements for something, be it a service or experience, which is perceived to be both novel and meaningful. If only the reality of service innovation, and that of service management in general, were that simple. Examples of poor service design and service provision are plentiful, and the typical customer likely experiences a service failure on a daily basis. We believe that one of the most important and urgent dilemmas today's service providers face is this: managing service innovation is conceptually straightforward except for the few million details! The empirically varied, yet conceptually similar, approaches to systematic

service innovation uncovered in this research highlight that it is likely the case that service innovation is less straightforward as a business activity than desired in practice, and we believe that our five service innovation principles gleaned from examining the innovation strategies, practices and efforts of several notable North American symphony orchestras offer meaningful and prescient insights into how similar cultural organizations and other service providers spanning a diverse set of industries could improve upon their own thinking and approaches to service design and service provision. Such improvements in thinking and approaches should result in more innovative encounters, experiences and outcomes and greater quality and value realization for all service firm stakeholders. Indeed, the recent and ongoing collaborative interest in the advancement of scholarly understanding and practitioner insights on the innovation of service systems (e.g., the development and advancement of service science) only serves to reinforce the criticality for service providers to consider and follow these five service innovation principles that are not only representative of good management but also have broad analytical and practical generalizability.

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Co-creative Practices in Service Innovation

Stefan Holmlid, Tuuli Mattelmäki, Froukje Sleeswijk Visser and Kirsikka Vaajakallio

Abstract This chapter is about co-creative practices that can be used for the purpose of service innovation. It starts with an introduction to our core assumption that innovation is a deliberate activity and can be enabled and triggered through staged co-creative practices. The main reasons for co-creative practices are first, bringing different people together to share, make sense and to collaborate, and secondly, to rethink current and explore future possibilities. In line with Kelley's ideology, "You can prototype just about anything. What counts is moving the ball forward, achieving some part of your goal". We highlight the open-ended exploration practices familiar to designers, in which the practice of identifying problems goes hand in hand with creating solutions. The basis for exploration in this chapter is in engaging people in reflective and creative dialogues, and to situate activities in order to set frames for reflection. In practice, the co-creative practices emerge and evolve in a non-linear progress of stages that are partly overlapping and in relation with each other. This chapter, however, is organised through the use of four lenses: (1) insight generation, (2) concept exploration and development, (3) converging towards a specification and (4) transformative and implementation processes. The chapter introduces a number of examples and applied co-creative practices from various fields of service design. They address the co-creative character of many well-known tools such as role playing, context mapping, design games and

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experience prototyping. Finally, the chapter sums up the main considerations for the applications of co-creative practices, defining the purpose, utilising co-creative characters and developing facilitation capacity.

Keywords Co-creation · Design practice · Service innovation · Reflective dialogue · Creativity · Creative practices · Service design · Collaborative design

1 Introduction

Designing is about exploring future alternatives and articulating solutions in a concrete way. Collaborative designing in turn means to do this together with others. In such explorations, identifying the problem and finding the solution often go hand in hand by making sense of the current systems, experiences, solutions and practices and at the same time seeking insights for future ideas.

Service is, in one sense, from its outset a co-creative practice. That is, people collaborate in co-creating value in context by integrating resources through usage, to achieve common and individual goals. In service logic, there is a distinction made between three value-creating spheres (Grönroos and Voima 2013; Grönroos 2008), where the joint sphere is the service company's access to the knowledge and practices of the customers (Grönroos and Ravald 2011; Heinonen et al. 2010). This can be referred to as *performance time co-creation* to make a distinction with *design time* and *implementation time co-creation* (Holmlid 2012;

Edman et al. 2014) (Fig. 1).

In this chapter, we will focus mainly on co-creation practices in design time but touch upon co-creation in implementation time. By viewing a service as a co-creative practice, new possibilities of enhancing these practices to contribute to innovation processes are opened. Often this is done by studying and engaging

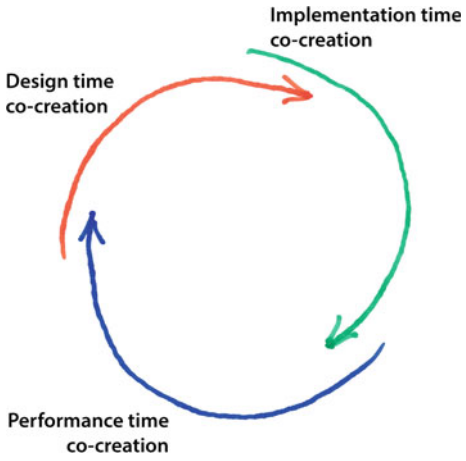

Fig. 1 Co-creation in different phases of a service life cycle

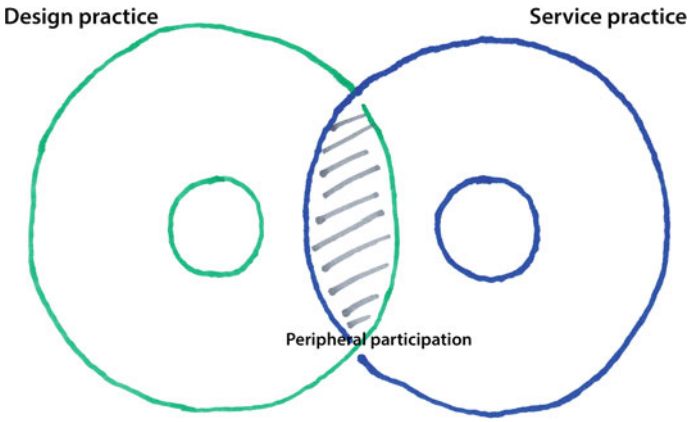

Fig. 2 Co-creative practices as pluralistic peripheral participation

people before proposing solutions. It can also be done through experimenting with changing of the practice as such (see, e.g. Burns et al. 2006), and/or by changing the surrounding service process and system.

Co-creation and co-design are terms that have been used to represent a variety of creative and collaborative practices in design. In addition, co-creation has been widely used also outside the design field, for example in the context of service marketing. In this chapter, we focus mainly on design-related practices of co-creation.

Co-creative practices can be viewed as practices where a design practice and one or more communities of practice participate in creating new desired futures. Lave and Wenger (1991) describes similar processes from a situated learning perspective, where professional development typically goes from peripheral participation in a community of practice to full participation. In design-related practices of co-creation, designers are peripheral participants in several service practices, and vice versa. Given this pluralistic peripheral participation, it is important that the co-creative practices used are well crafted (Fig. 2).

To set the stage for understanding co-creative practices, it is important to acknowledge that they cover a spectrum of tools and processes that can be conducted with different modes and mindsets.

Firstly, there are different modes of co-design. Mattelmäki and Sleeswijk Visser (2011) have proposed that there are four modes of co-design that reflect the traditions and practices involved: In the *1st mode*, the users are given voice and their expertise is utilised in the design process, i.e. referring to interviews, observations and the traditional ways to gather user data to design processes. In the *2nd mode*, the users contribution is facilitated with (co-creative) tools provided by the designers or researchers. In the *3rd mode*, the designer is not only a facilitator but participates in the collective creation; and in the *4th mode*, designers and design researchers support and facilitate a collaborative process of various stakeholders, not just users. In this chapter, we will focus on the three latter modes.

Secondly, there are different mindsets of co-design approaches. Sanders and Stappers (2012) have made a map of different approaches by placing them according to two dimensions: The first dimension addresses design driven versus research driven approaches, meaning that some of the practices emphasises designerly constructive envisioning, while others are more research and validity oriented. The second dimension considers expert mindset versus participatory mindset, meaning that the relationship and the roles of the people engaged, and their contribution varies according to some mindsets and traditions (ibid.). Thus, in some approaches, the designers take the leading role and responsibility of the outcomes, while in others, the outcomes are constructed collaboratively.

This chapter will give an overview and insight into co-creative practices that can be used for the purpose of service innovation. The chapter is based on the assumption that innovation is a deliberate activity, and also takes as its starting point that the co-creative practices are not part of everyday service performance. We propose that the main reasons for co-creative practices are first to bring different people together to share, make sense and to collaborate, and secondly, to rethink current and explore future possibilities.

There are a number of different models that explain and depict design processes. Many of them fail in explaining the iterative nature of the process and how co-creative practices could be applied in them. The chapter is based on a conceptual model of lenses, which describes perspectives that direct the process to innovations; where generation of insights, exploration of concepts, convergence towards specifications and implementation all are needed. Instead of a linear progression in several stages of an innovation process, one might need to converge towards a specification, in order to open up for generating more insights, etc. Moreover, the different lenses share elements and exhibit ambiguous relationships with each other. That is, it is difficult to devise a co-creative practice that contributes to only one of these stages (Fig. 3).

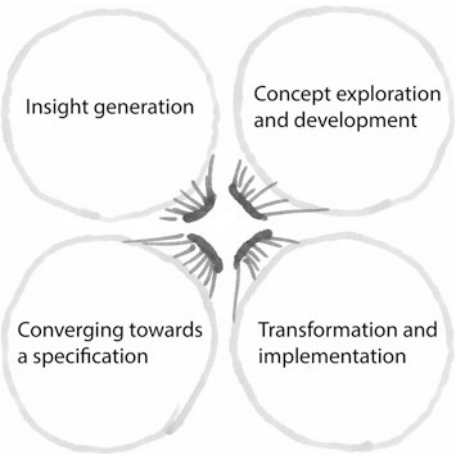

Fig. 3 The four lenses for viewing co-creative practices

The chapter is organised based on the four lenses: insight generation, concept exploration and development, converging towards specification, and transformative; and implementation processes. Each section of the chapter introduces one of the four lenses, details some general characters of co-creative practices, describes some methods or tools for co-creation, and give some examples from applied projects that show how design for service and service innovation meet and leverage each other through co-creative practices.

2 Co-creative Practices in Insight Generation

Insight generation activities on the one hand explore the users' and other stakeholders' aims and needs, and on the other seek alternative ways to approach the design solution space. Insight generation is part of the fuzzy front-end of the innovation process and often goes hand in hand with many other activities, such as stakeholder inclusion, setting up relations, setting the scope of the innovation project, etc. Many of the tools created for insight generation are open-ended and aim to trigger, inform and inspire the ongoing process.

Insight generation is about identifying needs, wants and potentials and thus, deals with exploring and being curious about what users experience and could experience in the desired future situation. Insights can be considered as starting points for the idea exploration and they can come from many different angles; from desk research (existing information about users owned by the service providers or found through other means) over trends research and strategy positioning to competitive analysis. User research is a prominent part of insight generation, since it aims to document and create understanding of users' everyday lives, their lifestyles and what drives them, their needs, values and motivations. However, this is not merely a collection of available user data. Rather it is a rich rhizome of interpretations and emergent empathic patterns, construed by becoming peripheral participant in the practices of other actors.

To reach this explicit as well as under-the-surface understanding, users need to become aware of their experiences. They need to be given means to open up to share these experiences as well as to be able or be enabled to express them. For empathic understanding, designers need time, dialogue and collaboration, in contrast to more traditional forms of user insight work, where users often are treated as respondents in giving answers to questions.[1] There are better ways of dealing with this.

In a project with people with diabetes, run by the do-tank RED,[2] the participants were shadowed and interviewed, but they were also asked to perform a set of exercises that tapped into aspects that were more subtle and harder to capture by

[1] There are two problems with the idea of asking questions in this manner. First there is the well-known caveat that one will only get answers to what has been asked. The second, and less highlighted, is that analysis often focus on the words in the text, and not what the answer means, or what the interviewee is talking about.

[2] Documentation of the work of the do-tank can be found at http://www.designcouncil.info/RED/.

observation. They were mapping emotions, sorting cards on leisure activities and doing a drawing exercise. The researchers shared their effort and attitude: "We spent a number of hours with each person, sometimes much of a day, trying to understand their lives, not just their disease" (Burns et al. 2006).

Because of the entanglement of problem and solution spaces in a design approach, it is not possible to ask users to answer precise questions. Designers simply do not claim to know the exact questions to ask yet.

There is an interesting crux in co-creative practices with users when trying to generate insights: On the one hand, activities need to support a dialogue, a mutual understanding of aims and scope, and a shared language to understand existing experiences of users with current products and services in their everyday lives. On the other hand, the activities in insight generation need to open up towards alternative futures; desired futures. The multiple goals of anchoring and futuring becomes a good foundation for participatory design activities.

2.1 Co-creative Character 1: Improvisation in Insight Generation

Improvisation techniques have been identified to be fruitful for insight generation (e.g. Sato and Salvador 1999; Brandt and Grunnet 2000; Iacucci et al. 2000). They build on improvisation theatre and forum theatre to facilitate making the otherwise hard-to-grasp tacit knowledge explicit (e.g. Brandt and Grunnet 2000). Improvisation needs particular facilitation, which can be set either in a use context or in a particular setting such as a meeting room or a workshop. Theatrical exercises call for lateral thinking and spontaneity in the form of "imagination-in-action" (Johnston 1998/2005, p. 136) and hence, are useful in generating insights into people's experiences and practices as well as opening up solution spaces for new ideas. Improvisation may not always be easy but there are strategies that can help. For instance, community drama facilitator Chris Johnston (1998/2005) suggests giving participants some fixed elements, such as a theme (betrayal), a restriction (no speech) or an objective (to win a favour), as frames for action. Frames can be given also in the form of tangible props, i.e. artefacts used by actors to support performance (Sato and Salvador 1999). When acting out scenarios, props together with the surroundings, body movement and verbal expression, helps to convey meaningful ideas.

2.2 Co-creative Character 2: Staging Events for Insight Generation

Staged events, such as different types of design workshops, are common mechanisms to invite users and multiple stakeholders to explore insights together with designers. Workshops are specifically arranged situations that have a pre-designed

structure, tasks and facilitation. They may be preceded by some tuning-in activities, for example in the form of sensitising kits, that are given to the co-design partners/users approximately a week before (Sleeswijk Visser et al. 2005). The aim of such kits is to get participants to reflect on the topic addressed and hence be more prepared to share experiences, dreams, etc. related to it. Johnston (Johnston 1998/2005) divides workshops roughly into three main sequences, which are warm-up, main part and feedback. The three parts give a basic frame to set the timeline for actions, moving from transforming participants' thoughts into the topic and towards an immersion in own experiences, followed by a creative setting, to insight generation and end with reflection on what was learned.

2.3 Co-creative Character 3: Playfulness in Insight Generation

Playfulness is a mode used in staged events that aim to facilitate conversations and envisioning among participants. For example design games are generative, sensitive, visual and playful tools aiming at sensitizing the imagination and facilitating exploration in co-design settings (e.g. Brandt 2006; Vaajakallio 2012). Tangible material promotes an explorative, playful and creative attitude. The material and rules invite both verbal and non-verbal reactions and dialogue, and support various means of expressing one's thoughts, dreams and knowledge. Acting out scenarios or having tangible props can evoke different kind of insights. The tradition of using constructive design settings can be found in design, with early work on concept games (Habraken and Gross 1987), in participatory design (Ehn and Sjögren 1991) partly influenced by Jungk's work on future workshops (Jungk and Müllert 1987), and in business innovation through serious play (Roos 2006). In participatory design, the aim has been to empower people, and in business innovation to articulate challenges, and its applications in service-related innovation has afforded an even wider scope.

If one turns the attention towards methods, tools and techniques in co-creation of insights, they are distinct from traditional research tools. Methods and activities in co-creation of insights are not simply about data gathering and analysis processes, as with traditional research tools, but more about exploring users' past, present and future experiences as well as exploring the future solution potentials. Accordingly, many methods purposely aim at collaborative exploration. In its most lightweight form, co-creation in insight generation has similarities to ethnography, but extended with human-centred design.

In the following, we will introduce four methods for insight generation. The two first will be shortly introduced, *probes* and *context mapping*. Then, in the following co-creation examples, two other methods will be described, *on the move* and *design games*.

2.4 Co-creative Method/Tool 1: Probes in Insight Generation

The *probes* method, was originally developed by Bill Gaver and his colleagues (Gaver et al. 1999; Gaver and Dunne 1999) under the label Cultural Probes, and was used to inspire and inform designers about the contextual issues and personal opinions and lifestyles of people involved. The probes method is based on self-documentation, i.e. the probes are open-ended and often ambiguous assignment kits given to the users to document and reflect, by themselves, about their experiences in the context they happen. Probes are descriptive and predictive, in other words they try to capture the current experiences and trigger the people involved to reconsider possible expectations and solutions. Once the assignments are completed, the kits are returned to the designers for interpretation. Depending on the specific case, probing can be complemented with, e.g. interviews and workshops. The probing process is composed of several steps, from (co-)creating the assignments, over invitations to participate in probing, to drawing design ideas. This trigger insights and discussion among users, between users and designers, and amongst the design team. The aim of such a discussion is in sharing experiences and inspiring idea generation. The probes, as a method, have been widely spread and the application style and field varies greatly. Some of them following the ambiguous and artistic spirit of the Cultural Probes, some take a more research oriented point of view. In Mattelmäki's research on Design Probes (Mattelmäki 2005, 2006), there was identified four reasons for using probes. In addition to (1) inspiration and (2) information mentioned by Gaver et al. (1999), the probes can be used for (3) participation, i.e. engaging users in the design exploration, and (4) dialogue, i.e. where the process of probing is initiating and facilitating dialogues and empathy (Fig. 4).

2.5 Co-creative Method/Tool 2: Contextmapping in Insight Generation

The *contextmapping* approach, developed by Sleeswijk Visser (2009), is also built on the same foundation as probes; on collaborative sensemaking in which the insight generation process is believed to be a non-linear process that has both

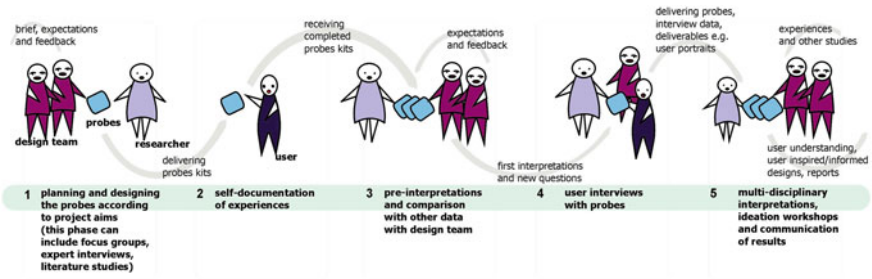

Fig. 4 An overview of a probe process

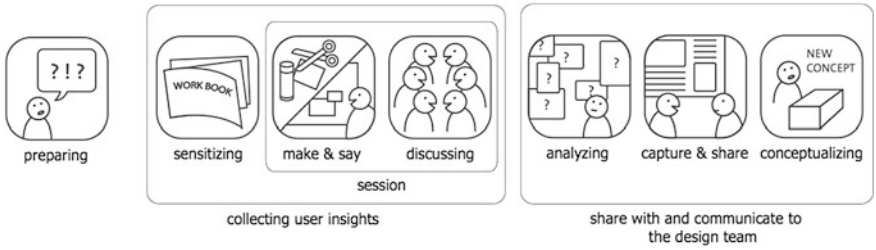

Fig. 5 An overview of a contextmapping process

rational and non-rational arguments. The process starts by engaging users to tell about their experiences through assignments. The process continues by discussing insights with the designers in open-ended dialogues that aims to support empathy as well as collaborative creation.

These approaches are based on a mindset in which users are treated as experts; experts of their experiences and in that role, they contribute to the design process. In contextmapping in particular users and designers typically meet in follow-up generative activities. Similar to many co-creative practices for insight generation, the artefacts created by the users in contextmapping, or in the probing assignments, are not aimed at designing solutions as such (although the assignment might be phrased in terms of 'design your own personal ideal device for…'), but a way to get them talking and reflecting about their experiences. In the methods described below, however, artefacts or 'props' and the roles users take (in role playing/acting) are more directed towards identifying constraints and exploring future situations (Fig. 5).

In the following examples, we identify several challenges and mechanisms when creating settings for a dialogue between designers, researchers and users, and for identifying and exploring needs and generating insights together.

2.6 Co-creation Example 1: Seeking Insights from the Context with Probes

The first example is from a project that aimed at creating alternative and customised solutions for ageing workers, and that focused on a particular service company in the field of cleaning, catering and maintenance services (e.g. Mattelmäki et al. 2011). One of the first step in the process was to understand what the ageing workers value, what their reasons are for early retiring and what the practical working days are like. Probes kits were given to 14 ageing workers for about a week. The assignments in the kits varied from more metaphorical tasks considering their motivations and characteristics to practical documentation of workdays. Each of the participants was interviewed to get deeper into the insights found in the probes kits.

The probes process opened up dialogues at least in two ways. Firstly, it was an icebreaker between design researchers and the ageing workers. It was a mediator to get to know each other and to start talking about meaningful issues suggested in the probes kits. This dialogue served as a basis for the next step in the co-creative process. Secondly, the probe results supported dialogues between other relevant stakeholders. The insights from the probes and the interviews were collected and discussed with other stakeholders, among others the management of the company, by using narrative persona descriptions to underline the personal view on working days, motivations and challenges of these ageing workers. Similar to context-mapping, these descriptions were open-ended interpretations and they aimed at sharing insights for making interpretations when moving towards co-creation of concept exploration (Mattelmäki et al. 2007).

2.7 Co-creation Example 2: Improvised Scenarios in Use Context

The second example is from the same project and titled 'Situated Make Tools' (Vaajakallio and Mattelmäki 2007; Vaajakallio 2012), and it combined improvised scenarios and make tools (Sanders and Dandavate 1999). The aim of the co-creative exercise was (1) to establish a view into ageing workers' normal work practices, (2) to generate design ideas expressed in physical, narrative and acted-out formats, and (3) to develop new concepts that are based on the workers' needs, desires, practices and attitudes. The design space was framed to envision novel functionalities of digital information and communication technologies.

The process was inspired by the "on the move with the magic thing" experiment described by Iacucci et al. (2000). In the experiment, they used a simple mock-up, a magic thing, to support users' thinking and acting. The magic thing is open by nature, and it can do anything the user can imagine. Accordingly, in Situated Make Tools, ageing workers were asked to build a dream device, from a provided set of make tools, that they could somehow utilise during their workday (Vaajakallio and Mattelmäki 2007). During 90-min observations of ageing worker's practices in their own context, designers' encouraged the worker to act out possible use situations every now and then. Users' everyday situations and practices thus served as the basis for improvised scenarios. The users were the experts of their own work, and the dream device they had constructed earlier, and were able to express important insights for the continued design process (ibid.). Improvised use scenarios illustrated usages of the dream device in a number of ways and for various purposes, and created an understanding of current practices, and how those potentially could be changed/improved with new technologies. They also pointed out contextual needs, opportunities and limitations.

Since the users were not accustomed to performing scenarios, the design researchers set up the following strategies:

- The designers conducted several observations on similar locations and on work practices to familiarise themselves with the context and with what could be expected to happen there.
- Before organising the Situated Make Tools sessions, there had been several meetings between the users and researchers, so that they knew each other prior to insight generation meetings.
- To get prepared for building the device and for the improvisation, every session started by discussion of (mobile) technology, that is part of the users' current work.
- The researchers initiated the performances by asking about what had just happened and whether that could be changed with the dream device, after which they asked the user to show how.
- The performances in which the participants acted as themselves took place in a familiar environment and were based on their daily practices. Furthermore, it was the users who built the dream devices, thus they were their designs—not the researchers' design.
- Tangible 'dream devices' made from make tools enabled exploring and creating solution ideas when acting instead of a need to rely on earlier proposed features (which might be hard to remember).

To sum up, imagination-in-action became visible when users performed how they would use the dream device in different situations. It made tacit knowledge embedded in situations, environments and people visual which allowed then the designers' to have a deeper understanding. For those ageing workers, who did not feel comfortable with acting in public places where they work; for example, a cleaning woman working at a public swimming hall, verbal description was allowed. In these situations, designers' asked them to describe recent experiences in detail. The dream device played an important role by connecting the described situations and ideas to the tangible mock-up. For most, nevertheless, performing scenarios seemed quite natural.

2.8 Co-creation Example 3: Changing Roles While Improvising

In the third example, by Diaz-Kommonen et al. (2009), users were taken from out of their comfort zone, playing a role they had little experience of. They were invited to step into the shoes of an archaeologist in order to envision new user interface opportunities. This exemplifies an approach where the idea is to set the story and role outside the user's everyday life and to take storytelling as a creative starting point for new insights. As described (Diaz-Kommonen et al. 2009, p. 81), "storyboards can capture characters' important moments such as encounters, emotions,

moves, expressions, gestures, sounds, utterances, thoughts, words, environments and artefacts".

The narrative was a story about an archaeologist, who finds a piece of ancient pottery and then has the task to create a digital three-dimensional replica of it. The participants were asked to take the role of the archaeologist and envision a way they would reach the goal.

In this case, the story and role were purposefully set outside the participants' everyday life to release them from the restrictions of their work practices and to allow them to imagine the system from several perspectives. According to Diaz-Kommonen et al. (ibid.), performance, supported by the script given in the beginning and some costumes and props, made the participants take different standpoints on the topic, which opened up new insights. Others, such as Seland (2009) are more critical towards creating settings outside the users' everyday life, since that might trigger stereotypical behaviour. In Seland's argument, when the participants play themselves, their improvisation becomes natural and they can base the play on their own everyday experiences instead of relying on stereotypical acting, which may easily happen when the participants are asked to pretend to be someone else (ibid.).

Any insight generation situation may take a different path than what was planned. This open-endedness puts emphasis on designers' sensitivity towards the unexpected; sometimes the most interesting insights are released in those moments (e.g. Mitchell et al. 2013). In addition, when role taking, participants may overact their roles or put emphasis on secondary issues (Seland 2009), which opens up possibilities to gain insight on system borders and the taken for granted.

These different viewpoints are in line with the two different aspects of insight generation proposed earlier: on one hand, understanding the existing situation by collaboratively exploring past and present situations close to users' realities, and on the other imagining possible futures in which users need to be supported to project their needs in future situations.

2.9 Co-creation Example 4: Insight Generation Through Storytelling

In the fourth example, the stage for insight generation was organised with less preparations than in the previous cases. The workshop was structured through a design game planned for this particular purpose; the Storytelling Game (originally Storytelling Group by Kankainen et al. 2011; Vaajakallio 2012). It was a lightweight variant of an insight generation event that aims to open desired future service experiences with a focus on social media. In the game, participants project their current and past experiences into a collectively constructed story with a fictive character. The interaction, and the insights, among participants—in this case people of different ages, skills and habits in social media, service developers from a partnering company and service designers—evolves through storytelling. The

players propose events for the story by describing customer journeys of long duration and reflecting on services as a dynamic process rather than as a single use situation or task.

The story titled 'warm-hearted surprise' or 'savior of the day' was given to the participants to guide the storyline, while being open for many interpretations.[3] To make it relatively fast, cheap and easy to produce, materials were minimised into a white paper with a line drawn to illustrate the timeline of a customer journey and few images as reminders of possible service channels.

The game invited players to bring in contextual understanding and user insights. To transform the players' verbal expressions towards more tangible evidence of the events in the story, the facilitator wrote players' propositions down on Post-it notes and placed them on the timeline. This materialised the discussion and enabled returning to different parts of it later.

The following techniques to support storytelling and connecting it to user insights were applied:

- The main facilitator focused on writing things down and keeping storytelling evolving;
- A second facilitator, a creative secretary, was added to ensure that emergent topics that would be important for the work of designers were discussed further;
- The titles related to the service were fixed elements that gave frames and starting points for discussion;
- Storytelling was utilised as a dramaturgical structure to invite participants into a 'game world' where everyday norms and rules did not count, and to point out unexpected situations, that could show the way to novel services (Vaajakallio 2012).

2.10 Summing up Insight Generation

All of the cases include role-playing in some form. Since role-playing seems to be a powerful way to explore the future situation from everyone's perspectives, its potential has been noticed in service design (e.g. Holmlid and Evenson 2006; Blomkvist et al. 2013). Although role-playing in its different variations has regularly been applied in design during the last decades, it has not been used systematically (Seland 2009). One of the reasons why role-playing has not become common practice could be the stress it puts on the facilitator, that the facilitator has a large influence on the validity of the created scenarios, and thus leadership is a critical factor (ibid.). It can also be a stressful approach for an inexperienced participant. Lego, puppets and Playmobil dolls alike have also been applied in similar purposes and situations partly to avoid the discomfort of acting out in person (see, e.g. Halse et al. 2010).

[3] The name of the stories in Finnish were, "sydämellinen yllätys" and "päivän pelastaja".

A basic foundation for identifying real needs of users is to involve them to become aware of their experience and being able to express these. Co-creative assignments and activities often consider the current situation and past positive and negative experiences. By recalling their memories and supporting them to reflect on these memories, they become more aware and are better able to express them. The process of co-creative assignments supports the dialogue between the users and designers as well as among design teams (Mattelmäki 2005, Segelström 2010). To achieve an empathic understanding through the insight generation, the design team has to open up, both cognitively and emotionally.

Discovery into the users' world, immersion in the users' world and connecting cognitively and emotionally are basic steps in the empathic understanding process (Kouprie and Sleeswijk Visser 2009a, b). To reach envisioned futures, designers take distance from the merged worlds with the users in order to detach and start to project the gained understanding into explorations in the future.

3 Co-creative Practices in Concept Exploration and Development

The co-creative practices we will go through in the following share that they are promoting a divergent approach. Here, the interest has moved from being focused on the needs and wants of different stakeholders to exploration of possible concepts that might fit with these needs and wants. Many of the co-creative practices use articulations and manifestations of these concepts as vehicles and focal points for experiments with and dialogues about the concepts and their underlying assumptions. At first glance, some of them resemble prototyping, and prototyping easily creates a picture of engineering workshops in which soldering and programming takes place. However, as pointed out by Buchenau and Fulton Suri (2000), experience prototyping can be done in quite a variety of ways. For example as a way to build a conversation, identify relevant players and explore and concretise visions.

The manifestations used in collaboratively exploring concepts are not meant for testing or evaluating ideas but rather concretizing, exploring and developing possible futures in a collaborative manner. In effect, the manifestations are agile and lightweight.

3.1 Co-creative Character 4: Reflective Dialogue in Concept Exploration

Reflective dialogue can take on many forms. In the exploration of concepts, dialogue complements the tools and events that are employed to drive a divergent mindset. For example if one is working with a prototyping process, it might be

more important to make the prototype together with stakeholders and target groups than evaluating it with representatives from the intended target group. Here, the process of making a manifestation of an imagined future is used as a means to sustain reflective dialogues with many of those involved in service development and later service performance (Blomkvist and Segelström 2014).

3.2 Co-creative Character 5: Situating Events for Concept Exploration

Many authors have emphasised contextual approaches either by taking the workshops into the context under study (e.g. Binder 2007), or conducting design experiments on the fly while users are engaged in their everyday practices (e.g. Iacucci et al. 2000; Ylirisku and Vaajakallio 2007). Examples of such contextual approaches were introduced in the previous section to illustrate the link between understanding people's current practices and envisioning future solutions. Building future visions on top of current situations can help to maintain the link between the imagined and facts. Everyday practices can also be valuable sources of knowledge and inspiration (Blomkvist and Holmlid 2009). However, contextual approaches have some challenges as well, particularly in service design, where defining the use context may be hard since it typically covers several locations bound together as a customer journey (Holmlid 2012). Hence, the whole service experience then consists of several activities and stages, such as preparation, approach, arrival, actual service experience and follow-up. These are all influenced contextually and through interactions, specific for their own contexts. Exploring a particular piece of a customer journey in situ, for example may not serve the purpose of envisioning a new complete service experience.

3.3 Co-creative Method/Tool 3: Speed Sketching in Concept Exploration

One technique that specifically builds on the expressive powers of drawing is *speed sketching*. It is a form of brainstorming technique, where the output is sketches. As stimuli for generating ideas, different forms of scenarios can be used. In Wentzel and Holmlid (2009), the facilitator used scenarios that were co-created through design probes, where some were nightmare scenarios and others were ideal scenarios. Participants were supposed to quickly do thumbnail sketches of ideas, solutions, concepts, etc. from hearing a scenario being read out. In that specific project, the nightmare scenarios were the ones associated with the most sketches. Participants claimed that it was easier to quickly identify a problem to solve in the nightmare scenarios and generate sketches for that than building on and developing ideal situations.

3.4 Co-creative Method/Tool 4: Magical Things in Concept Exploration

In their paper, "on the move with the magic thing", Iacucci et al. (2000) use a simple mock-up, a magic thing, to support users' thinking and acting in a real-world context. These magic things are capable of doing anything the user imagines. As such, they become focal points for needs and issues emerging in the contextual situations in which they engage. The functionalities projected onto the magic thing uncover the resourcefulness of users in their capability to imagine new ways of integrating, existing and innovative resources in service performance.

Next, three examples illustrate the above-mentioned for co-creative concept exploration and development. Public organisations and their service development have been considered as slow to change. In the first example, such organisations experience design prototyping as a way to step out of the box and co-create 'the feeling of things'. The two subsequent examples shows concept development in an environment, especially designed and built for collaborative explorations of future possibilities and in particular, developing solutions further collaboratively.

3.5 Co-creation Example 5: Dialogue-Labs as Settings for Exploring Augmented Mood Boards

This example is about setting up a co-design activity in a Design-Lab (e.g. Binder 2007) in meeting room that was transformed temporarily to look and feel like a design studio, hence the name 'Dialogue-labs'. The setting had similarities with a laboratory or theatre stage allowing to specifically build on and use those elements of a design studio that had been found relevant in relation to the given design task. The meeting room was more controllable than, for example the participating designers' studios had the activities taken place there. The 'Dialogue-labs' were organised in 2007, including altogether seven co-design events. It was part of a study on augmented mood boards (Lucero 2009) and the overall theme was to imagine future ways of creating and communicating mood boards. The co-design setting aimed at supporting dialogue among researchers and possible users, the industrial designers, to gain feedback for the initial design concepts and to develop them further together.

The design lab was purposefully planned to act as a stage for co-creative exploration and development. For sharing experiences and developing ideas, there were various triggers or props, from make tools to different objects and videos. These props were brought into the stage without specific connotations. In the process of co-creating, the participants attached meanings to them according to contextual and emergent needs. For instance, make-tools foam blocks became binoculars and a pile of post cards was used to represent a material sample. By providing a wide range of media for expression, the participants were allowed to

find an appropriate dialogue style in a particular situation, meaning that they could rely on a medium that they are familiar with or feel comfortable working with in a situation where the space and co-designers are typically new to them. In general, co-creation stages, such as the described design lab, use materials as props and building blocks to support co-creation for solution seeking for explorative manners (see, e.g. Agger Eriksen Material matters in co-design 2012).

3.6 Co-creation Example 6: Cardboard Hospital for Prototyping Patient-Centric Environments and Services

This example is about exploring and developing more patient-centred hospital infrastructures and services in collaboration with the experts from the field of health-care, architecture, service design and hospital users. The setting for the co-design process was a black box theatre at the university premises. In this black box, the physical human-scaled prototyping environment was built up for a week. As Kronqvist et al. (2013) explain, "The idea was to create a setting that would support exploratory and individual ways of acting and doing things while being an aesthetically inspiring environment for creative activity". The prototyping material included doors, boxes, walls, screens, signs and small screen-like cardboard elements, with which participants could build flexible and easy to modify spatial settings. In addition, the prototyping environment had specific objects such as a hospital bed. This bed turned out to be too realistic in the sense of limiting the creative thinking in the early design phase.

Three prototyping workshops were organised to co-construct hospital spaces using human-scale cardboard blocks and other prototyping materials. While exploring alternative physical settings, participants also reflected on health-care services from the patients' perspective. The cardboard hospital was conducted in the early stages of an architectural planning process to let concept development influence the new hospital wing that should be ready in 2017 (Kronqvist et al. 2013).

3.7 Co-creation Example 7: Design Games as Setting for Concept Development

This example looks at a set of co-creative methods, called design games from the perspective of how different types of prototypes or mock-ups have been applied in participatory design practice. The focus of design games that mainly invite users to contribute to design processes has widened to involve multiple stakeholders in the creative exploration of possible futures. Exploratory design games (Brandt 2006), for instance, may take various forms, but as the name highlights they all share an

exploratory nature, hence allowing co-construction of different future scenarios. One such is the Landscape Game, where players create contexts and physical surroundings for personas created earlier in the design process. The tangible game materials include a conceptual game board, moment cards and trace cards, which introduce elements from the physical surroundings identified during the field studies, while at the same time guides discussion and development of stories (e.g. Brandt and Messeter 2004; Brandt 2006).

3.8 Summing up Concept Exploration

The basis for exploring concepts is to engage users in reflective dialogues, and to situate activities in order to set frames for reflection. Carefully crafting these situations, and tooling them, becomes necessary to allow for, e.g. acting out future scenarios, rather than grounding them in what is possible today. However, if all aspects of such a situated activity are open for experimentation by the participants, it will be difficult to explore and ideate as choices are too many. Thus, it is important to craft both what should be kept static, where elasticity should exist, and what should be open for experimentation.

Moreover, often in these situations designers turn into facilitators of these creative processes rather than designers participating in the processes. To find the right balance, conscious decisions on designers' roles has to be made.

4 Co-creative Practices in Converging Towards a Specification

Co-creation is also effective when there is a need to converge concepts towards specifications. This is especially true for services, as they are depending on several skills and competences that are applied in context when the service is performed. Convergence in this sense means two things. On the one hand, it has to do with the definition or specification of a service, and on the other, it has to do with that all the involved actors converge on a shared understanding of the service and their specific role in its development and delivery. The former is often aided by prototyping, and the latter by visualisations and modelling.

The latter can be seen as a communicative process, where earlier co-creative events and findings are summarised and reported, often to people that were not involved in the co-creative events. In design for service, there is an extensive use of visualizations to achieve these communicative goals (Segelström 2010).

As stated earlier in this chapter, prototyping can take form in quite a variety of ways and can serve different purposes. They can help in identifying and constructing an overall understanding of the design challenge, as well as eliciting expressions and practices from the stakeholders and provide design drivers for

further development. However, in addition to exploring and opening up the design space, they typically also serve the purpose of converging towards solutions. Then, the co-creative practices aim at supporting participants to make selections and further development of the alternative components.

4.1 Co-creative Character 6: Open-Ended Interpretation

In co-creative processes, it is common that an articulation created in one activity is used as the basis for another activity. To achieve this, there need to be allowed for *open-ended interpretations* to be made. There is also a need for open-endedness in how articulations can be used as building blocks that might deviate from the initial purpose of that articulation.

For example a popular tool in design is so-called personas. Usually, they are developed through deep interviews and using the repertory grid technique to find archetypical factors in the material. These formal techniques are difficult to use in a co-creative manner, because they require a skilled interviewer and analyst. To allow for using the same kind of insights in a more agile manner, other approaches are necessary. For example in a set of activities that generates insights, data about users and their lives are collected, and summarised in story snippets, storyboards, trait cards, issue cards, etc. In themselves, these are open-ended interpretations that can be used later as building blocks and vehicles for collaboratively creating user stories, developing characters of stakeholders and users to be used in, e.g. design games, etc.

By being well founded through, e.g. field studies, the articulations are also less sensitive towards being used for other purposes than conceived when the articulations were done. For example story snippets or storyboards that initially was done as summarising and communicating the shared understanding of specific situations and scenarios, might be repurposed as tools for identifying needs for mediating technology in service situations (Blomkvist 2009).

4.2 Co-creative Character 7: Prototyping Service

Prototypes, and *prototyping*, can be seen in the sense of being vehicles for learning about and sorting out details of a service concept, process or system. It is important to note that prototypes in, e.g. systems development are used in a more general manner, than in, e.g. product development. From a co-creation point of view, this should also be the case in service innovation. That is, a prototype may refer to any prototypical representation of the imagined end result, regardless of when in the development process it is developed (Blomkvist 2012; Blomkvist et al. 2011).

The reasons for prototyping can be summarised as follows:

"Prototyping is acting, exploring and perhaps even failing before finding the answers" as Tom Kelley claims (Kelley 2001) and continues "You can prototype just about anything—a new product or a service, or a special promotion. What counts is moving the ball forward, achieving some part of your goal." In sum, prototyping is about exploration and generation, about communication of the overall concept and appearance of an idea, about facilitation of collaboration and about providing a hands-on feeling of the future solution (Säde 2001; Blomkvist 2001a; Blomkvist and Holmlid 2011b).

Prototypes in services are often related to drama techniques. In service design prototypes or tangible tool sets like generative tools, are often utilised together with performing/acting out different roles, interactions and situations (Sato and Salvador 1999; Brandt and Grunnet 2000; Iacucci et al. 2000; Svanæs and Seland 2004; Diaz-Kommonen et al. 2009). And they are typically customised to specific user groups, audiences and co-design situation to make it possible for people to relate to their own role in the final service.

However, there is a generic challenge in prototyping, where the fidelity of the prototype will be decisive for the role of the prototype in co-creation. Usually, prototypes that looks more like finished products, does not invite radical alterations of the prototype, but rather directs changes towards surrounding system environments, or towards details such as colour. When exploring and developing concepts, there is a need to balance between openness and framing. The balance depends on the openness of the concept as well as the objectives of the activity. Agger Eriksen (2012), for example has categorised materials used in co-design. Some of them can be characterised as topic specific, or predesigned, some of them more generic.

4.3 Co-creative Method/Tool 5: Service Walkthrough

One prototyping technique that focus on the whole service, as opposed to specific service moments or service channels, is the *service walkthrough* (Blomkvist 2012; Arvola et al. 2012). It relies on the idea that an embodiment of a service will give a rich foundation for participants to contribute to the development of a service. In a service walkthrough, all components of the service are given prototypical representations, the actors, the resources, the service concept, as well as the service process and the service system. These representations need to be carefully chosen with respect to what aspect of the service that is under scrutiny.

The walkthrough is then performed by playing through the whole service, collaboratively with stakeholders and users of the future service. When the purpose of the walkthrough is to converge towards a specification fidelity of the representations as well as validity of the walkthrough context need to be considered. The fidelity issue is similar to the general challenge in prototyping, while validity of the context has to do with making sure that the context does not restrict the service

action in the walk-through, and making sure that the actions are framed in such a way that the experience of them are close to the envisioned experiences.

4.4 Co-creative Method/Tool 6: Experience Prototypes

As many services are partially mediated through technology, focusing on this mediation is sometimes needed. *Experience prototyping* is a method that attempts to express and capture the experience of interaction with an artefact or a system (Buchenau and Fulton Suri 2000). It uses a replica of an existing or envisioned situation, in which participants can understand what it is like to interact with the service through artefacts and systems. The method requires a certain amount of willingness to participate in role-play situations, which might be a hindrance for some (Oulasvirta et al. 2003; Brandt and Grunnet 2000).

Even though this technique was not developed as a service innovation technique, it is useful when there is a need to converge towards specifications.

4.5 Co-creative Example 8: Design Probes as Experience Prototypes

This example illustrates design probes as experience prototypes in a project with two main aims: to create and support client-centred service networks, and to create human-centred service offerings in a local neighbourhood in the City of Helsinki. The project focused on senior citizens and especially families in which one needs care, e.g. has dementia, and the other is officially named as a carer. These families are entitled to financial support for some services that has been decided by the municipal care manager. The aim was to create a service offering from both public and private services that create the above-mentioned network, from which the families together with the care manager could make a selection. In the need of human-centred solutions and empathic understanding of the situations probing was considered as way to have a view to the everyday life challenges and joys. This is the typical reason for applying probes. However, in this case, it was also seen as a possibility to experiment a potential future practice for creating a channel of dialogue and reflection between the families and care managers.

Probes were designed, delivered and filled in by the volunteer families, who were then interviewed and the collected material interpreted. During the process, the functionality and usability of the probes kits as such were tested. The first version of the probes was well received with many improvement suggestions. The process of probing helped the families to open up both more general and specific challenges and to prioritise and point out the kind of services they needed. The probes also supported the municipal caregiver to see beyond the official and professional viewpoint. Currently, based on the experience prototype probes

experiment, the tool and the process have been adjusted according to the feedback, after being used in 33 families. The aim of the public organisation is to develop this co-creative and dialogical practice wider to be used as a reflective discussion channel between the families and service providers.

4.6 Co-creative Example 9: Feeding Milan—Scenarios as Open-Ended Prototypes

In Italy, Politecnico di Milano service researchers have initiated and been strongly involved with creating strategic plans in a project called Feeding Milan—Energies for change. The project focuses on designing system of services and infrastructures and transforming the food chains and consumption into more sustainable ones by engaging regional food producers and citizens. This is an example of a systemic and strategic approach to services where the design aimed at systemizing by, e.g. seeking synergies and collaboration, envisioning by facilitating conversations and solution building, and communicating by making the project and the results visible and understandable for all involved parties.

The scenario building process had several phases that supported each other. (1) Collecting potential example cases, leading to design studios, where the case ideas were elaborated. (2) Testing design opportunities by local projects by exploring and analysing the local settings. (3) Establishing a digital platform for interaction and (4) a Co-design stall where the ideas and scenarios as early prototypes could be discussed and further elaborated by the stakeholder. The Co-design stall is an actual place in a regularly organised farmers' market that offers a forum for proposing the open-ended prototypes to start negotiations and co-creative sessions with farmers, corner-shop owners, citizens, municipalities and other decision-makers. Through a long-term process, the researchers together with other activists have been able (1) to engage people in reconsidering new potentials, (2) to enable participation to further development of the scenarios in practice by utilising their competences and knowledge of local practices, (3) to empower the citizens to become active actors in the sustainable transformation (Cantu and Simeone 2012).

4.7 Co-creative Example 10: Co-designing a Project Plan

Services can be described as interactive processes, including journeys, phases and touch points and various stakeholders and networks. The expectations, competences and resources of the stakeholders are not always clear. An attempt to co-creatively construct a process, a project plan, was done in the project Developing Extreme Service Design Methods (2008–2009). It featured a collaborative tool named Project Planning Game, based on a design game foundation, that aimed to clarify the potential contradictions early on in a design research project with several

partners (Vaajakallio 2012, p. 163). In this project, the participants were researchers from the university and service developers from partner organizations with different motivations to join the project. They were invited to negotiate the project plan during a 2-h facilitated session.

The game session included five phases: (1) warming up by sharing typical development processes in participant organizations, (2) choosing the labels that define the main phases of the design process, (3) specifying the goals for each phase, (4) presenting, negotiating and deciding the methods for each phase, so that they meet the goals, and (5) allocating the available resources accordingly. The game featured a game board as a project prototype platform, phase cards to identify the phases, method cards, and human figures to represent the number of human resources available. The game rules helped the participants to move from identifying the expectations and needs to more precise decisions that finally lead to a project plan with work packages and divided resources.

Prototyping a project plan might not at the first sight inspire to think about co-creative practices in services. However, it should be viewed as an example of a rehearsal of the coming process by going through it step by step; explicating and making decisions together about the phases, goals and deliverables as well as alternative ways of reaching them.

4.8 Summing up Converging Towards Specification

The task of converging towards a specification of a service requires involvement of most of the stakeholders and actors that will be the subject of the user's resource integration activities. If this is done in a co-creative manner, not only will a specification of these resources become more precise, but the actors involved in the process will learn, and prepare for future service delivery. As many people are involved, many different aspects, issues and opportunities will be dealt with even possibly before major decisions on actual development/implementation has been taken.

5 Co-creative Practices in Transformative and Implementation Processes

Many organisations use co-creative practices when transforming the organisation, or when implementing new ways of working. Some use internal labs to rehearse future customer interactions, or set up a roll-out process where one office is the first to use a new service process.

While many of the examples in this chapter point towards creating temporary stages for co-creation, also a trend towards more sustainable co-creative practices that aim at long-term societal transformations can be identified.

Probes and design games as a design approach have been applied in organizations to support the transformation and exchange between siloed organisational structures. Furthermore, prototyping may take on new challenges and formats when used as a means for transformation and implementation. For example, the prototype work as training for the service staff, preparing them for potential change.

5.1 Co-creative Character 8: Capacity Building

When viewing service delivery as an act of resource integration performed by a user, the *capacity* of other actors in the service system and process needs to be able to respond to these integrative acts (Holmlid 2014). When implementing a new service, working co-creatively with this perspective will build capacity in two ways. The first is that individuals in participating organisations will understand the role of their own capacity in relationship to others in the service, thus increasing operative resilience (Holmlid 2012). The second is that individuals and organisations may build capacity to act co-creatively together and with others for purposes of innovation.

5.2 Co-creative Character 9: Transformative Platforms

It is well known that for several kinds of services, there are multiple actors simultaneously shaping and contributing to the service outcome, such as public service and health and care services. Meroni and Sangiorgi (2011) identify that sometimes it is fruitful to understand the basic components to achieve transformation and change as being *platforms*. Such platforms consists of tools, rules and roles (Sangiorgi 2011), that together define the possibilities for people to actively participate in service delivery. When platforms are working well, they are not only platforms for co-creation of value in transformative processes, but also platforms that may be used for opening up participatory innovation spaces.

5.3 Co-creative Example 11: Design Games as a Co-creative Structure to Organise and Facilitate Cross-Functional Collaboration and Ideation

In collaboration with the city of Helsinki, several co-design sessions that applied the structure of design games were conducted. The purpose was twofold, (1) bringing people together to share a state of mind that allows them to collaborate in developing human-centred public services, and (2) introducing and applying design tools and processes with the belief that they could provide fresh perspectives for public organizations and the networks of actors involved.

> One such examples that has a design games kind of structure that was originally inspired by TV-format known as 'ready steady cook', and that has since then been repeated several times. The goal of the workshop has been in gathering representatives from different departments of the municipal organization to share their ideas and to co-create solutions for cross-functional projects and events. The participants shared their departments' proposals as ingredients. Through a creative process of negotiation and by combining them, adding city strategy as spices they stirred and cooked delicious dishes. Those were finally collected to recipes that described not only the menu but also the atmosphere and who should be invited. All the recipes were collected to a booklet to be shared among the participants. (Hakio and Mattelmäki 2011)

5.4 *Co-creative Example 12: Co-designing a Design Game for Involving Citizens in City of Vantaa*

In the strategy of the City of Vantaa, involving citizens and other stakeholders throughout the organization is specifically articulated. Hence, every department (and teams in them) needs to start to consider how they could achieve that. However, participatory processes are new to most of the people in the organization and therefore they need some tools to help to implement the strategy into the practice.

In the municipality, there are eight persons working as area coordinators, whose responsibility is to support different departments to implement the strategy. It was suggested that design games could be an appropriate approach to allow for different working teams in the municipality to build common understanding of what collaborative processes could mean for them, who they could involve in their processes and why they might be interested and motivated to do that.

Specific design games were developed for that purpose. The area coordinators did most of the work guided and supported by a service designer. As a result, there are now two prototypes of design games. One of the games is focusing on learning about service design methods and diversity of people that could be involved. This includes several descriptions of citizens that aim at evoking empathy and understanding of the personalities rather than stereotypical characters. The second game is focusing on co-constructing understanding of topics to consider in regard to team's own ongoing and coming projects and citizen involvement.

5.5 *Co-creative Example 13: A Co-creative Tool Becomes Part of Everyday Processes*

In the RED case with diabetes care and management the insights generated were summarised as a set of archetypical patients and a patient path (Burns et al. 2006, see also 2). These were later used as a basis for involving patients and staff in

transformation processes. In many of the projects run by RED, it was crucial to transfer the power to transform to the persons involved in the actual situations and practice, such as diabetes care and management. One tool initially developed for simple prototyping of service in diabetes management, was cards that documented everyday troubles and issues that diabetics experience; the so-called issue cards. It showed that they happened to fit into the everyday dialogue between patient and staff in a very good manner. They finally ended up as one important co-creative tool in the revised service process.

5.6 Summing up Transformation and Implementation

Co-creative methods and techniques used for transformation and implementation are powerful in the sense that they build on and develop the capacity of the organization to rely on their resourceful staff, and their customers/users. Sometimes, the co-creative tools used turn into everyday process facilitation in interactions between organisation and customer.

6 Conclusion

In this chapter, we have given an overview of co-creative practices that may be used in service innovation. The examples we have given show how a co-creative attitude and practice give new possibilities for service innovation. We hope that this has triggered you to identify other examples, methods, tools or techniques that exhibit co-creative characters. Even though we presented tools and methods, through specific lenses, several of them are used for other purposes than those presented.

When applying co-creative practices for service innovation, one needs to consider the purpose of co-creation, the characters of co-creative practices and how to ensure facilitation (Fig. 6):

First of all, one needs to decide for what *purpose* the co-creative practice will be used; for insight generation, for concept exploration, for convergence or for implementation. Choosing appropriate methods or tools becomes easier this way, and setting up productive co-creative activities will be swifter.

Secondly, the *characters* of co-creative practices need to be carefully considered as the specific co-creative activities are crafted. Some of the characters that co-creative practices exhibit are improvisation, staging of events, playfulness, reflective dialogues, situating events, open-ended interpretations, prototyping, capacity building and transformation. A good composition of co-creative practices exhibits a variation over these characters across the practices used, which are chosen with respect to the purpose of co-creation.

Third, these co-creative practices need skilled co-creation *facilitators*. These facilitators, regardless of their home practice, take resourcefulness and participation

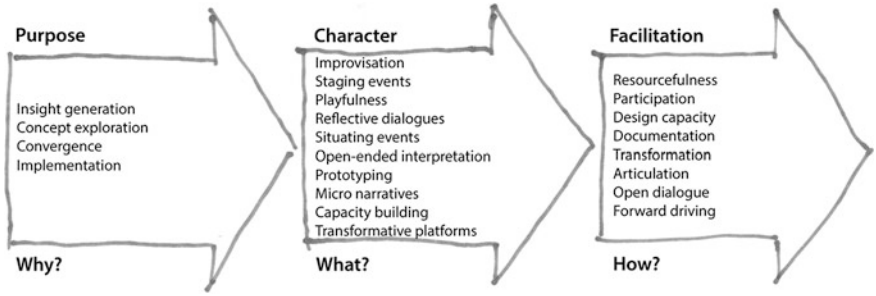

Fig. 6 The three areas of consideration for co-creative practices in service innovation

seriously, and know how to build on the character of co-creative activities. Finally, there is also need for design capacity in the co-creative practices to document and transform produced material into new articulations that invites forward looking dialogue.

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Managing Online User Co-creation in Service Innovation

Lars Bengtsson and Natalia Ryzhkova

Abstract In many economic sectors the users of existing products are the largest source of innovation, particularly so in the service industries. Users as an important source for innovations combined with the advent of web 2.0 have increased interest in online innovation tools. Nevertheless, the understanding of how to systematically generate, converse and exploit user and customer knowledge in the service development process remains limited. The purpose of the paper is to present a framework of capabilities and related management practices to the effective management of different types of online service innovation tools. The framework highlights the development of three types of service innovation capabilities and related processes: (a) online service exploration capability in order to find, direct and motivate users to contribute, (b) online service conversion capability in order to select, develop and appropriate users' contributions, and (c) online service exploitation capability in order to transfer, integrate and combine users' contributions into service offerings. In order to effectively utilize online service innovation tools a company need to develop these capabilities and related management practices. The framework and the management practices are built mainly on previous research on customer co-creation, user innovation and online innovation tools but also on case studies performed by the authors. The framework and management practices will be illustrated by a case study on a major telecom operator company's use of an innovation web site in order to generate ideas, test and design prototypes of new mobile services.

Keywords Online service innovation · User co-creation · Service innovation capabilities · Online innovation tools

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1 Introduction

In many economic sectors the users and customers of existing products are the largest source of innovation, particularly so in the service industries (Cohen et al. 2002; Tether 2005; von Hippel 2005). Users as an important source for innovations combined with the advent of web 2.0 have increased interest in online innovation tools (Prandelli et al. 2006; Ryzhkova 2012). Several approaches using social media, open source techniques and simulations have been proposed in the literature (Sahwney et al. 2005). Nevertheless, the understanding of how to systematically generate, converse and exploit user and customer knowledge in the service innovation process remains limited (Kristensson et al. 2008; Witell et al. 2011). In this chapter we propose the dynamic capabilities view in strategic management (Teece 2007) as useful in understanding the online service innovation process because of its intangible and co-specialized character.

The purpose of the chapter is to present a framework of capabilities and related management practices to the effective management of online service innovation tools. The framework is mainly built on the dynamic capability approach but also on previous research on customer co-creation (e.g. Kristensson et al. 2008), user innovation (e.g. von Hippel 2005), online innovation tools (e.g. Ryzhkova 2012) and on a case study performed by the authors (Bengtsson and Ryzhkova 2013). The framework will be illustrated by the case study on a major telecom operator company's use of a service innovation web site in order to generate ideas, test and design prototypes of mobile service innovations.

2 User Co-creation and Online Service Innovations Tools

Service innovations are usually not conceived in service firm labs or similar firm development units (den Hertog et al. 2010). They are more usually conceived by lead users (von Hippel 1986), user firms (Oliveira and von Hippel 2011), and knowledge intensive business service firms (den Hertog 2000) in a co-creative process (Witell et al. 2011). Service firms rely to a great extent on their actual and potential users for co-creation of service innovations (Michel et al. 2008; Matthing et al. 2004). The service-dominant (S-D) logic (Vargo and Lusch 2004) in service research holds that value could only be determined by the user in usage and in different processes (Michel et al. 2008; Lusch et al. 2007).

Firms engaging in both internal and external sourcing of knowledge exhibit better innovation performance than firms relying only on one or the other (Cassiman and Veugelers 2006). Users have been recognized as very valuable external knowledge source for innovation (von Hippel 1986; von Hippel 2005). Innovation by users has proved to be common in many industries such as juvenile products (Shah and Tripsas 2007), automobiles (Franz 2005), and services like retail banking (Oliveira and von Hippel 2011), and social services (Svensson and Bengtsson 2010). One type

of user innovation mechanism is to involve users through online innovation tools. These can be used to involve users and customers into sharing experiences, spawning ideas, test products or design products (Gangi et al. 2010; Prandelli et al. 2006). However, empowering users with tools and technologies have significant effects on the firm's capabilities as firms' have to adapt to a new way of dealing with users and user knowledge (Ogawa and Piller 2006; Prahalad and Ramaswamy 2004).

Online service innovation tools may complement as well as replace the traditional innovation tools. In relation to traditional tools the online innovation tools have the advantage of being interactive both in relation to the company's managers and other users. Interactive features of the online service innovation tools stimulate the development of proactive user attitudes. Users are then more prone to involve themselves in co-creation of new offerings (Ryzhkova 2012). Online service innovation tools may be broadly categorized into three types according to their particular role in the innovation process (Dodgson et al. 2006; Prandelli et al. 2006). One type of tool concerns *searching and idea generation*. Here firms explore user information through the exploration of user problems, needs and solutions. A second category of online innovation tools is *the prototyping and product/service design* tools, sometimes called user toolkits (Piller and Walcher 2006; von Hippel and Katz 2002). The service company either empowers its users to co-design a solution or implements methodologies to efficiently transfer an innovative solution from the user into the service company's domain. Thanks to the progress in web and information technologies various design software in software development using so called Application Programming Interfaces (APIs) and other design toolkits of this type of online service innovation tools are now readily available for most companies. The third category is *service or concept testing and simulation.* Solutions and concepts are displayed to users so they can react to proposed design solutions. Concept testing using focus groups, pilot or beta users are employed by companies collaborating with customers with the goal of service or concept testing facilitated by improved multimedia capabilities engaging users in realistic and appealing simulations.

3 The Framework of Capabilities and Online Service Innovation Tools

In the long run service innovations need to be repeatedly created and introduced. A capability to continuously introduce service innovations allow for competitive advantage in a changing environment. The dynamic capability approach (Eisenhardt and Martin 2000; Teece 2007) is a theoretical starting point for construction and analysis of dynamic service innovation capabilities overall and here specifically of dynamic online service innovation capabilities. According to Teece (2007, pp. 1319–1320) "Dynamic capabilities include difficult-to-replicate enterprise

capabilities required to adapt to changing customer and technological opportunities. They also embrace the enterprise's capacity to shape the ecosystem it occupies, develop new products and processes, and design and implement viable business models." Thus, the dynamic capability approach is a very appropriate starting point for building our framework of dynamic service innovation online capabilities. For our analytical purposes the "dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting and when necessary, reconfiguring the business enterprise's intangible and tangible assets" (Teece 2007, p. 1319). In analogy with the dynamic capability approach we propose a framework of online service innovation capabilities consisting of three types of capabilities and related management processes and practices: (a) online service exploration capability in order to find, direct and motivate users to contribute, (b) online service conversion capability in order to select, develop and appropriate users' contributions, and (c) online service exploitation capability in order to transfer, integrate and combine users' contributions into service offerings. In order to effectively utilize online service innovation tools a company need to develop these capabilities and related management practices, processes and tools.

To differentiate between operational capabilities and dynamic capabilities is often hard (Helfat and Winter 2011). We hold the view that operational capabilities could be defined as "how we earn a living now capabilities" (Winter 2003, p. 992), i.e., capabilities needed to run the existing operations, and dynamic capabilities as the "capabilities that would change the product, the production process, the scale, or the customers (markets) served" (ibid.). As Helfat and Winter (2011) note there is always change going on in the environment and that blurs the difference between operational and dynamic capabilities. Some operational capabilities are also used in processes such as product development. For our purposes it is sufficient to note that implementation of an online service innovation tool, which is basically an enhanced product development tool, have the potential to change existing products, develop new products, change the production process, the scale of the operations as well as serve new customers. Thus, when a firm introduce and implement a new tool like an online user innovation tool it will cause the development of new capabilities, reconfiguration of existing ones as well as use of existing ones if appropriate. The three online service innovation capabilities is thus a mix of more generally used operational capabilities, capabilities used in other firm processes, as well as more unique and dynamic capabilities only used in relation to the online service innovation tool.

3.1 The Three Online Service Innovation Capabilities

Understanding users, their needs and different user conditions are key in the service innovation process. Moreover, the combinatory nature of a service makes it necessary for service firms to understand how service components could be bundled

and unbundled (Normann 2002) to increase customer value in value constellations (Normann and Ramirez 1993). Thus a service firm needs to have systematic capability to find, direct and motivate users to contribute. This capability is a service exploration capability and parts of this service exploration capability may be based on the web and target online users and different kinds of third-party developers. Third party developers might be professional service firms such as software developers, content developers, marketing and Public Relations firms, but also individuals with particular skills such as software development, industrial design, interaction design, art work etc. In this chapter we only focus the capabilities related to the online service innovation tool. Firms might have other service innovation capabilities but this is outside the scope of this chapter.

3.2 Online Service Exploration Capability

The online service exploration capability consists of three processes. First, there is the process to tap users on detailed user information such as user needs, user patterns, user complaints, user responses to new services and so on. This online service innovation exploration process gives the firm the opportunity to understand the user in more detail and the usage environment of the service. For instance, by engaging in dialogue with users and their complaints about services might not only give information about the complaint itself but also the nature, the causes, the consequences and possibly the remedies of the complaint. For technology-based services such as mobile phone services or Internet services there are usually a lot of complaints around the compatibility of different systems, or rather the lack thereof. An online forum where users can signal these problems and the service firm could respond to them might immediately pay off in increased customer value for the service. More importantly, more detailed knowledge about user problems and needs may signal important unmet user needs. The second exploration process is to tap lead users (von Hippel 2005), experts and third party developers on expert knowledge of different kind. These "users" have deeper insights into user needs, solutions, new technological options and other important trends in general. These lead and expert users usually have stronger incentives than the normal user in solving different kinds of user needs, because they could profit either directly (solve their own problems) or indirectly (they get to supply some part of the solution and get paid for it) from the solution. By engaging in dialogue with lead users the service firm might identify new technological options, new developments on the market and new competitor and industry activities. The lead users are (outside the firm) experts in their fields and thus might hold valuable information about important trends and events. In mobile services smart phone gaming is an important market niche. Lead users in smart phone or computer based games are highly distributed in the world. These might have different backgrounds such as professional software developers to 15 year old school boys who are heavy game players. When searching for concepts for new digital games these persons are very

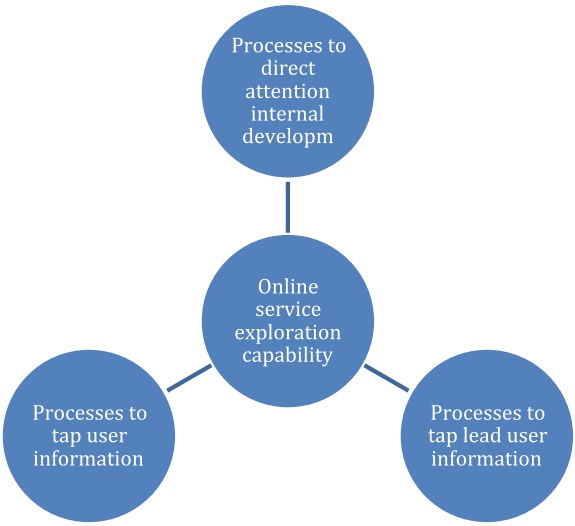

Fig. 1 Online service exploration capability and its processes

important to consult. The second exploration process is designed to tap these lead users of their expert knowledge.

The third exploration process is to direct attention from internal development units, e.g., R&D unit and marketing unit, to the online tool and the contributions from users and lead users. As internal development units are used to source their information internally, or from trusted external partners, the process to monitor and transfer the user information to the development units have to be developed. Otherwise the user information will just stay with the unit responsible for the online tool and the users themselves (Fig. 1).

3.3 Online Service Conversion Capability

The service innovation process is highly interactive and has a shared process character (Alam 2002; Magnusson et al. 2003). A single user idea is in itself seldom the whole story of a new service concept. It may start as a single suggestion from a user but then it will be co-created to a service concept through dialogue, feedback, responses, and perhaps voting. The capability of taking a user idea, a user suggestion, a user complaint, or even a user query to a service concept we have called the online service conversion capability. This capability will ensure that user ideas will receive responses, dialogue and feedback as well as will try to maintain users committed and loyal to the online tool. We have found three such conversion processes. The first conversion process is building loyalty and commitment among online users. Online users will in the longer run not participate in online forums if they are not recognized and rewarded in some way (Gangi et al. 2010). Tools that may be used for this are different kind of recognition systems where more active

and successful users (top innovator, top participator, experts, ambassadors etc.) are recognized and rewarded. Competitions are also commonly used to create interest and distribute rewards. The second conversion process is directing and delineating the user solutions. Not all service concepts are of interest to a particular firm. Many are not in line with the firm's strategy, business model or feasible because of lack of resources and competences. A direction and delineating process will ensure that user generated service concepts stay within certain limits. For technology-based services such as mobile or Internet services choosing a technology platform is an important part of such a process. Mobile services in forms of apps in smart phones are delineated to technology platforms like Apple's IOS, Google's Android or Microsoft's Windows. In such cases the firm need to communicate their Application Programming Interface (APIs) to user developers so they can develop their software that will work on the technology platform. The directive and delineating process does not only include availability of technology platforms but also communication which target customers, which type of services, type of business models that are relevant. For instance, online brand communities which have an online innovation component have delineated their interest into customer solutions which might fit the current brand. The third conversion process is the appropriation process. When new service concepts emanate from users there will be an intellectual property rights issue. The ideas and suggestions have not come internally from the firm and thus it is an issue who owns the service concept. To be able to handle the IPR issues is another vital process when sourcing service concepts from online users. Usual tools to use here are different kind of legal documents that users approve when start using the online forums. Securing the IPRs has to be balanced against the rewards and recognition system used by the firm. A user with valuable service idea has to be recognized and rewarded in a way that seems fair to the user. Otherwise the users will not continue to use the online innovation tool (Fig. 2).

Fig. 2 Online service conversion capability and its processes

3.4 Online Service Exploitation Capability

The exploitation capability is about transferring, integrating and combining the service concepts and service prototypes into the firm's own service portfolio, systems or other firms' portfolios and systems. It includes finding marketing and distributing channels in the firm, combining new service concepts with other current services, reconfiguring current services, or combining them with other firms' current or newly developed service concepts. It also includes aligning internal incentives, transfer information and knowledge and enables continuous learning about the new services. The online service exploitation capability entails three processes. The knowledge process includes internal transferring of information and knowledge and learning regarding new service concepts developed by normal users, lead users or third party providers. Knowledge regarding a new mobile service needs to be transferred to the product and marketing units of the firm or to other firms. Usual tools used are different forms of liaison functions, new product board meetings, Intranet and Internet tools. A second process is the governance process creating incentives for internal or external units to transfer and integrate new service concepts from the development units to the marketing and distribution units in the firm or to other firms.

The third process is co-producing new service concepts from third party developers. While normal users and lead users could be thought of as third party developers, we are here referring to other professional service firms. The combinatory nature of services making them possible to bundle or unbundle (Normann 2002) may attract professional service firms to suggest that their current services (or new services) could be integrated into the portfolio of services of another service firm. This is common practice in hotels, restaurants, mobile services, retailing and so on. Hotels might provide premises for an independently run restaurant, car-hire firm and hair dresser to increase the value of the hotel service. An online innovation tool may be used to test third party service providers' services and to develop them to fit into the service firms' portfolio of services and firm systems (Fig. 3).

4 Innovation World: A Case of Online Service Innovation

Innovation World (IW) was the web innovation site for a major Nordic telecom operator. IW was an initiative from the central R&D-unit aiming to get closer to users and customers and to accelerate innovation in mobile services. The IW site had three user forums. The first forum was for user ideas, comments and dialogues. The second forum was the prototype testing forum where the company itself or independent service developers may launch and test beta versions of services such as new games and let users try these for free and then publish reviews, comments, suggestions for changes and improvements. A third forum was for independent developers, or lead users, of software where software developers could get information and support about APIs and other relevant information and support material.

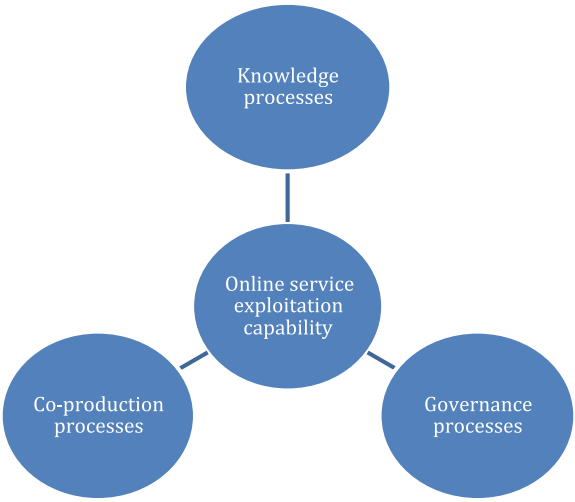

Fig. 3 Online service exploitation capability and its processes

The team managing the online innovation tool, the IW-team, formed a separate unit within the corporate R&D-unit with their own objectives and personnel. The IW-unit was represented through the IW project leader in the top management team of the R&D-function. There were also idea managers among the IW-employees who gave feedback (official) and tried to motivate test users to write reviews. The two major sources to attract new visitors and members were through advertising on Google search and then piggybacking on the company's activities at universities and other schools where they attended and showed their advertising material. The IW-team wanted primarily to recruit lead users to the web site. As lead users where thought of being either software developers and/or heavy users of mobile services such as games the IW-team targeted universities and especially engineering schools to stage different kinds of activities. To differentiate between lead users and more ordinary users was not very easy. The IW-team also wanted traffic and activity on the web site, thus ordinary users also joined the IW. The most active user contributors were recognized in different ways as top contributors and so on. Some were named "ambassadors" and in exchange for early trials of new services, recognition on the site and some gifts in the form of mobile appliances they had to perform more thorough tests of the mobile services, write reviews, comment and vote on other users' contributions and provide their own suggestions. The IW-team recognized winners in contests, the ambassadors, most active contributors and latest and hottest contributions on the web site.

To raise activity on the IW web site, get more ideas, discussions and direct attention of the users as well as get more activity from lead users the IW-team added more content on the web site. They also divided the idea and search generation activities into user expert groups on issues like future network technologies, the digital home, design of interfaces etc. The IW idea manager had to constantly respond to ideas and discussions in order to keep up the dialogues and suggestions.

New interesting material had to be introduced regularly. Internal experts provided specialized material to the expert groups in order to get more directed discussions and ideas as well as tests of new concepts.

Users, especially lead users and independent third-party developers, were from the beginning concerned about compensation and ownership issues. The IW-team had from the beginning a contract that all members of the IW community had to approve which gave the intellectual rights to the firm of everything that was posted on IW. Compensation for valuable ideas, ideas that the firm would start to use in their service offerings, sell to others or use in their internal processes, were promised to be given up to maximum amount equal to about 1.000 US dollars. The compensation was however not satisfactorily when the IW-team launched a competition for independent developers on best software application for mobile networks in the developers' forum. A price sum of some 5.000 € to the winner was given. The IW-team also contacted small independent software developing companies to interest them in developing mobile software and to beta test them on the IW-site. They started with companies they already had a business relation with and then continued to contact companies they had not been working with before. Some third-party developers were suspicious that the large telecom company tried to "steal their ideas". The IW-team then developed standardized contracts regulating the rights of the software companies when test-launching a mobile service on the IW-site as well as specifying the process for licensing the mobile service if the software company and the IW-team wish to do so. The process of licensing and transferring a third-party developed software from the IW-unit to a sales and marketing unit in the company was roughly the same as the process for services developed internally by their own R&D-unit (Fig. 4).

In order to transfer interesting user ideas, user developed software applications and favourable reviews on beta tested mobile services to the company's sales and R&D-units the IW-team set up regular meetings with relevant sales and R&D-units.

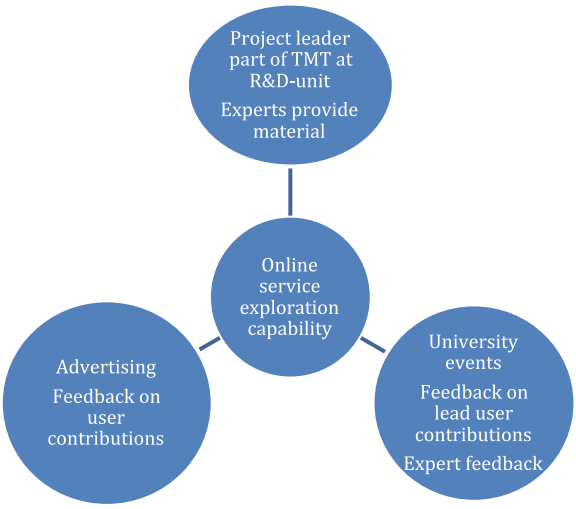

Fig. 4 Management practices and tools used related to the online service exploration capability in the IW-case

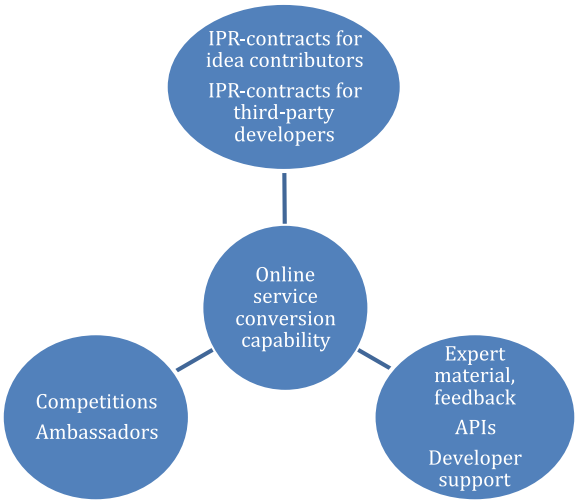

Fig. 5 Management practices and tools used related to the online service conversion capability in the IW-case

These units were after a while appointed liaison managers that had regular contacts with the IW-team. The liaison managers also provided expert material to the web site in order to direct and stimulate some of the flow of ideas and comments by the users. To stimulate marketing units to adopt services developed in the IW-tool into their service portfolios rankings and comments from the users were used to prove market interest. The marketing units also had objectives to meet, such as specific number of new services that created user interest, had to be introduced each year. For independent third-party developers they had a choice to launch them in the telecom company's service portal or launch them in another firm's mobile services portal (Figs. 5 and 6).

Fig. 6 Management practices and tools used related to the online service exploitation capability in the IW-case

4.1 The Creation of New Online Innovation Capabilities and Reconfiguring of Existing Capabilities

The types of challenges the managers experienced in the implementation process of the online innovation tool were initially problems of finding and motivating users and lead users to contribute. The IW-team was piggy backing on the firms' routines to run student events, to increase awareness and interest of the company as a future employer, at universities and the number of users did reach the targeted levels. The marketing of the web site was not good enough in the beginning but later complemented with more general advertising on Google search, competitions and small rewards for recruiting new members. Thus, the member recruiting, that was part of the information tapping process from users and lead users was a reconfiguration of the student recruitment process used by the Human relations unit in the company.

Another challenge for the IW-team, indicating the need for a new or reconfigured process, was the feedback system. In the beginning of IW feedback on user ideas and suggestions was not regularly provided in order to further develop user ideas and discussions, hence the user discussions died. As this was something completely new for the company, new routines, practices and tools had to be developed to form two new processes specific to the online tool—tapping of information from user and lead users. For both processes, routines to give regular feedback, responses and appraisal to users' contributions was important. A system of keeping track of discussions, the level of activity and whether the IW-team had addressed and provided input to the discussions was developed. For instance a user complaint had to be responded to within a certain time period. The normal users often had complaints, more ordinary suggestions, and questions of functionality. The more expert-oriented lead users had more complex and technologically advanced questions, ideas and suggestions. For these users a more expert oriented support had to be organized where internal experts could provide information, responses and the discussion could be organized in specific expert forums. In these expert forums more background information could be provided, for instance on new technological options, and internal experts could organize challenges, put questions and so on. As many lead users also were software developers; programming tools, APIs and software development support had to be provided. These tools were used both to stimulate and tap lead users of their information as well as in a directing and delineating conversion capability.

In addition there were challenges finding and motivating independent developers to use IW as a test platform for their beta versions of mobile services. As the activities picked up in the idea generation and test zones, new type of challenges appeared; challenges related to appropriation. Users, especially lead users started to voice concerns about being used and not compensated for valuable contributions. Compensation in contests and testing of beta services had to be decided as well as policies for compensating other valuable contributions. The mobile service idea contest as well as other discussions in the idea zone provided some interesting ideas for the company. Here the integration problems appeared; mainly the questions of

who should develop the ideas further and how it should be transferred. Compensating users for their ideas resulted in the development of transparent compensation schemes for valuable ideas using compensation schemes from other similar web sites and internal practices on appropriation issues. The practices related to the integration challenges developed partly based on previous practices of regular meetings between sales units and the R&D-unit, appointing liaison managers but also new practices of professional ranking of ideas.

The processes forming the new and re-configured capabilities to handle the challenges related to the implementation of IW came from three different sources; previous internally developed practices, vicarious learning from other firms, and learning-by-doing. In the case of testing beta-services the appropriation and integration practices could all partly be copied from previously developed practices as the company had previous experience of testing their own developed mobile services on users (though not through an open web site). Moreover, the internal routines and contracts for transferring a new service from the R&D-unit to the different business units in the company were also used for transferring and licensing a third-party developed service. The challenges of user ideas and discussions in the idea forum proved much more difficult for the IW-managers to handle as they had very limited experience from this before. Instead they relied on vicarious learning through studies of other similar web sites, such as Dell Storm, in order to figure out relevant practices. Especially the practices of motivating users to contribute were studied. For instance, to get a flow of ideas they started concept competitions intended to run every year. Giving timely feedback to users on ideas and suggestions also proved to be difficult for the managers to handle and here they relied on experimentation and learning-by-doing to create a system which ensured providing timely feedback to user comments.

5 Conclusion

One of the top research priorities in service research is to "capture the ways in which companies are innovating services" (Ostrom et al. 2010, p. 12). Understanding how online user co-creation can be an effective service innovation tool has been the aim of this chapter. In order to further our understanding we have introduced a capability-based framework (Teece 2007) for online service innovation. We base the framework on the capability-based approach in strategic management (Eisenhardt and Martin 2000; Teece 2007) and in service innovation (den Hertog et al. 2010), previous research on user innovation (von Hippel 2005) and online innovation tools (Prandelli et al. 2006; Ryzhkova 2012). Three online service innovation capabilities have been identified, their sub processes and related management practices and tools. The chapter provides a managerially relevant view of the complementarities between external sourcing of knowledge and necessary internal capabilities to reap the benefits of involving users through an online service innovation tool.

While the aim of our framework is to inform both management research and practice a few research and managerial implications must be mentioned. Dynamic capabilities and their consequences such as reconfiguration of existing capabilities and development of new capabilities do not come for free. Implementing an online service innovation tool could result in heavy investments in new capabilities and reconfigured capabilities. Thus, there is a need for understanding the costs and risks of dynamic service innovation capabilities and balanced view on these tools. Some firms may find it relatively easy to develop and make effective use of the online service innovation tools as they have made previous resource endowments that could be utilized (Teece 2007) and thus are in the position to implement low-cost solutions (von Hippel 2005). Other firms have greater difficulty in development of appropriate capabilities for online service innovation tools. Understanding how different resource endowments affect the cost and risks of implementing online service innovation tools is both a future research issue and an important managerial issue.

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Practices for Involving Organizational Customers in Service Innovation

Heidi M.E. Korhonen and Ilari Kaarela

Abstract It is not clear what kind of customer involvement leads to optimal service innovation. An integrative approach is needed so as to link the practices of how a firm involves customers in service innovation to the advantages it is seeking. We apply previous research into service-dominant (S-D) logic and open innovation in order to study the practices for involving organizational customers in service innovation. Our empirical research is based on case studies on six globally operating technology companies known for their innovativeness and service-oriented business with their organizational customers. We describe customer involvement practices based on their openness as *in-house development and supplier co-operation*, *development based on customer insight*, *co-development with customers*, and *development by customers*. We find that, in addition to obtaining information, ideas, and development partners, these customer involvement practices are used for *shaping the context of value co-creation, fostering network effects, living with contingency*, and *engaging in business with meaning*. We also contribute by bringing the research streams of S-D logic and open innovation closer together.

Keywords Service innovation · Open innovation · Customer involvement · Service-dominant (S-D) logic · Practices · Business to business (B2B)

1 Introduction

Our study aims to increase understanding of the practices of service co-innovation with customers and users. We focus on service innovation in the business to business (B2B) context, whereas the previous literature has mainly analyzed

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individual users or communities of devoted users. We seek answers to the following questions: *why do companies involve organizational customers in service innovation, and how do they utilize different practices in achieving these goals*. That is, we examine how the various practices differ in their aims, and how customer involvement practices are implemented.

As our theoretical background, we apply service literature which highlights value-in-context and value co-creation, together with open innovation (OI) literature that emphasizes open systems, inter-organizational knowledge flows, and joint innovation. Our contribution is to link together the research streams of service-dominant (S-D) logic (Vargo and Lusch 2004, 2008) and open innovation (Chesbrough 2003). By positioning ourselves between the practice-oriented view of OI and customer involvement and the more theory-oriented S-D logic we hope to gain insight into customer involvement practices and their goals. Our empirical research is based on six cases of technology companies from California and Finland that have developed service-oriented business.

We start by introducing our theoretical background, innovation in the light of S-D logic, and the paradigm of OI and customer involvement. We explain our methodology and describe our case companies. Then we start outlining our findings and describe the customer involvement practices by structuring them based on the nature of their openness. We then continue our findings by explaining the new insight we have gained from the point of view of S-D logic into customer involvement in these companies, what they use customer involvement for. Finally, we conclude our paper by discussing our findings and their theoretical and practical implications.

2 Innovation in the Light of Service-Dominant Logic

In order to understand the customer involvement practices companies choose to use in their service innovation, we need clear definitions of both ‘service’ and ‘service innovation’. In this section, we highlight important previous research in the area of service innovation and service development, and present how we understand the concepts of ‘service’ and ‘service innovation’.

2.1 From Innovation in Products and Services to Service Innovation

Increasing interest in services and service innovation has sparked numerous reviews of past research into service innovation (cf. Droege et al. 2009; Gallouj and Savona 2009; Toivonen and Tuominen 2009). As proposed by these writers, there have been multiple attempts to define service innovation. These attempts are frequently divided into the perspectives of: technologist, assimilation, demarcation, and

synthesis (Droege et al. 2009). The technologist perspective puts great emphasis on technology. New technologies lead to process innovations that enable improvements in services or even totally new services (Barras 1986). The perspective of assimilation views service development as similar to product development, and proposes that transferring innovation practices from product development to service development is fairly straightforward (Drejer 2004; Nijssen et al. 2006). This is in stark contrast to the demarcation perspective, which proposes a clear distinction between product and service development. Those who share the demarcation view believe that there is a need for autonomous concepts and separate understanding for service innovation (cf. de Brentani 1995; Edvardsson and Olsson 1996; Sundbo 1997).

The newest and most promising interpretations of the nature of service innovation are from the synthesis perspective (cf. Gallouj and Savona 2009). From this perspective, the study of product and service innovation can complement each other; the phenomena of product and service innovations have shared characteristics, but also qualities that differentiate them. The study of product innovations can bring fresh insights into the study of service innovations, and vice versa. Of special importance is the great emphasis on customer involvement in service development.

Moreover, there are characteristics of service innovation that are relevant when trying to understand companies' choice of practices. For example, in many service companies dedicated R&D departments or resources are difficult to identify, and there may even be no deliberate service innovation activity taking place. Instead, service innovations are often emergent changes carried out directly in the process of service provision, and are not recognized as innovations before implementation. As such, service innovations are difficult to detect. Additionally, service innovations can rarely be classified meaningfully into product, process or organizational innovations, as they almost always reflect aspects of each of these classes. Instead of viewing service innovation as a clearly defined process of taking an idea into operation through predetermined development steps, service innovation should be considered to be a more fuzzy process that can also begin by an observed change in operations, or a rapidly applied idea that is later developed further with practical experience. (Toivonen and Tuominen 2009)

As Toivonen and Tuominen have so aptly summarized the definition of service innovation presented in Sundbo's (1997) classic article: "*A service innovation is a new service or such a renewal of an existing service which is put into practice and which provides benefit to the organization that has developed it; the benefit usually derives from the added value that the renewal provides the customers. In addition, to be an innovation the renewal must be new not only to its developer, but in a broader context, and it must involve some element that can be repeated in new situations, i.e. it must show some generalizable feature(s). A service innovation process is the process through which the renewals described are achieved.*" (Toivonen and Tuominen 2009, p. 893)

So as to further develop this definition, we broaden the concept of service by adopting that given by Vargo and Lusch (2004, 2008). In their service-dominant (S-D) logic, service is conceptually distinct from services. They define service as

the application of resources for the benefit of another (ibid.). Benefit is seen as value-in-use, or more recently value-in-context (Vargo 2009; Chandler and Vargo 2011). This value is always uniquely and phenomenologically determined by the beneficiary, and is thus "idiosyncratic, experiential, contextual, and meaning laden" (Vargo and Lusch 2008). By choosing to use this definition, the definition of service innovation above is further enriched with the contextuality of the actors and their reciprocal relationship. Instead of discussing innovation in services, we should be discussing innovation in service, innovation in co-created value, or even innovation in the co-creation of value itself.

Value refers here to the total perceived tangible and intangible benefits and costs. Intrinsic value occurs when something is appreciated for its own sake as an end in itself—whereas extrinsic (or instrumental) value occurs when something is appreciated as means of achieving something else (Holbrook 1999; von Wright 1963). Goods and services can be seen as means to ends and this kind of value-in-use approach accentuates extrinsic value. However, it can be argued that only an experience can be appreciated as an end in itself, for its intrinsic value (Holbrook 1999). Discussion in S-D logic has also emphasized that goods and services are essentially experiences for both individuals and organizations (Schembri 2006). Therefore the experiential nature of value has been included in the most central core of S-D logic (Vargo and Lusch 2008; Vargo 2013).

It is easy and fairly common to mistake value co-creation for co-development of service offerings. In S-D logic, value co-creation refers to the interactional and contextual nature of the process, where value is extracted from the service. All social and economic actors integrate resources to create value for themselves and for others (Vargo and Lusch 2008). This way value is co-created in a network of interacting and resource integrating actors.

2.2 Innovating New Forms of Value Co-creation

When we select the fairly abstract definition of service that Vargo and Lusch (2004, 2008) propose, what then are the outcomes and practical implications for service innovation and business development? Lusch et al. (2007) claim that S-D logic can bring competitive advantage to companies by helping them distinguish between value delivery and value creation, and between embedded value and the co-creation of value. They also propose that S-D logic has to do with viewing employees, partners, and customers as collaborators who co-create value together (ibid.). Thus, they argue that adopting S-D logic thinking makes a company better at grasping the subjective views of the customer on the value of an offering, and better at acting on changes in these views, which ultimately results in competitive advantage (ibid.). Moreover, adopting S-D logic allows companies to focus on innovating customers and with customers, rather than merely coming up with new service offerings (Rubalcaba et al. 2012). Grönroos and Voima (2013) also propose that, with direct interaction, the service provider can influence a customer's value creation.

If we look at service innovation as innovation in the application of resources for the benefit of another, that means we can simultaneously innovate the application of resources (the offering) and the benefit of another (the need to be fulfilled and the beneficiary). Innovating becomes an activity that, on the one hand, is bound by constraints in access to resources and the interests of the possible beneficiaries, but, on the other hand, offers significant freedom of choice. The actors participating in value co-creation can imagine and shape the future together which leads to business ecosystem evolution.

An important phenomenon guiding the evolution of business ecosystems, i.e. value co-creation systems, is network effect. Network effect makes an offering more valuable when more people use it (Katz and Shapiro 1985). Direct network effects occur through direct physical effects, whereas indirect network effects are mediated by the market, as when there is better availability of complementary goods or services (Katz and Shapiro 1994). Theories on network effect suggest that it is not the attractiveness of the value proposition of a single focal actor per se that leads to successful innovation, but how the focal actor is able to obtain support from other actors so as to co-create an attractive total value proposition (cf. Tse 2002).

3 Open Innovation and Customer Involvement

In this section we describe how the view of innovation has developed from a closed producers' model into an open model, and how this has led to an understanding of the significance of customer involvement in innovation practice. We then explain that companies' innovation practices can be categorized in many ways, and we present a typology of customer involvement practices based on how open or closed they are.

3.1 From In-House Innovation to Collaborative Innovation

Schumpeter, the father of the idea of creative destruction, first emphasized the importance of entrepreneurial spirit, and later the importance of large companies' resources and capital for innovation. Following his legacy, most innovation studies used to assume a producers' model as the dominant mode of innovation, and concentrated on the internal organizing of companies' R&D processes. Furthermore, the majority of these studies concentrated on technological innovation, even though Schumpeter had a wider view on innovation, including, e.g., product, process, and organizational innovation. He defined development as new combinations of new or existing knowledge, resources, equipment, etc. (Schumpeter 1934).

Knowledge and resources that are required for innovation are not always found within the boundaries of a single organization. Instead, they are frequently combined from different sources, such as suppliers, research institutions, partners,

investors, even competitors. The logic of OI, popularized by Chesbrough (2003), emphasizes that organizations need to open up their innovation processes and manage network connections and relationships in order to search outside their boundaries, trading knowledge both into the company as well as out from the company. This enhances knowledge flows in and out of the company, enables a wider scale of knowledge combinations, and improves the efficiency of knowledge utilization.

Von Hippel (1988) identified users, manufacturers, and suppliers as important sources of useful knowledge and noticed that the locus of innovation varies; it is often the users who innovate. This is because users benefit directly from innovations and possess the richest needs information (von Hippel 2005). This realization brought to the fore user-driven innovation, where users can be innovators themselves or can feed ideas and improvements into companies' innovation processes. More specifically, users can be defined as firms or individual consumers that expect to benefit directly from using a new offering (Baldwin and von Hippel 2011).

3.2 Changing Innovation Practices

Companies are not simply just open or closed innovators; instead, their OI practices vary. We are still lacking systematic evidence of OI practices and their impact on performance (Ebersberger et al. 2012). Even though the OI model describes why a firm acquires valuable resources from external firms and shares internal resources in interfirm collaboration, the model does not answer the question how a firm does this (Hsieh and Tidd 2012). We need an integrative approach that would link the practices of how a firm involves customers in innovation into the advantages it is seeking.

There have been many approaches and typologies to open innovation practices varying in their specificity, attention to detail, and conceptual view of the innovation process and its goals. In the context of this book chapter, we find especially interesting the typologies that describe how open or closed customer involvement is. Kaulio (1998) looked at different methods of involving customers in product development, and created a framework for analyzing the methods based on the phase of the new product development (NPD) process and the role of the customer in the process. Most methods he studied were used in several phases of the NPD process. He described the role of the customer or the openness of the involvement as designing *for*, designing *with*, and design *by*. When designing *for* customers, customer data is an input of the design process; when designing *with* customers, customers are allowed to select, reject or in other ways react to proposed solutions; when design is done *by* customers, customers are active participants in the design process (ibid.). Others have used similar frameworks, e.g., Desouza et al. (2008) describe the design *for* type as customer-focused and closed innovation, the design *with* type as customer-centered and open innovation, where customers are allowed to be involved in the process at specific points in time, and the design *by* type as

customer-driven and open innovation, where the customer engagement is dynamic, providing ideas anytime and anywhere. Westerlund and Leminen (2011) identify four types: *producer-driven closed*, where development is led by the producer and is closed; *user-centric closed*, where the role of users is more visible, as the producer and its suppliers collect information on users; *user-centric open*, where development is somewhat led by users but each user individual is only involved in the process once; and *user-driven*, where development is truly led by users.

There are also other kinds of typologies describing customer involvement practices. As companies typically regard the innovation process as a stage-gate process with specific phases, customer involvement practices are often described based on the phases in which they can be used (cf. Russo-Spena and Mele 2012). Another way to analyze OI practices is to look at the role the firm itself takes in the OI process, whether it is utilizing the incoming or outgoing knowledge flows, or both, or being an intermediary (cf. Gianiodis et al. 2010). Also the role of the customer can be seen as the correspondent, the tester, the reflective practitioner or the dreamer (Edvardsson et al. 2012). These typologies have been summarized in Table 1.

Table 1 Typologies describing customer involvement and open innovation practices

Dimension	Categories	Reference
Role of the customer in the company's innovation process	designing for customers, designing with customers, design by customers	Kaulio (1998)
	customer-focused (for customers),	Desouza et al. (2008)
	customer-centered (with customers),	
	customer-driven (by customers)	
	producer-driven closed (users as buyers),	Westerlund and Leminen (2011)
	user-centric closed (users as sources of ideas),	
	user-centric open (users as important but disposable sources of information),	
	user-driven (users as long term collaborators)	
	correspondent, tester, reflective practitioner, dreamer	Edvardsson et al. (2012)
Role of the company in an open innovation process with stakeholders	utilizes incoming knowledge flows,	Gianiodis et al. (2010)
	utilizes outgoing knowledge flows,	
	utilizes both knowledge flows,	
	intermediating role	
Innovation process phase	co-ideation, co-evaluation, co-design, co-test, co-launch	Russo-Spena and Mele (2012)

Even when we recognize more and more ways and dimensions in which a company is an open innovator, we should not just accept without proof the idea that the more open an innovation process is, the better it is. We need to better understand the mechanisms through which companies gain advantages from different customer involvement practices.

Users are seen to benefit from user-oriented service development through a better end result, but also directly from the process (Edvardsson 1997; Grönroos 1990). Service providers are seen to benefit from user involvement through better served customers, and through the ideas and knowledge that customers bring. But user involvement can also benefit service providers if it speeds up the innovation process, such as in rapid application (Toivonen 2010), and if it increases the adoption of the service due to the role that users have in the stage at which an innovation is put to use (Sundbo and Toivonen 2011). Mustak et al. (2013) describe the value outcomes of customer involvement for sellers as, for example, economic value, better customer relationships, facilitation of development and innovation activities, and negative outcomes such as customers becoming competitors through knowledge spillover. They also describe the value outcomes for customers as, for example, better fitting offering, improved perceived quality and greater perceived value, economic value, and enhanced skills of creating value from the offering (ibid.).

It has also been suggested that the critical condition for successful innovation is not the openness per se, but the generative potential of relationships to induce changes in the way participants see their world, act in it and give rise to new entities (Lane and Maxfield 1996; Swan and Scarborough 2005; Hopkins et al. 2011; Remneland-Wikhamn et al. 2011; Hsieh and Tidd 2012).

4 Methodology

In this section, we first discuss our research approach and its trustworthiness. We then continue by explaining how we have collected and analyzed our data and give brief descriptions of our case companies.

4.1 Research Approach and Trustworthiness

Our empirical research is based on qualitative case studies that investigate technology companies' service innovation practices with their organizational customers. As Yin (2003) explains, the case study approach should be considered when a 'how' or 'why' question is being asked. Case studies allow us to study the particularity, complexity, and contextuality of each case (Stake 1995).

To assess the trustworthiness of our research, we adopt an alternative terminology brought forward by Guba and Lincoln as the quality criteria for qualitative research: credibility instead of internal validity; transferability instead of

generalizability; dependability instead of reliability; confirmability instead of objectivity (Guba 1981; Guba and Lincoln 1994).

In order to strengthen our credibility, we have included elements of peer debriefing, and the findings were frequently discussed with colleagues within our own organization as well as peers from partner organizations. The interviews were all recorded. Three of the companies were actively involved in commenting on and assessing the conclusions drawn from all the data collected, not only the data from their interviews.

So as to strengthen transferability, we have endeavored to collect rich contextual data. Also, we selected companies generally known as innovative from different industries so as to maximize the range of data collected. So as to ensure dependability, we looked into the public information available on the case companies. Moreover, the researchers analyzed the data individually before moving on to comparing and combining the findings. When assessing the interpretations that we can actually make based on the data, we have to take into account the fact that the views we have gathered are the views of the interviewees and not of the companies. In large organizations, different or even conflicting viewpoints could have been found.

4.2 Data Collection and Analysis

The case companies were interviewed about their OI practices, emphasizing customer collaboration. The interviews were conducted between 2011 and 2013. Material from research meetings and publicly available information were also studied. Initial analysis was conducted by looking for things that could be seen as a practice or an aim, a positive or negative outcome of open or closed innovation or customer involvement. Further analysis was conducted by (i) categorizing the practices based on the openness of customer involvement, and discussing why companies used a certain level of openness, and (ii) studying the companies' aims related to innovation in the light of S-D logic and describing the practices from the viewpoint of these aims.

The case companies all operate globally and are stock exchange-listed technology companies that are known for their innovativeness and have developed service-oriented business. In Table 2 below we present basic data on these companies. The interviewees worked in senior executive, managerial or expert positions in areas of strategy, sales and marketing, and customer service.

Autodesk is the world leader in 3D design, engineering, and entertainment software and services. It develops solutions for the design process. It serves business customers in the fields of architecture, engineering and construction, civil infrastructure, education, media and entertainment, natural resources, product design and manufacturing. Autodesk helps its customers imagine, design, and create a better world.

Table 2 Basic information on the case companies

Company	Revenue 2011	Country of headquarters	Line of business	Strategic quote from interview or web site
Autodesk	USD 1.95 bn	USA	3D design software	Imagine. Design. Create.
Interface	USD 1.05 bn	USA	Modular carpet	Design with purpose
Nokia	EUR 38.7 bn	Finland	Mobile phones	Connecting people
Ixonos	EUR 81.4 m	Finland	Mobile solutions	Dream-Design-Deliver
Vaisala	EUR 273.5 m	Finland	Environmental and industrial measurement	Observations for a better world
TeliaSonera	SEK 104.8 bn	Sweden (interviews in Finland)	Network access and telecommunication services	Offerings based on deep understanding

Interface is the world's largest designer and maker of carpet tiles. They describe themselves as Design with Purpose and are known as a pioneer of sustainability. They manufacture and sell modular carpets to commercial environments including corporate, healthcare, education, retail, hospitality, and government.

Nokia is a mobile products manufacturer and its mission is: Connecting People. Having dominated the mobile world for over a decade, Nokia has faced a tough challenge as the industry has shifted to a war of ecosystems. As we are in this article interested in involving organizational customers in service innovation, we have interviewed Nokia regarding the development of logistics and supply chain services and its cooperation with its operator customers. In the end of 2013, it was announced that Nokia mobile phone business would be acquired by Microsoft.

Ixonos is one of the world's leading developers of mobile devices, mobile software, and mobile internet services. It positions itself as an experimental solutions provider helping its customers to very quickly innovate solutions to business problems or market opportunities that are often fuzzy or changing in this volatile market.

Vaisala is a global leader in environmental and industrial measurement. It helps its customer groups—meteorology services, airports, roads and rail, defence, new weather markets, life science, and targeted industrial applications—to better understand and influence their environment and reduce uncertainty with well-informed decisions.

TeliaSonera is a telecom operator that holds strong positions in the Nordic and Baltic countries, Eurasia, and Spain. It provides network access and telecommunication services for both the consumer sector and the business sector. It is a future-oriented company that is proud of being a pioneer in the telecom industry.

5 Findings

In this section, we first categorize the customer involvement practices based on the nature of their openness and then discuss the purpose of customer involvement based on new insight on innovation gained from S-D logic.

5.1 Practices for Customer Involvement in Service Business Development

In order to describe customer involvement practices based on the level of their openness, we apply a categorization that resembles the ones used by Kaulio (1998), Desouza et al. (2008), and Westerlund and Leminen (2011). We start with *In-house development and supplier co-operation*, where customers are not directly involved. *Development based on customer insight* can be described as closed innovation, where special emphasis is put on understanding customers. *Co-development with customers* is understood as mutual co-operation, where both the company and its customer are active participants. *Development by customers* means a very strong customer involvement. It is notable that companies use different types of customer involvement in different situations, with different customers, at different times, and for different purposes.

5.2 In-House Development and Supplier Cooperation

When a company intentionally does not involve its customers in service development, but instead prefers to conduct in-house development or supplier co-operation, this can also be seen as a practice of customer involvement. For example, *Nokia* has a lot of strong capabilities, such as their logistics know-how, that can be used for developing attractive value propositions. They find it important to get the 'base line' ready in-house. Only appropriate customers are interesting partners for developing things above the base line. Very small companies do not have the resources to take part in co-development, and it is not profitable to tailor offerings for them. *Vaisala* develops its internal service processes in-house, but involves customers in the development of those processes that are directly visible to customers.

It is natural to involve in service development those internal functions that operate in the customer interface. For example, sales and marketing departments often take part in service development, while technology development is typically carried on in R&D departments. When in-house development of services is carried on in several places within an organization, it is important that these departments co-operate closely. *Ixonos* accentuates the importance of bringing together many different kinds of people in-house regardless of the level of customer involvement.

However, there is no one right way to work together. Ixonos expects its people to continuously look for new ways to co-operate.

Autodesk conducts a lot of internal development, but it is also continuously looking for interesting companies to acquire. Because of these acquisitions, Autodesk has development work going on in various locations around the world, which needs to be coordinated and facilitated together.

Collaboration within a global organization is also an important issue for *Interface*. They would like to utilize the knowledge of local units globally. They feel that they need to have strong technological know-how and ability to do things by themselves, because they are too small to rely on acquisitions. However, some acquisitions have been done in the past in order to get access to new regions and product categories. Interface also finds it important to observe and collaborate with SMEs as their innovations would otherwise easily go unnoticed. Innovations made by large suppliers are usually offered to Interface directly.

5.2.1 Development Based on Customer Insight

In the business to business (B2B) sector, sales and customer interface are typically the most important sources of customer insight. Combining development based on customer insight with in-house technology development is currently a very common way for companies to operate. For *Vaisala*, development based on customer insight is the main type of customer involvement. *Interface* also makes very clear the importance of customer insight. The carpets they make must suit the customer needs or they will not sell. *Nokia* strives to understand how purchasing varies with different customers and to develop appropriate services for different kinds of customer. For *Ixonos*, the methods for gaining insight on the customers are included in the Dream-Design-Deliver approach they use.

User communities can be an important tool for gaining customer insight. *Autodesk* works with user communities for this purpose. It does not use user communities to make customers ideate or design new offerings or features, but instead gathers information on how Autodesk products are used by customers. *TeliaSonera* also utilizes user communities in the same way to learn about customers and to spark discussion. It also emphasizes the importance of effective utilization of customer knowledge within the company. Customer insight needs to be operationalized, documented, and shared with the right people.

There are reasons to keep customer involvement at the level of insight instead of actual co-development. One major reason in b2b markets is the importance of each individual customer relationship. Service providers often do not want to take the risk that customers' expectations may rise above the level they are willing to provide. This can easily happen in a co-development relationship. Another obvious reason is the risk of undesired knowledge spillover. In-house development and development based on customer insight enables much better protection of intellectual property than co-development. Furthermore, co-development is very resource-intensive.

Both the company and its customers typically lack time and resources for co-development. Because of this, many companies must settle for development based on customer insight.

5.2.2 Co-development with Customers

Co-development is development cooperation where both parties are actively involved in the development work. It is mutual co-operation in which all the participants can impact the outcome and process of the development. Co-development is especially useful in situations where several parties need to dream together, where information from several different parties needs to be combined in order to create something new, and where there is a need for synchronized changes or actions. When involving customers in this way, a high level of commitment is required for active and beneficial participation. The customer organizations need to see a clear benefit in committing resources to this work. It is up to the supplier company to make such benefits visible to the customer, and to find ways to motivate them. Also, it is important for the supplier company to consider the costs of co-development. These processes are resource-intensive at both ends.

Vaisala suggests that especially large packaged services should be co-developed closely together with customers for whom these service packages are designed. When customers take part in development work, customer needs can be better satisfied, the customer is thoroughly informed of the service and better understands the service agreement it is planning to enter with Vaisala. Incremental improvements to services are not as often explicitly co-developed. Instead, a higher level of radicalness is sought in co-development.

Nokia sees that co-development is clearly different in business markets than in consumer markets. Co-development campaigns with consumers usually demonstrate a tendency towards marketing communication, whereas in B2B markets co-development has to be more fact-based; there has to be a clearly defined problem and a proposition on how to structurally solve it. According to Nokia, customers expect benefits from co-development either through increasing sales or cutting costs. Radicalness is not often sought in co-development projects, as 'larger goals are usually tied to operative work'. The greatest benefits of co-development are manifested in how fast and how broadly improvements are implemented.

At *Ixonos*, co-development is a central part of their Dream-Design-Deliver development approach. The customer is brought into participate at an early stage so as to dream new solutions with dedicated designers. The stages of design, which involve actual design work, and delivery, which stands for the technical solution behind the service being developed, are conducted in parallel to the dreaming stage. In this way, Ixonos can guarantee that the dreams can actually be realized as service solutions promptly and accurately.

According to Ixonos, it is less risky to involve consumers than business customers. This is because individual business customers are inherently more valuable, as each customer represents a large part of the whole market. Also, organizational

customers are always busy, and the necessity for their participation and resource commitment needs to be clearly argued.

When *TeliaSonera* co-develops with its large customers, it helps them understand their needs and imagine what is possible. TeliaSonera finds it important to get into an open discussion and beyond the normal role expectations with the customer. It stresses the use of techniques that help to find even latent needs.

Each company strives to shape the context of value co-creation in a way that allows for continuing operation and profitable business. This dictates what a company wants to develop openly and what it wants to develop in-house. For example *Autodesk* does not want to develop its software code as open source because Autodesk is a software company that draws revenues from code.

5.2.3 Development by Customers

A company can also provide platforms and incentives that guide customers to conduct development work for the company's benefit. This development work can be directed towards improving a solution that the company currently provides, or to develop something new so as to complement existing solutions. Customers can develop their own product or a third party's offering that supports the company through network effects. It is noteworthy that, when development is taken forward by customers, the company might not have complete power over the direction the development work takes. Customers may end up developing solutions that the company finds harmful.

The case of *Nokia* demonstrates that customers are willing to increase their efforts and take a more active role when they have a personal interest in the development work. It can be seen as a spark of enthusiasm that motivates customers to take an active stand and start thinking and creating for themselves.

According to *Ixonos*, many companies previously thought that ideation could be outsourced to customers or users by utilizing, for example, crowdsourcing methods. However, they soon came to the conclusion that nothing particularly special could be found this way. Truly great ideas are rare, and the minority of great ideas might be overrun by the majority of the crowd. Instead, you need to identify the right group of people and give them resources to take ideas further. Large crowds have a different role; they bring momentum to development. Ixonos illustrates this with an African proverb: "If you want to go fast, go alone. If you want to go far, go together."

Autodesk has been following open source software development for a long time. To their initial surprise, they noticed that open source software is not innovative. Instead, development by a large crowd seems to result in steadiness and robustness.

The customers of Autodesk use Autodesk programs for design purposes. All design work done with these products strengthen its market position, as network effects are so apparent. Its customers are free to build new functionalities and add-ins to existing programs. Autodesk is eager to learn about and support new ways for customers to use their products.

5.3 The Use of Customer Involvement Practices

The existing literature highlights the role of customers as sources of information and ideas and as partners in development processes. However, alternative goals for customer involvement came up in our cases as we approached innovation from the viewpoint of S-D logic. These lesser known goals are presented in this section. We start with *shaping* the context of value co-creation, which describes well the core idea of innovation in the light of S-D logic. We continue with *fostering* network externalities, which gives momentum to the first goal. We then move on to *living* with contingency arising from the uncontrollability of unexpected changes in the context of value co-creation, and conclude with the purpose of *engaging* in business with meaning, which we believe to be the recipe to involving customers.

5.3.1 Shaping the Context of Value Co-creation

Many of our case companies talked about dreaming and imagining, about finding out what the value could be, about helping customers understand what is possible, about identifying latent needs, about finding solutions that would benefit both parties, and about creating a better world. This kind of thinking implies that value co-creation and value itself is changing, and that it is possible to tap into this change or even shape it.

Autodesk has an exceptional view to the design world, and they see a profound change in an increasing overlap between the roles and phases around design where things are imagined and actually created. Technology will allow people to imagine and create new and better possibilities in a way that has never before been possible. This will be an important force that will change the world.

Ixonos has this kind of overlapping Dream-Design-Deliver approach. Together with their customers they dream new kinds of end-user experiences and businesses these experiences could create. At the same time, they are closely connected to the know-how about how to actually deliver the intended dream. *Nokia* also highlights that the purpose of co-development is to find mutual value in a new solution. They also bring up the potential of lean thinking. According to lean philosophy, service should be focused only on the elements that generate customer value. Other elements should be eliminated or simplified.

Similarly, *Vaisala* is not that interested in co-development when doing incremental service development. Instead it wants to involve customers in co-development when trying to accomplish something novel.

TeliaSonera wants to help its customers always take a step further. It has recognized that it has an important role in influencing the market, but it also recognizes that it is itself influenced by the rapid changes in the market and by its customers. This multidirectional influencing takes place as TeliaSonera interacts with different actors and stakeholders.

Interface is interested in everything that moves the value co-creation towards sustainability. This is because it differentiates itself through sustainability. The original value proposition of Interface was a plastic-backed carpet cut into squares that was twice as expensive as regular carpet. That is a very tough sell, unless you are able to change what your customers view as the problem to be solved and shape the context of value co-creation. Interface also reminds us that you cannot go too far ahead of the customer; you need to be aware of how big a step your customer is willing and able to take. Shaping the context of value co-creation is typically like a dance, where the customer and the service provider need to be very close to one another and follow each other's moves.

5.3.2 Fostering Network Effects

Several of our case companies discussed the importance of network effects on the evolution of value co-creation. It seems that fostering network effects is an important area for applying customer involvement.

Autodesk is a de facto standard in the design profession. Design projects are carried out together with other people with whom you need to share the same tools. Because Autodesk is so strong, there are plenty of people doing third party development work for it. This work strengthens Autodesk's ecosystem, so it is in their interest to support it. Developers sign up to the Autodesk developer community and receive technical support from Autodesk. The community creates scale and momentum for the ecosystem. In order to motivate others to support your ecosystem and to develop innovations for it, you need to offer possibilities for profit.

Nokia, on the other hand, is in a challenging position in an ecosystem war. In order to recover from its hardships, it needs support from other actors in the industry. It can get this support if the other parties find it beneficial. Therefore, it is essential that Nokia is able to offer interesting value propositions also to parties other than consumers, for example, operators and other actors in the Windows ecosystem. *Ixonos* discussed network effects amongst bird-watchers, for whom it had just developed a new service together with *National Geographic*.

5.3.3 Living with Contingency

In practice, companies' possibilities to influence the changes in the context of value co-creation are limited. No company can control the formation of value co-creation networks, nor even forecast it. That is why, especially in volatile markets, it is important to learn to cope with contingency. Contingency is further increased by the complexity of these networks. Companies can apply customer involvement so as to increase their flexibility and ability to live with contingency.

An example of this is *Autodesk*. The founders originally developed AutoCAD as a side project for an assumed niche market, because it was possible to get the

product to market quickly. As they were unfamiliar with the market, they did not know what to develop. Instead, they built a platform with basic functionality and let third parties develop special functionality on top of it. Later, Autodesk bought some of those companies and incorporated that capability into the product line. Subsequently, Autodesk set up a developer network. Nowadays the market is still in a state of flux. The user communities and the developer network help Autodesk to understand new ways for customers to utilize its offering and to develop new functionality in a volatile market.

Interface cannot acquire as many new companies as larger companies can, but because of their reputation as a forerunner of innovation and sustainability, they get a lot of ideas pitched to them first. This view of the development work done within SMEs is very valuable for living with contingency.

Nokia describes its business environment as extremely volatile. Market situations and customers' needs change very fast. New service needs pop up quickly and require extreme pace from service development processes. The only way to meet these demands is to develop together with customers. Nokia finds it important to understand the problem the customer wants to solve and the change that is taking place. The value of collaboration for both Nokia and its customers is underlined in a volatile market.

Ixonos' Dream-Design-Deliver approach also increases flexibility and speed in the development work. The fuzzy picture of the market is made clear and extra work is removed by involving a variety of stakeholders. However, ideation and development is not outsourced.

Also *TeliaSonera* involves a wide range of stakeholders at multiple levels in the process of learning so as to understand the contextual needs and motivations. It utilizes an advanced questioning technique that also reveals new stakeholders who need to be involved in the process.

5.3.4 Engaging in Business with Meaning

We believe that the secret to involving customers lies in engaging them in business with meaning. An offering being developed needs to create meaningful experiences in order to be valuable to the customer. When people feel that something has meaning for them, they are motivated and ready to commit themselves to the development process and its outcome at a deeper level. Customer involvement can be utilized to find out what is meaningful for customers, but also to simultaneously create such meaning.

Interface declares it is Design with Purpose. It boldly aims to change the world towards sustainability. Some customers are extremely interested in sustainability, but less willing to pay for it. They might not even be ready to change their buying habits so as to buy something of equal price. What Interface's customers really care about is 'better', not greenness. Things need to be sold first as 'better' and next as sustainable. If people like the offering anyway and discover an interesting

sustainability story, customer loyalty ensues. But it is hard to get someone to switch because of greenness.

Interface's mission creates commitment and energy that drives its innovation. The sustainability goal has opened the eyes of both Interface and its customers to new solutions that have brought additional benefits for both. Green innovations have led, for example, to cost reductions, functional improvements and a special fit to certain markets. Interface sees that involving customers in the innovation process is a way to commit them to sustainability.

Autodesk links itself to the meaningful experiences of its customers by helping them imagine, design, and create a better world. It is not trying to convince its customers what that better world consists of, but if the people themselves have the motivation, Autodesk wants to offer them the means to accomplish their goals.

Green values are important also for *Vaisala's* customers, as it is in the business of environmental and industrial measurement. In Vaisala's business, better service is something that has an overarching positive effect. It is a win–win–win that benefits Vaisala, the customer, and the environment.

Several companies, like *TeliaSonera, Ixonos, Vaisala* and *Nokia* talk about the importance of trust and finding out what customers really value, what is meaningful to them. A certain level of trust is needed before co-development can reveal deeper meaning. On the other hand, trust is built and meaning is influenced in the collaborative process. Meaning evokes the motivation of individual people. If motivation is lacking, co-development will not take off.

5.4 Summary of Findings

The case findings presented in this section are summarized in the following Tables 3 and 4. The practices and activities reported here are exemplary; all companies are likely to utilize many other practices of customer involvement in addition to these.

6 Discussion

Our article aims to fill an apparent research gap in understanding the practice of involving organizational customers in the creation of service innovations. We have done this by studying the reason and depth of customer involvement. We have applied previous research on service-dominant (S-D) logic and open innovation as our theoretical background, and have deepened the cross-disciplinary discussion between these converging research streams.

Table 3 Examples of case companies' customer involvement practices

	In-house development and supplier co-operation	Development based on customer insight	Co-development with customers	Development by customers
Autodesk	Acquiring companies	Gathering information on customer and user behavior from user communities		Allowing customers design new functionalities and add-ins
Interface	Co-operating internally	Collecting customer feedback and surveys to gain understanding on customer needs		
	Building internal capabilities			
Nokia	Building internal capabilities	Open discussions with customers on needs and challenges	Improving existing processes	Focusing on specific customers with personal interest in development work
			Showing customers visible benefits to get them involved	
Ixonos	Co-operating internally	Utilizing the dream-design-deliver approach	Ideation in the early stages of innovation, dreaming	Identifying key customers
				Handpicking focus groups
		Open discussion with customers		Crowdsourcing not preferred
Vaisala	Developing internal processes (to make services more efficient)	Collecting customer feedback	Customizing large service packages for large individual customers, especially valuable in radically novel projects	
		Open discussion on customer needs		
TeliaSonera		Gathering information on customers from user communities	Understanding customer needs	
			Helping customers understand what is possible	

Table 4 Examples of case companies' use of customer involvement practices

	Shaping the context of value co-creation	Fostering network effects	Living with contingency	Engaging in business with meaning
Autodesk	Assisting people to imagine and create new and better possibilities	Offering a de facto standard that facilitates collaboration	Building a platform with basic functionality and letting third party developers develop special functionality Cooperating with user communities to understand new user needs	Helping customers imagine, design and create a better world Offering customers means to accomplish their goals
		Supporting third party development work		
Interface	Changing how customers view the problem Keeping synchronous pace with customers, like when dancing		Learning about the front-end of development through pitches	Building customer loyalty by selling things first as better and next as sustainable with an interesting story
				Creating commitment and energy with a mission
				Committing customers to sustainability by involving them in the innovation process
Nokia	Finding mutual value in new solutions	Making interesting value propositions to stakeholders in the ecosystem	Speeding up development process with close customer involvement	Finding out what is meaningful to customers and creating offerings based on meaning
	Eliminating elements that do not generate value			
Ixonos	Dreaming new kinds of businesses and end-user experiences with customers	Offering a collaboration platform for end-users	Making the phases of dream, design and delivery overlap in order to speed up the development process and increase flexibility	Finding out what is meaningful to customers and creating offerings based on meaning

(continued)

Table 4 (continued)

	Shaping the context of value co-creation	Fostering network effects	Living with contingency	Engaging in business with meaning
Vaisala	Accomplishing something novel			Finding a win-win-win benefiting Vaisala, the customer, and the environment—an overarching positive effect
				Finding out what is meaningful to customers and creating offerings based on meaning
TeliaSonera	Helping customers take a step further		Understanding contextual needs through the involvement of a wide range of stakeholders	Finding out what is meaningful to customers and creating offerings based on meaning
	Participating in multidirectional influencing		Revealing important stakeholders with an advanced questioning technique	

6.1 Theoretical Implications

We see that there is great potential in increasing understanding of innovation by combining knowledge from the research areas of S-D logic, service innovation, and OI. Research into OI could greatly benefit from looking at innovation in the light of S-D logic. OI and user-driven innovation emphasize knowledge flows in the legacy of Chesbrough and von Hippel. We would like to extend this discussion to issues related to value co-creation, especially to shaping the context of value co-creation and to engaging in business with meaning.

An S-D logic-based view on innovation is emerging. Research into innovation in services has in many ways followed a goods-dominant (G-D) logic, whereas research in S-D logic has only lately, within the ecosystems view, been able to address the dynamics of innovation. The development of an S-D logic-based view of innovation could greatly benefit from previous research into OI. We emphasize that the structures of value co-creation are in a state of dynamic flux, and that it is possible to take an active role in shaping the context of value co-creation and in fostering network effects. OI practices can also help in coping with contingency. As S-D logic has been criticized for being too metaphorical in its view of value co-creation (Grönroos and Voima 2013), and not being able to analytically specify the roles of customers and providers in a way that would lead to practical implications, we hope that cross-fertilization with the more practice-oriented OI discussion and the introduction of different levels of customer involvement leads to fresh insights into the practice of innovation based on S-D logic.

Both S-D logic and OI are very symmetrical approaches, where either service or knowledge flows in multiple directions. This symmetry is highlighted in network effects, where support is needed from lots of stakeholders in order to ensure the viability of the offering. Therefore, we would like to say that there may be more actors involved in service innovation in the role of "service beneficiaries" than the obvious customers.

In light of our research, customer involvement differs in B2B and business to commerce (B2C) contexts. In the B2B context, the share of each individual customer of the total market is relatively large. This increases the risk related to each customership. This risk constrains co-development, as co-development easily leads to increased customer expectations that the company might not be willing to fulfill. The commercial interest that both parties have in a business context is different from the use interest of a consumer. The commercial interest limits willingness to expose information in an open manner. Different kinds of benefits, costs and resource constraints are relevant from the viewpoints of businesses and consumers. This is why the style of interaction with business customers and consumers is so different, and business customers' motivation for co-operation is often addressed more formally. Business customers are also more complex to understand, as they can be seen as networks of actors in different contexts.

6.2 Practical Implications

It is important for practitioners to understand the possibilities and limitations of customer involvement. It is possible to benefit from customer involvement in many more ways than just the gathering of ideas and information. We emphasize shaping the context of value co-creation, fostering network effects, living with contingency, and engaging in business with meaning. The service developer needs support from a variety of actors. In order to get this support it needs to understand the underlying motivation of each actor and to create mutually beneficial solutions.

Based on the goals of customer involvement, available resources, and the motivation of both parties, there are several levels of customer involvement to choose from. Some issues are best developed in-house or with suppliers; some are best developed based on customer insight. Sometimes development with customers is the best option, and sometimes development by customers. Companies typically use several approaches simultaneously in different situations, with different customers or in different phases of the development work. There are indications that co-development is evolving in a direction where the stages and roles of imagining, designing, and creating are merging, and this will require the development of new competencies.

Concerning new idea generation and the actual development work, it is necessary to consider who and how many actors to involve. Co-development with customers and multiple stakeholders seems to be beneficial for understanding and dreaming the value and value co-creation, and for creating momentum, robustness and network effects. Increasing the number of cooperating parties may, however, slow down the development process, kill radical or bright ideas, and increase the costs of development.

7 Conclusion

7.1 Limitations and Further Research

We have addressed a rather large issue through six company cases based on interviews with individual representatives of these companies. Our work does not provide a comprehensive picture of customer involvement practices in these companies, not to mention the practices of companies in general. However, our research does create a novel understanding of the practices of organizational customer involvement in service innovation.

We encourage further research into service innovation in the light of S-D logic, focusing especially on innovation practices. We believe that combining the research streams of S-D logic and OI is a fruitful approach for this research, especially when carried out with a discussion on the nature of value. Research on innovation can greatly benefit from a wide view to innovation, as in innovating co-created value. Such an approach calls for a better understanding of the phenomena of value and value co-creation.

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Part VI
International Dimensions of Service Innovation

Services Offshoring: Location Choice and Subnational Regional Advantages in China

Given the strategic importance of service offshoring both at the firm and national level, it is critical to understand why service offshoring activities are carried out at particular locations around the world, and the implications of the location choice on service efficiency, service quality and service innovation. Compared to manufacturing offshoring, location decisions for *services offshoring* tend to be based on different rationales, and focus more on factors, such as cultural differences, education level of workers, and telecommunication infrastructure (Bunyaratavej, Hahn and Doh 2008).

Highlight *According to an on-going large survey by the Offshoring Research Network (www.fuqua.duke.edu/offshoring/), companies benefit from service offshoring not only in cost reduction due to access to cheap labor and economies of scale, but also in improving service level because of access to qualified personnel, expertise of service providers, and increased organizational flexibility.*

Innovative Strategies in Servicing International Markets from Ireland

Ireland provides an interesting case study of growing involvement in internationally traded services, with multinational subsidiaries under increased pressure to be more innovative in servicing international markets through service innovations across borders. Innovative tax policies together with innovative managerial practices such as transfer pricing have enabled multinational subsidiaries in Ireland to evolve their operation more globally as well as remain profitable in a relatively high cost location.

Highlight *In order to trace the growth and contribution of Ireland's internationally traded services (ITS) in areas such as computer and financial services, use is made of available sectorally defined trade data (Forfás 2010). Going beyond these aggregate data, however, this chapter also makes use of company case studies of major ITS investments in Ireland to identify some of the innovative strategies being adopted by subsidiaries as they seek to remain competitive both within Ireland and also within their corporations. Additionally, background information on employment and revenue in relation to case study companies is examined, using the annual Irish Times Top 1,000 company database, together with company profile information from web-based sources.*

Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets

One of the challenges for any firm is a sustainable approach to value creation. As firms aim to create additional value for their clients, their output comprises a combination of supplementary service activities supporting the development of, or increased utility of, a good or a service. Products comprising goods and/or multiple service components are complex and add to the logistical and operational challenges of product delivery across international markets. Although the use of innovative technologies for international service delivery are available to the firm, some degree of direct interaction may still be required for various types of supplementary services, such as customized design, installation, maintenance and ongoing after-sales service support.

Highlight *By undertaking an exploratory case study of four Australian firms, operating in industrial markets, this chapter seeks to assess the use of service innovative technologies in the delivery of supplementary services to international clients. For all case study firms, the delivery of supplementary services formed an important component of their international strategy. In particular, the provision of maintenance services was assessed by senior management as their company's competitive advantage. A key finding is a preference for direct delivery of services, in conjunction with technology. This is for two reasons - first, not all service related problems can be successfully resolved via technology; second, is for the firm to retain the ability to provide customer relationship building, specifically for the purpose of enhancing value creation.*

Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments

According to the EIU report published in 2011, 66 % of the economic growth in the next five years will come from emerging markets. Leading the pack are China, India, Indonesia and Brazil with innovations that can be characterized as "need driven" in the low-end market context. India, for example, has pioneered what many have termed "Frugal Innovation" (Zeschky, Widenmayer et al. 2011), where local needs are met with local resources in ways not tried before, driven by shortage of resources in the emerging markets—"resource-constrained innovations" (Ray and Ray 2010).

Highlight *In rural India where the bicycle is still a popular mode of transport and electricity is yet a luxury—but not the ownership of a basic mobile phone in households—Nokia created a phone charger based on the same principle used in powering the bicycle light: a dynamo charged by pedal power (Dhavale 2013). Furthermore, Prahalad, who coined the phrase "bottom of the pyramid" has suggested that the BOP market is a breeding ground for radical innovations based on the market dynamics influenced by social classes (Prahalad 2012).*

Services Offshoring: Location Choice and Subnational Regional Advantages in China

Hao Tan and Stephen Chen

Abstract In a broad sense, service offshoring is a specific type of service innovation because companies engaging into service offshoring will have to inevitably make changes in a number of areas, including internal procedures, business model, service delivery, technology, target customers, service content, legal environment of service, and so on. In addition, service innovation may also drive service offshoring, in that innovative service companies are more likely to internationalize and be successful that way. Effectiveness of service offshoring is largely determined by whether the company is able to choose the 'right' foreign location to perform the service. In this book chapter we extend research on location choice of service offshoring to the subnational level. We examine the patterns of distribution of offshoring activities in China, and determinants of the location selection at the city level. Our empirical study confirmed that the location of offshoring of services firms in China is highly influenced by location-specific factors, in particular the presence of a large educated workforce in the city.

Keywords Offshoring destination · Information technology outsourcing (ITO) · Business process outsourcing (BPO) · Knowledge process outsourcing (KPO) · Spillover effects

1 Introduction

The traditional view of services holds that four attributes of services distinguish them from goods, namely *intangibility, simultaneity, heterogeneity and perishability* (see Lovelock and Gummesson 2004). Among those attributes, the attributes

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of *simultaneity and perishability* imply that services have to be produced and consumed at the same place and time; and services are 'non-tradable', meaning that it is difficult to establish and transfer ownership in services (Doh et al. 2009).

However, these notions of services have been greatly challenged by emerging trends in service offshoring. Services are nowadays not only provided from globally dispersed locations to distant customers, but also are outsourced to external partners and 'traded' among different economic units.

Service offshoring is defined as "the transnational relocation or dispersion of services activities" (Doh et al. 2009, p. 927). Service offshoring activities could be in-house (captive), which are performed by the company itself; or be outsourced by the company to an external service provider. Offshore services are broadly categorized into those primarily involving information technology offshoring/outsourcing (ITO), business process offshoring/outsourcing (BPO), or knowledge process offshoring/outsourcing (KPO). The OECD and the Boston Consulting Group estimate the revenue of the global offshore services industry in 2008 was between US $101 and $157 billion (Gereffi 2010). The phenomenal growth of service offshoring activities is a result of advances in technology and innovation in organization and management practices.

Benefits from services offshoring to both firms and national economies have been widely reported. According to an on-going large survey by the Offshoring Research Network (www.fuqua.duke.edu/offshoring/), companies benefit from service offshoring not only in cost reduction due to access to cheap labor and economies of scale, but also in improving service level because of access to qualified personnel, expertise of service providers, and increased organizational flexibility. Meanwhile, service offshoring has been found to have a significant positive effect on productivity. In the US, service offshoring accounts for around 10 % of labor productivity growth over the period 1992–2000 (Amiti and Wei 2009).

Given the strategic importance of service offshoring both at the firm and national level, it is critical to understand why service offshoring activities are carried out at particular locations around the world, and the implications of the location choice on service efficiency, service quality, and service innovation. Compared to manufacturing offshoring, location decisions for services offshoring tend to be based on different rationales, and focus more on factors, such as cultural differences, education level of workers, and telecommunication infrastructure (Bunyaratavej et al. 2008). It has also been found that different locations tend to attract different types of services offshoring activities, depending on, for example, to what extent the service is interactive, repetitive, and innovative (Doh et al. 2009).

Most research has focused on factor advantages in attracting services offshoring at the national level. However, most popular destinations of services offshoring, notably India and China, are countries with large geographic areas and considerable diversity in resources, industrial structure, economic development, culture, and institution cross subnational regions. Service offshoring activities are highly uneven across regions within those countries, as is their success.

As such, in this book chapter we extend research on location choice of service offshoring to the subnational level. In particular, we investigate what regional factors are of importance for successful service offshoring activities, and what are their implications for service offshoring clients, providers, and policy makers, especially those at the regional level. Our discussions are focused on China, where great efforts have been made to attract service offshoring from other countries. To date, 21 Chinese cities have been designated as 'Service Outsourcing Model Cities', hundreds of Chinese industrial and high-tech parks promote them as bases of service offshoring, and competition among subnational regions for attracting services offshoring is evident. In this book chapter, we examine the patterns of distribution of offshoring activities in China and determinants of the location selection at the city level. Our analysis sheds light on the understanding on how regional heterogeneity within a country impacts on the success of attracting service offshoring.

2 Service Offshoring and Service Innovation

Service offshoring and service innovation are two of the most important strategic issues facing service companies in a globalized economy today. While few previous studies have attempted to examine service offshoring and service innovation simultaneously, there appears to be a strong interrelationship between the two. In a broad sense, service offshoring is a specific type of service innovation because companies engaging into service offshoring will have to inevitably make changes in a number of areas, including internal procedures, business model, service delivery, technology, target customers, service content, legal environment of service, and so on (Tidd et al. 2008). In addition, service innovation may also drive service offshoring, in that innovative service companies are more likely to internationalize and be successful that way (Philippe and Leo 2010). It is therefore reasonable to believe that innovative service companies may be among the first to engage in offshoring activities as a form of internationalization, and enjoy access to global resources.

A closer examination of the two concepts may help understand their interacting relationship. Service innovation is defined as "a new or considerably change service concept, client interaction channel, service delivery system or technological concept that individually, but most likely in combination, leads to one or more (re)new(ed) service functions that are new to the firm and do change the service/good offered on the market, and do require structurally new technological, human or organizational capabilities of the service organisation" (van Ark et al. 2003). Some scholars distinguish between innovation in service companies and innovation in services; and focus on the latter as 'service-based innovation', a distinct type of innovation compared with that in the manufacturing industry that is mainly driven by technological evolution and breakthroughs (Barcet 2010). Barcet (2010) further develops a four-layer model of service innovation, as shown in Table 1. In the

Table 1 The layers of innovation in services

Layer	Focus	Actor(s)	..act on
Layer 1. Service-based innovation: Why and For Who?	The effects of the service (financial or non-financial effects; short-lived or sustainable effects	The client (s)	The system on which the service acts
Layer 2. The concept of service: What?	The service as a result defined and required by the service provider	The service provider	The specificity of the offer and commitments
Layer 3. Organizational innovation: How?	The effectively implemented service in heterogeneous conditions with specific space and duration dimensions	The organization	A coordinated set of activities
Layer 4. The methods and resources implemented: With What and With Who?	Skills, technologies, external resources, effectiveness	Internal and external operators	

Source based on Barcet (2010)

following discussion we elaborate on the relationship of service offshoring with each of the layers of service innovation.

The *first layer* of the service innovation model is concerned with the *question of 'why', or what effect or value will be expected to result from a particular service innovation, and for whom.* Companies engage into service offshoring in order to achieve competitive advantage. Kedia and Mukherjee (2009) suggest that service offshoring companies can potentially yield three main types of advantages by locating certain activities offshore, namely *disintegration-related advantages*, *location-specific resourcing advantages*, and *externalization advantages*. These advantages are detailed in Table 2. When successfully implemented, service offshoring as a service innovation can help improve financial and non-financial performance of the company and create value for both the company and its clients.

In the *second layer*, the service innovation model is concerned with *what change the service provider will make to its offer to the market*. From a service innovation perspective, service offshoring per se may not necessarily change the content of service that the offshoring firm offers to the final clients. However, service offshoring will have *significant impacts on the organization*, which is the focus of the *third* layer of the service innovation model. Service offshoring involves disaggregation, relocation, and reintegration of activities (Jensen and Pedersen 2011). This often requires the organization to make changes to its structure and business processes accordingly. Figure 1 shows a global service offshoring value chain consisting of various activities. The service offshoring company will need to decide which part of the service value chain to be offshored, and how to organize and coordinate the offshoring processes with other activities that remain within the organization.

Table 2 Advantages to be achieved through offshoring

Types of advantage	Nature of advantages
Disintegration-related advantages	Advantages related to increased focus on core competencies
	• Innovation
	• Superior capabilities through resource reallocation
	• Increased quality of products and services
	Advantages related to modularity
	• Increased flexibility
	• Increased speed
	• Cost reduction
Location-specific resourcing advantages	Country level
	• Infrastructure
	• Government policy
	Human capital level
	• Labor arbitrage
	• Knowledge arbitrage
	• Time arbitrage
Externalization advantages	• Advantages related to relationship capital
	• Advantages related to co-specialization
	• Advantages related to mutual organizational learning

Source Kedia and Mukherjee (2009, p. 253)

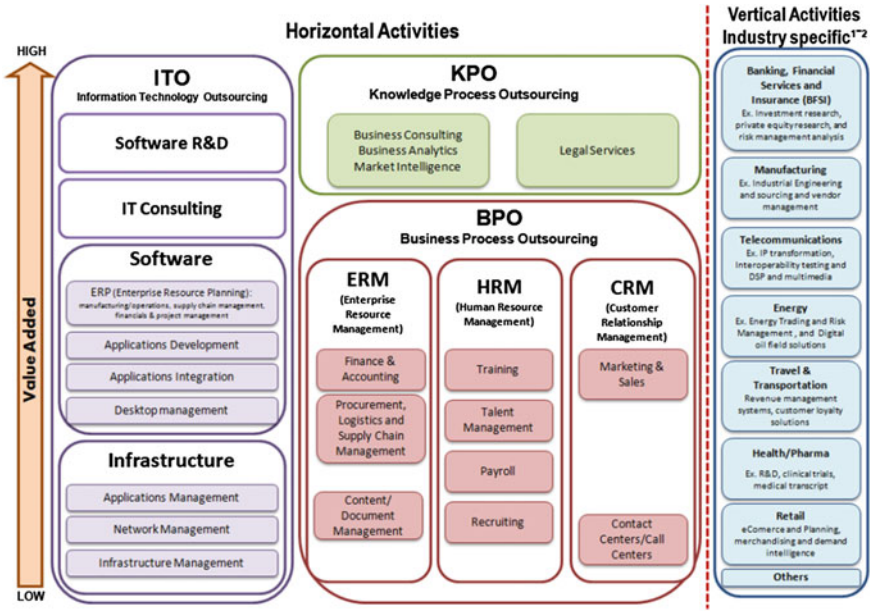

Fig. 1 Offshore service value chain (*Source* Gereffi 2010, p. 5)

Finally, the *fourth layer* of the service innovation model *considers the relationship between the organization and the environment, including the network that the service provider is embedded in* (Agarwal and Selen 2009). Many studies have focused on configurations, or 'fits' between offshoring activities and their task contexts (Aksin and Massini 2008; Luo et al. 2012). For example, the study of Luo et al. (2012) suggests that the task context such as end-customer geo-breadth (as measured by the number of countries that end-users of the services are located in), and type of offshore provider (independent vs. internalized) have significant effects on effectiveness of service offshoring activities. Aksin and Massini (2008) also argue against the notion of 'best practices' in service offshoring, and propose four types of configuration between offshoring companies and the environment to achieve superior results, namely business-minded optimizers, cost watchers, focused adopters, and immature service providers.

After examining the relationship between service offshoring and service innovation, we next discuss the location choice of service offshoring activities.

3 Location Selection in Service Offshoring

Effectiveness of service offshoring is largely determined by whether the company is able to choose the 'right' foreign location to perform the service. Although it is difficult to provide a precise picture in terms of geographic distribution of global offshoring activities, it is generally agreed that countries such as India, China, and Malaysia are among the most attractive offshoring destinations (AT Kearney 2011). However, the attractiveness of global service offshoring locations is activity-specific and changes over time. For example, Latin American countries have emerged during the recent years as a popular destination of information technology-based service offshoring activities by finance and insurance companies, while those in some traditional offshoring locations such as Canada have been declining, as shown in Fig. 2. Figure 3 suggests that countries such as China and Vietnam attract a large amount of BPO and ITO, but few voice-based offshoring activities. Table 3 lists some emerging offshore locations by type of activity in the finance and insurance industry, as identified in a joint study by the Conference Board and the Duke Offshoring Research Network.

The question is then why companies choose certain locations for their service offshoring activities, and what are the implications of location selection for service performance.

3.1 Location Determinants of Service Offshoring Activities

The traditional view of location determinants for industrial activities has focused on factor endowments of a location compared with others. In his well-known *'Diamond Model'*, Porter (1990) argues that certain attributes unique to a location,

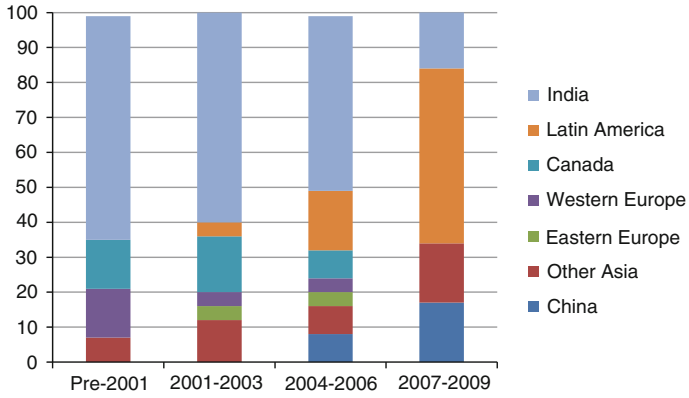

Fig. 2 Distribution of information technology offshoring activities by finance and insurance (*Source* Authors based on data available at The Conference Board (2010))

Fig. 3 Industry activity in 10 popular service offshoring destinations (*Source* Adapted from AT Kearney 2011, p. 13)

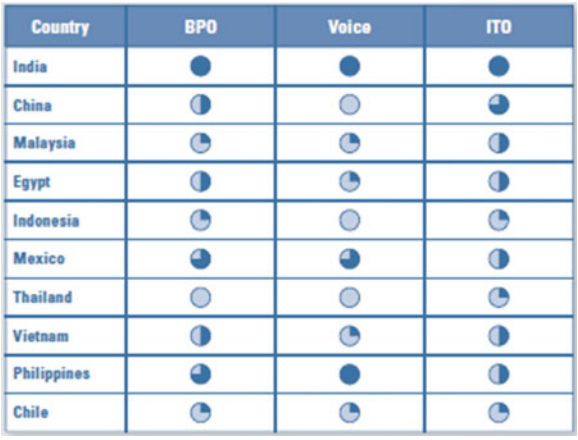

Table 3 Emerging offshore locations

Contact center	Finance and accounting	IT	Software development
El Salvador	China	Australia	Belarus
India	Costa Rica	Belarus	China
Mexico	India (Dehli, Hyderabad, Pune)	China	India (Hyderabad, Bangalore)
			Korea
	Korea	India (Hyderabad, Mohali)	Philippines
Philippines	Philippines		
South Africa (Cape Town)	Vietnam		

Source The Conference Board (2010)

including factor conditions, demand conditions, related and supporting industries, government policies and firm strategy and structure, determine competitive advantage of industries from a given country/location.

As outlined in Table 4, there are different considerations on location selection for offshoring services and manufacturing. For service offshoring, Srivastava (2008) argues that offshoring companies evaluate location attractiveness of a nation based on two dimensions, namely structure appropriateness and labor arbitrage. Structure appropriateness refers to such location attributes as political and economic risk, language of communication, geographical distance, and ICT development and usage. The consideration on labor arbitrage focuses on to what extend an offshoring company can take advantage of labor forces in host countries compared with that in its home country; and is concerned with factors including labor cost, labor practices, and labor knowledge and skills (Srivastava 2008). A more comprehensive list of factors is provided by AT Kearney (Table 5), based on which the consulting firm has developed a Global Service Location Index to evaluate comparative advantages of countries for offshoring service activities globally. Those factors are concerned with financial attractiveness, people skills and availability, and business environment of a host country.

It appears that research on location selection of service offshoring has advanced on two fronts in recent studies. Firstly, many scholars stress the 'fit' among the firm, offshoring activities, and the location. Mudambi and Venzin (2010, p. 1511) argue that offshoring is basically an "attempt by firms to combine the comparative

Table 4 Location considerations for service offshoring and manufacturing offshoring

	Manufacturing	Service offshoring
Infrastructure		
Physical infrastructure	Road/airport/railway	Telecommunications technology
Human capital/labor	Low skill workers	High skill workers; educational level is key attraction
Location-specific factors		
Political risk	More vulnerable to political risk because manufacturing investment is capital intensive and immobile; hence "obsolescing bargain"	Less vulnerable because of labor-intensity and investments provide net employment opportunities for local citizens
Business risk	Firms looking to serve local markets are concerned about factors such as income per capita	Firms do not serve domestic- market. As a result, domestic economic variables of less importance
Government policy		
Government incentives	More relevant to attract investments	Less relevant. For example, there is no need for free trade zones or other incentives
Cost	High set-up cost	Low set-up cost

Source adapted from Bunyaratavej et al. (2008, p. 230)

Table 5 The AT Kearney *Global Service Location Index* metrics

Category	Subcategories	Metrics
Financial attractiveness (40 %)	Compensation costs	• Average wages
		• Median compensation costs for relevant positions (call-center representatives, BPO analysts, IT programmers and local operations managers)
	Infrastructure costs	• Rental costs
		• Commercial electricity rates
		• International telecom costs
		• Travel to major customer destinations (New York, London and Tokyo)
	Tax and regulatory costs	• Relative tax burden
		• Corruption perception
		• Currency appreciation or depreciation
People skills and availability (30 %)	Remote services sector experience and quality ratings	• Size of existing IT and BPO sectors
		• Contact center and IT center quality certifications
		• Quality ratings of management schools and IT training
	Labor force availability	• Total workforce
		• University-educated workforce
		• Workforce flexibility
	Education and language	• Scores on standardized education and language tests
	Attrition risk	• Relative IT and BPO sector growth and unemployment rates
Business environment (30 %)	Country environment	• Investor and analyst ratings of overall business and political environment
		• A.T. Kearney Foreign Direct Investment Confidence Index
		• Security risk
		• Regulatory burden and employment rigidity
		• Government support for the information and communications technology (ICT) sector
	Infrastructure	• Overall infrastructure quality
		• Quality of telecom, Internet and electricity infrastructure
	Cultural exposure	• Personal interaction score from A.T. Kearney Globalization Index
	Security of intellectual property (IP)	• Investor ratings of IP protection and ICT laws
		• Software piracy rates
		• Information security certifications

Source AT Kearney (2011)

advantages of geographic locations with their own resources and competencies to maximize their competitive advantage". As such, whether a location is 'optimal' for service offshoring depends on the interplay of the 'location advantages' specific to a location, and the 'ownership advantages' specific to the company. On the fit between the location of offshoring activities and attributes of the service, Doh et al. (2009) make three hypotheses. First, interactive services tend to be located in foreign countries where ICT infrastructure is more advanced and there is a high use of the language spoken in the home country of the offshoring company. Second, services that are repetitive in nature tend to be located in countries where wages are relatively low and political environments are stable. Third, services with a strong innovative component tend to be located in countries with a high level of education in their workforce. They find evidence to support those hypotheses in a sample of 36,000 service offshoring projects. Similarly, Jensen and Pedersen (2011) also argue for the fit between offshoring activities and local context. Based on the investment development path (IDP) model established by Dunning and Narula (1996), Jensen and Pedersen (2011) suggest that firms will offshore advanced, high-end activities to more developed countries with a knowledge-based economy, and offshore relatively simple, standardized activities to less developed countries with natural resources-based economies.

Secondly, increasing attention has been paid to the dynamic nature of offshoring activities. It is well recognized that comparative advantages across nations and places may change over time, which influence and are influenced by offshoring activities at the location. Economic geographers, Ström and Wahlqvist (2010), argue that the dynamic feature of the interaction between location and offshoring activities may be even more relevant to the service sector. Figure 5 portrays the 'people-place-firm' model as proposed by Ström and Wahlqvist (2010). They suggest that: (1) specific characteristics of a place attract companies to locate their offshoring activities there; (2) in consequence, the industrial structure at the place changes, which may have an impact on the structure of the workforce; (3) the changing workforce and their skills are a part of the location characteristics which again impact on offshoring activities (Ström and Wahlqvist 2010). Yet, we believe that the relationships among place, people, and firm are more complex than the linear and one-way circle as shown earlier in Fig. 4. For example, the relationships can be in reverse where place drives people, which in turn drives the emergence of offshoring service providers (firms).

3.2 From National Advantages to Subnational Regional Advantage

While contextual factors at the national level have been long regarded as a source of competitive advantage and reasons why offshoring activities occur in certain locations, there have been few studies that focus on the role of factors at the level of

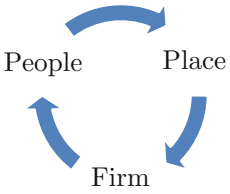

Fig. 4 Dynamics of people, place, and firm in service. *Source* Ström and Wahlqvist (2010)

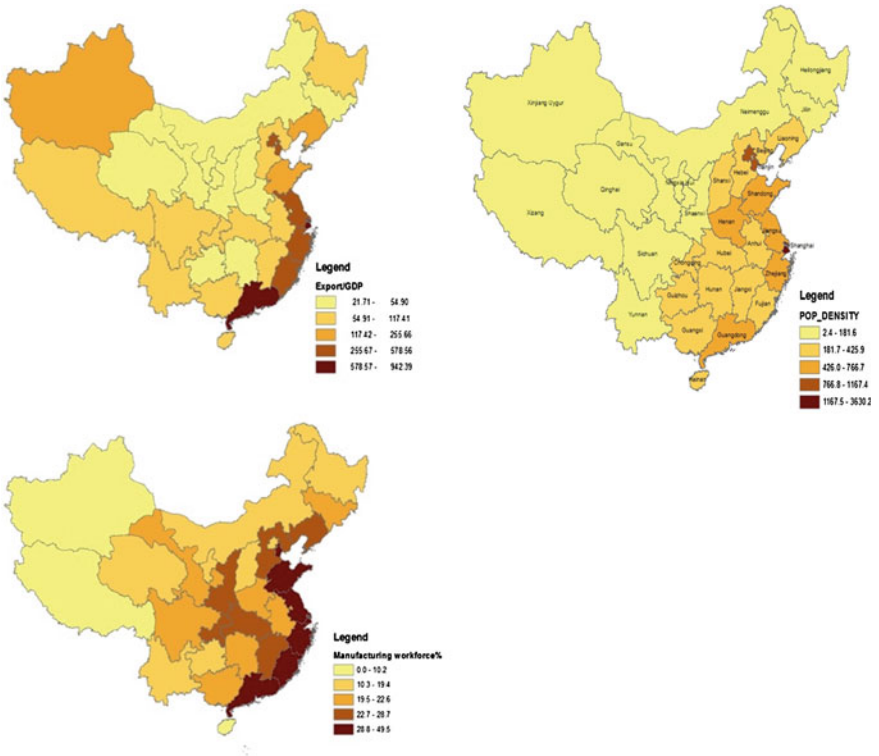

Fig. 5 Population density, exports/GDP, and manufacturing workforce % by province. *Source* Authors based on data from the National Statistics Bureau of China

the *sub-national region* in service offshoring. However, we believe an analysis at subnational level is important to understand location selection of service offshoring and its implication to service innovation, for two reasons. First, there is extensive research in economic geography which has been mainly concerned with spatial distribution and spatial organization of economic activities at subnational levels, focusing on key questions such as why certain economic activities occur at certain locations, and how the economic activity at one place relates to others at its

surrounding areas (Dicken and Lloyd 1990). These questions have been asked in particular in relation to a phenomenon that has been observed in many industries, which is the clustering or geographical concentration of firms, particularly new start-up firms, in certain regions. For example, Weber (1969) explained the dense cluster of heavy manufacturers in Bavaria by noting that their location allowed these firms easy and relatively cheap access to coal and iron ore, which are critical inputs in these industries. Marshall (1961) explained these local concentrations of specialized activity in terms of external economies: the ready availability of skilled labor, the growth of supporting and ancillary trades, and the specialization of different firms in different stages and branches of production. More recent work in the 'new economic geography' (Krugman 1990) argues that such clusters can arise not only because of resources in the location, but also due to the presence of positive network externalities arising from the interaction between firms themselves. Research has shown how the concentration of firms in such industry clusters facilitates innovation and production (Audretsch and Feldman 1996), and how social networks facilitate the start-up of new firms by entrepreneurs (Zucker et al. 1998). These studies, among others, highlight the importance of considering the local environment of firms at a subnational level.

Second, subnational regional factors may be particularly important in some of the largest service offshoring host countries, such as India and China. In the case of China, the country is large (9,598,094 km^2) and geographically diverse with significant differences in economic development across regions. Figure 5 shows how some fundamental demographic and economic variables vary considerably across provinces.

In China, which is geographically large and culturally, socially, and ethnically diverse, differences across subnational regions and cities can be significant. For example, it is estimated that the GDP per capita in the eastern provinces of China is twice that of the central provinces, and three times that of the western provinces (Fan and Sun 2008). Among other factors, the geographic location has been identified as a key factor for economic success of the eastern coastal provinces in China, as it is easier for them to gain access to international markets and foreign investment (Bao et al. 2002). Chan et al. (2010) also found that performance of foreign affiliates varies substantially across subnational regions in both China and the US; with variation more profound in China, possibly because economic and institutional development is more uneven across subnational regions in a transitional economy. The uneven development is also to some extent encouraged by the Chinese government, which has designated certain regions for strategic industrial development, and export processing (Yeung et al. 2009).

Differences in demography, economy, and institutions across subnations and cities may have significant impacts on location selection of offshoring activities and their subsequent success. For example, many regions and/or cities have developed special areas such as special economic zones, export zones, free trade zones, high-tech zones, and so on, which offer incentives for, for example, foreign firms to increase investments in the country (Yeung et al. 2009). In addition, firms in those special areas may benefit from spillover effects (Chang and Park 2005). In their

study on R&D offshoring of Taiwanese firms in China, Liu and Chen (2012) find that there are significant differences in regional innovation systems among subnational regions, which in turn have impacts on motivations and consequences of offshoring activities from foreign companies. For example, among the three subnational regions in China under study in Liu and Chen (2012), the Beijing–Tianjin–Hebei region houses a large number of universities and research institutes with a relatively advanced knowledge generation and diffusion subsystem in its regional innovation system, thanks to the strong science base. On the other hand, the Pearl River Delta has a comparative advantage in its knowledge application and exploitation subsystem thanks to the more developed production systems in the region. Finally, the Yangtze River Delta is superior in both areas compared with the two other regions. As a result, Liu and Chen (2012) argue that Taiwanese firms tend to locate their offshore R&D activities in the Beijing–Tianjin–Hebei region and the Yangtze River Delta to pursue a home-based technology augmenting strategy; while they offshore R&D to areas such as the Pearl River Delta for exploiting and applying home-based technologies.

4 Location of Offshoring Services in Chinese Cities

Figure 6 shows the geographic distribution of offshoring service providers according to the type of service offered. Consistent with our argument that there are significant subnational differences in China, and that city and province location specific factors impact significantly on choice of offshoring location, it is immediately apparent that there is a concentration of offshoring service providers in certain locations.

Most notably, the cities with the greatest number of offshoring service providers are mainly located in the eastern coastal provinces, where coincidentally there are relatively large populations, a relatively large percentage of people employed in manufacturing, and a relatively large percentage of exports/GDP. There also appears to be a difference in numbers of cities offering each type of service, with relatively few cities hosting BPO, KPO, and Voice offshoring service providers as compared with those hosting ITO offshoring service providers. This is confirmed in Table 6 which shows the top 10 cities offering each service and Table 7 which shows the distribution of firms by city population.

As might be expected, the largest number of offshoring service providers are found in the two largest cities, Beijing and Shanghai. Chengdu has the third highest number of providers for two of the services (ITO and KPO), and Dalian for the other two (BPO and voice). However, what is more striking is the difference in number of cities offering each of the four types of services. There is a clear difference in number of service providers that offer ITO services compared with BPO, KPO and Voice services. Clearly far more cities offer ITO services compared with BPO, KPO, and voice services. This is understandable if one considers the skills required for each type of service (see Fig. 1). BPO requires skills in Enterprise

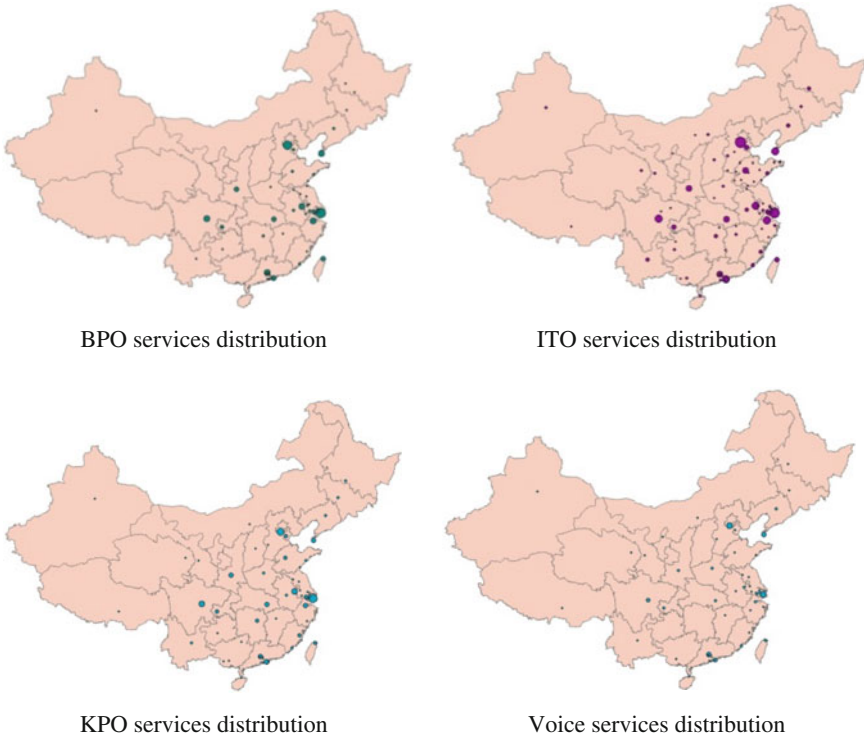

Fig. 6 Geographical distribution of offshoring services in China BPO services distribution ITO services distribution KPO services distribution Voice services distribution. *Source* Authors based on data available from Hadcroft (2011)

Resource Management, Human Resource Management and Customer Relationship Management. KPO requires skills in Business Consulting, Business Analytics, Market Intelligence, and Legal Services which are all skills that not only need a high level of education and experience to develop, but which also require personal contact with the client. Voice service providers need a workforce that is competent with foreign language skills. On the other hand, ITO service providers require infrastructure and skills in software and IT which are more commonly bought and easier to provide at a distance.

In order to study the effects of the city on the location of offshoring service providers, we tested the effects of various city specific variables on the number of offshoring service providers in each city. Negative binomial regression on a sample of 291 BPO, 291 KPO, 512 ITO, and 154 Voice service providers showed that city population, university enrolments as percentage of the population, and FDI amount are all significant variables. Interestingly, industrial output of the city showed not to be significant. The presence of foreign firms as measured by FDI amounts appears to be a significant attractor for all offshoring service providers, and this is consistent

Table 6 Top 10 Cities for Offshoring Services[a]

BPO		ITO		KPO		Voice	
City	Count	City	Count	City	Count	City	Count
Shanghai	39	Beijing	50	Shanghai	36	Beijing	21
Beijing	37	Shanghai	45	Beijing	29	Shanghai	20
Dalian	21	Chengdu	27	Chengdu	17	Dalian	12
Guangzhou	18	Nanjing	27	Nanjing	17	Guangzhou	12
Chengdu	17	Dalian	25	Dalian	14	Shenzhen	9
Hangzhou	17	Shenzhen	23	Guangzhou	14	Chengdu	8
Nanjing	16	Hangzhou	22	Hangzhou	14	Hangzhou	5
Shenzhen	15	Guangzhou	21	Wuhan	13	Xi An	5
Xi An	13	Wuhan	21	Shenzhen	12	Chongqing	4
Wuhan	12	Jinan	17	Xi An	11	Nanjing	4

[a] Excludes Hong Kong, Macau, and Taiwan

Source Authors based on data from Hadcroft (2011)

Table 7 Distribution of offshoring firms by city population size[a]

	No. of BPO providers		No. of ITO providers		No. of KPO providers		No. of Voice providers		Total	
>10,000	99	34 %	154	53 %	90	31 %	58	20 %	179	62 %
5,000–10,000	137	47 %	257	88 %	149	51 %	65	22 %	339	116 %
2,000–5,000	39	13 %	66	23 %	38	13 %	16	5 %	111	38 %
<2,000	16	5 %	35	12 %	14	5 %	15	5 %	42	14 %
Total	291		512		291		154		671	

[a] Excludes Hong Kong, Macau, and Taiwan

Source Authors based on data from Hadcroft (2011)

with other studies which have found that firms in an industry tend to follow each other in overseas expansion (Knickerbocker 1973). Possible reasons include mimetic pressures (DiMaggio and Powell 1983), network externality effects (Chang and Park 2005), as well as the presence of local resources. Firms may rationally expect that if other firms in the industry have chosen a particular location, that there must be some good reason for that choice and so follow the same strategy. In this particular case, the results also show that the percentage of university graduates in the city's population is a significant factor, so firms may quite reasonably be attracted to cities where they are most likely to employ skilled workers. However, public funding on education and science in the city were not significant variables, indicating that there is no direct link to public expenditure in education and science.

Contrary to our initial expectations, the relationship between average salaries and number of service providers in a city is positive, i.e., higher average salary costs increase the likelihood of offshoring firms in a city. This finding, which seems odd at the first glance, is in fact consistent with that of Bunyaratavej et al. (2008). From a parity perspective, Bunyaratavej et al. (2008) suggest that firms tend to offshore to locations where conditions such as wages are closer to those in their home countries. This might also be explained by the fact that, even in Chinese cities where salary costs are relatively high, the salaries are still significantly lower than salary costs in developed countries. This means that for offshoring service providers the main attractor may be the presence of highly skilled workers in the city, which in turn would be reflected in higher salary costs. Alternatively, it may be that the presence of many highly skilled workers in a city increases the average salaries in the city.

5 Conclusion

The rapid growth of IT and knowledge services offshoring in China shows that the four attributes of services that are commonly cited as distinguishing them from manufacturing (intangibility, simultaneity, heterogeneity, and perishability (see Lovelock and Gummesson 2004) are not necessarily a significant barrier for offshore service locations. However, it is clear from our empirical analysis that location-specific factors are still important in determining the location of offshore service providers. The critical factor that stands out from our analysis is the presence of skilled workers in the location. Our findings are consistent with other studies which have found that IT and knowledge services offshoring is being driven largely by a global search for talent (Lewin et al. 2009).

Yet, this chapter shows that firm location may be constrained to particular geographic locations, which manifest at the city level in the case of a large country such as China where the distribution of highly skilled IT workers is highly unevenly distributed across the country. This also opens up questions for smaller countries in exploring whether they would experience the same level of concentration when

travel time between cities is smaller, and there is a more even distribution of skilled workers within the country.

While the four service attributes may still be important in the case of some services in determining the point of consumption and the location of clients, this may be less critical for IT and knowledge processes services provided through the Internet.

In conclusion, the study in this chapter confirmed that the location of offshoring of services firms in China is highly influenced by location-specific factors, and specifically the presence of a large educated workforce in the city. Contrary to our initial expectations, higher average salaries in the city were positively related to the likelihood of location by an offshoring service provider in that city. This may reflect both the relative shortage of highly skilled workers in China, as well as the relatively low salaries in China for skilled workers in comparison to their counterparts in developed countries. These findings were based on supply side factors, such as the number of offshoring service providers, without taking account of demand side data, such as data on the clients of offshoring firms, or the amount of offshoring services they purchase. So while we infer that a large amount of offshoring services takes place where there are many offshoring service providers, this may not always be the case. For example, it was not known whether all or only some of the activities associated with each service were carried out in each location where the offshoring service provider was present. Given the ease with which activities in the value chain of off-shored services can be disaggregated, it is possible that not all activities are carried out in each location. Future research could verify the factors influencing location choice by surveying clients directly, and by obtaining more detailed data on where services are provided. More detailed data on location of different activities in the value chain would enable analysis of the distribution of activities within each firm and enable researchers to see how city location-specific activities influence distribution of activities within each firm.

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Innovative Strategies in Servicing International Markets from Ireland

Seamus Grimes and Patrick Collins

Abstract This chapter examines the innovative evolution of Ireland's internationally traded services sector in the context of the increased significance of servicing international markets by foreign companies in Ireland. The policy adjustments made to ensure that Ireland continues to be a competitive location for such activity are enhanced by service innovations arising from the public sector. Some of the difficulties of understanding the innovative reconfiguration of multinational subsidiary activity involved in internationally traded services relates to traditional conceptualisations of services as being a distinct sector of activity mainly confined to a specific domestic economy. Ireland provides an interesting case study of growing involvement in internationally traded services, with multinational subsidiaries under increased pressure to be more innovative in servicing international markets through service innovations across borders. Innovative tax policies together with innovative managerial practices such as transfer pricing have enabled multinational subsidiaries in Ireland to evolve their operation more globally as well as remain profitable in a relatively high cost location.

Keywords Service innovation · Public sector · Multinational subsidiaries · International markets · Foreign direct investment (FDI) · Innovative tax policies · Innovative management practices

1 Introduction

In order to understand the ability of a small open economy like Ireland to attract and maintain foreign direct investment (FDI), in an increasingly internationalised and to some extent globalised economy, it is necessary to explore the key factors underlying

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this internationalisation. While multinational corporations play a dominant role in this internationalisation, there is some scepticism about how truly global such companies are in their organizational strategies (Dicken 2007). Friedman's (2005) view that communication and transport technologies facilitate a model of almost 'anything anywhere' is disputed, and while emerging regions in Asia are competing strongly with more developed regions for FDI, factors such as face-to-face contact continue to be important for locating investments close to key markets. Yet innovative organizational models of multinational corporations, associated with growing trends towards outsourcing and offshoring result in increasingly fragmented value chains (Sturgeon 2003). In an attempt to conceptualise this more complex geography of economic activity both network and value chain frameworks are used to evaluate the changing competitiveness of particular locations (Coe et al. 2008; Gereffi 2005). Such frameworks provide insights into the innovative strategies of corporations involved in reorganizing their investments in response to major changes in the geography of competitiveness. As locations compete for additional inward investment, subsidiaries within corporations must be more innovative to compete for higher value added functions to sustain their operations (Collins and Grimes 2008).

Our continued dependence on aggregate economic statistics, which relate primarily to distinct economic sectors and to specific domestic economies, hinder to some extent, our ability to contextualise the role of particular locations within a global context (Sturgeon 2008; OECD 2013). The adoption of multiscalar and relational perspectives contribute towards a better understanding of the increasing transnational logistical and supply chain management role of subsidiaries in particular locations. These developments involving increased intra-firm activity and the expansion of internationally traded service activities such as business and financial services place considerable pressure on multinational subsidiaries to develop innovative strategies in order to remain profitable.

This chapter will explore these issues in the context of the increased pressure on multinational subsidiaries in Ireland to be more innovative as they evolve their operations towards becoming a significant servicing hub for the European, Middle East and African (EMEA) region. Before the current financial crisis which has had devastating consequences for the Irish economy, Ireland's foreign direct investment model was already under considerable pressure in terms of its international competitiveness. Rather than simply focusing on cost issues in isolation, this chapter will adopt a broader perspective in examining how both subsidiaries and policymakers in Ireland have sought to exploit innovative tax structures, among other measures, to facilitate Ireland's evolution as a competitive international servicing hub (OECD 2013).

In order to trace the growth and contribution of Ireland's internationally traded services (ITS) in areas such as computer and financial services, use is made of available sectorally defined trade data (Forfás 2010). Going beyond these aggregate data, however, this chapter will also make use of company case studies of major ITS investments in Ireland to identify some of the innovative strategies being adopted by subsidiaries as they seek to remain competitive both within Ireland and also within their corporations. Additionally, background information on employment and revenue in relation to case study companies is examined, using the annual Irish Times

Top 1,000 company database, together with company profile information from web-based sources.

Apart from Accenture, the global consultancy company, the remaining four case study companies include Microsoft, Oracle, Symantec and Novell, all global software companies. These companies are selected as being typical of many major investments in Ireland's internationally traded services sector, and among the key functions carried out by these companies in Ireland are software localisation, internet sales, technical support, shared services, centralised accounts, finance, procurement, regional headquarter functions and R&D. Many of these functions cover international markets both within Europe's single market and beyond. A series of unstructured company interviews with senior management and lasting at least an hour in each case were carried out, as were additional interviews with personnel in state agencies such as IDA Ireland and Forfás (the industrial policy advisory agency). Particular attention was given to policy issues in relation to evolving tax strategies being developed by subsidiaries in Ireland. Although case study research is frequently criticised in relation to the representativeness of companies chosen for interview, these interviews provide useful insights into the innovative strategies adopted by subsidiary management which were not evident from the aggregate data (Hardwick 2009; Phelps and Fuller 2000). Rather than depending on sources which focus primarily on the specific indicators of the local economy, the use of multiple sources of evidence can help to contextualise the contribution of subsidiaries within a transnational context. Taken together these sources provide evidence of innovative activity both by the subsidiaries and policy makers to ensure the sustainability of internationally traded services investment in Ireland.

Having explored the theoretical literature related to factors influencing the changing FDI competitiveness of locations like Ireland and the impacts on multinational subsidiary reconfiguration, the chapter will then trace the recent evolution and growth of Ireland's internationally traded services activities within the FDI sector. Expansion in exports of computer services, business services and financial services and the growing imports in royalties and licence fees are examined in detail to illustrate the significance of intra-firm trade between multinationals and their subsidiaries located in Ireland. The growing attention being paid by both media and government authorities in both Europe and the US to by multinationals of innovative taxation strategies to maximise the exploitation of Ireland's low corporate tax regime is also examined. The final section examines the subsidiary evolution of case study companies illustrating the range of innovative strategies being employed by multinational subsidiaries to sustain their competitiveness.

2 Globalisation and Transnational Networks

Scholars continue to grapple with the development of effective conceptual frameworks for explaining the implications for locations, regions and territories arising from increased internationalisation of services, with some arguing that the most

recent phase in this process is associated with the global economy functioning as a single entity to a greater extent than heretofore (Dicken 2007; Sturgeon 2008; Yeung 2009). Some researchers argue that globalisation has been exaggerated, noting that service firms average 83.3 % of their sales within their home triadic region (North America, Europe and Asia-Pacific), as against 64.8 % for manufacturing firms (Rugman and Oh 2008). Rugman and Verbeke (2008) further argue that the globalisation of services is restricted to a few subsectors with outsourcing of IT services to India being an exception to the rule. It must be acknowledged that, even within Europe's single market, political opposition at the domestic economy level to the European Services Directive has slowed the internationalisation of service activity, although recent research illustrates how multinational companies are developing innovative strategies in servicing international markets (Massini and Miozzo 2012). While the more innovative multinational corporations are in the process of developing globalised organizational structures, the activities of many large companies continue to be organized within the major triad regions (Dicken 2009).

With the growth of outsourcing and offshoring of functions to lower cost regions in recent years, facilitated by more sophisticated IT systems, the organization of production networks and value chains by multinational corporations has become more dispersed geographically, with the increasing integration of emerging regions into those networks (De Backer and Yamano 2012). Within a European context, the development of the single market of more than 500 million people, which is highly differentiated in terms of language and culture, has facilitated more innovative reconfiguration of how corporations service this market in a more consolidated fashion, with the development of shared services centres in particular locations. These evolving transnational models have important implications for the changing relationship between major foreign investments and the states in which they are located, with some locations becoming particularly attractive for centralising servicing functions partly related to more innovative tax strategies. The increasing use of low taxation locations like Ireland and the Netherlands by multinational companies, particularly for internet-related activity has been receiving increasing attention by the business media and state revenue authorities. Attempts by individual states to apply traditional domestic economy taxation models to companies involved in transnational activities is creating significant challenges and reflects the tensions arising from outdated institutional arrangements for a more globalised economy (Azam 2011).

Domestic economy-related statistics on trade and investment provide limited insights into the level of control that firms in particular locations exert over activities they carry out internationally, and how this control is translated into added value for locations. A lack of transparency of tax strategies and transfer pricing practices associated with the movement of intellectual property between headquarters and subsidiaries in low tax locations presents challenges for researchers, and increasingly for tax authorities (Desai 2009; Dunning and Lundan 2008). Innovative taxation strategies of multinational companies can give rise to complex patterns of international production and servicing of markets, which may reflect inflated revenues for particular locations bearing little direct relationship to the

value being added in those locations. The transfer of intellectual property from regions of origin, often in high taxation locations such as the US where much of the values is added, to low taxation locations such as Ireland and the Netherlands, where some value is added to legitimate such beneficial movements, is not uncommon among the innovative tax strategies being exploited by multinational companies. Increasingly particular countries or subnational regions are rarely responsible for the delivery of services in their entirety, and thus have come to specialise in some element of the global value chain (Sturgeon 2003). Hence the need for case study companies to help identify how subsidiaries innovate to remain competitive in particular locations.

Fragmenting of the value chain associated with outsourcing and offshoring, resulting in a globally integrated supply chain in some sectors, is a major consequence of globalisation, and has important implications for the changing geography of foreign investment (Gage and Lesher 2005; Massini and Miozzo 2012). Related to these changes is the changing geography of comparative advantage and differences in rates of growth and decline in major markets, with the growing integration of formerly peripheral regions into the transnational networks of multinational companies (Gereffi 2005; Yeung 2009). This results in increasingly intense competition between regions for inward investment with some suggesting growing opportunities for innovative peripheral regions (Ó Riain 2004). Major centres in India such as Bangalore have attracted significant inward investment in internationally traded services amenable to digitalisation (Dossani and Kenney 2003). The increased fluidity of international mobile investment is a matter of concern for policymakers who are focused on embedding such investment in local economies, but more innovative policy approaches seek to upgrade investment through subsidiary evolution by substituting lower skilled functions being offshored to lower cost regions by more sophisticated and therefore more sustainable activities. In seeking to attract more innovative investment, developed regions promote greater involvement in knowledge-based activities such as R&D (Oxelheim and Ghauri 2008).

Although significant emphasis continues to be placed on locationally-specific cost factors such as labour and other business-related costs, innovative policymakers are seeking to develop packages, including tax strategies, for attracting new forms of investment such as R&D and intellectual property management by subsidiaries involved in servicing international markets. Factors such as labour costs and infrastructural quality may have been important in the initial attraction of inward investment, but over time the availability of knowledge workers, particularly in areas such as software engineering and management together with the potential overall return on investment which a location can deliver, are likely to become more important, and hence the focus on developments such as tax allowances for R&D, zero tax rates on royalty payments, and double taxation agreements between countries. Such innovative policy measures are essential to facilitate the necessary subsidiary evolution in a more competitive global environment. Part of

the sustainability challenge for transnational subsidiaries in high cost locations is to expand their servicing of markets from more regionalised towards a more global model, while exploiting the comparative advantage of lower cost regions for more routinized functions (Ernst 1997).

3 Offshoring and Fragmenting Value Chains

With increased globalisation multinational corporations have evolved from a traditional hierarchical structure to heterarchical or decentred models that involve a greater level of shared decision making within different parts of the organization, and also from vertical integration to horizontal relationships associated with outsourcing and offshoring (Dunning and Lundan 2008; Dicken 2009; Zanfei 2000). More innovative conceptualisations of the geography of services, capable of transcending local and regional economies, are required in an era when outsourcing and offshoring of business functions has become more prominent (De Backer and Yamano 2012). New technologies which facilitate coordination and monitoring of fragmented value chains help to redefine the boundaries between intraorganizational hierarchies and markets, resulting in a lesser role played by distance and proximity (Storper 2009). The new distributed contexts associated with these changes result in organizational dimensions of economic activity acquiring greater significance than its geographic pattern. A balance is necessary, therefore, between both globalist and localist perspectives in understanding the forces both for clustering and dispersal at work in these new configurations, with routinized services more easily dispersed and activities involving more complex decision making more likely to be clustered (Sturgeon 2003). Some suggest that, rather than skill level, the key distinction in deciding what activities are more likely to be offshored is related to their potential to be delivered electronically. Leaving aside the more extreme and simplistic views suggesting that anything can be located anywhere, language, cultural characteristics and proximity and time to market continue to be significant factors influencing the optimum way for servicing international markets and the associated inward investment decisions (Mithas and Whitaker 2007; Christopherson et al. 2008).

In making such decisions, companies distinguish between core and support functions, with non-core functions more likely to be outsourced either to specialist companies or to other subsidiaries within the same corporation, facilitating subsidiary evolution to more sophisticated functions in developed regions (Massini and Miozzo 2012; Lanz et al. 2013). Core functions include strategic management, product development, sales and marketing, account management, procurement, logistics and distribution, while support functions might include corporate governance such as legal, finance and accounting, HR, IT systems and customer and after-sales services (Sturgeon 2003).

4 The Evolving Model of Servicing International Markets

Multiscalar perspectives associated with transnational production networks allow for a more contextual analysis of the local components of inward investment in particular subsidiaries within a broader international context. A network framework allows for a methodological shift from a localistic perspective focused on a domestic market to an analysis of how different components of the value chain are allocated over time relating to changing comparative advantage (Massini and Miozzo 2012). Such an approach examines the on-going bundling and unbundling of multinational business functions, as they search for optimum solutions for servicing global markets (Lanz et al. 2013). The changing competitive dynamics of cost, flexibility and speed to market are important drivers of the adoption of particular spatial, organizational and technical fixes by corporations (Yeung 2009). The more complex spatial arrangements of investments may influence the overall rate of return on investment of subsidiaries in particular locations, partly because business conducted in certain countries, in Europe's single market, for example, may be reported financially in other jurisdictions for tax purposes, which renders simplistic ranking of investment locations based on only local factors somewhat redundant. Despite the greater levels of international economic interdependence arising from the functional reintegration of spatially dispersed production, some policymakers continue to view inward investment locations mainly within a national context (Memedovic 2008).

The network perspective, therefore, focusing on the circulation of capital, knowledge and people provides a more realistic appraisal of the contribution of particular multinational subsidiaries in the servicing of international markets (Coe et al. 2008). Global networks of production create considerable demand for a wide range of transactional and support services such as logistics and supply chain management, which can be outsourced either to specialist service firms or allocated to particular subsidiaries within a multinational corporation (Lanz et al. 2013). With the growth in outsourcing and offshoring, the challenge of managing more complex supply chains is reflected in the growth of internationally traded services such as business services, financial services, R&D and IP management, allowing more innovative subsidiaries to evolve their profile with more sophisticated functions (Nordas 2008). With the offshoring of production to lower cost regions, the activities of major technology corporations in more developed regions become more focused on core competencies associated with intellectual capital. With such an evolution the traditional sectoral distinction between goods and services becomes more difficult to sustain, as separate service and manufacturing companies are being replaced with manufacturing/service companies or conglomerates (Daniels 2000; Jack et al. 2006). This is not to suggest that service-specific firms are not an important component of internationally traded services, particularly in the financial sector, but there is also growing share of workers in the manufacturing sector engaged in service-related activities (OECD 2007).

As additional rounds of investment are decided, with major implications for regions in which multinational subsidiaries are located, greater attention needs to be given to the highly contested nature of intra-firm relationships (Phelps and Fuller 2000). Since the ability of subsidiaries to compete effectively for more sophisticated functions and projects is related to the on-going benchmarking with sister subsidiaries, rather than focusing on local linkages and embeddedness, policymakers and subsidiary management need to place greater emphasis on the innovative ability of subsidiaries to adjust to rapidly changing circumstances (Gorg et al. 2009). Seeking to increase the level of R&D activity associated with subsidiaries may not be a sufficient response as opposed to placing greater emphasis on a subsidiary's organizational innovation for the servicing of international markets (Costa and Filippov 2008). Such an approach would emphasise the 'relational embeddedness' of a subsidiary within the corporation network as it seeks to evolve its profile towards more knowledge-based functions (Begley and O'Gorman 2005). Within an increasingly globalising context, rather than their traditional preoccupation with embedding foreign investment locally, policymakers need to place a greater emphasis on promoting innovation capacity (Storper 2009; Berndt and Boeckler 2009).

5 Competing for Inward Investment

In evaluating the potential of particular locations to attract increased inward investment, it is argued that closer attention needs to be paid to the evolving role of existing investments within an international context. Yet, in many cases, national policymakers and to some extent the management of multinational subsidiaries continue to be focused on benchmarking local factors influencing competitiveness. Some argue, that rather than a narrow focus on labour costs, factors such as productivity and innovation, can contribute an attractive rate of return on investment even in relatively high cost locations (Porter and Ketels 2003). Despite the on-going critique of narrowly based measures of competitiveness, for some 'the new competitive foreign investment environment has prompted analogies between competition among governments for foreign investment and competition among firms for market share' (Wells and Wint 2000, p. 4).

The on-going monitoring of Ireland's competitiveness for inward investment has sought to include a wider range of indicators such as taxation, regulation, finance and social capital, physical infrastructure and knowledge infrastructure, with a growing focus on the role of innovation (National Competitiveness Council 2010). The most interesting additional indicator in recent reports, which moves beyond the traditional preoccupation with cost factors is the rate of return on investment to US subsidiaries in Ireland. In addition to physical infrastructure such as an effective transport and communications network for attracting investment in high technology and knowledge intensive services, researchers are also including softer factors such as the availability of a well-educated manpower and technological capability which

Table 1 Index of Foreign Direct Investment (FDI) Stock, 2000–2009

Base = 2000	Irish FDI stock	EU FDI stock	World FDI stock
2000	100	100	100
2001	105	109	106
2002	144	133	117
2003	175	173	142
2004	163	208	167
2005	129	204	175
2006	123	258	215
2007	152	319	272
2008	136	297	259
2009	152	321	238
2010	194	297	257

Source UNCTAD (2010)

can overcome the limitations of a high cost location by encouraging greater levels of profitability (Daniels 2000).

With the emergence of the European single market and the European Monetary Union in 1992, Ireland became an increasingly attractive location for inward investment, particularly from the US, which enhanced the country's integration into the global production networks of electronics and chemical products. Between 1999 and 2007, data from the European Central Bank show a 33 % increase in labour costs in Ireland, compared to 2.9 % in German and 16.9 % in France, effectively eroding any advantage in low-end manufacturing (Stark 2008, International Monetary Fund, 2010). Between 2000 and 2008, Ireland also experienced a 35 % loss in its trade-weighted international price competitiveness, two thirds of which was accounted for by exchange rate movements (Forfás 2009). Not surprisingly, therefore, Ireland's share of both global and European manufactured exports fell sharply after 2001, and export growth more recently has been sustained by repositioning Ireland as an international servicing and knowledge hub (Grimes 2006).

Despite this repositioning, changes in Ireland's relative ranking are reflected in a more intense struggle to maintain inward investment levels, with the stock of FDI relative to GDP peaking at 149 % in 2002 (€164 billion) and falling to 85 % (€142 billion) in 2009, but recovering again to €186.2 billion in 2011 (Brennan and Verma 2010, 2013). In 2009 Singapore at 194 % was much higher, but both the Netherlands and Sweden at 75 % were considerably lower. Although the EU maintained a strong performance in attracting FDI since 2004, Ireland's FDI stock relative to that of the world and the EU began to decline (Table 1). Although Ireland's share of Eurozone FDI fell from 14 % in 2002 to 6 % in 2007, this was still well in excess of Ireland's 1.3 % share of the EU economy. While it must be acknowledge that Ireland's international reputation has suffered as a result of its banking crisis, it continued to be a profitable location for FDI. The rate of return on

US-owned investment in Ireland for 1993–2003, for example, was nearly three times higher than the rate of overall US direct investment abroad (Congressional Budget Office 2005). US Bureau of Economic Analysis data for 2008 show the rate of return on US investment in Ireland to be 16 %, down from 21.2 % in 2004, but quite healthy compared to an average of 8.7 % for the EU-15 (Forfás 2009).

6 Innovative Tax Strategies

One of the factors which is likely to have helped Ireland maintain its overall competitiveness for inward investment in recent years, despite rising labour and other costs, is an innovative low corporation tax regime together with policy adjustments to facilitate the strategic use of Ireland as a low tax international servicing hub. In addition to proximity to markets and strong institutions, among the reasons acknowledged for the transformation of Ireland into a significant location for multinational regional headquarters, were low tax rates and an accommodating regulatory regime (Desai 2008). In recent years there has been considerable international media attention focused on innovative tax models developed by major US investors in Ireland such as Apple, Microsoft, Google and others in minimising their tax payments in the US by using Ireland and the Netherlands together with tax havens such as Bermuda and the Cayman Islands (Drucker 2010). Such media attention has resulted in a series of governmental investigations both in the US and the UK seeking insights into possible tax losses due to practices such as transfer pricing associated with IP allocation and royalty payments between the headquarter and subsidiaries of multinationals, resulting in inordinate levels of profitability for US subsidiaries in Ireland and elsewhere. As recently as September, 2013, The US Senate Permanent Subcommittee on Investigations scheduled a hearing on 'Offshore profit sharing and the US tax code in the US' (The Permanent Subcommittee on Investigations 2013).

Because of US companies locating IP in Ireland, the country surpassed Japan and the UK in 2007 to become the most important source country for US receipts of total royalties and licence fees (Koncz and Flatness 2008). Profits per employees in US subsidiaries for 2008 for Ireland, Switzerland, Bermuda, Barbados and Singapore (all of which are low tax jurisdictions) were estimated to be $298, 334, but were $520, 640 for Ireland taken separately (Sullivan 2011). While considerable difficulties exist in specifying the location of services produced by intangible assets, Lipsey (2007) provides insights into the shifting of software from the US to Ireland for tax purposes, together with other intellectual assets such as drug patents and corporate logos. Referring specifically to Microsoft, which reported pretax profits of €3 billion in 2004, one of its subsidiaries in Ireland controls more than $16 billion of the company's assets and collects licensing fees in many countries for sales of software, which for the most part was developed in the US.

The large share of income from intellectual property rights allocated by multinationals to their Irish affiliates results in one of the highest value added ratios

(18.5 % of GDP) of non-bank majority-owned US affiliates, compared for example to only 6.2 % in the UK (Mataloni 2007). Since royalty payments for intellectual property is not subject to Irish tax, the property rights of much of the IP for the major FDI sectors in Ireland of pharmaceuticals and software, which originates in the parent companies in the US are transferred to their Irish affiliates. This practice, while being subject to increasingly hostile media and political commentary, is fully in line with accepted financial and accounting guidelines, whereby the transferred IP is subject to a cost-sharing agreement under which the parent company and its Irish subsidiary agree to share IP development costs on an on-going basis.

There appears to be considerable evidence, therefore, of transfer pricing practices as part of the tax strategies of subsidiaries based in Ireland. In response to political pressure, Ireland introduced a new transfer pricing regime in 2011, based on best practice as outlined by the Organization of Economic Co-operation and Development (OECD). Of particular concern to Irish policymakers is the European Commission's proposal for a common consolidated corporate tax base (CCTB) in Europe, whereby tax would be paid in the location of sales. This would have huge implications for Ireland's FDI model which has facilitated the evolution of Ireland as a significant multinational servicing hub for the EMEA region, allowing companies involved in servicing international markets to report revenues back to Ireland.

7 Ireland's Emerging Internationally Traded Services Sector

Trade data analysis indicates that the predominantly foreign-owned pharmaceuticals, computer/electronic/optical, medical/dental manufacturing sectors continue to play a major role in Ireland's FDI sector and in the economy generally. Merchandise exports accounted for €84.2 billion of total €153 billion exports in 2009, having fallen from a peak of €93.6 billion in 2002, and whose annual compound rate of change between 200 and 2009 was −0.04 % (Forfás 2010). The shift towards internationally traded services in the FDI profile is reflected in the considerable expansion from 20.5 % of the value of total exports in 2000 to 45.1 % in 2009, with an annual compound rate of growth of 10.3 % (Fig. 1). By 2025, it is estimated that business services exports will account for 70 % of total exports, becoming the main driver of economic growth (FitzGerald et al. 2008).

By 2008, monetary intermediation accounted for 29.4 % of Ireland's total FDI stock, making it the largest area of activity, and reflecting the general shift in investment profile. Exports from Dublin's International Financial Services Centre (IFSC), Ireland's major cluster of such services, grew from 8.7 % of exports in 2000 to 16.5 % in 2009, a compound rate of 5.8 % but a levelling off in IFSC activity in recent years. Ireland's FDI profile shows an increasing substituting role by internationally traded services (ITS) for the decline in the important but

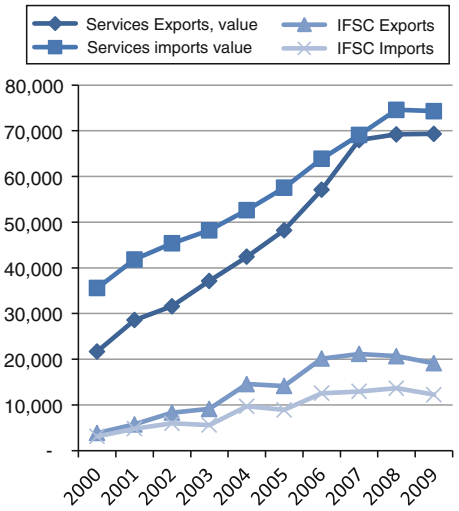

Fig. 1 ITS Services exports and imports and IFSC exports and imports €million. *Source* Central Statistics Office 2010

decreasing significance of merchandise exports. By 2009, the three major components of the ITS sector were Business Services (33.5 %), Computer Services (33.2 %) and Financial and Insurance Services (18.5 %) (Table 2). Overall expansion in the sector's exports between 2000 and 2009 was 229.2 %, ranging from 170.4 % in Financial Services to 1053.4 % in Business Services (Table 3). The major ITS imports in 2009 were Business Services and Royalties and Licences, together accounting for 83.6 % of the total, with Royalties and Licences expanding from 25.5 % of the total in 2000 to 41.6 % in 2009. Both the export and import data suggest significant expansion in intra-firm trade between Irish-based multinational

Table 2 Key ITS export and import sectors (€million) 2000 and 2009

	2000	% of total	2009	% of total
Exports				
Financial/Insurance	4,978	23.0	13,190	18.5
Computer	8,138	37.5	23,650	33.2
Business	2,070	9.6	23,877	33.5
Total	21,674		71,342	
Imports				
Business	15,113	42.5	31,224	42.0
Royalties/Licenses	9,051	25.5	23,860	41.6
Total	35,563		74,290	

Source Central Statistics Office, Database Direct and 'External Trade Bulletin June 2010'

Table 3 Services exports 2000–2009 (€million)

	2000	2009	% change
Tourism	2,851	3,506	22.9
Financial	2,255	6,099	170.4
Insurance	2,723	7,091	160.4
Computer	8,138	23,650	190.6
Business	2,070	23,877	1053.4
Other	3,637	5,110	40.5
Total	21,674	71,342	229.2

Source Central Statistics Office, Database Direct and 'External Trade Bulletin June 2010'

Table 4 Origin and destination of ITS exports and imports to and from Ireland 2008 (€million)

Exports	Europe	US	Other	Total
Finance/Insurance	10,364	2,591	1,936	15,432
Business	12,545	812	8,043	21,400
Computer	20,176	249	2,027	23,284
Imports				
Royalties/Licenses	11,916	7,741	973	22,549
Business	14,975	10,032	5,566	30,573

Source Central Statistics Office (2009)

subsidiaries and their parent companies, with payments for intellectual property and other services in the form of royalties and licence fees.

An analysis of the geography of Ireland's ITS sector's trade shows that Europe with 65.2 % of exports was the most significant destination, with the UK, not surprisingly being the single largest market for exports and the US with 29.9 % in 2008, being the most important source of services imports. Clearly much of Ireland's multinational activity continues to be regionalised within Europe, as reflected by ITS exports which range from 58.6 % of Business Services to 86.7 % of Computer Services. Regions outside Europe and the US accounted for a relatively small amount of activity, apart from 37.6 % of Business Services, suggesting some evolution towards more globalised trade patterns. For services imports in 2009, Europe with 50.8 % was the main source, with the US supplying 29.9 % and other regions 18.8 %. Of the total €22.5 billion in Royalties and Licence Fees in 2009, €11.8 billion came from Europe and €7.7 billion from the US, reflecting considerable intra-firm trade in the FDI sector (Table 4).

Table 5 Turnover, Profit and employees for case study companies 2002–2009

Company	Turnover €million	Profit €million	Year end	Employees	Turnover per employee (€million)	Rank
Microsoft	10,825	809	2009	N/A	N/A	3
	11,300	477	2008	818	13.81	3
	10652.97	2370.49	2007	1,155	9.22	2
	9469.8	2064.9	2006	1,115	8.49	3
	8337.61	2389.05	2005	1,090	7.65	3
	8111.62	n/d	2004	1,090	7.44	3
	6918.62	n/d	2003	1,700	4.07	3
	5,224	994	2002	1,700	3.07	3
Oracle	4,138	155	2009	N/A	N/A	10
	3742.54	707.47	2008	843	4.44	12
	3182.24	468.81	2007	957	3.33	14
	2246.89	427.59	2005	844	2.66	16
	2033.86	553.23	2004	1,067	1.91	19
	2,019	427	2003	1,067	1.89	14
	1957.42	351.13	2001	1,000	1.96	16
Symantec	1,487	−7	2009	N/A	N/A	40
	1535.47	27.34	2008	916	1.68	37
	1269.4	171.26	2007	939	1.35	38
	981.14	157.94	2006	750	1.31	49
	679.67	253.74	2004	700	0.97	69
	496.62	134.97	2002	400	1.22	71
Novell	261	1	2008	N/A	N/A	202
	203.9	−17.5	2007	141	1.45	241
	171	−3.35	2006	180	1.43	265
	287	n/d	2005	120	2.39	139
	190	n/d	2004	120	1.58	176
	248.91	n/d	2003	125	1.99	134
	222.49	n/d	2002	125	1.78	143
Accenture	137 (e)	N/D	2009	1,200	N/D	324
	205	n/d	2008	1,500	0.14	238
	205	n/d	2007	1,500	0.14	230
	135	n/d	2005	1,300	0.10	268

(continued)

Table 5 (continued)

Company	Turnover €million	Profit €million	Year end	Employees	Turnover per employee (€million)	Rank
	118	n/d	2004	1,000	0.12	275
	70	n/d	2003	900	0.08	378
	50	n/d	2002	900	0.06	469

Source Irish times Top 1,000, various years

8 Company Case Studies

Having outlined the emergence of Ireland's ITS sector, Table 5, based on the Irish Times Top 1,000 company database, provides data on revenue, profit and employment levels for five company case studies for the period 2002–2009. These four software and one consultancy companies are primarily involved in market servicing activities on behalf of their parent companies. In terms of revenue, the operations of Accenture and Novell are relatively small, being ranked at 202 and 324 in the top 1,000 Irish companies in 2009, but the remainder range between €1.4 billion for Symantec (ranked at 40) and €10.8 billion for Microsoft. In employment terms, Accenture with 1,200 was the biggest employer, while Novell with 141 was the smallest, and Symantec, Oracle and Microsoft ranged between 818 and 916 in 2008.

The effects of the current recession appear to be reflected in declining revenue figures for Microsoft, Oracle, Novell, with Symantec showing the most significant decline. The more mature investments show a falling off in employment levels, with Microsoft's most recent figure being less than half that of 2002, which suggests that employment generation in the FDI sector may have already peaked. Apart from Accenture, whose focus is consultancy as opposed to market servicing, revenue per employee was exceptionally high, with Novell and Symantec having more than €1 million per employee, Oracle with €4.4 million and Microsoft at an all-time high of €13.8 million in 2008. Clearly revenue per employee has significantly increased in many cases in recent years, partly reflecting declining employment levels, but it is also generally accepted that the revenue figures reflect considerable levels of transfer pricing within these multinational companies.

9 EMEA Servicing and Subsidiary Evolution

The company case study interviews provided additional insights into the evolution of these investments in Ireland and the importance of tax strategy within that evolution (Table 6). A key factor for locating in Ireland was to be within Europe's single market. Initially all software companies focused on manufacturing CDs and

Table 6 Case study company functions

Function	Oracle	Microsoft	Symantec	Novell	Accenture
Software localisation	x	x	x	x	
Sales/marketing		x			
Internet sales	x	x		x	
Tech support	x	x	x	x	
Shared services	x	x	x	x	x
Centralised accounts	x	x			x
Finance		x	x	x	x
Procurement	x				x
Licensing	x	x	x		
Telemarketing	x				
Regional HQ	x	x			x
Consulting					x
R&D		x		x	
IP management		x			
Backoffice services		x		x	
Payroll					x

Source Company interviews

the distribution of their product throughout the EMEA (Europe, Middle East, and Africa) markets. By attracting such major software companies, Ireland acquired an international reputation for software localisation with computer programmes being translated into many languages (Collins and Grimes 2008). All of the investments, which in some cases included a number of separate company divisions, evolved considerably over a 20 year period, with technological developments facilitating outsourcing and offshoring of some functions to lower cost regions. Increased competition from these regions forced subsidiaries in Ireland to develop innovative strategies to ensure the sustainability of their operations.

Microsoft's Dublin operation, which was established in 1985, has evolved its activities to include a wide range of backoffice and supply chain functions, servicing markets in 126 countries, and establishing a role model for subsequent investments. Having peaked in 2003, employment numbers since declined to 818, with 20 % of its workforce coming from non-English speaking backgrounds because of the language requirements associated with a pan-European servicing hub. During its 25 years of investment in Ireland, the operation has come under considerable pressure from India and China, with many lower skilled activities being offshored to these locations, but being replaced by more highly skilled functions such as software development and R&D. In addition to this evolution to a greater involvement in the development of core products, the Dublin EMEA Operations Centre has also evolved from manufacturing to 'order-to-business'

functions. While the competition for Asia is likely to intensify, the linguistic requirements for Dublin's pan-European market support functions continues to provide Ireland with a comparative advantage.

Other major software company investments in Ireland have followed a similar path to Microsoft's evolution. Oracle, for example, employed 1,000 in 2009 (since reduced to 843) in 14 different business units reporting to Dublin, the UK and to the global headquarters in California. Oracle's acquisition of other software companies such as Siebel Systems and Sun Microsystems with existing investments in Ireland resulted in an expansion of Oracle's overall investment. Unlike many other multinational companies which are organized within the three main triad regions of the world, Oracle is organized along global lines, focusing on major customers such as other large corporations rather than on distinct countries. Like other major software companies in Ireland, its functions include product translation, shared services, and sales and marketing, and because of the multilingual nature of the markets involved around 40 % of its workforce in Ireland are from non-English speaking backgrounds. Like Microsoft, Oracle's operations in Ireland have experienced considerable competitive pressures, with Ireland being ranked as its third most expensive location, compared with Romania in the mid-20s and India at 36. The evolution of functions reflects Ireland's changing competitive profile, and while product translation continues to be a significant component, its shared services functions in Ireland have gained greater sustainability as they became more global in orientation, serving a greater number of markets.

Like other software investments, Novell Ireland's main reason for establishing in Ireland in 1995 was to centralise its EMEA administration and business systems in a pan-European, multilingual shared services centre (SSC) in Dublin. Its low ranking among the Irish top 1,000 companies suggests that it is a relatively modest investment and has been experiencing considerable problems in relation to profitability. In addition to being its only European SSC, Dublin is also the company's European headquarters and its functions include finance and accounting, order processing, invoicing, and multicurrency transaction handling. Currently, test engineering is outsourced to India and China with Dublin providing support services for 400 workers in these countries, but the Dublin operations is experiencing considerable competitive pressure from the established operations in Asia.

Although many of the functions carried out by Accenture in Ireland are quite similar to the companies already mentioned, its primary focus revolves around IT consultancy and outsourcing on behalf of other corporations. It was first established in Ireland in 1969, but did not become a significant investment until 1999, when it added a multilingual, pan-European shared services centre in Dublin to look after accounting, payroll and procurement activities for the corporation. Since 1999, the Irish operation has evolved with transaction work in English being offshored to Bangalore and currently 40 % of employees in Dublin are from a non-English speaking background, reflecting the multilingual nature of the work carried out. Among the important projects which have contributed towards evolving the operation to higher levels of sophistication include a global procurement service which was rolled out in 18 countries, and a core financial system to service 48 countries.

In 2009, after considerable criticism from the US government about multinational companies' use of tax havens, Accenture relocated its place of incorporation from Bermuda to Dublin, where the company's headquarters for tax and legal functions are now based.

10 Conclusion

The increasingly complex geography of economic activity associated with outsourcing and offshoring by multinational companies presents considerable methodological challenges to researchers who seek to evaluate the changing competitive advantages of particular locations seeking inward investment. In monitoring the changing geography of competitiveness, it is necessary to look beyond the narrow measures of cost competitiveness to consider less transparent aspects such as innovative tax strategies employed by multinational companies which can have a significant impact on the profitability of particular locations.

This chapter considers the role of innovation in Ireland's foreign investment model which has been experiencing increasing competition from emerging regions as it seeks to remain competitive as a relatively high cost location within a global context. While Ireland continues to be an important location for multinational manufacturing activity, major changes in international competiveness has resulted in a major shift in the inward investment profile towards the servicing of international markets. The growth in Ireland's internationally traded services sector in software, business services, financial and insurance services and in royalty and license fees reflects considerable innovation by multinational subsidiaries in Ireland involved in servicing international markets. Over time the management of multinational subsidiaries in Ireland have evolved their range of functions, through offshoring and outsourcing less sophisticated activities to more competitive locations in the emerging regions and replacing them with more sophisticated functions. Competition from emerging regions have forced Irish subsidiaries to develop more innovative models of servicing international markets in order to ensure the sustainability of their investments. These more innovative servicing models are also responding to the need for multinationals to become more global in their operations, with more internationalised production networks giving rise to the need for the internationalisation of servicing.

The development of more internationalised servicing models by multinational companies in Ireland has been strongly supported by an innovative policy environment by the Irish state and its development agencies. A wide range of policies have been employed to ensure that Ireland continues to be a profitable location for globalising business operations during the current period of economic crisis and increased global competition for investment. Accepting the reality that Ireland's competitiveness as a location for inward investment is no longer primarily related to manufacturing, policy development has been particularly focused on persuading international investors of Ireland's attractiveness as an emerging market servicing hub. Since a

critical factor influencing the location decision-making of global operations is their tax strategy, Irish policymakers have been particularly innovative in ensuring that low levels of corporation tax, generous tax allowances for R&D activity and for royalty payments and other such initiatives provide a stable and reliable tax environment in which the complexities of international market servicing can remain profitable despite the relative high costs associated with operating in Ireland. The synergies between this innovative policy environment and the evolving models of multinational subsidiaries have created the necessary conditions in which Ireland continues to attract significant inward investment, despite growing political opposition both in Europe and in the US particularly to some of the tax models being employed.

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Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets

Robert Jack

Abstract One of the challenges for any firm is a sustainable approach to value creation. As firms aim to create additional value for their clients, their output comprises a combination of supplementary service activities supporting the development of, or increased utility of, a good or a service. However, products comprising goods and/or multiple service components are complex and add to the logistical and operational challenges of product delivery across international markets. Although the use of innovative technologies for international service delivery is available to the firm, some degree of direct interaction may still be required for various types of supplementary services, such as customised design, installation, maintenance and on-going after-sales service support. By undertaking an exploratory case study of four Australian firms, operating in industrial markets, this chapter seeks to assess the use of service innovative technologies in the delivery of supplementary services to international clients. For all case study firms, the delivery of supplementary services formed an important component of their international strategy. In particular, the provision of maintenance services was assessed by senior management as their company's competitive advantage. A key finding is a preference for direct delivery of services, in conjunction with technology. This is for two reasons—first, not all service-related problems can be successfully resolved via technology; second, is for the firm to retain the ability to provide customer relationship building, specifically for the purpose of enhancing value creation.

Keywords Service delivery · Inseparability · Value creation · Service technologies · Embedded services

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1 Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets

1.1 Introduction

Services represent an increasingly significant component of the international economy. Services are defined as deeds, processes, and performances (Grönroos 2000; Hill 1977; Nicoulaud 1989; Shostack 1977). In contrast to a good, a service involves interactive activities either performed, or directly delivered, by a firm to its customers. The term 'inseparability of production and consumption' is applied to describe this service process and has emerged as a significant point of difference between services and goods (Berry 1984; Lovelock 1983).

Although commonly assessed as separate product categories, researchers acknowledge that there are numerous service activities that firms 'embed' with products (Bowen et al. 1989; Dunning 1989; Robinson et al. 2002; Ulaga and Reinartz 2011). These can range from services delivered before the production of a good, such as customised design, to post-production services, such as installation and on-going post-sale service support for a good. Similarly, embedded services can be used to develop or support service-based products. In this regard, service packages, consisting of a combination of core and supplementary services have been identified (Grönroos 1998; Lovelock and Yip 1996). In a similar manner to services embedded with goods, different combinations of service activities may merge to form offerings, or value creating packages. In both these instances, a firm progresses beyond providing a product solely with good or service characteristics. As firms aim to create additional value for their clients, their output increasingly comprises a combination of value-creating activities organised around a product, which could be a good or a service (Ulaga and Reinartz 2011).

Understanding the composition of a firm's productive output has particular relevance to internationalisation. The successful delivery of services may require some form of direct interaction between the user and the provider (Erramilli and Rao 1990, 1993; Grönroos 1998; Vandermerwe and Chadwick 1989). Consequently, firms that provide services may enter foreign markets directly to fulfil the needs of customers and may not have the option of exporting, as (some) services may not be delivered successfully to consumers in this manner (Cardone-Riportella and Cazorla-Papis 2001; Cicic et al. 1999; Clark et al. 1996; Erramilli and Rao 1990).

Although many services are presumed to require interactive delivery, researchers have long considered how technology may affect the requirement for the provider and client to interact with each other. The concepts of e-service and service technologies have received increasing attention and suggest that traditional market place interaction is being replaced with 'market space' transactions. In terms of internationalisation, this provides the firm with opportunities and a dilemma. A firm intending to conduct business activities in a foreign market must choose an

appropriate entry mode for product delivery (Morschett et al. 2008). Diverse product composition implies that firms may be required to undertake multiple tasks across international markets. These multiple tasks may require the use of distinct entry modes for each (Morschett et al. 2008). If these tasks are responsible for the firm's competitive advantage the firm will choose an appropriate delivery method consistent with the maintenance of its competitive advantage. Technology allows services to be embodied in a codified format. This opens the way to a more flexible, efficient delivery option thereby enabling the firm to 'reach' international customers across a broad range of markets.

However, the dilemma posed for the firm is the leveraging of value. Contact personnel and the social/interpersonal aspects of a service encounter play a much greater role than technology in forming quality perceptions (Jayawardhena et al. 2007; Murray and Schlacter 1990). As Pehrsson (2007, 2008) asserts, localisation of value-adding activities close to customers enables firms to gain an understanding of customer needs, hence enhancing their competitive advantage.

The current research aims to expand our understanding of how firms evaluate their product components and leverage value across international markets. In order to understand how firms deliver value to their overseas clients, this paper adopts a qualitative case study methodology and examines the entry mode approach of four industrial Australian firms all with sales across international markets. Our chapter is structured as follows: we provide an overview of service characteristics and their compatibility to delivery via technology. We then detail how internationalisation may affect service delivery. After providing a brief overview of each case study firm, we discuss the implications of the data, and provide a conclusion.

1.2 Services and Embedded Services

Services represent not only an integral component of the delivery system of a final product (a good and/or a service) but also represent an essential component of production (Dunning 1989; Giarini 1987, 1994, 2002; Grönroos 1999; Leo and Philippe 2001; Ulaga and Reinartz 2011). Giarini (2002, p. 61) explains:

> If we consider all sectors of contemporary economic activity, it can be shown that services of any sort comprise the essential part of production and utilisation systems of both goods and services.

The relevance of this definition is that it highlights that firms increasingly rely on the development of services in order to improve their economic performance in production and product utilisation. Researchers have, therefore, explained that services are embedded in products at both the pre-production and post-production phases (Giarini 2002; Grönroos 1999; Hirsch 1988, 1989, 1993; Lovelock and Yip 1996; O'Farrell et al. 1998). Consequently, embedded services are responsible for extending the value of a product beyond that incorporated in its tangible features to extend its overall performance. Internal activities, such as research and development,

can be oriented toward cost-reduction initiatives, which although they may ultimately benefit the customer, may not be apparent to the customer. Conversely, installation, after sales service, customised design and guarantees and warranties will be visible to the end user.

Taking this broader understanding of service activities into account, Grönroos (2000, p. 46) defines a service as:

> A process consisting of a series of more or less intangible activities that normally, but not necessarily, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems.

This definition is more comprehensive and suggests that a service can be delivered either as an individual activity or in combination with other product forms.

Early proponents of services marketing emphasised that services contain characteristics that distinguish them from goods (Berry 1984; Carman and Langeard 1980; Grönroos 1978; Shostack 1977). Expanding on these differences, some researchers conclude that services contain four characteristics that differ markedly from manufactured goods (Berthon et al. 1999; Coviello and Martin 1999; Gabbott and Hogg 1994; Patterson and Cicic 1995; Roberts 1999)—intangibility, heterogeneity, perishability and inseparability. Of the four characteristics inseparability is frequently cited as especially important, and has received a substantial amount of attention in the literature. Researchers argue that much of what makes a service special is that it is a 'lived-through' event. Lovelock (1983); Grönroos (1998); Lovelock et al. (2001) define services as a 'process consumption'. As services are created as they are consumed there is more scope for tailoring a service to meet the needs of individual customers (McLaughlin and Fitzsimmons 1996). Lovelock (1983, p. 12–13), explains:

> If customers need to be present during the service delivery, then they must enter the service 'factory' and spend time while the service is performed. Their satisfaction with the service will be influenced by the interaction they have with the service personnel, the nature of the service activities and also perhaps by the characteristics of other customers using the same service.

However, inseparably is by no means an exclusive characteristic as services can be 'splintered' or 'separated' from their original production and embodied in a tangible format for separate sale or delivery (Bhagwati 1984; Erramilli and Rao 1990, 1993; Sampson and Snape 1985). Examples of such separation, or splintering, are the transfer of services by correspondence or electronic transmission (Berthon et al. 1999; Grubel 1987). In some of these examples, the service function can be presented in an accessible format. In these cases, 'inseparability' no longer applies.

Several researchers (Meuter et al. 2000; Zaheer and Manrakhan 2001) have considered how technology may affect the requirement for the provider and client to interact with each other. The concepts of e-services and service technologies has received increasing attention (Bartezzaghi and Ronchi 2003; Berthon et al. 1999, 2008; Meuter et al. 2000; Moen et al. 2008; Mulligan and Gordon, 2003; Petersen

et al. 2002; Surjadjaja et al. 2003; Vatanasakdakul et al. 2010; Zaheer and Manrakhan 2001), and suggests that traditional market place interaction is being replaced—or supplemented—with 'market space' transactions. Rayport and Sviokla (1995, p. 14) describe the 'market space' as a virtual realm where products and services exist as digital information and can be delivered through information-based channels.

Advances in information and communication technologies have made it easier for firms to connect with individuals and other firms remotely and to interact with them at many levels no matter where they are located (Zaheer and Manrakhan 2001). It also enables disintermediation of the internal and connected value chains of the firm hence creating a multitude of new service opportunities. Service-based information content, which can be clearly specified with measurable outputs in terms of quality and quantity, could be suited to transmission via remote access (Meuter et al. 2000). Such remote access is particularly feasible in activities that involve significant levels of information or digital content and which form an increasing proportion of the value add for many manufacturing and service firms. This provides the firm with both opportunities and dilemmas. The potential for technology innovation to transform delivery from an inseparable to separable format creates greater growth opportunities for the firm as it allows for a more efficient delivery across a broader set of markets or segments. In this way, market space transactions effectively replace market place interactions. However, the dilemma posed is that the firm needs to determine the value of undertaking this. Leamer and Storper (2001) explain that, regardless of the ability of technology to allow long distance 'conversations', it does not replace the 'richness' of face-to-face interaction. The requirement for the delivery of complex, uncodified 'messages', requiring trust and understanding, implies that face-to-face contact is still essential. The movement toward customisation and relational marketing, point towards firms maximising product–customer interaction rather than minimising it (Beaven and Scotti 1990; McLaughlin and Fitzsimmons 1996; Vargo and Lusch 2004a; Vargo and Lusch 2004b).

1.2.1 Services and Internationalization

Differences in product separability can influence a firm's decision to adopt a particular entry mode when entering markets. There may be a range of international market entry mode options open to a firm producing a particular type of service product. Although the options do not follow any particular sequence, the firm can pursue a number of different entry modes ('direct export', 'indirect entry', 'electronic transmission'—sometimes referred to as 'wired exports', 'contracting', 'information-based services' and 'direct investment') (See Ball et al. 2008; Grönroos 1999; Lovelock and Yip 1996; Roberts 1999).

Berthon et al. (1999) explain that inseparability, combined with the additional elements unique to the international environment (technological, economic, physical, socio-cultural, and political–legal) make the internationalisation of a firm's service activities complex (Clark et al. 1996; Dahringer 1991; Fernandez 2001;

Patterson and Cicic 1995). A 'location-bound service' limits the service provider in the internationalisation options they can pursue as the service relationship between the provider and the user restricts the ability of companies to export services without engaging in a form of foreign direct investment. This may require the firm to 'skip' the export stage when it begins its internationalisation process, as it is simply not possible for the firm's product to be delivered to the user via this mode.

The use of various forms of e-technologies has the potential to improve the efficiency of market transactions as companies can reduce their search costs significantly and increase their ability to respond flexibility to new market opportunities (Petersen et al. 2002). Firms must also consider the transaction costs associated with co-ordinating and controlling relationships and transaction flows among external partners. Every transaction places resource or asset demands on the providing institution (the firm). A number of key studies utilized transaction cost theory to analysis both firm-customer exchanges and the entry modes associated with service delivery (see Bowen and Jones 1986; Brouthers and Brouthers 2003; Petersen et al. 2002). Transaction cost theory suggests that the appropriate governance structure for a given transaction and, therefore, the appropriate entry mode, is one that minimises total transaction and production costs (Datta et al. 2002; Dunning 1979, 1988, 2001; Madhok 1997; Williamson 1979). Efficiency is achieved by reducing the costs of negotiating, monitoring and enforcing the exchanges between parties to a transaction. When directed to the activities of the firm, a transaction cost approach argues that firms choose their optimal structure for each stage of production by evaluating the costs of economic transactions (Anderson and Gatignon 1986; Brouthers and Brouthers 2003; Teece 1986).

Brouthers and Brouthers (2003) cite three different factors that influence transaction costs: asset specificity, environmental uncertainty and behavioural uncertainty, with asset specificity being the prime determinant of integration. When such investments are made, a supplier and a buyer are locked into the transaction because the assets are specialised to that transaction and have limited or no value outside that transaction. In these examples, asset specificity is defined as 'high'.

Services vary with respect to their asset specificity and these variations may result in differences in entry mode selection (See Contractor and Kundu 1998; Dunning and Wymbs 2001; Erramilli and Rao 1993; Fladmoe-Lindquis and Jacque 1995; Murray and Kotabe 1999). As some services are likely to be people intensive, competitive advantage tends to be derived from idiosyncratic assets (training and knowledge), and entry mode choice may vary with the degree of idiosyncratic asset investment. When services being provided require high levels of idiosyncratic assets internal sourcing, in the form of direct investments, is the outcome.

This overview is relevant as researchers have focused on the relationship between the increasing use of technology and the effect that this may have on the level of asset specificity (Bartezzaghi and Ronchi 2003; Meuter et al. 2000). Specifically, the adoption of internet service strategies can lead to reduced transaction costs, largely because products are easier to describe, and because

information transfer across markets is more efficient. That is, the specificity of assets is reduced (Bartezzaghi and Ronchi 2003; Mulligan and Gordon 2003; Petersen et al. 2002). Bartezzaghi and Ronchi (2003) point out that Internet technology provides the possibility of increasing the effectiveness of communication and delivery through its standard protocols and worldwide access. Dunning and Wymbs (2001) also emphasise that the Internet may assist in reducing asset specificity by permitting increased specialization of a firm's value creating activities. The variability in transaction costs may influence management decisions regarding organizational form and the assignment of transaction flows to assets (Mulligan and Gordon 2003).

This provides a rationale for the firm to adopt those technologies with the aim of reducing transaction costs and thereby allowing a greater flexibility in terms of reaching a greater number of foreign markets. However, the dilemma it faces is that it may contradict one of the key tenants of firm internationalisation—emphasizing the importance of building tacit knowledge in foreign markets by the localisation of value adding activities close to customers enabling the firm to gain an understanding of customer needs, hence enhancing their competitive advantage (Pehrsson 2007, 2008).

1.3 Research Method

The current research seeks to understand the use of technology in service delivery across international markets. To achieve this objective, the methodology must be one that lends itself to both exploration and theory building. This objective makes qualitative research a particularly attractive research tool as it seeks to explain the relationship between the components of a firm's product and its delivery choices. It is a complex phenomenon. Understanding such an intricate relationship calls for direct contact with the respondents. The aim is to build on existing knowledge and to interpret strategy formation and implementation in a real life context, but without specifically excluding any variables at the outset (Yin 2003). The approach allows for an open and flexible investigation to be conducted with the aim of developing new insights into service innovation, delivery and firm internationalisation.

The context of the study is important here. The qualitative method allows researchers to understand the context-specific depth of a phenomenon (Bamberger 2000). This method also allows the researcher to investigate a contemporary phenomenon (service delivery) within its real-life context (firm internationalisation) (Yin 2003). As such, it is likely to provide a better understanding of the dynamics of the entry modes pursued by firms. A qualitative, case study-based research technique using in-depth, face-to-face interviews can provide a rich, focused, and realistic account of the impact of service innovation on a firm's entry mode strategy.

As internationalisation is a complex phenomenon, it is difficult to understand the intricacies of the firm's situation without being directly in contact with the respondents. The result of this on-going contact provide 'rich descriptions' essential for analysis. This research utilises the multiple case study method. Researchers have

described the case study as a potentially powerful method of identifying and testing patterns across studies (Amatatunga and Baldry 2001; Gummesson 2000; Larsson 1993). According to Feagin et al. (1991) and Hamel et al. (1993), multiple case studies have distinct advantages in comparison to single case designs. Yin (2003) argues that evidence from multiple cases is often considered more compelling and the overall study is therefore regarded as being more robust. Multiple case studies, like multiple experiments, allow replication logic. The multiple case study approach is useful for the current research, in that it allows firms with different products to be chosen as individual cases for analysis.

Although there is no ideal number of cases, Eisenhardt (1989) advocates a range of at least four to a maximum of ten. Potential case study firms were initially identified using academic contacts, reviewing case study literature and recommendations by representative bodies such as the Australian Trade Commission (Austrade) and The Australian Business Foundation. Contact was initially made with firms via email with potential interviewees being informed about the characteristics of the investigation together with a request to collaborate and assist in the study. Those firms that responded with interest were then asked formally for their participation. Four firms agreed to participate in the study. The firms were all small to medium size and operated in business-to-business markets. Their key characteristics are listed below in Table 1.

The Chief Executive Officer, or designated managing director, was interviewed to explain the firm's current product focus, how the firm has approached internationalisation, and the role that service characteristics may have played in that process. Functional managers in the areas of business development, marketing and operations were interviewed to ascertain how components of each firm's product are delivered internationally.

The interview protocol was designed to gather information in relation to the nature of product composition and internationalisation. Interviewees were asked to explain the service composition and characteristics of their product offerings. Subsequently, the CEOs were asked whether the degree of service innovation, had an impact on the company's existing foreign markets entry-mode choice.

Table 1 Characteristics of case study firms

Firm	Product classification	Percentage of total sales from international markets (%)	Year of establishment	Total number of employees
Case 1	Industrial design and manufacturing	60	1972	120
Case 2	Industrial design and manufacturing	85	1969	30
Case 3	Industrial design and manufacturing	77	1985	180
Case 4	Software design and installation	25	1990	42

A total of 20 interviews (five for each firm) were conducted with senior staff. Interviews typically lasted 60 min and were recorded and transcribed. All data were coded in nVivo software. Individual case studies were reviewed by case participants. All interviewees were sent a copy of their transcribed interview for validation. This process, which Flick (2008) calls 'member checks', allows communicative validation of data and interpretations with participants of the study. After all individual case studies were written, a cross case analysis was conducted to synthesise the findings from all four cases. Analysis was conducted primarily through pattern matching logic (Yin 2003).

1.4 Overview of Results

1.4.1 Case Study 1

Case study 1 has a history of industrial design, manufacturing and product maintenance throughout Australia. Their product composition was explained by the CEO:

> Well it is design, manufacture, maintenance, and in some cases refurbishment. The company has diversified to a certain extent into providing other maintenance capability services and manufacturing services for additional market segments.

Its international market development is detailed in Table 2.

Case study 1 product offering requires a significant amount of interaction with clients, as explained by the Marketing Manager:

> It does require a significant amount of interaction. If you look at Australia, we have 14 operations scattered in key customer interface positions. In Asia we're currently using the Hong Kong office as the hub; if you say you are going to provide the service to ensure the reliability, then clients like to see people on the ground.

However, maintenance can be electronically provided by the firm's service support offices, which are strategically located throughout Australia and Asia. Accordingly, the CEO stated that, in regard to maintenance:

> Some of our products have built in components with the ability for electronic feedback, so that regardless of where the product is, our people can diagnose the problem without physically having to be there. It can all be done remotely.

Table 2 Case 1 international market information

Country or region	Percentage of international sales (%)	Entry mode used to access each market	Establishment
Hong Kong	60	Maintenance facility	1995
South-East Asia	30	Export	2000
Other	10	Export	2000

Table 3 Case 1 embedded services and separability

Service type	Length of service activity	Frequency of service activity	Method of delivery
After sales support—maintenance	On-going	On-going	Interaction and electronic transmission

In the Hong Kong market, face-to-face business is more common as accepted business practice, so a more interactive approach is considered appropriate. This was seen as a reflection of the complex nature of firm's product, and the fact that the firm's international clients expect a customised approach to their individual product needs, as explained by the CEO:

> Certainly, technology has improved the situation; however, we have to convince the customer that we are capable of doing the work before you get the opportunity to price it. We have to convince them that we have the capability, the technical resources and the financial capability. This result in a more interactive approach to service delivery rather than just relying on the basics of electronic transmission.

Table 3 provides an overview of the firm's service and delivery method.

1.4.2 Case Study 2

Case study 2 is a designer and manufacturer of industrial goods and also provides a significant amount of service support for its finished product. Their product composition was explained by the CEO:

> Our slogan is 'building products and partnerships'. The service component is important for helping our brand name and for delivering our slogan—we try to work fairly hard at that, which means we turn up at their factories more than our competitors do.

Its international market development is detailed in Table 4.

The firm organizes the delivery of its service support in two ways. First, some of the service support can be done from head office by electronic transmission. This normally requires the firm to access their product's internal software on-line and

Table 4 Case 2 international market information

Country	Percentage of international sales (%)	Entry mode used to access each market	Establishment
Malaysia/Thailand	40	Joint venture	1972
North and South America	20	Exports/agents	1999
China	35	Joint venture	2002
Other	5	Exports	1972

Table 5 Case 2 embedded services and separability

Service type	Length of service activity	Frequency of service activity	Method of delivery
After sales support—remote reading	On-going	On-going	Electronic transmission
After sales support—consulting	On-going	On-going	Interaction

reprogram it to resolve a problem. These remote repairs are conducted at head office and can be done at any time. It does not require any on-going interaction with the firm's clients, other than the client making the firm aware that a problem exists and requires immediate attention.

Second, some service support requires the firm to travel directly to the client to solve the problem. The CEO estimates that additional service support is normally split:

> Some of the service support can be done from head office and some has to be done in the field. A lot of the problems are solved at the commissioning stage and during the warranty. Anything after that will be around 60 % from the office and 40 % from the field.

The Marketing Manager explained that the on-site service assistance is more often a relationship building exercise which goes beyond the specific purpose of the visit:

> So they are happy because someone is holding their hand and we are happy because we are never out of their face.

The service visits require the firm to provide a technician for routine service 'calls', four times a year. Table 5 provides an overview of the firm's service and delivery method.

1.4.3 Case Study 3

Case study 3 is a designer and manufacturer of specialised medical equipment and provides a significant amount of service support for its finished product. The Director of Operations defined the product as follows:

> If you look at what we do, typically we might design and build one machine and never do it again because it is a very specific requirement or client need. So I would say that what we do is not really a product it is a service. The fact that we deliver hardware is part of that is kind of irrelevant, as we are providing that as part of a service.

Its international market development is detailed in Table 6.

The service support can be provided electronically or remotely by using devices such as webex, emails. The Director of Operations stated:

> It is interesting that fairly recently in the last 3–4 years we are relying more and more heavily on using some of the latest technology which allows us to connect to a machine via

Table 6 Case 3 international market information

Country	Percentage of international sales (%)	Entry mode used to access each market	Establishment
North America (USA and Canada)	70	Sales and marketing office	2002
Europe	25	Agents × 3	2000
Asia/Pacific	5	Agents × 2	2000

Table 7 Case 3 embedded services and separability

Service type	Length of service activity	Frequency of service activity	Method of delivery
After sales support	On-going	On-going	Interaction and electronic transmission

> modem. So we are able, with the technology available now, to be able to do a lot of diagnostics over a phone line. So a lot of the 'troubleshooting', which we would normally have to send someone out too, can now be done by dialing up the machine and we can have a look at what going on and diagnose what the problem is and, providing that you have someone reasonably competent at the other end, you can fix it remotely. So we are relying on that at the moment as our front-line way of dealing with that sort of issue.

However, the company is committed to supporting the technology it has developed in a direct and interactive way:

> So, often you could justify the service trip on the basis of being about relationship maintenance. And given that you are traveling quite often you can incorporate other things to make that trip more cost effective……I don't think you can ever avoid that. So in that case I don't think that technology will help a lot because that is still going to be a very personal thing.

Table 7 provides an overview of the firm's service and delivery method.

1.4.4 Case Study 4

Case study 4 delivers and installs software application solutions tailored to clients' specific needs. The company's product is utilised by over 10,000 licensed users across more than 1,300 customer organisations throughout Australia, New Zealand, and Malaysia. The CEO described the product as follows:

> We regard ourselves as a solution provider. Because the product is no longer a desk application—it was and we still have quite a few products like that within our range—most of it now requires it to be set-up properly and people have to be trained, so it is an enterprise wide solution, as opposed to a desk top application.

Its international developed is detailed in Table 8.

All interviewees highlighted the interactive nature of the methodology. The CEO explained:

Table 8 Case 4 international market information

Country	Percentage of international sales (%)	Entry mode used to access each market	Establishment
New Zealand	20	Subsidiary	1995
Malaysia	60	Joint venture	2002
Nigeria	20	'Export' from head office	2002

> Most of it is face to face; you have to meet the key players or stakeholders and people who are going to run the system, help set-up their core project office team and so forth. So there is a lot of interaction. We virtually camp at the client's site and become part of their team as such.

All interviewees emphasised the inseparable nature of the service embedded in their product package. However, it was explained that maintenance was a combination of inseparable and separable components, with interaction required only as a 'last resort':

> Most of our support is delivered by email, or over the web where customers can log onto a knowledge portal and look for resolutions. I would say that 90–95 % of all our (post installation) problems are resolved by e-service technologies. There is 5 % where we need to send someone to site, but they are rare exceptions, as what we try and do is resolve the problems without incurring the expense of sending someone. We would do it obviously when it really needs to happen, where we need to be pro-active as part of the escalation process; or sometimes we are trying to build a special relationship with the customer.

The provision of the firm's maintenance services for overseas clients is achieved via a process known as escalation. The CEO and other respondents explained that the escalation process occurs throughout the their network, so if the problem cannot be dealt with by either the Malaysian or Australian helpdesks, then it can 'escalate' to helpdesks operating from the USA or Europe. Such a process ensures that any direct interaction required by the firm is really only supplied when it becomes clear that the escalation process cannot assist the client in resolving their problem.

However, respondents stated that although the escalation system was designed to minimise the requirement for sending a technical person to the client's site, the firm will provide such a service if it feels that it is important for creating client value or relationship strategies:

> We will send someone on site to see what the person is doing and correct what they are doing because it is part of our customer management policy.

Table 9 provides an overview of the firm's service and delivery method.

Table 9 Case 4 embedded services and separability

Service type	Length of service activity	Frequency of service activity	Method of delivery
After sales support - maintenance	On-going	On-going	Electronic transmission and interaction

1.5 Discussion

We previously draw attention to the trend towards the provision of e-service technologies across international markets (Bartezzaghi and Ronchi 2003; Meuter et al. 2000; Surjadjaja et al. 2003). We also highlighted that over the last decade researchers have developed terms such as 'wired exports' (Roberts 1999); 'electronic marketing' (Grönroos 1999) and 'information based services' (Lovelock and Yip 1996) to explain the method of service delivery through technology or electronic transmission. The data collection process revealed that all case study firms use technology, in various forms, to assist in the delivery of their product package internationally. Although all firms emphasised the practicality of electronic technology in communicating with their international clients, the focus of the research was on how firms were using technology to deliver services internationally.

A summary of the service type and delivery method for each case study firm is presented in Table 10.

The firms use technology to assist with the delivery of various embedded maintenance services for their international clients. However, all explained that, although various forms of e-services technologies were used quite consistently for clients in the Australian market, each firm realised that this 'indirect' approach for service delivery is not always appropriate for clients in international markets. Rather face-to-face interaction is the preferred method of delivery. This 'preference' for direct delivery of advice and associated services displays some compatibility to the literature identifying the 'richness' of face-to-face interaction in service encounters in comparison to the indirectness of on-line delivery (Leamer and Storper 2001). Roberts (1999, p. 80) research highlights that embodied service exports and various forms of electronic transmission, such as 'wired exports', are less popular methods of service exportation than those that incorporate face-to-face contact.

The case study firms explained that on-line service delivery is always combined with direct delivery of maintenance services internationally. Senior management emphasised that their aim is to provide the majority of maintenance services via on-

Table 10 Delivery of embedded services via technology or web-based facilities

Firm	Type of service delivered by technology	Used to as a delivery mode in international markets	Used in conjunction with direct delivery of services
Cast study 1	After sales support maintenance	Yes	Yes
Cast study 2	After sales support remote readings and consultation	Yes	Yes
Cast study 3	After sales support	Yes	Yes
Cast study 4	After sales support maintenance	Yes	Yes

line access. In most cases, the aim is to supply up to 90 % of selected maintenance services by delivery through various forms of electronic transmission.

However, respondents also emphasised that they cannot entirely rely on service technologies across international markets. The value of direct delivery, by company staff to international clients, was always emphasised. For example, although Case Study 4 'escalation process' of on-line maintenance service provision is comprehensive, the need to supply staff internationally, for direct delivery of maintenance services, is integrated into the firm's international strategy. The other case study firms applied similar arrangements.

The preference of the firms for direct delivery of maintenance services, in conjunction with technology, is for two reasons. First, not all maintenance problems can be resolved successfully via technology. Therefore, the firms had to retain the ability to directly deliver their embedded services to international clients. This became particularly important as all four firms had their client base in industrial markets. Consequently, unresolved maintenance problems for their clients could mean a temporary shutdown in production, and substantial loss of revenue. Therefore, each firm had to guarantee their international clients the ability to provide direct support for their product if it was required. Often the requirement for direct delivery is only given at short notice. Accordingly, it is difficult to anticipate when a service employee will be required to travel from head office to the client.

The second reason to retain the ability to provide direct delivery of maintenance services is client relationship building. Case study firms 2, 3 and 4 explained the importance of direct service delivery as a means of enhancing client trust and ensuring a high degree of satisfaction. For all firms, the delivery of embedded services formed an important component of their marketing strategy. In particular for Case study 2, the provision of maintenance services was assessed by senior management as their company's key competitive advantage. Similarly, senior management at Case Study 1, whose electronic maintenance network is quite extensive globally, explained that the expectation in overseas markets, particularly their major international market in Hong Kong, was for clients to see maintenance staff 'on the ground'. Accordingly, direct delivery of certain services was undertaken for relationship building purposes, even though technology could still provide the service to the client.

1.6 Conclusion

International service activities requiring a significant amount of interaction and customisation do have greater transaction cost drivers. The current research does provide some support for the literature that emphasises that technology and electronic service transmission can reduce the asset specificity and transaction cost of services. The development of service innovations and online technologies has opened up new channels through which companies can reach international

customers with opportunities inherent in transcending the barriers of location and distance.

The trend towards substantial embedded service delivery via service technologies was evident and was emphasised as a desirable and appropriate format. Importantly, although each firm's ability to deliver elements of their embedded services via on-line technology was acknowledged, all four firms emphasised the additional value generated by delivering these services directly to their international clients. They further explained the necessity of integrating a direct service delivery requirement into their internationalisation strategy, regardless of the extent of electronic or on-line service transmission. Each firm's assessment of leveraging value across their international markets was a balance between what could be delivered to their clients on-site and what could be delivered via technology.

Future research could look at the implications of information and communications technology for firm internationalisation and the delivery of services to international clients. The research has been limited to a qualitative study. Future research could form the basis of a quantitative research study, allowing researchers to apply its findings over a broader range of firms. All of the case study firms could be classified as small-to-medium-sized enterprises. Research into larger firms with similar types of product packages would be useful. It would also be beneficial to conduct a longitudinal study to examine whether the established pattern of these firms is stable over more than a single point in time.

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Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments

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Abstract Since the outbreak of the Global Financial Crisis (GFC), businesses and governments in developed economies are more focused on a single metric than ever before: sustainable affordability. The survival depends on cutting back on the wasteful ways of the past, and is an opportunity for reinvention through, perhaps, creative destruction (Schumpeter and Backhaus 2003). Consequently, an opportunity to learn and adopt more frugal and sustainable ways in innovating has emerged. In this chapter, we provide a framework based on lessons in frugal innovations derived from emerging market experiences. Frugal innovation results in affordable products and services through minimizing the use of resources or by leveraging them in new ways (Govindarajan and Ramamurti 2011; Bound and Thornton 2012; Radjou et al. 2012). The lessons from successful frugal innovations in emerging countries are important—they provide a continuous and sustainable innovation approach—and help businesses and governments in the developed economies stay relevant to their stakeholders. Besides, more inclusive services innovation—as seen in examples from India, China, Africa, and other emerging countries, may ultimately ensure established businesses have a way of providing "good enough" service experiences, at low cost, and more importantly, in shortest time to benefit.

Keywords Innovation · Service innovation · Frugal innovation · Disruptive innovation · Low-end innovation · "bottom of pyramid" (BOP) innovation · Reverse innovation · Frugal services innovation · Global financial crisis (GFC)

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1 Introduction

According to the EIU report published in 2011, 66 % of the economic growth in the next 5 years will come from emerging markets. Leading the pack are China, India, Indonesia, and Brazil with innovations that can be characterized as "need driven" in the low-end market context—seen from the examples discussed in this chapter. India, for example, has pioneered what many have termed "Frugal Innovation" (Zeschky et al. 2011), where local needs are met with local resources in ways not tried before, driven by shortage of resources in the emerging markets—"resource-constrained innovations" (Ray and Ray 2010). Now, was constraint-based innovation not practiced earlier? If it had been, then the question is why are these innovations being noticed or reported only now? There may possibly be several reasons for this, one of which is that frugal innovation has gained prominence in the developed economies since the Global Financial Crisis (GFC) came to the forefront in 2007.

Since the outbreak of the GFC, businesses and governments in developed economies are more focused on a single metric than ever before: sustainable affordability (Zeschky et al. 2011). A Standish Group survey found nearly 60 % of features and functions are paid for but not used in products. Survival depends on cutting back on the past's wasteful ways and is an opportunity for reinvention through, perhaps, creative destruction (Schumpeter and Backhaus 2003). Consequently, an opportunity to learn and adopt more frugal and sustainable ways in R&D and innovation has emerged. Evidence of these can be seen from companies such as General Electric (GE), Unilever, Nissan, and Nokia, among others, which are methodically bringing the lessons from such constrained-based innovation to their more developed markets, while studying and directing their research by being physically present in the emerging markets (Baiyere and Roos 2011; Zeschky et al. 2011).

Applying the principles of frugality (discussed in this chapter), and services innovation (the subject of this book) will provide a framework for "frugal services innovation". The aim is to contribute to the existing literature on frugal innovation, with specific contribution to frugal services innovation, and to provide an adoption framework. The motivation is that such a framework may assist in the development and delivery of services consistent with frugal principles. The approach proposed, however, does not mean that the services delivered are suboptimal; on the contrary, such a resource constraint approach would enable an organization, such as Nokia with its bicycle charger—where electric power is a cocreation process (Dhavale 2013), to differentiate itself from its competitors in the market, both in emerging and, perhaps, in their traditional developing and developed economies. Further, it is anticipated that governments may also benefit from the proposed framework as the first-world governments grapple with public sector spending cuts to balance budgets (Roubini and Sachs 1989; Papadimitriou and Wray 2011) while needing to maintain a high level of service to their citizens and businesses. The emerging markets' governments in the Asia-Pacific region (for example, Sri Lanka) have

demonstrated frugal yet effective approaches to public sector initiatives, despite their funding and other unique challenges (Wescott 2001; Davidrajuh 2004; Heeks and Stanforth 2007).

This chapter provides a *Services Innovation Framework* for business and government organizations, based on currently understood frugal innovation attributes (Zeschky et al. 2011) integrated with "time" as another important attribute—while leveraging the lessons derived from emerging markets' experiences. This chapter begins with an in-depth exposition on innovation and the challenges it faces in its traditional approach.

2 Innovation

Innovation is the process of introducing and implementing new ideas successfully (Rogers 1998). It includes both products and services. Innovation acts as a catalyst for the advancement of all sectors—be it business, government or social—encompassing industries, societies, and countries.

The basic drivers of innovation are coherently stated in the Porter's Framework (Porter 1979, 2008). Each component in this framework—industry competitive dynamics of existing competitors, substitutes, potential entrants, suppliers, and the dynamics of the buyers (customers)—drive the motivation to innovate. It is the fundamental business principle of identifying unmet needs and fulfilling them, as well as to replace a current product or service offered by the competition in the most effective manner—led by disruptive technologies, as an example. These are the key drivers to innovate.

At the next level, creating and leveraging complementors through innovation (Apple and its hundreds of thousands of app developers) ensures a key requirement for sustained business regarding competitive advantage. In the context of emerging markets, for example, $10 mobile phones with c1/min tariff have made telecommunication mainstream in the low-end of the emerging markets, complemented by services delivered via the device ranging from commerce, banking, health care, and so on (Prahalad 2012).

2.1 Emerging Challenge to Innovation

History has repeatedly shown that the victims of an extreme business condition, invariably, are R&D and innovation initiatives (Cheng 2004). These are the most affected functions when the executives and bureaucrats are tasked with reducing business and governance costs, respectively (Bruton et al. 1996; Cheng 2004) (this is however not true in the Nordic and Germanic countries where R&D spending goes up when the economy goes down). Compounding the savings focus is the false belief that the current offering will keep the company afloat longer than they

actually will—the perils associated with this attitude is discussed in detail later in this chapter. The recent and much publicized examples of corporate resuscitations (such as General Motors, Hewlett-Packard, Sony, Yahoo and many deceased) clearly point to R&D cuts to shore up the finances in the short term and the consequences of doing so. Again, as widely reported in the media, it is not uncommon to see companies continuing to put short-term priorities ahead of long-term relevance; even the developed world governments have not been spared this reality vis-à-vis the need to balance the budget and deliver surplus.

What are the consequences of this approach? Most certainly, companies stand to lose their competitive advantage (Lengnick-Hall 1992). Further, governments with less innovation have less engagement with their stakeholders, resulting in lower societal engagement (Coffé and Geys 2005; Keen et al. 2006). Unfortunately, the easiest way that both organizations and governments have found to save costs is to outsource (Calantone and Stanko 2007; Verkuil 2007). However, is outsourcing of innovation the panacea? Or do austere times provide an opportunity for businesses and governments to *challenge* the conventional wisdom and existing practices, created through irresponsible use of resources?

2.2 Emerging Response to the Innovation Challenge

The answer may partly lie in the recent developments within developing economies, such as India, China, or South Africa, where product and service innovations with shoestring budgets—enabled by new technology platforms that help reduce innovation costs—enter the markets rapidly. In a recent study in India, the researchers found that "the emerging markets are extremely price-sensitive, but the growing middle class is willing to try new ways" (Bound and Thornton 2012).

The changing perspective on innovation for many global companies in the recent past has been to ensure that emerging and developing markets (comprising more than two-thirds of the global population, which is expected to contribute to the future revenues and profits) is addressed effectively. Unlike marketing to lead-users in mainstream markets, who are likely to be engaged for the novelty of the innovation and its functions and features, the majority of the consumers in emerging economies are laggards when it comes to dispensable innovation and unwilling to pay for over-engineering (Tiwari and Herstatt 2011). While the traditional approach of the Multi National Corporations (MNCs) has been that of ensuring satisfaction of its lead-users in the short term, the demands of the majority in the emerging economies are more day-to-day needs-based and, thus, require scalable and sustainable products and services (Bhatti 2012).

In solving the problems of the majority, the frugally minded innovators seeing opportunities in emerging markets are more acutely aware of the requirements, such as the need to keep the costs low and working with local resources—even if the functionality offered is limited. Consequently, such innovations are "bottom of the pyramid" (BOP) opportunity focused (Prahalad and Hart 2002; Prahalad 2010).

These innovations can eventually be exported to developed economies to serve certain segments of the markets with social and commercial motivations. The diffusion of such innovations from emerging markets to developed markets has come to be known as "reverse innovation" (Govindarajan 2012). Further, the concept and phenomenon of such a constraint-led innovation, where the focus is on creating a product or service for BOP affordability, may include maturing old technologies; that is, influenced by technologies developed for the lead users in high-end markets by large firms (George et al. 2012). An important expectation from the large BOP segment, however, is longevity of the innovation (Bhatti 2012)—unlike in the developed lead markets, where small number of users are hungry for continuous innovation and have a pro-change bias (Sheth 1981; Rogers 1995).

3 Motivation for Frugal Innovation

A set of "bounded" needs (basic and critical) is the primary motivator for frugal innovators. Frugal innovation is primarily driven by three key factors: (1) resource constraint (Zeschky, Widenmayer et al. 2011); (2) institutional void (Bound and Thornton 2012); and, (3) affordability constraint (Govindarajan and Ramamurti 2011). The emerging markets suffer from one or more of these constraints, particularly from voids created by government inaction. An example of this is significant infrastructure-led issues in countries such as India, Indonesia, Brazil, Venezuela, South Africa, and some East European countries (Govindarajan and Trimble 2012). The more interesting examples are where innovators work at the grassroots level, fulfilling the needs of the BOP consumers with innovative approaches—at times, working around voids created by the governments, such as the case of quality eye care delivered by Aravind Eye Care System in India (Bound and Thornton 2012) or the MedAfrica health ecosystem serving remote communities of Africa (Fellet 2011).

However, the most significant of all the issues is affordability—the bane of the BOP in emerging markets, and increasingly relevant to segments of developed economies in the wake of the GFC and the ongoing economic stressors. Take the case of innovation in the form of a single-use dispensable shampoo sachet from India (Bhattacharya and Michael 2008), initiated by local companies such as CavinKare to compete against multinationals in low-end markets, has recently found its way to economically depressed Spain. As such, global companies are looking for ways not just to innovate in mature markets for lead customers but, more importantly, continue to be relevant to their traditional customers who may be affected by austerity measures in Western economies. Consequently, learning from the emerging markets is relevant, if not critical, to the situation.

Emerging economies, which include more than 50 % of the world's population, form the "low-end" in terms of affordability. Ironically, some of these countries have been gifted with natural resources that would be envy of developed economies; yet some of these resources have traditionally been inaccessible to the

majority and, hence, the accessibility gap. As such, when one or more of the above-mentioned three gaps are present, the motivation for a different kind of innovation —frugal innovation—is heightened.

3.1 The Concept and Phenomenon of Frugal Innovation

Frugal innovation is a response to limitations in resources, whether financial, material or institutional, and transforms these constraints into an advantage using a range of methods (Bound and Thornton 2012). Frugal innovation results in lowering the costs of products and services through minimizing use of resources or by leveraging them in new ways (Govindarajan and Ramamurti 2011; Bound and Thornton 2012; Radjou et al. 2012); such as, using lower-cost mobile phones with applications in the field of health services in the developing countries—primarily due to the shortage of doctors, qualified paramedical staff and access to medical facilities. An example of this is MedAfrica—a platform that seeks to improve the health of communities and regions by increasing access to health care-related information and services in Africa (Fellet 2011).

The key guiding principle of frugal innovation is to result in "good enough" products and services (Govindarajan and Ramamurti 2011; Zeschky et al. 2011). The underpinning characteristics as seen from the examples, in addition to functionality created from *existing resources*, are the *cost of ownership* and *need fulfillment*. For example, in rural India where the bicycle is still a popular mode of transport and electricity is yet a luxury—but not the ownership of a basic mobile phone in households—Nokia created a phone charger based on the same principle used in powering the bicycle light: a dynamo charged by pedal power (Dhavale 2013). Furthermore, Prahalad, who coined the phrase "bottom of the pyramid" has suggested that the BOP market is a breeding ground for radical innovations based on the market dynamics influenced by social classes (Prahalad 2012)—as illustrated in Fig. 1.

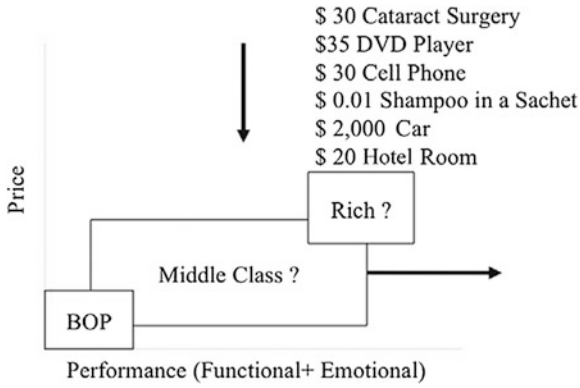

Fig. 1 Morphing of value equation in the global market (Prahalad 2012)

With increased focus on cost reduction, both private sector companies and governments are forced to evaluate alternative ways to continue innovating and staying relevant to stakeholders. The idea of doing "more with less" is appealing to organizations that are resource (including capital) constrained. Increasingly, for governments and organizations, "careful use of resources and avoidance of waste," as posited by De Young (1986), is the main driver for considering a different approach to innovation programs. In this context, especially from a customer perspective, frugal innovation is not just about the acquisition of a product; it also includes the impact from the use of it. Consequently, impact is an important consideration in the conceptualization of frugal innovation.

3.2 Frugal Innovation as a Competitive Advantage

Emerging markets play two essential roles in business growth: providing business opportunity and developing as an optimal source of supply for products and services. What allows this phenomena to impact businesses significantly is the enhanced rate of economic growth in the emerging markets—be it extensively increased consumption or supply. The visible emergence of this, especially from the consumption or market point of view, is best structured by CK Prahalad and Stuart Hart. Their notion of BOP, where volume and affordability compensate for premium offerings at the Top Of the Pyramid (TOP), is an opportunity for product and service providers to tap into new market segments (Prahalad and Hart 2002; Prahalad 2010).

Global companies are used to delivering identical products and services to emerging markets as they do to lead markets. Therefore, innovations at the BOP in the emerging markets by emerging market entrepreneurs and innovators, using limited resources of the emerging markets—are a threat, as these entrepreneurs go down the pyramid from lead users to the masses. Those BOP innovators who have started serving the masses with "adequate enough" products and services (to meet the critical needs or requirements) may see opportunities to go up the pyramid when the proposition becomes attractive in some of those segments.

Further intensifying the competition is the attractiveness of the developed markets for BOP innovations. Certain segments of those markets are ripe for emerging market BOP innovations. Reverse innovation (discussed in the next section) becomes a strategy for established global players wanting to fend off new frugal competitors, as well as traditional rivals adopting the practices. These companies have adopted several strategies from moving their chief innovation officers to an emerging market and setting up innovation labs, producing products and services specifically for those emerging markets (Radjou et al. 2012).

4 The Concept of Reverse Innovation

From a private sector context, the most critical objective that all businesses passionately pursue is sustained growth. Globalization—that is, seeking opportunities outside the home country—is a universal path for businesses. In the last three decades, there has been conscious stratification of countries into distinct tiers: Developed Countries (DC), Newly Developed Countries (NDC), and Emerging Countries (EC).

Starting with success in EC markets, many global companies (including local MNCs) that have institutionalized the "local innovation" centers and teams, then begin the process of taking such products and services to markets outside their own country market—first to other ECs, then to NDCs. Subsequently, they find customer segments with unmet needs in DCs; for example, shampoo sachet (Unilever), compact store (Walmart), washing machine (Haier), and compact car (Tata, Nissan).

This process is what is now termed "reverse innovation" (Govindarajan and Ramamurti 2011; Govindarajan 2012), where the origin of innovation is the EC, and the target segment ultimately includes customers from DCs. The scholars who coined the phrase suggested, "When a multinational corporation learns to generate successful innovations in emerging markets and then exports that knowledge and those innovations to the developed world, new business possibilities suddenly burst forth. The limits imposed by its traditional operations become surmountable, and the company can rethink all its products and attack new markets in search of growth"(Immelt et al. 2009; Govindarajan 2012).

Opportunities in the NDCs and ECs are important for global firms. Many firms —such as Procter & Gamble (P&G), GE, Nokia, and Nissan—are focused toward these markets to enable sustained growth. One of the key factors for success in these BOP market countries is break through innovation, whether in the form of packaging (as P&G, Unilever have learned) or portable ECG machines (developed by GE). Of great interest to such global firms is the ability to leverage innovation of products and services that were initially targeted to BOP customer segments to then fulfil demands of customers in developed countries.

4.1 Impact of Reverse Innovation on Developed Economies

With increased attractiveness of markets in the ECs, there has been a key change in strategic perspective of successful companies. Creating and sustaining a competitive advantage in these new markets has become a key pillar for sustained growth.

In many ways the focus on emerging markets is opposite to the classic principle of "lead markets" (Beise 2001, 2004) that many MNCs pursued as a core element of their business strategy. Lead markets strategy assumed that it was only customers in developed countries who were sophisticated and would be willing to pay for

innovations: They were the only ones who can afford to pay for the innovations, and they were seen as the "reference customers" for those from the other markets. In general, nearly all the global companies followed the classic principle of the lead market (Beise 2001, 2004; Jänicke and Jacob 2004).

However, as seen thus far, frugal innovations from emerging markets are somewhat changing the traditional understanding of lead markets for global companies: Now, the reference customers are emerging from the BOP.

4.2 Frugal Innovation and the Changing Dynamics of Resource Allocation

In the next decade, emerging-market economies will rapidly evolve from being peripheral players, from largely reacting to events set in motion by wealthy Western nations, into powerful economic actors in their own right. They will shed their role as suppliers of low-cost goods and services—the world's factory—to become large-scale providers of capital, talent, and innovation. Evidence in support of this prediction is that the number of BRIC companies on the Global Fortune 500 list has more than doubled in the past 4 years alone (Bisson et al. 2010). It is important to note that the trend is not just about China and India: "To varying degrees, ASEAN, Latin American, and Eastern European nations, as well as portions of the Middle East and North Africa, are taking part in this economic renaissance. Even pockets of sub-Saharan Africa now demonstrate vigor after decades of stagnation" (Bisson et al. 2010).

One early strategy that some global companies followed in exploiting global opportunities in the EC was of "localizing," at times is referred as "Globalization" (Bauman 1998). This entails appropriately modifying the features of their offering (packaging, size, even functionality) and the value chain (distribution, post sales support) to the level of being "good enough" for the target customers. Interestingly, some global companies sensed a new opportunity for business growth with a very different perspective: They discovered that in many of the emerging countries, local teams (i.e., local employees based in such countries)—also known as "Local Growth Teams" (Govindarajan 2012) developed innovations that met local needs much more effectively. In many cases, they also discovered that there were competing local companies whose locally developed products and services were far more sought-after by the local customers or consumers. Many such innovations became "disruptive innovations" (Christensen 1997), where they started from the low-end of the market and encroached into the top-end of the local customers. This sort of disruption prompted global companies to allocate resources to emerging markets more favorably and strategically than ever before, as seen in the examples of Nissan, GE, and Unilever.

5 Frugal Innovation in Services

While there are great examples of frugal product innovations, the emerging markets are also pioneering how services are conceptualized, designed, and delivered—influenced by frugal principles. Some notable examples are Microfinance in Bangladesh (the pioneering country), Aravind Netralaya for eye care in India, Bharti Airtel's innovative business model of converting fixed costs to pay-per-usage and so on (Bound and Thornton 2012). These innovations are not only helping the emerging market firms address market voids but also differentiate against local and global rivals.

Successful frugal innovations are not only low cost but can also be made available on a large scale (Bound and Thornton 2012). Some of the most radical examples of frugal innovation are in services; for example, a work breakdown based on specialization in the service delivery, designed with economic value drivers (Bound and Thornton 2012), where hospital staff and patient caregivers participate in the recovery of the patient, as in the case of Narayana Hrudalaya hospital in India.

Further, services based on frugal principles herald a new interdependence among local businesses, multinational corporations, societies and governments, big ,and small, promoting ethical use of resources, and a more inclusive approach to innovation—implementation of new ideas, creating opportunities that enhance social and economic well-being for all (George et al. 2012). There is also a dimension of enhancement of social- entrepreneurship. An oft quoted example has been the experimentation in microfinance—a social innovation—in one of the poorest countries in the world (Govindarajan and Ramamurti 2011).

So, how is frugal services innovation different from their product cousin? We see from the examples that in the frugal world, products are designed to meet cost affordability with limited resources to achieve accessibility. The innovator, therefore, is influenced by the laggard users' specific, unmet, and necessary needs, thus, driven by purposeful innovation from the bottom-up rather than from a point of novelty or dispensable need. Therefore, the question is, what drives services innovation, and where are the opportunities to do so frugally?

The emerging markets are ripe for services innovation; institutional void is potentially a bigger concern when it comes to service delivery in addition to the cost of delivery. In India, Shankara Netralaya and HCG Services for cancer patients are delivering medical services to the masses by transforming the traditional delivery value chain. Ginger Hotels, with the same parent corporation that produces Nano cars priced at $2,000, is transforming the hotel stay by creating minimalist lodging (Prahalad 2012). These and other examples indicate that services can be and are being innovated, and the principles of frugality apply as much as in product innovation.

What, if any, are the attributes of frugal services innovations that are different from frugal product innovations? In addition to the attributes discussed in frugal products, a service can be innovated through another attribute that is distinctly

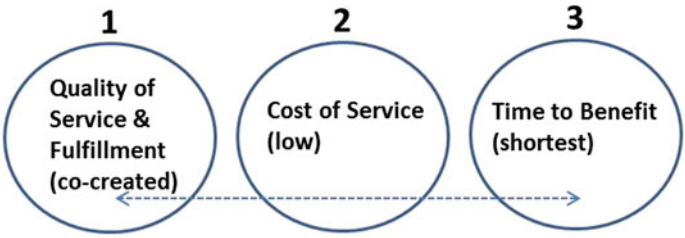

Fig. 2 A "good-enough" frugal service innovation characteristics

different from a product: the dimension of "time". In addition to cost and quality (thus, experience), which are characteristics of product offerings, some service innovation examples highlight that services also include "time" as an additional determinant of service effectiveness. Such examples are in emergency response services, real-time customer engagement for service recovery, risk management, and so forth. For instance, governments around the Pacific Belt have implemented early tsunami warnings, tapping into the proliferation of mobile phones in fishing communities along the coastal belt (Abraham 2006; Gordon 2007).

From the context of frugal innovation, where resources are premised to be constraints, the question is, should time be considered a resource and a constraint? Time, while it can be argued is a constraint in a competitive world of business, is not a real resource constraint unlike capital, skills, technology, and such tangibles. However, designing a service with time as a constraint to achieve service effectiveness is consistent with frugal principles and approaches, focusing on efficient and effective outcomes. This is represented in Fig. 2 below. Take for instance, E-Choupal: A low-end agriculture produce/commodity trade information platform available on mobile phones and in local languages for Indian farmers. The community uses that for determining commodity, including fresh vegetable prices, in real time, and uses the information for their trade with wholesalers (http://www.echoupal.com/).

More importantly, however, service innovations do differ from products in that they are normally co-created and, therefore, the resulting experience is individualistic (Vargo et al. 2008). As seen from one of the examples, a hospital that gets patient's care giver to actively participate in the recovery of the patient is relying on the experience to be co-created.

6 Adoption Framework for the Developed Economies

Domains such as strategy have proven that researchers should not assume the theories or findings in a developed economy will be equally relevant in an emerging economy (Peng and Luo 2000). Although this chapter attempts to provide a

framework for adopting frugal innovation practices, the reverse process of taking experiences of emerging markets to developed economies in its entirety, devoid of context, would be problematic.

6.1 Model for Organizations to Develop and Deploy Frugal Innovations

Frugal innovations are diffused, much like any other disruptive innovation. The latter start at the low-end of the market and diffuse upwards (Schmidt and Druehl 2008). The challenge for firms in the developed economy has been the disruptive nature of the innovations that often catch them off-guard. Paap and Katz (2004) attribute this to "tyranny of success"(2004:15). The scholars further suggest that one of the reasons that a previously innovative firm would lose its innovativeness and, hence, its competitive edge is said to be conflicting challenges of dualism. The model proposed here is one that addresses the dualism challenge by providing a framework with which companies are able to leverage disruptive innovations while still addressing the market needs of today, thereby sustaining their business models and becoming competitive in the future. Further, through the process of reverse innovation, which is becoming an organizational value and underpinning innovation culture in companies such as GE (Immelt et al. 2009) and Nissan, disruptive innovations from the emerging markets are adopted by the established MNCs.

Through frugal innovation practices, companies can deploy a continuous innovation model without much drain on organizational resources. The benefit of a continuous and perpetual innovation model is that it helps companies stay ahead of the markets and competition. Research by Paap and Katz (2004), Schmidt and Druehl (2008) and Zeschky et al. (2011) have shown that there are typically three drivers for innovation:

1. The old technology matures;
2. The old need matures;
3. The environment changes.

In instituting an innovation model with frugal innovation attributes—such as good-enough products and services—BOP market-led and cost-competitive organizations can begin to see opportunities beyond their typical lead user market segments. One of the criticisms of some historically innovative companies that had first-mover advantage (such as Gillette in the consumer goods business or Blackberry in the smartphone business) has been that these companies failed to recognize the maturity of the old technologies and old needs and the emergence of new needs. Now, it can be argued that the competitors of these companies created the need for the customers who did not yet see the need themselves.

In the case of mobile phones, Apple introduced the touch screen mobile with the concept of mobile apps, disrupting mobile handsets in particular and telecommunication business in general—despite Blackberry being the first to invent the

smartphone. Apple transformed the industry from being a hardware manufacturer to becoming a services business, co-creating value with its customers. This is a case of a new environment being created, thus, a new need on the back of newer technologies. One of the key factors in achieving this impact is the incorporation of complementors as a key factor in meeting customer needs. Britain's Wilkinson Sword outsmarted Gillette with its stainless steel blade that has three times longer life than Gillette's carbon steel blade (Paap and Katz 2004). The latter knew its technology has matured and also knew of newer technology but perhaps was reticent about making the change quickly.

The Cloud computing paradigm shift, underpinned by a services concept, caught many IT industry heavyweights by surprise, including Hewlett-Packard (HP), Oracle and SAP. The companies relied on old technologies for far too long, while newer competitors were disrupting the markets with newer technologies, delivering to the old computing needs. Customers did not know the need until Amazon, Salesforce.com, Workday and the like redefined how IT is delivered, albeit as a service. These scenarios indicate that companies can lose their competitive edge if they do not have a continuous innovation focus. However, the challenge of dualism has plagued many companies, including Hewlett Packard and Blackberry, as reported.

In all of the above examples, it can be seen that it is not the technology that brought about the value but rather the change: It is the mobile device as a personal service concierge, the long- lasting shaver generating savings in the household, or the avoidance of capital investments in IT and turning IT resources into another utility—used and paid for on-demand. For several companies it is the fear of cannibalization of their existing offerings that become their Achilles' heel (Paap and Katz 2004). Instead of taking the bold step to disrupt the markets themselves, from the position of strength, these companies let newcomers and competitors steal the market and then had to play catch-up.

Frugal innovations may have the ability to move from BOP to TOP; hence, they can be considered disruptive and seen as a threat from the perspective of multinationals based in the developed economies. The diffusion of frugal innovations can be akin to the low-end encroachment of disruptive innovations discussed by Schmidt and Druehl (2008). The new product or service introduced through frugal innovations first encroaches on the low-end of the market immediately upon introduction. Discount stores and micro-lending are some examples of services that found a market in the BOP. Such low-end disruptions, while targeted at the immediate and unmet needs of low-end markets, may diffuse upward in due course, targeting more price-sensitive customers or those who are satisfied with a "good-enough" offering. In this regard, the evidence refutes the claims of scholars who have maintained that low-end disruption does not lead to market expansion (Schmidt and Druehl 2008)—it is quite the contrary.

However, contrasting low-end innovation with disruptive innovation, with the latter essentially encroaching on the low-end of the existing market and then diffusing upward, the former could well remain an offering dominant in the BOP markets, such as the case of the Chinese firm Galanz, which developed a small,

low-cost microwave that captured 60 % of the market—coming from the BOP—compared to 2 % from the TOP that could afford the expensive alternative. However, the opportunity for BOP innovators is to take these BOP-centric market offerings from the ECs to the NDCs and DCs, satisfying certain segments—perhaps BOP in NDC and DC—that increasingly resemble the BOP market buyer characteristics. As such, with frugal innovations exported to the developed economies, the challenge for the developed economy MNCs are to fend off competition from their doorstep. In response, companies such as Mettler Toledo of Switzerland created basic weighing scale using their Chinese R&D subsidiary to pre-empt low-cost competitors from gaining market share (Zeschky et al. 2011), or the case of Walmart introducing small form factor neighborhood stores in places it is not economical for its flagship stores but needed a presence to keep off competition.

Often with disruptive innovations, starting at the low-end and diffusing upward, the incumbent firms may view the new entrant's product or service as nonthreatening (Christensen and Raynor 2003). However, as seen from innovation drivers, often it is the old technology that has matured or a new environment emerging, and the new entrants are positioning their offerings at the low-end, targeting price-sensitive customers. Since, the new offer is not taking sales away from the incumbents in their markets, which is high-end, or perhaps impacting only some sales in the low-end markets, the incumbents ignore the threat since these customers are not highly valued due to their low willingness to pay for the incumbents' products and services (Schmidt and Druehl 2008). Next, new entrants start to encroach upward, providing alternatives to price-sensitive customers and begin offering products and services modified for higher-end customers. The scenario is completely avoidable, but this is often not what happens. The case of Toyota's entry into the US market is an example of this type of diffusion. Another example is the Mini Magical Child, an entry-level washing machine from Haier, which originated in China for the masses but now marketed worldwide with great success (Hang, Chen et al. 2010). Haier also offers a mini-fridge, which is highly popular in the US.

Considering frugal innovation as another low-end disruption, with similar characteristics in terms of the value, approach and markets, they serve the unmet needs of the markets immediately—as seen from the examples. Unlike disruptive innovation, low-end disruption may or may not encroach into an existing market or diffuse upward (Schmidt and Druehl 2008). In reality, however, it has been shown that frugal innovations in the emerging BOP markets not only meet the needs of the new market but also begin to attract the price-sensitive segments above it. Tata Nano was conceived as a low-cost automobile for those driving motorized bicycles in India. In this regard, Nano was addressing a new market; however, the product now competes with entry-level car markets. Frugal innovations diffuse differently to the classifications of the disruptive innovation and low-end disruption, as provided by Schmidt and Druehl (2008).

Having started at the low-end, targeting the BOP markets with unmet needs, the products and services diffuse upward to TOP, becoming attractive to some segments as they provide alternatives for price- or sustainability-conscious consumers.

For instance, energy efficiency is one of the products or service attributes that interests certain customers in TOP, since the lead market offerings may not conform to high sustainability requirements due to rich features and functionalities offered. Again, with frugal innovations, the diffusion is not uni-directional (upward) in the emerging markets alone but, rather, lateral in addressing similar needs of markets in the developed world as well. The considerations and challenges for developed economy MNCs doing business in their home countries and emerging markets, therefore, are two fold: (1) compete on NDC/DC turf with the challenge from a frugal product or service designed for the BOP market, and (2) compete in the EC—home of frugal innovations.

The proposed framework is expected to help MNCs adopt frugal practices to address new BOP markets, which are fast becoming more mainstream in the emerging markets, and fend off competition from new entrants that are targeting segments of the developed world akin to BOP in emerging markets as a launch pad to move upward in the NDC/DC.

The proposed framework has three dimensions: the "market maturity" dimension along the X-axis, the "opportunity" dimension along the Y-axis, and the third dimension of "diffusion" along the Z-axis, influenced by the markets and the opportunities those presented.

Since emerging markets are the origins of frugal innovation led by good-enough products and services to meet unmet needs, typically, the innovators are initially seen as socially motivated, seen in the examples of micro-finance or affordable healthcare services. This segment is characterized by Bear-to-Pay (BtP) customers who have traditionally been a neglected group within the society such as, consumers from rural areas of emerging markets. However, the innovations—having started at the BOP as low-end disruption—diffuse upward to the mid-markets in emerging markets, resulting in an encroachment from low-end, as seen from the examples given. There is also an opportunity for such frugal innovations to be used as differentiators in the newly developing markets, where BOP innovations could be considered disruptive since they are seen to originate from low-end markets.

Finally, these innovations make their way to the developed markets, where they are attractive to certain segments of consumers. These segments have the Willingness-to-Pay (WtP) for the differentiated products and services. Mahindra's light tractor for small farms—a major source of work tools for price-sensitive farmers in India but is a "no frills" tool for developed market hobby farmers (Walters and Bhattacharjya 2012). The market for this good-enough innovation is not based just on lower cost but also on simplicity and convenience, sought by hobby farmers. Thus, one of the motivators for the frugal innovation-aligned customers in the developed world is that the existing alternatives are mostly "over-spec'd" and overvalued.

Therefore, MNCs from the developed world could incubate frugal innovations in the emerging markets, given the potential at the BOP, and leverage those innovations in the NDC/DC markets. This has been the approach of the prominent MNCs, such as GE, Nissan and few other pioneers who have established labs in the emerging markets to cater to BOP segments by creating new products and services

in a local context. These innovations—and, more importantly, the practices and lessons learned—are then exported to the home base and traditional markets. Further, even if there were no emerging market presence by way of local establishment, the mindset change serves to innovate in the context of BOP in EC and, consequently, in NDC and DC. The following section provides some guidelines.

6.2 Application of the Innovation Model in the Management of Frugal Services

The immersion programs by developed world corporations in innovation centres or labs in emerging markets have been on the rise. Nissan's executive in charge of entry-level cars was sent to India to produce a global small car, an entry-level car to be produced in India following frugal engineering principles and then exported to other emerging markets, such as Brazil, Indonesia, and South Africa (Radjou et al. 2012).

Taking a cue from Nissan, GE, Unilever, Nokia, and based on the frugal practices of several MNC pioneers, which led to good-enough products and services, the following are the principles, to be adopted in the management of such innovations:

1. Lead with contextual knowledge of the unmet need;
2. Analyze the components that make up the requirement (including technology maturity) in the context of value rather than features and functions;
3. Partner with complementors and form ecosystems; and,
4. Chart the diffusion trajectory.

The key competency for achieving frugal innovation capability is an insightful understanding of the "needs of the target customers," which is dynamic and aligned with changes in the contexts, and Willingness-to-Pay (not the prices). Both of these require an effective blend of "methodological rigor" and "creativity" (Ghemawat and Rivkin 1998). The commercial attractiveness for a frugal offering is the WTP by segments of customers, who are motivated by simplicity and sustainability. For MNCs, therefore, the frugal products and services open up new markets in their developed home-bases, imitating the emerging and developing markets. Often, though, it is not the specific innovation per se that is valuable to the MNC but rather the practices such as "time optimization", and lessons from innovating in the emerging markets with their constraints and within context. Another important competency is "cost optimization", which would include understanding of product and services features in the context of the entire "cost chain" from source to customer experience.

Many times, one of the key determinants of success is the role of the complementors (Brandenburger and Stuart 1996; Nalebuff and Brandenburger 1997). On the diffusion trajectories identified in Fig. 3, the opportunity is to replace over-spec'd offerings in the developed markets by enhancing certain dimensions of the frugal innovation offering developed for emerging markets. Such enhancement options can be achieved by collaborating with complementors. For example,

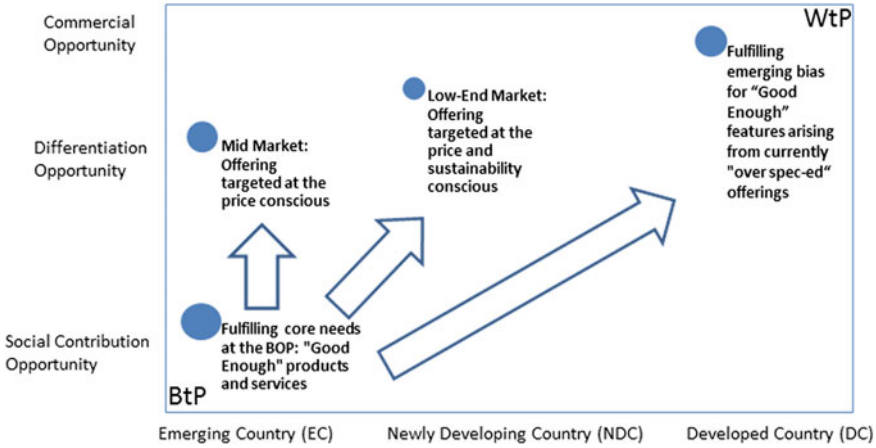

Fig. 3 Diffusion patterns of frugal innovation

inVenture, a social entrepreneurial startup in India, provides credit scoring using mobile technology, supporting the micro-finance industry. The usefulness of this is not limited to emerging markets such as India but can be relevant in NDCs and DCs in Europe, which are under financial stress, thus, resulting in record unemployment.

Beyond being nimbler than start-ups to sense and respond to unmet needs, one of the structural focus requirements for the MNCs is the interlock with the EC partner eco-system. A key lesson from successful frugal innovations in the emerging market is the network orchestration strategy adopted by social entrepreneurs that are addressing unmet needs of the BOP markets (Kleindorfer 2009; Wind et al. 2009). The involvement and cooperation with nongovernmental organizations (NGOs) and educational as well as research institutions have proved valuable in the conceptualization, development and adoption within the markets.

Finally, from an organizational perspective, adoption of frugal innovation practices requires change in mindset: the culture and value of an organization needs to support the frugal innovation approach to innovating. The mere establishment of the principles without the appropriate mindset change and governance may not result in the hoped-for outcomes. As such, it is important to ensure organization-wide understanding of the business model. The changes required are both structural and cultural—while new structures and rules may need to replace the existing ones, the most important critical success factor is a culture underpinned by a shared goal in terms of delivering value through frugal approaches.

In today's leadership qualities, managing an organization through different business, economic, and financial cycles is recognized as one of the core competencies. A number of leading institutions offer Executive Programs focused on Innovation Management. Frugal Innovation is certainly on the forefront of the latest thoughts in the area of innovation. A good understanding and competency in developing Frugal Innovation in an organization would be a key competitive advantage. For example, "outcomes based payment" pioneered by India's Airtel to

its technology suppliers, as a differentiated, "skin-in-the-game" business model, is a lesson taught in several business schools globally. A quite common BOP innovation in the Business-to-Business (B2B) relationship in the emerging markets where sheer volume (of users) trumps usage.

7 Conclusion

Frugal innovation is not about being cheap; neither it is about the standard. It is about fulfilling an unmet need with a good-enough product or service. Empirical evidence in frugal innovations in services include Aravind Eye Care, Narayana Hrudalaya for cardiac care, telecommunication services from Bharti Airtel (all of these from India), microfinance from Grameenbank in Bangladesh, MedAfrica's platform for Africans to get medical advice in remote locations, and funds transfer and bill payments through SMS from Safari.com in Africa (where banking services in rural areas lag behind mobile coverage). These represent how local companies saw the potential for social and economic development opportunities in their BOP markets. The organizational drivers for innovation, and particularly frugal innovation, have been influenced by local startups with a focus on the markets at the bottom of the pyramid (Baiyere and Roos 2011).

While these provide valuable lessons in innovating in the context of mass market needs, other examples—such as GE's portable ECG (India) or Ultrasound (China) systems, Nokia's bicycle charger, Unilever and P&G's single-use shampoo sachets—are proofs of Western companies' innovating for the BOP markets with a view to exporting them, together with the lessons, to their traditional markets, creating an innovation culture that is more frugal. What emerged as a necessity-driven approach in the emerging markets, undertaken by local entrepreneurs, the approach has not only been adopted by multinationals doing business in emerging markets, but also exported to traditional developed economies' home bases to help differentiate, especially during the austere times. In this regard, frugal innovation has the potential to become a competitive tool for multinationals competing in the emerging markets and in their developed home bases. To this end, innovation transfer from emerging markets to the historically dominant economies, is an increasing and impactful trend.

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Part VII
Service Innovation in the Government Sector

How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production

Public sector innovations can include new services (service innovations), new ways of organizing services (like Public-Private Partnerships), or new ways of distributing, or communicating about, services (like ministerial blogs and e-voting). Mulgan (2007, p. 6) defines radical innovations in public sector as a systemic change, such as the creation of a national health service or a move to a low-carbon economy. Windrum (2008, p. 8–10) follows the same taxonomy adding conceptual innovation (such as a minimalist state) and policy innovation (the transition to market economies by Eastern European countries). Osborne and Brown (2005, p. 4) do not recognize incremental innovations at all; they see them as gradual changes to existing services. Innovations introduce new elements into public services in the form of new knowledge, a new organization or new management skills. Innovations always represent discontinuity of the past.

Highlight *The Finnish Customer-oriented Service Network Project resorts under the Services for the Elderly unit of the Helsinki Social Services Department (Social and Health Services Department as of 1st Jan 2013). The aim of the project is to create a new user-driven networking service model for the elderly. It is a model for a radical renewal of social and health services at the system level. The reform is based on a Public-Private People Partnership model, which is implemented together with the public, private and third sectors. Several universities and networks, like the European Network of Social Authorities (ENSA) and Design Led Innovations for Active Ageing-project (DAA), and Finnish regions doing benchmarking on personal budgeting, are involved in this cooperative effort.*

Innovating Universities: Technocratic Reform and Beyond

This chapter critically examines innovations and 'reforms' in university service provision and their management, focusing on Australia as illustrative of broader global trends associated with the integration of higher education into the international market economy.

The authors argue that more than the usual economic, technocratic approaches to service innovation are required because of the complexity and unpredictability that characterize the entire field of knowledge-based services.

Highlight *To apply our alternative framing of both the issues and the intellectual tools required for effective analysis, the chapter examines three dimensions of innovation, those in the policy, governance and academic work processes through which Australian universities have been transformed over the last 25 years. The author's contribution suggests that dominant approaches to university 'reform' risk diminishing the creativity and critical investigation skills required for these institutions to advance service innovation and emerging forms of society, not just a 'knowledge-based' and 'service-oriented' economy.*

Business Model Approach to Public Service Innovation

The operating environment of the public sector has undergone a fundamental shift towards a more competitive nature. As these changes accelerate, they are exerting considerable pressure on the government in terms of rising costs and ever-increasing need for innovative service offerings. In order to shed lights on these contemporary challenges, this chapter will review and analyze a number of innovative service delivery modes observed in practice, including joint ventures with the private and not-for-profit sectors, public-private partnerships, contracting out, franchising, and the use of social bonds and collaborative services.

Highlight *In this chapter, the authors analyze six innovative modes of service delivery through the lens of the Business Model framework. Public sector innovation is created by making choices in relation to the following components or dimensions: Resources, Competencies; Organization (internal and external), and Value proposition to the customers (RCOV). Analysis presents a new 'business model' developed using the RCOV business model framework designed specifically for decision makers in the public sector. This chapter will equip the readers with the means to better understand and manage public service innovations in the increasingly challenging environment.*

Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation

The last four decades have witnessed increasing research, policy discourse and the investment in government programs to foster innovation within the private sector manufacturing and service industries. Despite the adoption by many governments of the language of complexity theory and systems thinking in business and organizational management, and a growing awareness of the breadth of contexts and outcomes resulting from the innovation process, a broader commitment to investments in supporting skills development and capacity building for service innovation in businesses have yet to catch up.

Highlight *This chapter examines the factors that have contributed to the perpetuation of a limited conceptualization of the forms in which innovation contributes economic value, and the government policy instruments invested in to foster and sustain a diverse regional innovation system. This tangle of academic discourse, policy rhetoric and government programs aimed to support innovation will be examined through a case study of South Australia's strategic plan and the agencies charged with fostering and supporting innovation in the state.*

How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production

Tuula Jäppinen

Abstract This chapter addresses the management of the service innovation process in the public sector. Traditionally, innovation activities have been viewed in economic terms as the allocation of resources to innovation, while scholars have consigned the innovation process itself to a "black box." Service users and frontline staff are the most common sources of innovation in the public sector. Service co-design and co-production, in consultation with citizens, is a radical method of public sector renewal. This chapter discusses how the local government sector can use change management to better benefit from user-driven innovation in public sector renewal, with examples provided from the United Kingdom, Denmark, and Finland, who are pioneers in user-driven innovation. In addition, these new forms of user-democracy are linked to budgeting and decision-making routines related to public services. Empirical data were drawn from the Finnish Customer-oriented Service Network Project in Helsinki, referred to as the Lauttasaari Project, which is discussed in detail in terms of change management, decision making, and innovation management.

Keywords Service innovation · Service innovation process · Public sector · Co-design · Co-production · Service design

1 Introduction

Innovation can be classified into different types. Schumpeter (Fagerberg 2005, p. 6) distinguished in the 1930s, five different types of innovation focusing on the role of innovation in economic and social change. These types were innovations as new products, new methods of production, new sources of supply, the exploitation of new markets, and new ways to organize business. Schumpeter (Fagerberg 2005,

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pp. 7–8) also classified innovations according to how radical they are compared to the current state. Continuous marginal improvements of the product or technology are incremental innovations. Totally new products (such as the automobile or the airplane) or technological revolution are radical discontinuous innovations.

Innovations are usually examined from the perspective of the private sector and regional development, and have not included service restructuring in the public sector. Also, innovation researchers tend to come from the fields of economics, engineering, and geography (Fagerberg 2005, pp. 2–4); only 3 % of the researches have a background in political science or management (Fagerberg and Verspagen 2009, p. 229). Traditionally, innovation activities have been viewed in economic terms as the allocation of resources to innovation, while scholars have consigned the innovation process itself to a "black box," as Fagerberg (2005, pp. 2–4) notes. Yet, innovation activities often aim at social goals that cover a wider area than economic development only, the objective being to improve the quality of life and well-being of citizens (Sotarauta 2009, p. 18). Innovation in the public sector is a relatively new area of research and has been pursued internationally since the turn of the millennium (Moore and Harley 2008, p. 4; Nelson 2008, p. xi; Windrum 2008, p. 3).

Public sector innovations can include new services (service innovations), new ways of organizing services (like Public-Private Partnerships), or new ways of distributing, or communicating about, services (like ministerial blogs and e-voting). Further, Mulgan (2007, p. 6) defines radical innovations in public sector as a systemic change, such as the creation of a national health service or a move to a low-carbon economy. Windrum (2008, pp. 8–10) follows the same taxonomy adding conceptual innovation (such as a minimalist state) and policy innovation (the transition to market economies by Eastern European countries). Osborne and Brown (2005, p. 4) do not recognize incremental innovations at all; they see them as gradual changes to existing services. Innovations introduce new elements into public services in the form of new knowledge, a new organization, or new management skills. Innovations always represent discontinuity of the past.

This chapter addresses the interaction between local authorities and citizens in decision-making on services and service restructuring through the concepts of participation and a user-driven approach. Two channels through which citizens can participate in public service reform are discussed: the traditional way of participating in decision-making on services through representation or direct democracy; and a new, more innovative way where citizens participate in the planning and development of service provision through user-driven innovation activities. Subsequently, these new forms of user-democracy are linked to management issues related to budgeting and decision-making in public services, and illustrated with a case study involving an inductive analysis of municipal innovation activities in Finland.

2 User-Driven Innovation

The recent debate on innovation has brought to the fore the openness of innovations, and the increased role of service users and networking. These concepts culminate in the concept of "open innovation" promoted by Chesbrough (2003), which refers to network-based innovation, and the term "user-driven innovation" introduced by von Hippel (1988), who described the role of a service user as a service developer as part of the democratization of innovation (von Hippel 2005, pp. 22, 1).

The first decade of the twenty-first century saw the introduction of the concept of user-driven innovation in the international and Finnish innovation policy, at the time consumers became active players and part of business networks; a time where they became co-developers, collaborators, and even competitors (Prahalad and Ramaswamy 2000, pp. 6–7). At the European level; Denmark, Finland, Germany, and Sweden are recognized as innovation leaders (Scoreboard 2011), whereas the United Kingdom and Denmark are considered leaders in user-driven co-creation. Finland did not participate in this research and did not receive a mention at the time (Governance International 2008).

Yet, Finnish government programs of the early 2000s and the national innovation strategy adopted in 2008, have aimed to safeguard opportunities for citizens to develop services as service users. At the same time, new innovative user-driven methods of citizen participation have become available, such as methods of service design. Service design (Moritz 2005, p. 5) integrates management, marketing, research, and design. It also acts as an interface and connects organizations and customers in a new way. Many Finnish cities—Helsinki, Espoo, and Tampere among them—have customer-driven and user-driven orientations as a part of their strategy. However, both international and Finnish studies show that it is not yet a common practice of local authorities to plan and provide services in cooperation with citizens.

2.1 Traditional Way to Participate in Decision Making on Services

The Finnish Constitution (731/1999) and the Local Government Act (365/1995) lay down provisions on public participation and influence. In Finland, the objectives of the Government programs in 1995–2003 enhanced public participation and influence, welfare, openness, and publicity of governance. The Ministry of the Interior set up the citizen participation program in order to increase direct participation as a way to complement representative democracy. The report on increasing direct participation, drafted in 2002, groups forms of participation into four categories, which are *participation through information*; *participation through planning*;

participation through decision-making; and *participation through direct activities* (Direct participation 2002, pp. 3–4).

Participation through information refers to the citizens' right to receive and produce information. Forms of this participation are, for example, communication to, and consultation with, citizens by the municipality in responding to queries, and agreed service commitments. *Participation through planning* refers to interaction between the municipal organization and local people on issues related to planning. It takes place on a deeper level than participation through information; examples include community planning and city forums. *Participation through decision-making* means that citizens participate in decision-making on service provision, or on issues concerning their own neighborhood, such as neighborhood committees, which are chosen by the citizens and have delegated decision-power from the city council. *Participation through direct activities* refers to citizens' own activities in their living environment, or environmental regeneration and maintenance and service provision carried out as voluntary work (ibid. 4–5).

While 86 % of all Finns have used at least one of these forms of participation (Sjöblom 2006, pp. 246–249), with the local council delegating decision-power to services users, for example to the members of neighborhood committees; only 10 % of the existing 63 intramunicipal organs in Finland have any effective competence or decision-making power. The other organs can be characterized as forums for dialog between the municipality and its citizens, without any connection to service planning, development, or decision-making (Pihlaja and Sandvik 2012). This suggests more innovative ways for involving citizens as users of innovation through co-design and co-production.

2.2 A New Way to Participate in Decision Making on Services Through Service Co-Design and Co-Production

Recent research suggests that service co-production in consultation with citizens has emerged as a radical and necessary method of public service renewal. Co-design and co-production of public services are described as an active process between people who use services and those who provide them. In this process, service users are on the same level as the service providers. The aim of co-design is to draw on the knowledge and resources of both in order to develop solutions to problems and improve interaction between citizens and those who provide services (SCDC 2011; Needham and Carr 2009; Burns 2012, pp. 13–14).

Co-design recognizes that people have assets such as knowledge, skills, characteristics, experience, friends, family, colleagues, and communities, and they use these assets to support their health and well-being (Feeley and Mair 2012, p. 4). Co-design changes the dynamics between individuals and communities, creating more collaborative relationships. Frontline staff are more able, confident, and ready (than

management) to accept user experience (Needham and Carr 2009; Burns 2012, p. 13).

The Scottish Government and Convention of Scottish Local Authorities (Co-SLA) see co-design and co-production instrumental in successfully shifting the balance of health and social care, and other public services that are focused on prevention and independence (Freeley and Mair 2012, p. 4).

Service co-design process can be implemented through user-driven innovation and service design. The different phases of the innovation process are *discovery*, *creation*, *reality check*, and *implementation* (Mager 2009; Miettinen 2009, p. 13). Moritz (2005, p. 123) groups these phases into six categories: understanding, thinking, generating, filtering, explaining, and realizing. This more-detailed classification by Moritz emphasizes the basic idea of service design as to gain an understanding of what clients and users of the service need, before generating ideas and testing these ideas in the early stage of planning (Koivisto 2007, p. 7). In these different phases of the innovation process, different participatory design methods are used.

2.2.1 Discovery Phase

The *discovery phase* starts by observing the daily life of citizens, for example by means of ethnography. Understanding the customer and collecting customer information means finding out and learning about the customer's latent and conscious needs. It means also finding out about the context, and understanding what possibilities this context offers, or what constraints it places, in terms of new service and business opportunities (Moritz 2005, p. 125.)

The everyday lives of citizens can be observed or shadowed through design ethnography and design probes, or more traditional tools such as interviews and enquiries (Hämäläinen et al. 2011, pp. 61–73). Information about the service context can be gathered with stakeholder and context analysis (Moritz 2005, p. 126).

2.2.2 Creation Phase

At the *creation phase*, the information collected earlier is first analyzed in order to identify problem areas or new service needs. Customer profiling, and customer journey mapping tracking customers' use of services can be used as tools such analysis. After the analysis, new service concepts are created based on the new found ideas (Koivisto 2007, pp. 8–9).

New services can be created with the help of role-play and experience prototyping in consultation with customers (ibid.). A co-design workshop is one way of including a large group of people, such as service users, producers, and designers, in the planning process at an early stage (Mattelmäki and Vaajakallio 2011, p. 80).

2.2.3 Reality Check Phase

In the *reality check phase*, jointly created service concepts can be tested with prototypes before implementation. Service concepts can be illustrated and tested using methods such as scenarios and visualization (Miettinen 2011, p. 119).

A quick way of modeling user experiences is to use rough paper models; service processes and human interaction can be tested by means of storyboarding, and the entire service system can be visualized with service blueprinting. The aim of prototyping is to produce new information about the planning process and to offer different alternatives for decision-making (Vaahtojärvi 2011, pp. 133–134).

2.2.4 Implementation Phase

In the *implementation phase*, a well-functioning model selected on the basis of the tests is defined as the final product or service. A business plan is often drafted at this stage, together with a blueprint outlining in detail how the service system will be implemented. A personnel training plan and guidelines for service introduction are also typically drafted at this stage. The service should always be improved based on real user experiences gained after its implementation (Moritz 2005, p. 145).

3 Case Study of Co-Design Services: The Lauttasaari Project

The above service co-design and co-production concepts are illustrated with a case study, the Finnish Customer-oriented Service Network Project in Lauttasaari, Helsinki, which took place over the period 2010–2013. This case of Lauttasaari provides an inductive analysis of municipal innovation activities, where opportunities of local authorities and local citizens to act in an innovative environment are examined through various roles. These roles reflect the transition that is taking place in the European local government sector, where a shift is taking place from the old public administration to New Public Management and Governance (Jäppinen 2011a, p. 158). The OECD countries have developed many new ways to foster openness of government and of service delivery, and to be receptive to citizen concerns. Open governance in this context is a government which provides citizens with information on decisions (transparency), on how to obtain their legitimate service (accessibility) and on how to be heard (consultation and participation). The Nordic countries and the United Kingdom have also been pioneers in changing these structures (Blum and Manning 2009, pp. 43–46). In this process, the role of Finnish local authorities providing welfare services is changing from that of a service provider to a service organizer. In the transition, individual local authorities will, to an increasing degree, form networks and provide welfare services in

cooperation with other local authorities, businesses, and organizations (Jäppinen 2011b, pp. 18–19). A British professor of public management (Bovaird 2007, p. 846) describes the role of public administration and public servants in this transition as follows: "Whereas traditional public administration saw public servants acting in the public interest and New Public Management suggested ways in which service providers could be made more responsive to the needs of users and communities, the co-production approach assumes that service users and their communities can be part of service planning and delivery." Bovaird considers this change as a revolutionary concept in public service.

The Finnish Customer-oriented Service Network Project resorts under the Services for the Elderly unit of the Helsinki Social Services Department (Social and Health Services Department as of 1st January 2013). The aim of the project is to create a new user-driven networking service model for the elderly. It is a model for a radical renewal of social and health services at the system level. The reform is based on a Public–Private People Partnership model, which is implemented together with the public, private, and third sectors. Several universities and networks, like the European Network of Social Authorities (ENSA) and Design Led Innovations for Active Ageing-project (DAA), and Finnish regions doing benchmarking on personal budgeting, are involved in this cooperative effort.

The project has two target groups in the district of Lauttasaari: informal-care families in which the dependant is over 65 years, and home care support service customers; with 50 members in each group. The project has several customer-oriented sub aims: to create and to test a new care manager model; to create and to test a personal budget model; to look for new ideas for service vouchers; to research the effectiveness of developed models, and to use service design methods and tools in different phases of the project (Hyvärinen 2012).

The Lauttasaari project used various service design methods for involving users in co-design: ethnography, personas, video-recording of daily routines of informal carers, Lego serious play, design games, visualization, customer journey mapping, role-play, design probes, scenario cards, and tomorrow headlines (ibid.).

Next, we elaborate on the design probe method, how it is used for collecting user information, and how this information can be exploited in care management and personal budgeting.

3.1 Design Probe as a Tool to Understand the Daily Life of the Customer

The Lauttasaari project used *design probes* for identifying the needs of informal-care customers in the pre-pilot, and in the actual project. Design probes are self-documenting diaries. A customer documents his/hers personal context by, for example, taking photos of objects and events over a specified period (Mattelmäki 2006; Hämäläinen et al. 2011, pp. 61–73). The design probes in the pre-pilot were

developed together with Aalto University by using the British Person Centric Planning tool as an example. The pre-pilot was implemented over 4 months in 2011–2012. The design probes were tested by six informal-care families living in Lauttasaari. The probes were delivered in person to the families, and their content and use were explained. Over 7 days, the customers documented their everyday lives, their use and experience of services, and what improvements were needed. The customers were interviewed about their experiences when the design probes were collected from them. The families were positive about the design probes and showed interest in continuing the experiment. (Draft 2013, pp. 12–13.) The design probes implemented in the project were less complex than those tested. They were used by 21 informal-care families. This time as well, families mostly saw design probes as a positive way for collecting information about their daily lives. The type of design probe used in the project was designed by the personnel of the Helsinki Social Services Department (Draft 2013, p. 13).

3.2 Services Based on Customers' Needs

The aim of Finnish social and health policy is to support the elderly and the disabled to live at home. The care and service plan for an informal-care customer describes the services given to the customer and to her/his informal carer. Examples of customer support are home help, meals, transport, personal assistance, equipment, day care, home nursing, and other health services. The support for informal carers can include care fees, days off, social and health care services, and support for home cleaning or hobbies (STM 2006, pp. 5–33).

In the Lauttasaari project, customers and informal carers were given care management when the design probes were delivered to, and collected from, the families. Customers were given information about the public, private, and third sector service providers. A project worker acted as a care manager. During the course of the project, customers participated in the drafting of a new care plan that was based on the results of the design probes, and that would respond better to their needs. Customers needed help with doing daily household chores and with running errands, as well as with statutory services. For example, help was needed to lift up a spouse after she or he had fallen, or with cleaning. They also felt that it was important to take a break and go out with their spouse (Draft 2013). Personal budgeting, which is described later, could be also be used to fulfill some of these needs.

One of the pivotal aims of the Lauttasaari project was to create a network of public, private, and third sector volunteers who would provide services for the elderly. The aim was that this network, created in the project workshops, should be the care manager's primary tool. The first version of the network was tested in autumn 2011, but it was found that the model was not working in practice. Work on the network model continues in spring 2013.

3.3 Enabling Customers to Make Final Decisions on Services

To offer customers freedom of choice and better opportunities to make financial decisions on services, the Lauttasaari project created and tested a personal budget model and explored new ideas for using service vouchers.

Personal budgeting allows service users to buy their own services within the limits of their personal budgets. The Lauttasaari project used the Surrey Country Councils Personal Budgets experiment from 2005–2008 as a template for creating a personal budget model. Models from The Netherlands, as well as a legislation review carried out by the city of Tampere in 2009–2010, were also used.

In the UK model, the process of personal budgeting starts by identifying user needs with the help of a questionnaire. The size of customer budgets is determined by their service needs. Customers themselves plan how to use the budget; and the municipality provides information and tools for assistance. Customers can ask for help with planning from their family, a local authority, or a nonlocal authority care manager, a support group, a service provider, or a service broker (Hyvärinen 2011). The model of personal budgeting used in the Lauttasaari project was created in autumn 2011. The aim was to implement personal budgeting as an electronic card (like the Kent Card in the UK) as part of Helsinki city eTransaction, with the possibility to track its use in real time. The project was, however, implemented within the current legislation, and financed by the city's Social Services Department's informal-care project, whereas services were ordered for customers through the KOSTI electronic ordering system.

Personal budgeting in the Lauttasaari project was designed to provide independence for customers, and to meet their service needs. Informal-care customers could choose whether they would use public, private, or third (not-for-profit) sector services. The personal budget of the families was determined by using the design probes, the standing instructions of the city of Helsinki, and by pricing of service vouchers. The budgets were used to fund statutory leave, informal care, institutional care, transport, rehabilitation at home, cleaning, condition survey, and fitness instruction. Eleven families experimented with personal budgeting for 2–3 months in 2012. Informal-care families were pleased with the experiment (Linnosmaa 2013), and they felt that their needs were heard. The entrepreneurs participating in the personal budget experiment were also positive about it. Aside from Lauttasaari, personal budgeting is being tested in a few other areas in Finland (Ahlstén M, interview 5.10.2012).

Service voucher is another new user-driven way of choosing services. The aim is to enable municipalities to create new ways of service production. Service voucher allows service users to use private services as an alternative, or a complement, to the services provided by the municipality. The municipality determines the services that can be purchased using the voucher, as well as the value of the voucher. Further, it accepts those private companies whose services can be paid for with a service voucher (Hyvärinen 2011). The service voucher is in use in 93 Finnish municipalities (Kuntaliitto 2012). The service voucher is being experimented in

Helsinki in 2011–2013 by the Social Services Department (eight experiments) and by a health center (three experiments). The personal budgeting within the Lauttasaari project described above is one of the service voucher experiments of the Social Services Department. In addition, service vouchers are used in informal care to pay for a vacation fill-in, and in elderly day care. The customers hoped for a more flexible use of service vouchers. For example, informal carers needed longer periods of substitute care for the person being cared for than the current legislation allows (Service voucher experiment 2013). The Helsinki city council is evaluating the service voucher experiment and is expected to make a decision on whether the voucher will become a permanent way of providing services.

4 Change Management

4.1 Theoretical Background

Organizational change is a challenging task. Research findings of Beer and Nohria (2000; Holbeche 2006, p. 6) shows that around 70 % of change programs fail. Innovation and change are overlapping phenomena (Osborne and Brown 2005, p. 5). Osborne and Brown (2005, pp. 90–91) divide the change processes in public services and public service organizations into two different groups: wide-ranging, transformational changes on the one hand, and small-scale incremental changes on the other. Wide-ranging, transformational change can be described as radical alteration with accepted patterns of organizational behavior and operation. Successful organizational transformation can only be achieved with strong leadership, led by an inspiriting vision for the organization and bringing together a diverse range of stakeholders to implement the vision. Achieving the vision requires also identifying organizational barriers inside the organization (ibid.). Radical change aims for a strong and fundamental shift in the organizational activities, whereas incremental change is a slow-shifting reform. Change processes can exhibit features from both these models at the same time (Stenvall et al. 2007, p. 25).

Literature outlines two main methods of implementing organizational change: a top-down and a bottom-up approach. A top-down approach to change is initiated and implemented by the management. A bottom-up approach to change requires broad dialogic change communication and employee participation. It is considered to be a more time-intensive process than the top-down approach, but successful in producing more profound change in organizational behavior and operation (Stenvall et al. 2007, pp. 27–28).

Kotter (1996; Bruch et al. 2005, p. 99) distinguishes between leading change and managing change. Leading change means setting a clear goal and making decisions on how to achieve it; while managing change deals with how to realize the process. A prerequisite for successful strategic change is that decisions about its implementation, as well as the schedule for its implementation, are made at the strategic

level. Researchers (Bruch et al. 2005, p. 99) agree that change should not be initiated unless its objective has been clearly defined. This can be achieved by addressing questions, such as: Why is change needed? What is the target of change? What changes is the organization capable of making? What is appropriate from the perspective of the organizational culture and current context?

Any change process can start by analyzing the environment (Osborne and Brown 2005, p. 12). A PEST Analysis is one specific technique for a structured way to analyze factors in the environment. In this context, change in the environment is analyzed from a political (P = political), economical (E = economical), social (S = social), and technological (T = technological) perspective. Osborne and Brown (2005, p. 13, 20) describe PEST Analysis as a tool for scanning the future development of public sector organizations, as well as an essential element in helping public sector managers confront and engage with these future challenges. Finnish researchers (Meristö et al. 2007, pp. 11–13) describe PEST Analysis as a high-quality, future-oriented SWOT Analysis, which helps the organization connect the long-term future challenges in the form of different scenarios to the strategy process, and take notice of new possibilities and innovations. These new innovations must fit within current and future strategies. The final alternative courses of action are then reviewed against the organization's vision, which involves making an estimate of the resources required for new service concepts, together with a risk analysis for the resources.

The choices that an organization makes (Meristö and Kettunen 2007, p. 18) also depend on whether the chosen strategy is proactive or reactive. An organization that wishes to actively shape the future takes advantage of the possibilities offered by the scenarios, despite of growing risks. A defensive organization tries to prepare for, and minimize, any future risks presented in the scenarios. The final selection of new courses of action is made within these boundaries. Strategy-based development cannot solely rely on an "inside-out" organizational approach; the chosen approach must be "outside-in". This approach can be expanded, for example, with networks, or by using analogy models (Meristö et al. 2007, p. 21). Implementation should not be initiated until the basic purpose of change is understood (Bruch et al. 2005, p. 106).

A change process can be pursued in different ways. The content of a change process can be determined (Stenvall et al. 2007, p. 33) via a managerial process, auditing, building of feedback systems, or a conscious learning process. A managerial process is implemented through a strategy process, or a development project. An auditing process provides information about the opinions of political decision-makers and citizens on renewal. A learning process generates new information and best practices to support change. In the context of a wide-ranging, transformational change, researchers (Pfeffer and Sutton 2006, p. 178) emphasize episodes, which make it possible to address existing problems together, and strengthen belief of the appropriateness of change. Continuous auditing is considered as a means to enable a seamless implementation of a chronologically long change process.

According to Bruch et al. (2005, pp. 100–101), promotion of change process requires that:

- the basic purpose and the goal of change should respond to the needs of the current context of the organization;
- the change process has a clear focus;
- the senior management is committed to change; and
- change and the organizational culture are compatible.

The literature on organizational change also lists different kinds of change agents (Holbeche 2006, pp. 21–25). Key agents of change include the senior management, line managers, personnel managers, and specialists such as development, financial, IT and business managers, together with stakeholder representatives and external consultants. What is common to these groups is a position at the very top of the organization, because only they have the power and resources needed to embed cultural change across the organization.

Senior managers have a crucial role in this. The strategies they create and their own perceptions reflect the scope of change, including where the process of decision-making should take place, and to what extent stakeholders and the whole staff should be committed to change. The role of the senior management is usually that of a sponsor: they oversee, but do not themselves, manage change. It is the responsibility of the senior management to dampen down resistance, and to encourage those who implement change (ibid., p. 21).

The role of top political decision-makers differs from that of the senior management. Politicians may be motivated by a desire to improve social welfare, or the quality of life of citizens. Politicians can also have personal reasons to encourage change and innovation, for example a wish to improve their own personal status or reputation, even to write their name in history. Political decision-makers need different skills to support change; they must use rhetoric and persuasive powers, as well as the ability to mobilize social and financial support (Windrum 2008, pp. 12–13).

Line managers, too, have a crucial role in change, because they are acting as conduits to official information, they create the climate appropriate to the desired cultural change, and they can decide whether change is implemented from top-down, or from bottom-up by involving the staff in a participatory way. They play a key role in realizing employee potential through implementation or in acting as gatekeepers to counter resistance to change (Holbeche 2006, pp. 21–22).

HR management has the opportunity to affect the implementation of change by working with leadership teams, by developing people strategies, and providing management training, and through reward systems and recruitment practices. Other specialists can act as change facilitators in their own roles. Holbeche (2006, p. 25) notes that having a good project manager and staff is not enough to implement change, because change is largely about managing people, requiring a holistic understanding of the strategic, symbolic, rational, emotional, and intuitive aspects of change.

4.2 User-Driven Innovations as Change Drivers

Change can be implemented from top-down by the management, or from bottom-up by employees and customers. The top-down model is usually initiated with changes in governance frameworks and regulation, or it can be oriented toward achieving greater efficiency in the supply of existing services. By contrast, the bottom-up model is oriented toward providing better quality of supplied services, or the development of a new service. The bottom-up model challenges the traditionally used Weber's concept of government, where politicians are responsible for decision making, while public servants deliver services that are defined by politicians (Windrum 2008, pp. 13–14).

Service users (Hippel 2005, p. 22), frontline staff, and middle managers are the most common sources of innovation in the public sector (Borins 2000; Mulgan 2007, p. 31). New service concepts created in consultation with employees and service users can also be more radical than expected, because employees have professional training and deep knowledge of their field (Windrum 2008, pp. 13–14). In spite of this, innovations remain small in scale, and may not be disseminated for various reasons.

Mulgan (2007, pp. 13–17) names the following as barriers to the innovation process:

- Innovation does not respond to the context of the organization (a short-time horizon organization does not need innovation; it needs to put out fires);
- General reasons named for avoiding innovation and change: the public sector does not need experiments; a wish to retain the traditional way of doing things; public sector should be a stabilizing force, and the like;
- Innovations are not anyone's responsibility;
- Risk aversion;
- Many rules prevent innovation;
- Uncertain results;
- Public sector operates in silos, which block scaling of innovation; and
- Structures of public sector do not support innovation.

Enablers of the innovation process are (Mulgan 2007, pp. 18–24):

- National culture that promotes innovation (i.e., the Scandinavian governments; the cities of Helsinki, Amsterdam, and Barcelona);
- New needs of the political leadership and the public sector; civil society, service users, or radical professionals supporting innovation;
- Creativity and seeing things in a new way;
- Testing ideas with prototypes and pilots in real surroundings;
- Benchmarking;
- Replicating working pilots to a larger scale; and
- Sophisticated risk management.

Next, based on the above discussions and background setting, we examine the Lauttasaari project from the perspective of decision-making, change management, and innovation management.

4.3 The Lauttasaari Project Revisited: Decision Making, Change Management, and Innovation

In 2012, the last year of the Lauttasaari project, the project Design Led Innovation for Active Ageing (DAA) was launched in Helsinki. Over the period 2012–2014, the DAA project is benchmarking elderly care services in seven European cities (Antwerp, Barcelona, Berlin, Helsinki, Oslo, Sofia, Stockholm, and Warsaw). The objective of the DAA project is to make policy-makers and strategic level managers find their own role in the Lauttasaari innovation process, and in supporting the process (Sorsimo et al. 2012).

The DAA project consists of two phases. The first phase consists of interviewing both policy-makers and senior local government officers, chosen from three different levels of decision-making and implementation: the highest level of political decision-makers, senior managers, and officers at operational customer interface. Interviews were conducted as open individual interviews, the topic being radical innovations and their connection to the city's decision-making. These interviews yielded the following insights:

- Common language is a prerequisite for trust and collaboration;
- The organization avoids risks; the decisions taken have to deliver a totally correct solution;
- Current culture does not support innovations;
- Barriers to innovation are, for example, money, legislation, tax issues, personnel reductions, and politicization of decisions; and
- The persons interviewed had completely different views on how to measure project success (Sorsimo et al. 2012).

Based on the interviews, service designers created persona definitions of decision-makers in the same way that they created personas of service users (ibid).

These personas were then used in the second phase of the DAA project, consisting of an international workshop (carried out in May 2012). In the workshop, service designers used personas to model challenges facing innovation in the different stages of a decision-making process, and the different roles that people have in promoting radical innovations, and in implementing the required changes to the current operating culture. The different roles identified in promoting service innovations were those of a motivator, an enabler, a skeptic, and a censor.

All five international groups in the workshop made the same general observations about the barriers of service innovations:

- political decision-makers, senior management, and the operational level work separately, and do not speak the same language;
- the culture or legislation does not support innovation;
- the customer is not taken into account in service development; and
- a holistic view and discussion of the different development alternatives are missing.

The results of the workshop differed to some extent from those of the interviews. What was common to the conclusions drawn from both the interviews and the workshop was that political decision-making does not support innovation (Sorsimo J, interview 10.10.2012).

4.4 The Lauttasaari Project as a Change Process

The objective of the Lauttasaari project was radical renewal of social and health services at the system level, by creating a new user-driven networking service model for the elderly, instead of building a traditional elderly care center that provides public services. One of the aims was also to empower the elderly to make financial decisions themselves on services, and the freedom to choose the publicly funded services they needed, either from public, private, or not-for-profit sectors via personal budgeting, or service vouchers.

The methods used in the Lauttasaari project were targeted to achieve radical service innovation and wide-ranging and transformational change in organizations' earlier behavior, by taking a user-driven approach through involving service users (care managers) in designing, developing, and making financial decisions on public services. These new models of user-democracy involving citizens in planning, developing, and making decisions on public service financing are not yet common in Finnish municipalities.

Profound transformational change demands radical changes in the city's culture of development. Wide-ranging, transformational change can be described as radical alteration with accepted patterns of organizational behavior and operation. Successful organizational transformation can only be achieved with strong leadership, led by an inspiriting vision for the organization and bringing together a diverse range of stakeholders to implement the vision. The interviews conducted during the DAA project showed, however, that, instead of exhibiting strong leadership, the highest level political decision-makers and senior managers took on several ambiguous roles.

Achieving the vision also requires identification of organizational barriers and enablers inside the organization. The city of Helsinki identified the barriers to change as a part of the DAA project. A change process can be promoted if the basic purpose and the goal of change respond to the current context of the organization; the change process has a clear focus; the senior management is committed to change; and change is compatible with the organizational culture. Discussion about

the basic purpose and the evaluation criteria of the required change through a PEST analysis, for example, would promote the implementation of the change program. Such discussion and joint planning of the project should have been organized at the start of the project. The content of the aimed change in the Lauttasaari project is determined by the managerial process (development project), auditing (interviews of political decision-makers and citizens), and the learning process. Yet, in the DAA project interviews in spring 2012, no reference was made to the ongoing reform of the city of Helsinki social and health services.

The aim was to implement change management from the bottom-up, which, if successful, would guarantee a strong and fundamental shift in the organizational activities, but would require much more time and wider interaction at different levels of the organization than was the case in the separate DAA project. International researchers are estimating that an implementation of incremental changes may take from 1 to 3 years. In this project, implementation of the desired radical innovations may well take from 3 to 20 years. Because of such a long timeframe, it is not possible to introduce the new service models created in the course of the Lauttasaari project (three-year timeframe).

4.5 Lauttasaari Project as an Innovation Process

The customer-driven methods used in the Lauttasaari project aim to achieve radical service innovation and profound transformational change in the city's development culture. This change is implemented simultaneously at different levels of the pilot area, such as the administrative level, the service production level, and the service user community level.

This change can also be described as a change from a second-generation innovation unit to a third-generation change partner. Danish Carstensen and Bason (2012, p. 20) describe first-generation innovation labs or communities as a creative platform, where the employee-oriented innovation process focuses on ideation. The aim of the process is to train personnel and to facilitate the innovation process with different creative methods. The role of design is to visualize the process. Management of the company or local authority involved does not participate in the process. A key challenge for the first-generation innovation lab is to introduce new ways of working (ibid.).

A second-generation innovation unit is user-centered and focusses on value-creation. The aim of the process is to involve service users in the development of services and products by means of different projects, research, and interactive service design methods. Management is passively involved in the process. A key challenge for the second-generation innovation unit was to integrate the innovation processes across the organization (ibid.).

A third-generation innovation unit is a user- and organization-centered change partner which focusses on innovation drivers. The aim of the process is a core business transformation. Change is implemented in co-creation with users, and

supported by empathic service design methods and rehearsing futures. Management is now actively involved in the process. Service design is used instead of planning for systemic design, organization design, and managing design. A key challenge for this innovation process is to adapt new narratives that foster vision in the organization (Carstensen and Bason 2012, p. 20).

Radical transformational change requires change in the organizational culture. The Lauttasaari project operates as a user-centered second-generation innovation unit, although it aims at the third-generation core business transformation by co-creating services in consultation with service users. Its main focus is not on third-generation system design, organization design, or managing, but rather on second-generation interaction design with service design methods. Also the key challenge is now to integrate the innovation process into the Helsinki city organization; to be a third-generation change partner, the key challenge translates into executing city vision with new narratives.

In summary, findings from the DAA project show that methods of service design can be used at the start of an innovation process. This process highlights barriers that need to be overcome, while visualizing the process helps the external service providers understand the political decision-making process and the current culture of the organization. In order to promote radical service innovations, a change of culture is needed at all three levels, and this change needs the support of both the political and managerial level. Such support and ongoing dialog between all three levels are yet to be found in the Lauttasaari project (Sorsimo J, interview 10.10.2012). Yet, the DAA project opened up a set of interesting questions that should have been addressed at the start of the project:

- How to recruit and inspire decision-makers and budget administration to embrace the innovation process and co-design?
- Who has the responsibility for recruiting and inspiring?
- How are the effects and financial benefits of new service concepts shown and evaluated?
- Who decides whether these new concepts will be used after the project?

5 Conclusion

This chapter discusses the management of a service innovation process in the public sector. Service users, frontline staff, and middle managers are the most common sources of innovation in the public sector. In particular, this chapter described how a local government sector can use change management to better benefit from user-driven innovation in radical public sector renewal.

User-driven innovation may offer a new kind of discussion forum for the decision-making elite and citizens. In this forum, users can proactively express their own service needs at the service planning stage; and later on at the service development stage where they can act as change managers, together with decision-making

politicians, local government officers who make decisions, and employees who implement them at the customer interface. In this ideal model, local citizens can interactively participate in decision-making and development of services via the different stages of joint planning. A visionary change manager can exploit new narratives in a step-by-step implementation of transformational change.

Such model was empirically tested in a case study project, where challenges and opportunities of implementation were highlighted.

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Innovating Universities: Technocratic Reform and Beyond

Kereen Reiger, Toni Schofield and Margaret Peters

Abstract This chapter critically examines innovations and 'reforms' in university service provision and their management, focusing on Australia as illustrative of broader global trends associated with the integration of higher education (HE) into the international market economy. We argue that more than the usual economic, technocratic approaches to service innovation are required because of the complexity and unpredictability that characterize the entire field of knowledge-based services. Instead we establish an interdisciplinary social science-based approach drawing from critical organization studies and complexity perspectives. To apply our alternative framing of both the issues and the intellectual tools required for effective analysis, we examine three dimensions of innovation, those in the policy, governance and academic work processes through which Australian universities have been transformed over the last 25 years. Our contribution suggests that dominant approaches to university 'reform' risk diminishing the creativity and critical investigation skills required for these institutions to advance service innovation and emerging forms of *society*, not just a 'knowledge-based' and 'service-oriented' *economy*.

Keywords Higher education · Knowledge services · Organizations · Complexity perspective · Academic work · Governance

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1 Introduction

In Australia, as internationally, policy debates and institutional practice in the higher education (HE) sector are dominated by anxiety about increasing national and local competitiveness in a globalised market. Several innovations in institutional systems of governance, teaching and research have been implemented, contributing to what many refer to as the process of 'reconstructing', 'transforming' or 'radically disrupting' universities (Blackmore et al. 2010; Christensen and Eyring 2011; Harpur 2010). The dominant policy discourse promotes the integration of HE—both the vocational sector and universities—more fully into the commodified world of products and services (e.g. Universities Australia 2012; Ernst and Young 2012). Indeed it is possible to interpret 'innovating' twenty-first century universities in terms of an overdue shedding of medieval collegial structures and values of disinterested pursuit of knowledge—making them instead a crucial part of the post-Fordist knowledge-intensive and technologically driven economy (Mowery and Sampat 2005; Frank and Gabler 2006).

While few accounts of such changes are couched within a 'service innovations' framework, policy makers and academic managers primarily adopt an economic interpretation of the inevitable adjustment of universities. They also express frustration at the resistance towards these developments articulated by many working in the sector. There is thus a serious disconnect between current HE managements and those who react with pessimism to the 'marketization' of universities (e.g. Slaughter and Rhoades 2004; Vidovich and Sleek 2010; Marginson 2013). Academic critics reject the assumption that the HE sector is 'simply another industry' and express deep resentment at governments' and university managers' emphasis on a linear 'techno-productivist' interpretation of the 'services' generated within their complex field of work (Davies 2003; Blackmore et al. 2010). Conceptualizing the universities and academic work so narrowly, they insist, does not do it justice. Indeed, real 'service' to, cost-effectiveness, and innovation in a rapidly changing society is actually *endangered* by current conceptual, policy and implementation strategies which, say the critics, spell the 'death' of universities and are 'killing thinking' (Evans 2004).

In this chapter, we address this disconnect facing university managements by advancing a more complex analysis of both drivers and impacts of change. Going further, we argue that grasping these effectively requires radical revision of theoretical approaches to service innovation. Universities comprise a major social institution that contributes to national well-being as well as economic production. They provide crucial innovative capacity through processes of research inquiry and knowledge dissemination, and through the education of students for both employment and as citizens. More broadly, many academics contribute to civil society through public debate such as on climate science or in supporting social movements as in consumer-driven mental health care. As in much of the rest of the service sector, many of these contributions are intangible and often unrecognized, and the flow of ideas between people and institutions cannot be neatly located in

time and space. Calculation of 'outputs'—whether of social or economic value—is therefore a challenge.

We argue here that 'innovating' the services to society that universities provide is indeed essential, but not only because of questions of productivity and efficiency. To respond effectively to the twenty-first century challenges of social and environmental sustainability, and of institutional durability in the face of them, we need to widen our theoretical frame concerning service innovation. Questions of human value and social practice, of managing dynamic system change and considering future directions, have to take centre stage at policy and management levels. As academics within 'innovating universities', a term chosen deliberately to convey a particular sense of time—the continuous present—but also a sense of agency and process, we aim to contribute a new critical social science approach to the study of innovation systems and services innovation scholarship, a field to date largely shaped by economic perspectives.

1.1 Structure

The chapter is organized as follows. In Part 2, we locate our task within relevant theoretical debates on systems of innovation and their application to the service sector within which universities can be located. Here we suggest that most service innovation studies share similar premises and approaches to framing, examining and understanding the field, notwithstanding the debates regarding similarities and differences between industrial and service sectors—the 'assimilation', 'divergence/demarcation' and 'synthesis/integration' debates (Howells 2000, 2010; Gallouj and Djallel 2010). Like Petit (2010), we argue for the importance of more critical analysis of the intersections between economic changes, long-term cultural processes, and rapid disruptions and local institutional flux characteristic of contemporary societies as well as their economies. Following the lead of critical management and organizations scholars, especially those in health service innovation, we then draw upon the new directions offered by analysis of complex adaptive systems (e.g. Greenhalgh et al. 2004; Stacey and Griffin 2008).

To apply our alternative framing of both the issues and the intellectual tools required for effective analysis, Part 3 then examines three dimensions of innovation in the services generated by universities. First, we consider how such innovation has been framed to date by Australian policy makers and by the institutional stakeholders engaged in designing and driving innovation in the governance and academic work processes. These form the basis of services provided to students and citizens in the wider community. Second, drawing also on the wider HE literature and on our shared experience as participant observers in local Australian universities, we construct a picture of how university innovation is being effected in practice, specifically in relation to institutional governance and change management, and in academic work, not only due to new online teaching technologies but

the intensive auditing of teaching and research. On the basis of the available evidence, it appears that present innovation strategies tend to rely on simplistic, and indeed outdated and linear, understandings of institutional change and of service provision. Recent theoretical work instead stresses that innovation in universities as global systems reflects multiple causes, forms of power and contradictory consequences—all of which play out in different local contexts with varying and often unpredictable results (Bento 2013; Christensen and Eyring 2011; Frank and Gabler 2006).

2 Interpreting Higher Education Within the Service Sector

Authorities like UNESCO and Global University Network of Innovation (GUNI 2007) have argued strongly that the challenge to HE presented by the new twenty-first century world requires urgent analysis and effective response. However, compared with the other public sector under strain, health care (Greenhalgh et al. 2004; Fitzgerald et al. 2002), there has been little explicit comparison between innovation in service provision in universities and that in other enterprises (Antonelli et al. 2010; Christenson and Eyring 2011; Mowery and Sampat 2005). It has been widely observed that although the service sector of advanced economies has grown rapidly in recent decades to over two-thirds of the total production systems, it has remained the 'poor relation' in academic research and theorizing which is still dominated by the manufacturing and other technological fields which generate many services (Gallouj and Djellal 2010). In reviewing the service innovation field, Howells (2010, pp. 69–72) points out that in developing from a 'technologist' industrial production approach to an emphasis on the distinctive value of service industries in terms of intangible 'products' and the importance of knowledge and networks, the study of services needs to be informed by more connection with other relevant approaches. Others also acknowledge that a degree of over-specialization has produced a silo effect in service innovation research (Gallouj and Djellal 2010; Gallouj and Savona 2009). The disciplinary concerns of economics continue to dominate the theoretical framing of change in HE as in many other areas of service innovation (e.g. Gallouj and Djellal 2010). In our view, further integration with other interdisciplinary studies of work, organizations and services would greatly enhance the field.

2.1 Linear-Technocratic Framing and Beyond

Placing universities within analysis of service sector innovation offers an opportunity to develop a critical assessment of the dominant framework and development of an alternative lens. To this end, we follow an increasing number of scholars

turning away from theories based on rational-technical or technocratic, and productivist assumptions and instead emphasize the complexity and relational character of human as well as natural systems. In brief, as Figs. 1 and 2 summarize, in seeking to understand and explain service innovations, as other areas of scientific investigation, we are also concerned with questions of *ontology*, or theories of being (what is there to be studied?); *epistemology,* or ways of knowing (how can we gain access to the world?); and *methodology* (how can we go about research in practice?). At least until the ascent of complexity and related theories in recent decades, scientific investigation of the natural world stressed that reality was 'out there' to be 'found out about' by a disinterested or objective observer, whose observations or measurements could be replicated by another similar observer. Social reality, such as systems of innovation, is of course different. They are socially constructed over time by human agents whose values and practices become embedded over time not just in *material* reality (e.g. hospital buildings) but in the ways in which institutions are organized and managed. Debates over ontology have significant implications for epistemology and methodology, that is our capacity to know about and investigate the human, social world as well as natural systems. On the assumption that human life is explainable through general patterns or law-like regularities, positivist economic and social scientists see the investigator as neutral and dispassionate. They do not acknowledge the involvement, including emotional dimensions, of inquiry. The process of 'knowing' is understood as gathering as much factual/measurable/observable evidence as practicable in order to develop rational, predictive models.

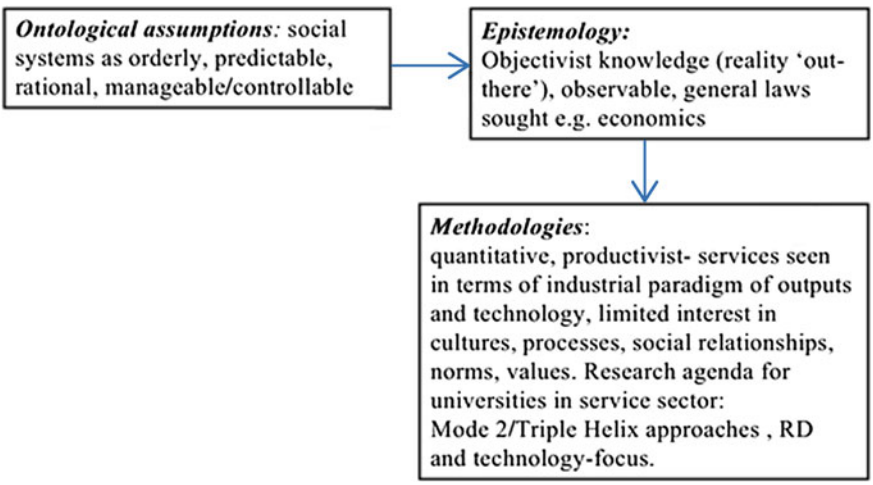

Fig. 1 Linear-technocratic framing

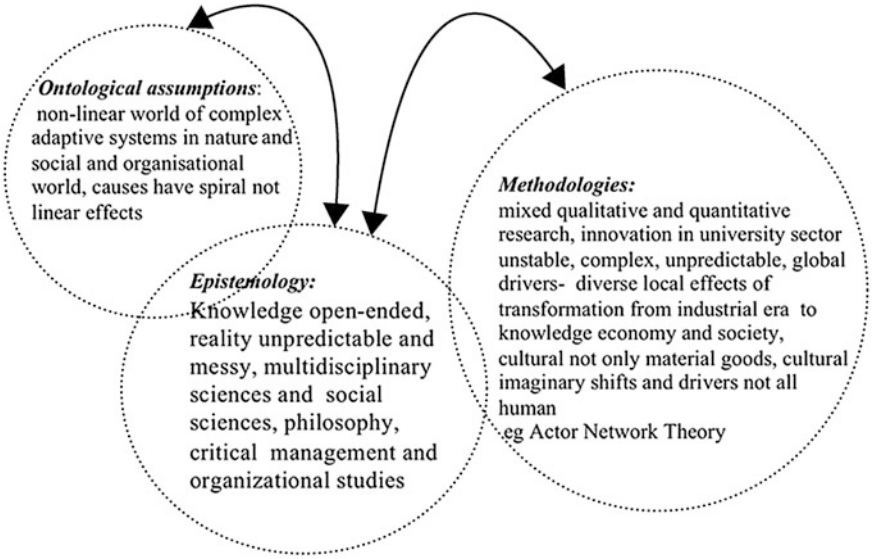

Fig. 2 Synthesis-complexity framing

2.2 Complexity Perspectives

Alternative theoretical perspectives on organizations and workplaces use concepts drawn from the field known as complexity science as well as organizational theories in which change management is recognised to be primarily a relational and cultural exercise (Reiger et al. 2008; Weick 1995). As recent excellent overviews of complexity theories and their relevance to innovation studies point out (Frenken 2006; Goldstein 2008), 'complexity' involves a diverse array of concepts rather than a coherent 'theory'. Complexity approaches have developed as an interdisciplinary endeavour, moving from biological to social systems, and share rejection of positivist frameworks. These still linger however: Frenken (2006) for example reviews the use of complexity approaches in a range of studies of technological innovation but retains a mechanistic approach rather than interpreting them in their organizational contexts as *living* systems. Several social theorists have now extended complexity theory's emphasis on fluid intersections between non-linear, open systems at multiple levels to make sense of the rapid social changes of late modern society (e.g. Cilliers 2005). Interpreting societies in this way produces an emphasis on how the social, economic and biological dynamics of human life, of our very *being,* are interwoven. Complex forms of social as well as biological life are hard to even begin to untangle conceptually and practically, but recurrent patterns ("attractors") can often be discerned.

As developed especially at the University of Hertfordshire Business School by Stacey and Griffin (2005, 2008), this fundamental conceptual shift means moving

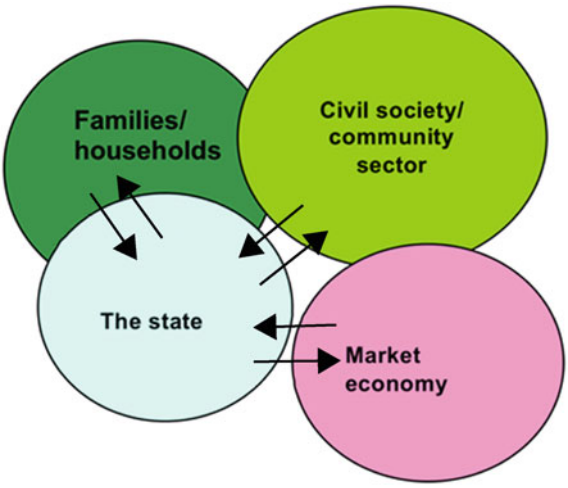

Fig. 3 Social organizations in complex intersecting networks

away from management and economic models which portray organizations and institutions in which action is rational, predictable, and thus able to be directed in a linear fashion (Mowles 2012). Rather, as Fig. 2 suggests, interdisciplinary complexity perspectives stress the essential *nonlinearity* of change in 'complex adaptive systems' and the capacity for radical transformation even from seemingly small 'causes'. Even before the interest in complexity concepts, many social theorists conceptualized the world in terms of dynamic intersections between its major fields —economy, state, civil society and families/households—pointing to the mobilization of power and material resources in the process (e.g. Weber 1921–1923/1978; Bourdieu 1977). As Fig. 3 suggests, not only services but social changes flow regularly and often unpredictably from one field to another, changes in family size or use of new technologies, for example (Reiger 1985).

Which field we prioritize or bring to the foreground for analysis varies according to our objective. Unfortunately, however, the legacy of Adam Smith continues to shape the dominant paradigm for thinking about service innovations as much else. As feminist theorists like Waring (1988) and Folbre (2001) have argued, mainstream economists have largely neglected the *care* and *relational* labour that is society's 'invisible heart'. By taking market relations as the normative paradigm for all of social life, they foreground that lens rather than seeing markets as constantly in fluid exchanges with other sectors.

Using complexity and related ideas to understand the transformation and future of universities offers considerable promise (Goldstein 2008; Mason 2008; Tosey 2002). Some education authorities have already moved in the 'complexity' direction. The 1990s UNESCO initiatives which supported the European 'Bologna process' of networking and course standardization—seemingly rational-technocratic strategies—were also influenced by the complexity perspective offered by French philosopher Morin's (1999) writings on education for the future (GUNI 2007).

Although a much younger scholar, Bento (2013), does not cite Morin, he has amply demonstrated the value of a complexity frame for empirical work on university leadership, innovation and organizational change. Bento's research in Norway and the US suggests that the response of academic leaders to current political-economic pressures is far from optimal in terms of innovating the university system. By merely resisting and/or accommodating intensifying managerialist demands, the real task of necessary innovation remains elusive. Similarly, in *Innovating Universities*, Christensen and Eyring (2011), warn of neglecting the centrality of complex social relationships and cultural factors. In view of state and public reputation factors and internal power issues, they argue that technologically innovating processes—notably what Christensen terms the 'disruptive' innovation of new ICTs—do not work in same way in the complex sphere of HE as in other industries. Although the vital national importance of university research cultures and productivity as an economic asset has been acknowledged, such as by the US Committee on Research Universities et al. (2012) and Universities Australia (2012) greater understanding of change processes in HE is urgently needed (Kirkby and Reiger forthcoming). In the following sections, therefore, we use this brief outline of an alternative to the dominant linear technocratic understandings of service innovation in universities to examine how the shifts in Australian policy developments and in governance and work practices in universities impact on professional and academic workforces, often it seems, with unanticipated and contradictory outcomes.

3 Innovating Australian Higher Education in Practice

3.1 Policy Directions

Many HE researchers have now established that developments such as the increasing availability of online knowledge, emerging digital technologies, the shift from an elite to a mass model of HE, competing markets for students and funding, and the push to align universities with industry are all significant drivers of university change in Australia and elsewhere (Anderson 2006; Marginson and Considine 2000; Olssen and Peters 2005; Vidovich and Sleek 2010). In particular, Commonwealth Government policy on HE and university governance processes have played a critical role in advancing the project of innovating universities in Australia over the last 25 years. These institutional processes—fundamental in defining and legitimating such a transformation—have adopted and enacted a specific approach to university innovation that has drawn on the principles and practices of rationalist, technocratic management. Such an approach is not new. Some suggest that it developed as part of the tide of rationalization that shaped public sector management in the twentieth century, particularly after the Second World War, and that technocracy is the 'quintessential rationalization of government itself' (Christensen and Laegrid 2007, p. 223). Others recognize that while such an approach has been with

us for some time, in the public governance of Anglo democracies it has developed a distinctive character since Reaganite and Thatcherite policies were unleashed in the US and the UK respectively in the 1980s (Davies 2003, p. 91). Variously described as neoliberalism and the New Public Management (NPM) (Olssen and Peters 2005, pp. 313–316, 322) or new managerialism and Total Quality Management (Davies 2003, p. 91), one of its distinctive features is that 'needs formerly met by public agencies on a principle of citizen rights, … are now increasingly likely to be met by companies selling services in a market' (Connell et al. 2009, p. 330). At the same time, public agencies that continue to provide services, do so increasingly on the basis of market imperatives.

As in the UK, Australian policy makers have offered only a limited framing of responses to the challenges of the emerging global and national 'knowledge economy' of the twenty-first century. Demands that universities enhance productivity and use new technologies to innovate their internal services and management have been pervasive. First, the Dawkins White Paper (1998) generated rapid and major restructuring of the sector and the introduction of a 'pseudo-market' through the introduction of student fees but also loans (Marginson and Considine 2000). Second, the ongoing process of what critics call 'marketization' has involved redefining the core role of HE as the private acquisition of economic goods rather than as services that also contribute to civil society, that is their 'public good' value (Marginson 2013). In spite of different emphases and strategies across a range of related policy formulations which space limits discussion of here (e.g. West 1998; Bradley 2008), dominant policy discourses have continued to construct the deployment of 'innovation' in the HE sector in overwhelmingly economic terms—a "means to increase productivity and drive economic growth" (Carr 2009).

State policies direct funding and institutional allocation of students, in a now deregulated market, but the question of what innovations are desirable for the *users* of university services has not been widely considered—at least other than in commercial or industrial contexts. Students' demands for better teaching were part of the initial moves in the 1970s towards quality improvement in HE, and increased social diversity has generated new measures of equity. Yet students are mostly seen as future workers rather than as citizens—such as in the recent Universities Australia paper, *Smarter Australia* (2012). For example a recent influential and colourful paper, *University of the Future: a 1,000 year old industry on the cusp of change* (Ernst and Young 2012), prepared by international accountancy consultants, lacks research evidence or conceptual sophistication. Using a purely economic lens, it constructs the key role of universities as educating 'our leaders and entrepreneurs of the future', creating 'new ideas and knowledge' (in the interest of economic growth), and earning 'much needed export income' (Ernst and Young 2012, p. 4). The word 'economy' and similar—'emerging markets' for example—commonly replaces consideration of 'society'. However, the unfortunate consequence of reducing all the complexity of tangible and intangible services provided by the university sector to narrow market value, is a self-fulfilling prophecy. If social recognition and valuing of universities as a 'public good' declines further, the

unwanted outcome is that community and hence tax-payers' and politicians' support diminishes. Hence Christensen and Eyring (2011) argue that contemporary attempts to overly homogenize and corporatize universities are inappropriate as innovation efforts because they fail to recognize that the fundamental 'DNA' of universities lies elsewhere—in academic staff, and institutional memory and buildings, and in local traditions which revolve around 'the critical jobs of discovering new knowledge, preserving the discoveries of the past, and mentoring the rising generation' (2011, p. 332).

3.2 Remaking University Governance

Empirical research exploring the impact on changing practices in Australian universities of the neoliberal policy reforms mandated by recent governments has not yet been extensive. From the considerable critical analysis of the patterns of shifting power relations however, and our own experiences as academics in markedly different institutions, it is possible to establish the complex dynamics at work as universities struggle to adapt to new forms of service delivery and organization. Carnegie and Tuck (2010) have argued that universities display three forms of governance: academic, business and corporate. Academic governance, they suggest, which used to lie at the heart of the system, was traditionally the preserve of academic boards. Dominated by the professoriate, these focused on a university's originality of research, scholarly reputation, and educational preparation of students —"the core intellectual functions of a university" (2010, p. 436). As this focus has shifted to business and corporate governance, power hierarchies have taken new forms. Access to university decision-making was democratized during the rapid expansion of the HE sector in the 1960–1970s, including some student representation, but such collegiate forms of governance have increasingly been phased out or rendered irrelevant. Replaced by a hierarchical corporate model, the political goals of competition and widening educational access are being implemented through 'top–down' management strategies and goals, with unanticipated as well as desired results (Blackman et al. 2009; Marginson and Considine 2000).

Although academic boards are still formally positioned by their terms of reference as 'the principal policy-making and advisory board on all matters relating to and affecting a university's teaching, research and educational programs' (Dooley 2007, p. 25), they have lost authority. Much of their activity has become confined to determining and overseeing policy and procedures to obtain consistency and compliance in day-to-day operational matters. In many universities, academic boards are increasingly perceived as regulators, not innovators. The opportunity for dialogue, debate and innovative thinking among board members and the wider academic community regarding institutional directions has diminished: setting strategic directions in research and in teaching has become almost entirely the preserve of increasingly narrow senior management groups (Brennan 2010; Zipin

2010; Vilkinas and Peters 2013). At the administrative level universities', in response to government policy mandates, regulatory functions which had been located within the Vice Chancellor's office and universities' business/finance units have moved into far greater prominence in terms of overall institutional governance. Performance measurements, management of income generation, resource utilization and risk management are now at the forefront of managerial concern. Responsibilities that were normally the province of general administration units, such as ensuring internal accountability and protecting organizational resources, have also expanded and been elevated to the purview and control of senior management with a corresponding increase in the number and power of such managers to perform the work required (Trowler 2008; Zipin 2010).

Further exacerbating the trend towards narrow input into decision-making, many of the university committee structures that had facilitated staff participation in decision-making are also being gradually abolished (Bolden et al. 2009). Some are being sidelined or rivalled by 'shadow' entities offering less transparency and direct scrutiny, ranging from internal administrative units to short-term 'co-operative research centres' connected to external industry partners. These offer innovative potential but can readily be marginalized rather than enhancing institutional learning. In spite of being increasingly excluded from broader strategic decision making processes (Bradshaw and Fredette 2009; Brennan 2010; Rowlands 2012), key decision makers within universities, such as academic boards and their subcommittees, along with executive deans and discipline or department heads, are now held more directly accountable for research, teaching and learning outcomes. These internal institutional developments are driven by new external reporting imperatives imposed by such agencies as the Australian Qualifications Framework (AQF) and, more recently, the Tertiary Education Quality and Standards Agency (TEQSA). Meeting their escalating auditing demands poses significant challenges for academic governance, leadership, and management (Blackman and Kennedy 2009; Vilkinas and Peters 2012, 2013). As administrative time and technological resources compete with the needs of teaching and research, internal competition intensifies.

Although the move to a business model of university governance allegedly allows for swifter and more efficient responses to such external drivers (Bento 2013), several problems associated with increasingly top–down decision-making are therefore apparent and threaten to undermine effective institutional governance in the longer term. Dispensing with collegiate governance in favour of technocratic management offers greater institutional control over academic work and the workforce (see below) and, in turn, an enhanced responsiveness to volatile market demands. Yet it also generates cynicism and the demoralization of committed academic leaders who bear the brunt of staff frustration with escalating bureaucratic demands. External drivers directly impact on the roles of faculty/divisional deans and heads of schools who are expected to grow student load at undergraduate, post graduate and higher degree levels, recruit more fee paying international students, reduce the number of small (costly) courses, provide courses simultaneously offered

on-line and in mixed mode, maintain high student satisfaction levels with their courses, and generate jobs for graduates. The market-driven competitive pressures on universities mean that sustainability of courses, academics' continuing positions, and sometimes the viability of whole departments, have become subject to the operationalization of a business model of governance at the level of faculties or divisions. New forms of electronic communication through e-bulletins and interactional sites concerning teaching and learning and organizational change initiatives have brought innovation but are no substitute for collegial debate. In the absence of feeling, they can have impact into strategic decisions such as closure of programs or campuses, staff cynicism mounts and morale and trust diminishes. As Stacey (2010) points out, the policy implementation journey is not usually either linear or uncontested.

It is unsurprising then that a growing body of empirical evidence (e.g. Andersen et al. 2000; Blackmore et al. 2010; Fredman and Doughney 2011) provides disturbing accounts of academic work conditions and practices since the introduction of market-based governance models. While collegial models of academic governance and organizational culture can, and sometimes successfully do, prove resistant to corporate-technocratic approaches to management, they do so in complex and contradictory ways. As Bento's (2013) research in Norway and the US indicates, in the process of being lived out in the daily lives of academics and university managers, networks and disciplinary allegiances shape responses to top–down *diktats*. Clegg and his colleagues claim that organizational members can "exercise freedom in choosing, resisting, rejecting, undermining, accepting, imposing, extending, beguiling, and questioning power" (Clegg et al. 2006, p. 403). But how do the academic members of university organizations make sense of and negotiate these new managerial 'realities'? What impact are corporate and technocratic modes of 'innovation' having on their work, that is, of generating new knowledge and providing knowledge-based services to students, the professions, commerce and industry and, importantly, to the wider community of citizens?

3.3 Linear-Technocratic Innovation and Academic Work

University service innovations have been nowhere more seismic in effect than at the 'chalk face'—in the working conditions and practices of the academic workforce. The following discussion examines the main 'innovations' or 'reforms' that have been introduced in relation to these conditions and practices, and the challenges they pose. We argue that research and teaching innovations have much to commend them if they can genuinely improve the quality of services, especially those that advance goals fundamental to democratic participation and social sustainability. This however requires a wider frame of reference than apparent in implementation in contemporary Australian universities.

3.3.1 De-professionalization and Effacement of Academic Autonomy

The most dramatic innovation in the working lives of Australian academics—shared also by their British counterparts (Olssen and Peters 2005)—has been erosion in their *autonomy* (Blackmore et al. 2010, p. 7; Lyons and Ingersoll 2010; Vidovich and Sleek 2010). One of the hallmarks of professional work more generally, autonomy is usually associated with control over the design, execution and appraisal of one's work (Noordegraaf 2007, pp. 767–768). Academic work, with long but flexible hours, involves considerable discipline and surveillance of the self (Davies 2003; Anderson 2006). Autonomy operates both at an individual and collective level, the latter mainly evident in peer assessment and evaluation. Academic work also offers an opportunity for engagement in creative and critical intellectual production that yields a range of dividends, not least of which is considerable work satisfaction (Fredman and Doughney 2011). However, it is now evident that recent organizational innovations have seriously curtailed academic autonomy and de-professionalized academic work both in teaching and research, seriously threatening intellectual productivity. They also involve dramatically increased middle management—usually at faculty or divisional level, often drawing successful and committed academics away from teaching and research and limiting collegial relationships with peers. Close supervision of academic teaching and research performance, particularly with respect to outcomes, outputs, and so on has become a new normative expectation within HE (Olssen and Peters 2005; Fredman and Doughney 2011; Blackmore et al. 2010, p. 7). As Davies (2003, pp. 92–93) suggests, this new calculus of academic work has worrying implications. Its 'multiplied gaze'—an insidious surveillance—provokes profound anxiety and a prevailing sense of personal worthlessness and distrust within the institution. These threaten to diminish commitment and capacity for innovative and critical thinking.

3.3.2 Work Intensification and Workload

Greater surveillance of academic work is typically enacted by engaging academics in more intense *administration* related to their own and colleagues' research and teaching performance. Regular "performance and development reviews" commonly entail individual completion of a standardized online form about one's teaching and research goals and plans, achievements and failures, barriers to progress and identification of requirements for overcoming them. Completion and submission of the form to middle management then generally entails formalized and documented "mentoring" by an academic superior, usually a member of the professoriate. While this recent innovation offers the possibility of genuine support and professional development, the mentor need not even share the same or similar academic disciplinary background, and thus lack knowledge of and interest in the relevant field: instead, just 'going through the motions' of the competitive, technocratic system. As others have argued cogently (Bento 2013; Blackmore and Kandiko 2012), academic work is shaped in fundamental ways by 'disciplinary tribes', knowledge

networks that go across institutions and are often personally based, such as due to previous shared study or supervision relationships. By contrast, standardized performance reviews routinely involve the application of a metrics for individual academic performance and specific recommendations for improvement to be assessed by independent arbiters in the following year. Failure to address unsatisfactory performance as measured by increasingly narrow criteria can certainly curtail promotion prospects and lead to the termination of employment, contrary to traditional academic expectations of tenure and protection of academics' professional autonomy.

Academics are "assisted" to complete such performance *audits* (Blackmore et al. 2010) through the establishment of standardized research and teaching performance criteria, usually by senior management at faculty or divisional level. This may or may not involve consultation with academic staff. Research performance criteria are directly influenced by the Australian Government's system of allocating financial rewards to the HE sector as it has developed since the 1990s. Performance measures include the annual number of publications for an individual staff member—preferably peer reviewed journal articles in the physical and biomedical sciences which have provided the basis for the model. Books and book chapters along with articles have traditionally been more highly valued in the humanities and social sciences, but peer reviewed journal articles are privileged by the new regime (Blackmore 2010). By contrast, the contributions of public intellectuals to community debate, and thus the public good, are ignored. The ranking of scholarly journals by discipline and "impact factor" is widely adopted to assess academic research performance, increasingly benchmarked in the light of international competition (Marginson 2010, 2013). Success in attracting research funding through competitive grants is a further major indicator of satisfactory performance. Unsuccessful research grant submissions by academic staff may be recognized as an indicator of research performance because of the 'grant writing capital' acquired, but, like much service sector work, this is difficult to quantify. As recognition is subject to middle managers perceiving it as consistent with the goals of senior management (Brennan 2010), innovation and critical thinking can be discouraged.

Teaching performance is also increasingly monitored closely through a variety of evaluation techniques. Again, support for introducing innovations and improving the quality of teaching and learning are admirable objectives but standardized measures, such as the questionnaires that academics are now routinely directed to distribute to their students for completion, are not necessarily the optimal strategy (Marginson 2010). Specific features of academic teaching practice are outlined in the questionnaire and scored on a scale from one to five according to students' responses. These scores are then aggregated and statistically processed to determine an overall rating of one's teaching performance. It is widely recognized by academics themselves, however, that qualitative feedback from students, through open-ended written responses and verbally through group discussion, is much more valuable as effective feedback to assist quality improvement. Exclusive reliance on standardized student evaluations of teaching is inadequate, unreliable and distorts intrinsically variable and dynamic processes (Hattie and Timberley 2007).

Nonetheless such limited standardizing measures now carry considerable weight in performance reviews for academics' salary increases and promotion.

In spite of the ostensible quality improvement goals of the audit system, it relies largely on an inappropriate, or at least limited, productivist and competitive logic which limits capacity for innovative thinking and constructive working relationships. The escalation in institutional surveillance through performance management of academic work and in the concomitant administration required also imposes major constraints on the time academic workers have available for research, even though the pressures to 'perform' it have intensified significantly (Blackmore et al. 2010, p. 7). As a number of international studies have disclosed, the opportunity to conduct research and publish findings from it is one of the main attractions of academic employment (Anderson 2006; Bryson 2004; Clegg 2008), and was traditionally seen as driving optimal teaching. Recent research suggests that "the common belief that research and teaching are intertwined" is now but "an enduring myth" (Hattie and Marsh 1996, p. 529). Academics report frustration at the reduction of teaching quality that results, and having to make up for time lost in administration by devoting more of their supposed "leisure time" to research (Anderson 2006; Fredman and Doughney 2011). Yet this trend towards the *intensification of work* is also resented by many academics because it is perceived as being driven by a market-based or business agenda unrelated to pedagogic goals or genuine knowledge advancement. For some, it seems antithetical to the advancement of critical and creative inquiry and scholarship (Anderson 2006; Fredman and Doughney 2011). Academic morale and work satisfaction in Australia and Britain—among the lowest in the world according to recent reports (Coates et al. 2009)—have been directly linked to the imposition and monitoring of narrow performance criteria and the increased administrative workload associated with it.

3.3.3 Marketizing Teaching and Learning

Academic discontent over workload however also reflects the impact of the extension of HE to an ever-wider array of students (Bryson 2004). Increased student numbers but diminishing relative resources have accompanied the marketization of such provision over the last 25 years or so in Australia and Britain (Marginson 2013), with student-staff ratios deteriorating significantly as a result (Fredman and Doughney 2011, p. 43). In some cases, this has meant an absolute increase in the hours of face-to-face teaching with no appreciable rise in class sizes, while in others it has meant both increased teaching hours and class sizes. Some classes, even at first-year level, are now only available every second week of semester, resulting in less support for students and deterioration in the quality of interaction between students as well. Even so, academic working hours have risen decisively (Fredman and Doughney 2011, p. 43). Combined with a greater "muscularity" of university management style (Anderson 2006, p. 578) in scrutinizing academic teaching and research performance, and government funding cutbacks—both in the 1990–2000s and the projected future—this innovation in university

service provision basically demands that academics must do more with less. Such developments have extremely worrying implications for the quality of teaching and learning (Skolnik 2010). Not only do they affect development of students as competent to assume chosen careers, but importantly, the competencies required for social and political participation and social sustainability (Nordensvard 2011).

Marketized innovation of university service provision has transformed the relationship between students and academic teachers to one in which students are constructed as *consumers* and academics as *service providers* (Maringe 2011; Nordensvard 2011). With the monitoring of teaching performance now depending in large measure on student evaluations of teaching, such evaluations tend to operate as 'consumer satisfaction' surveys and have begun to operate as the tail wagging the dog. Academics' pedagogical choices regarding course content are heavily influenced by these evaluations because of their significance to their performance reviews. As they are competing with a media savvy youth market, academics can find themselves adopting teaching methods that might seem innovative and engaging to students but can be pedagogically spurious. Just as significantly, in the marketization of the student-teacher relationship and the conversion of the student citizen to student consumer, the opportunities for learning to advance intellectual competencies for social and political participation, and in turn the development of social sustainability, are seriously circumscribed (Maringe 2011; Nordensvard 2011, pp. 158–166).

3.3.4 Increased Standardization of Teaching and Research

In teaching, university service innovations have involved increasing standardization in the design, delivery and evaluation of courses (Marginson 2010), especially in undergraduate programs that are aggressively marketed—both domestically and overseas. The demand for individual courses to conform to a brand template has escalated and teaching methods and delivery of courses are now characterized by greater standardization. This can of course make for better standards, but there is less opportunity for materials to express a lecturer's innovation or ingenuity. Greater use of lectures and larger tutorial groups (of 20 or more students) is common, decreasing opportunities for individual student expression and productive interaction. Standardization in teaching also limits forms of student assessment and feedback even though the latter is essential to effective learning (Hattie and Timperley 2007). Exams prevail over essays because they do not require written individual feedback; multiple choice tests prevail over essay-based exams because they can be marked mechanically and are often provided as an accompaniment to particular texts if academics prescribe them for their students; and standardized discussion and essay questions are more routinely adopted along with model responses. Academic staff members are encouraged to adopt marking rubrics instead of giving individually "customized" comments. Thus in the interest of supposedly standardizing the quality of teaching and learning, what is personal, the

relational aspects of teacher–learner interactions, is undervalued, unrecognized and thus diminished (Christenson and Eyring 2011, pp. 336–337).

Academic research is also under increasing pressure of standardization with the relentless drive to measure and evaluate academic performance (Marginson 2010). The adequacy of an academic contribution to research has to be able to measured and according to a narrow range of categories: grants, peer reviewed journal articles, chapters and books published by commercial organizations, and peer reviewed published conference papers. Research grant success in the most competitive schemes is also generally contingent on strict conformity to prescribed criteria in formulating research proposals and demonstrating the significance of the research, even prior to undertaking it!

3.3.5 Casualization and Flexibilization

Clearly, these innovations in academic work practices permit managers to exercise more power in pursuing and achieving their objectives as marketized service providers. The flexibilization of the workforce—or the transformation of a predominantly permanent pool of academic employees (either full-time or part-time) to one in which employment is increasingly offered on a casual or contract basis—allows university managements to respond more nimbly to HE market variations in demand for courses and also significantly reduces labour costs. One of the most pernicious consequences for academic work, and for innovative practices in particular, is the casualization of the workforce and the creation of precarious academic employment. Along with the narrowing of governance structures, the dominance of technocratic-corporate employment and linear, top–down management practices preclude involvement by academics in regulating and managing their employment contracts and workload in transparent and equitable ways. Just as significantly, such principles and practices impede the stability and continuity of access by students to what is arguably the most critical resource required in university teaching and learning—academic guidance and feedback. For contract and casual staff, once their contract has terminated—often before student assignments and results are returned—they are no longer available to provide either to students. The expansion of online teaching in HE—much vaunted by university service innovators but too complex for detailed review here—has contributed greatly to the casualization of the academic workforce. While the research and evaluation of the efficacy of online teaching and learning suggests that it generally equals face-to-face student learning in terms of measurable outcomes, this is not so for all. In spite of the good intent of access and equity programs, a significant proportion of low-income and minority group students find that online courses pose significant challenges to their sustained participation and achievement in HE (Jaggars and Bailey 2010, p. 11). In this as many other aspects of the transformation of university service provision documents in the literature, complex contradictions and unanticipated as well as planned results abound.

4 Conclusion

4.1 Beyond Corporate-Technocratic Management?

The rapidity of change in the postindustrial global world of the 'new economy' and the centrality of knowledge within it demands that university service providers both recognize and understand the changes and respond to them in ways that shape future trajectories effectively. In this chapter, we have argued that, as in the past, more than economic tools are required because of the complexity and unpredictability that characterize the entire field of knowledge-based services. In view of the perspective advanced here, top–down, linear-technocratic approaches focused on market imperatives are clearly inadequate to the challenges. Importantly, we believe that the over-emphasis on 'adjusting' the university as a 'service industry' to late modern times risks 'killing the goose that lays the golden egg'—that is the creativity, critical investigation skills, innovation and dissemination of new knowledge required for universities to contribute not just to a 'knowledge-based' and 'service-oriented' *economy* but to emerging new forms of *society*.

Innovations and service innovations literature, like that on universities, is extensive though often self-referential. On the basis of the interdisciplinary but social science based complexity perspective argued for here, we would encourage HE authorities to consider the innovative alternatives available in many profitable, 'high performing' organizations and documented by leading change management experts, notably those using complexity perspectives (Stacey 2007; Mowles 2012). By contrast with the dominant approach we have identified and discussed in this chapter, research into many innovative services and companies reveals recurrent themes. Attention by management to *change processes and culture* is essential along with recognition of skilled staff as an organization's greatest resource. So, too, is recognition that social relationships within institutional settings are a key factor affecting productivity and financial viability, and that bringing employees into decision-making strengthens the organization. Moreover effective *leadership*—rather than just 'management'—is central to negotiating change in productive ways. A significant British report on excellence in innovation which reviewed leading companies' practices (BNI/Qinetiq 2008) sums this up as follows: 'Service innovators place a strong emphasis on creating the right environment for innovation and developing a positive attitude to creativity, risk and failure' (2008, p. 6, 49). Although approaches to this are diverse, leadership and supportive organizational cultures are critical.

It appears that, contrary to the current hegemony of competitive and hierarchical institutional relations within the university sector, fostering co-operative social relations between and among staff, students and management may be more successful in generating effective and enduring service innovations in research and teaching than present approaches. It is also likely to be more cost-effective in the long term. The essential qualities of teaching/learning, for example, include not just acquiring information relevant to life, but knowing and trusting each other enough

to think, talk and listen respectfully together. This is an embodied process of dialogue, one not readily attained in the virtual world in spite of its flexibility advantage nor does it lend itself to obsession with quantitative measurement of 'outcomes'. Is there any model for what a genuinely 'services-oriented' university education system, as against a purely 'market-driven' one might be like? Those emerging in the health sector have much to offer: after all, it shares with HE many similarities in financing, in complex and changing local demands, and in questions of professional autonomy, commitment and responsibility. The agenda of the emerging movement for 'patient- and family-centred' care has indeed adapted standardizing strategies for humanistic ends. Developed both by users of health services and committed health professionals, it is based on the understanding that there is no substitute for high quality *relationships* and improved *social practices* in workplaces, especially in large complex organizations (Berwick 2009; Crock 2010). In HE, Blackmore and Kandiko (2012) point in the same direction, arguing that a network approach to change could succeed where the neoliberalist vision has failed, for promoting a 'university based on creating, developing, supporting, and sustaining [local]networks is stronger, more ethical and more educationally sound' (2012, p. 209). Constructing such a vision for universities would require new strategic alliances to foster new forms of public dialogue with students' families and others in our diverse communities. It might just give us a genuinely innovative vision of the university's future in providing services to society as well as to markets—undoubtedly a legacy worth leaving to the next generation.

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Business Model Approach to Public Service Innovation

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Abstract The operating environment of the public sector has undergone a fundamental shift towards a more competitive nature. As these changes accelerate, they are exerting considerable pressure on the government in terms of rising costs and ever-increasing need for innovative service offerings. In order to shed light on these contemporary challenges, this chapter will review and analyse a number of innovative service delivery modes observed in practice, including joint ventures with the private and not-for-profit sectors, public private partnerships, contracting out, franchising, and the use of social bonds and collaborative services. By presenting a new 'business model' designed specifically for decision makers in the public sector, this chapter will equip the readers with the means to better understand and manage public service innovations in the increasingly challenging environment.

Keywords Business model innovation · Innovative modes of service delivery · Service innovation · Collaborative partnerships

1 Introduction: The Diminishing Public Sector

The traditional mode of service delivery in the public sector involves the State as a (frequently sole) owner of public entities, with service or product monopolies. Within this traditional mode, Government agencies are not able to provide access to services for everyone, and instead ration access to services by using price and non

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price mechanisms, such as client eligibility criteria. Not only this, but agencies are increasingly being asked to justify their very existence (Burgman and Roos 2004, p. 1):

> [This] is taking the form of identifying, quantifying and reporting of the social value created by the agency as well as providing such value with financial performance guidelines where such guidelines can range from 'staying within budget' to 'delivering an economic profit'.

In recent decades, the traditional mode of public service delivery has been challenged by a number of new approaches which have been sometimes forced onto and sometimes initiated and welcomed by political leaders, who are being held accountable for controlling and reducing the ballooning public sector budgets. The new approaches may range from funding a provider to service the client, to funding the client to access the provider at no cost or at a discount (e.g. Medicare), and everything in between. It also has opened the door for emergent public goods that are seizing increasingly expansive technology enabled free-rider *opportunities.* This development has been discussed by Gruen (2014) who outlines the following roles for government in this domain:

1. Government as information funder and wholesaler;
2. Government as innovation partner;
3. Government as benevolent wholesaler for life;
4. Government as promoter of information platforms;
5. Government as sponsor of standards formation;
6. Governments as collective purchasers.

Public choice theorists have played a role in the decline of the traditional mode of public sector delivery wherein they want to minimise the role of the state, and reduce or dismantle public monopolies which are seen as inefficient and out-of-touch with customers. As a starting point, some theorists advocate that the advisory, regulatory and delivery functions should be separated and undertaken by different agencies (Boston 1991) (this is very much how the Swedish Constitution originating in 1634 is set up to operate). Their overarching proposition is that societies should look to markets rather than the State to meet their needs.

Some writers—for example Sturgess (1996)—differentiate the role of government from the role of service provider, and see merit in commercial businesses and not-for-profits being actively involved in the provision of public services under contractual arrangements. Innovations can flow from this approach. To illustrate this proposition, Sturgess discusses the first privately-managed prison in the UK, HMP Wolds in the following terms:

> HMP Wolds drew heavily on … North American innovations in regime. As a condition of the contract, prisoners were out of their cells for around 14 h a day, compared with much lower levels in existing facilities. Prison officers spent their working day amongst prisoners in large association spaces, even eating their meals with prisoners. They wore softer, non-military uniforms, and name tags. They called prisoners by their first names. And, as a result of a non-discriminatory recruitment policy, when the prison opened, around one third of the prison officers were female compared with an average of around 3 % across the rest of the prison estate (Sturgess 2009, p. 22).

Another development which has facilitated change in the provision of public services has been a focus on service charters. In March 1997 the Australian Commonwealth Government introduced Service Charters in order to promote a more customer-focused public service. All Commonwealth Departments, agencies and Government Business Enterprises that had an impact on the public were required to develop a Service Charter. These Charters represented a public commitment by each agency to delivering high quality services to their customers. This has forced the public sector to reflect on the ways in which services are provided to the end user, and to improve them, i.e. to explore avenues for innovation.

However, having a Service Charter is not the same as being truly responsive to the needs of customers. For instance, the traditional policy framework, and most of the frameworks which have succeeded it, generally do not allow for input in service designs from the recipients of those services. However, end user input features as an important element in the literature on services innovation (Barrett 2002).

2 Cross-Sector Collaboration in Public Service Innovation

A good definition of innovation is provided by Drucker (2011, p. 3): "the effort to create purposeful, focussed change in an enterprise's economic or social potential". Within the context of public service delivery, innovation can begin as simply another way—or a non-traditional way—of delivering services to the public.

In Australia, the way in which public services are provided has undergone significant changes in the past 30 years. Following the waves of privatisations in the 1990s (partly driven by the pressure to reduce costs and to deliver new services), the public sector has been incorporating novel arrangements with partners in other sectors in delivering public services. Today, the public sector economy can be viewed as a bundle of services provided through cross sector collaboration involving a mix of public, private and not-for-profit providers through a variety of different contractual arrangements, which are funded fully or partially by the State. Some choice based services have also been made available through user pays systems. In some cases, service users themselves may be able to select from a range of service providers, financed by a government funded voucher system. One example is the Medicare card services in Australia, wherein if the provider makes a profit, some or all of that profit may be returned to the State, depending on the terms of the arrangement.

To date, some of the greatest innovations were achieved by privatising public sector organisations, franchising others, contracting out services to the private and not-for-profit sectors, and introducing competition for programmes to sustain and improve public services. Consequently, collaboration between different sectors has emerged as one of the main themes of contemporary service delivery. Advocates of collaboration—essentially a form of commissioning from the bottom-up—would argue that it creates the needed dynamics, and investment in innovation and efficiency, that is often lacking in traditional public services.

From a historical perspective, the private sector involvement in providing public services is not new (Sturgess 2009, p. 8). Their presence in the public sector has steadily increased, however, as the collaborative relationship between private sector suppliers and the public agencies has become increasingly more extensive and formalised. More frequently, we see hospital, prison and railway services being run by commercial organisations on behalf of government agencies.

One main objective of the chapter is to examine and classify—through the lens of Business Model (BM) frameworks—a variety of innovative public service delivery modes observed in practice. The BM approach will not only allow the readers to better understand and compare those service modes in a static sense, but will also provide the basis for considering how public services are able to innovate, evolve and improve over time. Building on the current knowledge in the BM literature and the insights from practice, the chapter will then present a new BM framework encompassing the important success factors unique to public sector service innovation. Our second objective is therefore to equip the readers with a useful managerial tool for determining the fitness between the service tasks and the current business model in use, and for bringing about beneficial innovations while designing future modes of service delivery.

3 The 'Business Model' Concept

To date, multiple theoretical frameworks have been developed to improve our ability to understand and manage service innovation. In regards to choosing the most appropriate framework, the discipline of Business Service Management (Rosemann et al. 2009) proposes that it is advantageous to view service delivery from a business perspective. In line with such views, experts have identified the 'business model' (or BM) as an appropriate framework for assessing organisations' potential for service innovation (Fielt 2011) and for formulating plans to achieve beneficial innovation (Chesbrough 2007).[1] One good definition of the business model concept (or BM) is provided by Osteralder et al. (2005, p. 5):

[1] The BM framework is by no means the only approach applicable to service innovation. For example, Gallouj and Weinstein (1997) proposed six innovation models including radical innovation, improvement innovation, incremental innovation, ad hoc innovation, re-combinative innovation and formalised innovation. Hertog and Bilderbeek (1999) on the other hand provided a four dimensional model of service innovation consisting of the new service concept, the new client interface, the new service delivery system and technological options. The authors also examined seven patterns of service innovation which they labelled as supplier-dominated innovation, innovation within services, client-led innovation, innovation through services and paradigmatic innovations. Agarwal and Selen (2011) adapted this model by modifying the fourth dimension from "technological options" to "organisational options" to reflect the wider setting of a service network.

> A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with what financial consequences.

Clearly articulated business logic is one of the prerequisites of setting up new businesses and innovating existing organisations. The power of the business model lies within its ability to highlight the choices made by an organisation (profit or non-profit) which are central to how it generates value for various stakeholders (Plé et al. 2010). The choices are illustrated by a set of relevant business concepts (such as value proposition, competencies, cost/revenue models etc.) and the relationships between these concepts. Organisational innovation therefore can be effectively understood and managed through the lenses of BM, which informs decision makers of the necessary choices leading to the newly defined organisational objectives.

Various forms of BM have been developed over the past decade following increased interest in such concepts. Alberts (2011) reviewed ten BM frameworks in the literature (Table 1):

Appendix 1 provides a more detailed overview of the above ten BM frameworks along with the 32 specific concepts identified in the initial BM analysis (for a more detailed review of the development of the business model literature see Roos 2013 which reviews the complete literature published in several languages from 1993 to 2010). These are summarised in Table 2. It is worth pointing out, that although some progress has been made towards public sector innovation (e.g. Eggers and Singh 2009), the literature has yet to provide a robust business model framework tailored specifically for public service innovation. Furthermore, some of the existing factors may be seen as overlapping, with other factors relevant for the public sector missing from the discussions.

The RCOV BM by Demil and Lecocq (2010) appears to be more appropriate to serve as the theoretical foundation going forward. RCOV stands for Resources, Competencies, the internal and external Organisation, and the Value Proposition.

Table 1 Alberts (2011) review of ten BM frameworks

No.	Sources	Business model name
1	Zott and Amit (2010)	Activity system
2	Gordjin and Akkermans (2001)	e-3 value methodology
3	Demil and Lecocq (2010)	RCOV
4	Hedman and Kalling (2003)	Business model concept
5	Morris et al. (2005)	Entrepreneur's business model
6	Yunus et al. (2010)	Social business model
7	Kim and Mauborgne (2000)	Business model guide
8	Wirtz and Lihotzky (2003)	4C internet typology
9	Lumpkin and Dees (2004)	Internet business model
10	Osteralder (2004)	Business model ontology

Table 2 Ten business models and their components

Component	Activity system	e-3 value	RCOV	Business model concept	Entrepreneur business model	Social business model	Business model guide	4C internet typology	Internet business model	Business model ontology
Activities/value activities	X	X		X						
Capabilities							X			X
Collaboration						X				
Commerce								X		
Competencies			X		X					
Competitors/ competition				X	X					
Connection								X		
Content								X	X	
Context						X		X		
Cost and profit/cost structure										X
Cost target/ competitive position					X		X			
Customers	X			X						X
Design	X									
Distribution channel										X
Entrepreneurial					X	X				
Innovation					X					
Inputs				X						

(continued)

Table 2 (continued)

Component	Activity system	e-3 value	RCOV	Business model concept	Entrepreneur business model	Social business model	Business model guide	4C internet typology	Internet business model	Business model ontology
Market/customer/ market segment		X								
Offering				X						
Online								X	X	
Organisation			X	X						
Partnering							X			
Price model					X		X			
Reduce bureaucracy						X				
Relationships										X
Resources			X	X						
Retention of customers								X		
Revenue/revenue model					X					X
Self-sustaining						X				
Sell/rent							X			
Stakeholder value						X				
Value/value configuration/value proposition/ dependency path		X	X		X					X

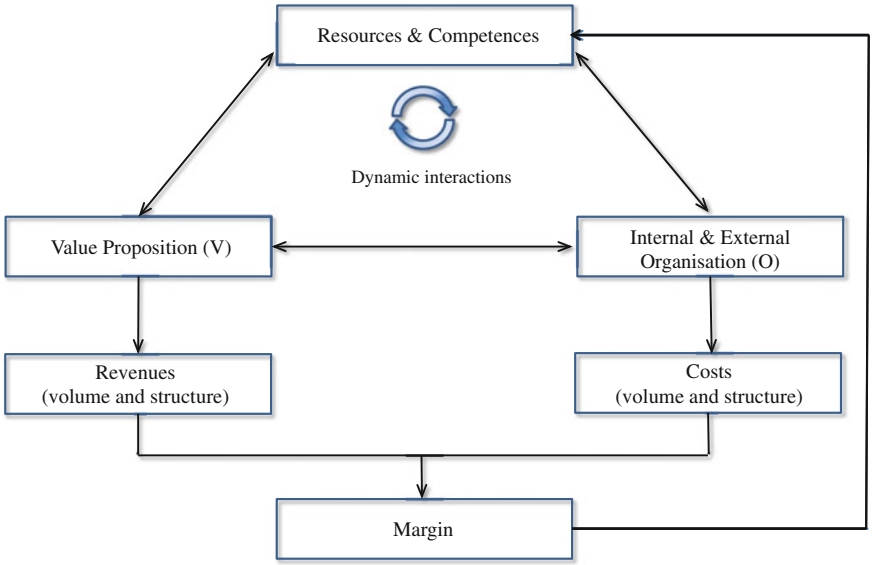

Fig. 1 The RCOV model. Reproduced from (Demil and Lecocq 2010)

The Resource-based view of the firm, as a theoretical framework in management literature, has been influential in deriving competitive advantage (Barney 1991; Kraaijenbrink et al. 2010; Penrose 1955; Wernerfelt 1984). As such the Resource-based view can particularly be useful for explaining the rise of collaborative relationships between public and private sectors as an attempt to facilitate resource sharing and joint value creation. The dynamic nature of the model is also a powerful feature in explaining the interactions between core organisational concepts and their ability and adaptation to change. A visual representation of the RCOV model is reproduced in Fig. 1.

Next, we discuss six innovative modes of public service delivery for service innovation as observed in the Australian context.

4 Six Innovative Modes of Public Service Delivery for Service Innovation: Australian Evidence

Each case study is supported by a general analysis drawing on concepts available from the BM frameworks. The set of factors emerging from these analyses will be used as building blocks to complement the RCOV framework so that a more appropriate and comprehensive business model may be developed for managing public service innovation.

4.1 Privatisation

Privatisation is the full or partial transfer of ownership of public assets to the private sector either by way of a trade sale to another enterprise (usually involving tendering processes) or public float (RBA 1997). Private sector financing of public asset purchases may come from equity issues, borrowing from banks, and the issue of debt securities. In Australia, privatisation occurred largely in the domains of financial services, electricity, gas, transport and communications.[2]

4.1.1 Case Study: Commonwealth Bank

The Commonwealth Bank (CBA) was fully privatised in three stages spanning from 1991 to July 1996. The privatisation was timely because the newly introduced capital adequacy guidelines for the banking industry meant that any expansion of the bank would require an increase in its equity base, and this would have required continuing injections of funding from the public purse.

A range of innovations was introduced between 1993 and 1997 which had fuelled the Bank's growth. These included Business Banking Centres, Customer Service Centres, the Customer Relationship Model, and the Relationship Management Program for the bank's high value clients. These innovations were backed up by the investment in a centralised back-office processing system in each state, and several computerised customer service programmes (e.g. ASSIST and CommSee). The acquisition of the Colonial Group of companies and Bankwest was also part of the Bank's growth strategy. To date, the former public sector organisation has thrived under privatisation, and emerged as a leading player in the country's financial services sector.

The value proposition of the pre-privatised CBA was that money invested in the bank is guaranteed against market failure by the Government. Its target customers were businesses, families and pensioners. It did very little in marketing and relied on its brand as a wholly-owned Government entity to attract potential business. It was staid, conservative and risk averse, and was a follower rather than a leader in terms of offering new products and services. It had good transactional processes, and its core competency was avoiding risk of any kind. Its suppliers and stakeholders were mainly Government entities. It was subsidised by Government, so the cost of doing business did not reflect the true cost base.

[2] A significant portion of the Australian public sector was privatised in the 1990s. This mirrored the experience in the United Kingdom where nearly all public trading enterprises operating in the competitive sector were privatised in the 1980s. Such change is primarily driven by the reduction of government debt. Some of the organisations involved are the Commonwealth Bank, Telstra, Australian Airlines, Qantas, Australian National (rail), Brisbane Airport, Perth Airport, State Bank of NSW, Suncorp, State Bank of South Australia, Bank West, and most of the Victorian electricity industry (both generators and distributors).

Following the privatisation, CBA aspired to become a fully commercial entity, completely separate from the Government, and to compete as one of the leading players in the financial sector. It offered mixed services with both standardised and highly customised lines, through both direct and indirect distribution channels. It targeted B-to-B and B-to-C markets at the local, regional, national and international levels, with customers across business, government and not-for-profit sectors. The Bank focused on improving its legacy technology systems as a source of competitive advantage and driving operational excellence through superb customer service. It leveraged off its unique customer relationships to offer customised and innovative financial services such as e-banking. Margins were generated through a growth strategy focussed on new services such as insurance, funds management, superannuation and stockbroking, which further propelled the bank's operation into new geographic markets overseas where a new customer base was established. Hence, the customer has been central in CBA's success story, and this has not been adequately addressed in the current BM framework. A more in-depth analysis using a customer-integrated approach will overcome this issue.

4.2 Public Private Partnerships

The term 'Public Private Partnership' describes a business venture which is funded and operated through a partnership of government and one or more private sector companies. In line with the 'National Public Private Partnership Policy and Guidelines' (Australian Government 2013), the Australian, state and territory governments will consider a Public Private Partnership for any project with a capital cost in excess of $50 million.

4.2.1 Case Study: Sydney Airport Link

Facing significant costs of building Olympic venues, the Fahey NSW Liberal Government sought to reduce the construction costs of the new railway from Sydney's CBD to the Airport by entering into a public private partnership. Under the agreement, a private company, Airport Link, would cover the costs of building four stations. In return they were to operate those stations for 30 years and have the right to impose a surcharge on the fares. The NSW Government would fund and own the railway itself and Wolli Creek station. The company's involvement was motivated by the passenger estimates and train reliability guarantees that later proved overly optimistic. The Airport Link consistently failed to meet patronage targets. The company eventually went into receivership, exposing the government to losses of around $800 million. The stations were purchased by Westpac, and in 2009 the business started making a profit.

The business model of Sydney Airport Link (SAL) revolved around the company's decision to provide a rail link to and from the airport by building four

underground railway stations linking the airport to the suburban railway system, and charging the public a surcharge for use of this section of the line. The target customers were either travellers arriving at Sydney airport, or Sydney residents wishing to travel in the direction of the airport. The value proposition was a competitively priced travel option to the domestic and international airports every 10 minutes by railway instead of taxis or shuttle buses. SAL relied on both existing and new railway infrastructure and service offerings, while providing four brand new stations.

In terms of the quality of service delivery, there was concern that the SAL brand would suffer from the association with the inferior suburban rail network. Further challenges arose due to crowded carriages when suburban customers travelled during peak hours, as well as the absence of storage facilities for luggage. The suppliers and stakeholders were the Government, Sydney Airport, commercial airlines and travel agents. The venture relied on a bank loan to finance construction and operating costs. The substantial interest payments meant that adequate and stable revenue was crucial for the success of the BM. The operators had revenue targets and were tracking metrics such as the number of passengers travelling to and from the airport. However, given the nature of such an infrastructure project, less innovation was possible once the BM was operationalised.

4.3 Contracting Out

Contracting Out is defined as an arrangement whereby a public agency enters into a contract with a supplier from outside that agency for the provision of goods and/or services which typically have previously been provided internally (though not necessarily involving competitive bids).[3] This may go beyond the outsourcing of back-office functions and involve outsourcing entire services to the private and not-for-profit sectors.

One of the benefits of planning for outsourcing, according to Aulich (2001) is in the task of writing specifications. It requires the agency to develop indicators of outcomes, outputs, efficiency and quality, and to cost these. In other words, the agency effectively develops a business model as part of such planning process. Furthermore, by introducing competition into the public sector such arrangements may induce beneficial learning across the system as a whole (Sturgess 2009). Contracting out has been widely used as the mechanism to innovate public service delivery, and can be expected to persist into the future—e.g. the outsourcing of employment services (Bruttel 2005; Webster and Harding 2000).

[3] Industry Commission, Report No 48—Competitive Tendering and Contracting by Public Sector Agencies, 24 January 1996, p xix. (Henceforth, Industry Commission Report).

4.3.1 Case Study: Department of Immigration and Citizenship

The Department of Immigration and Citizenship provided facilities management and operational services to the Regional Refugee Processing Centre in Nauru. Until recently, the Department had three separate contracts with the private and not-for-profit sectors at the site:

- With the Salvation Army for case management of the detainees;
- With International Health and Medical Services for medical care;
- With Transfield Services for facilities management services, including the ongoing maintenance of utilities, accommodation, catering, transportation and security etc.

Under such a contracting relationship, the government agency was able to focus on its core competencies of processing refugees, whereas a number of private and not-for-profit stakeholders would provide the resources and competencies needed for other aspects of operating the processing centre. The cost structure was specified in the contracts, with potential penalties imposed by the agency if certain KPIs were missed.

In terms of value proposition, the case could be seen as a unique case with negative implications to services being offered. A closer look at the role of customers (or detainees) may provide additional insights.

4.4 Commercialisation

Commercialisation is defined as follows:

> [The] process by which a department or a commercialised operation of a department, charges for the goods or services it provides and adopts, in varying degrees, other features of the commercial environment, including the principles of competitive neutrality,[4] clear and non-conflicting objectives, an appropriate level of management responsibility, authority and autonomy and accountability for performance (Queensland Treasury 2010).

The proponents of commercialisation claim that it improves customer focus, and the quality and timeliness of service delivery. Another advantage is that it brings in much needed revenue and helps to offset reductions to government funding. Brown et al. (2000) argue that—under the mantra of commercialisation—public sector agencies have introduced mechanisms to identify the full cost price of delivering programmes and services, and are able to implement user-pays to reclaim those costs.

[4] The term 'competitive neutrality' refers to the payments made to government to offset any advantage the commercialised operation has over the private sector by virtue of its government ownership. This advantage may include the non-payment of rent and salaries.

Partial commercialisation may involve the application of user-pays principles, and range from partial to full cost recovery. Full commercialisation involves the move to a competitive environment where clients have complete freedom to choose the source of supply, and where the entity is required to achieve certain commercial benchmarks, pay tax at the commercial rate, borrow funds without a government guarantee and have any regulatory advantages removed.

4.4.1 Case Study: Cochlear

Cochlear produces implants for children and adults who are deaf. Research on the cochlear implant started in the early 1970s led by Professor Graeme Clark of the University of Melbourne. A prototype was developed in 1978. In 1981, a collaborative arrangement was formed among Nucleus Limited, Melbourne University and the Commonwealth Government to commercialise the Cochlear implant. Nucleus had considerable experience in developing and commercialising implantable devices such as cardiac pacemakers. The product was implanted in Melbourne in 1982 and the US in 1983. FDA approval came in 1984.

Venture capital investment was obtained in 1985 and the company was sold to Pacific Dunlop in 1988. The company grew in the US, Europe and Japan and by 1995 it had worldwide sales in excess of $50 million and listed on the ASX at a value of $125 million. Cochlear now employs over 2,000 people in some 25 countries.

The BM based on commercialising the Cochlear implant had significant potential. The value proposition was a much needed medical product/service with negligible competition. Melbourne University provided the core competencies in research and developing prototypes, whereas Nucleus produced and took the product to the market through its distribution channels of hospitals, medical centres and general practitioners.

4.5 Franchising

Certain public services, such as water, gas and electricity, bridges and tunnels etc. can be operated under franchise or licence arrangements. Typically, the services are planned and operated by private companies, who either own their infrastructure outright or lease it from public holding companies. The government grants these companies certain decision rights, but retains control over strategic aspects such as the determination of fares. A government body sets minimum service standards and acts as the regulator. The operator is responsible for building the customer base, and receives a subsidy and a share of fare revenue.[5]

[5] The franchising model is generally associated with public transport in the United Kingdom, where the model originated under the Margaret Thatcher Government. In Australia, it is mainly found in Victoria and NSW.

The grant of a franchise frequently contains express conditions that the franchisee must perform, and is usually subject to regulation by an authorised body. A franchise can be exclusive or nonexclusive. The government can prescribe the duration of a franchise, and a franchise can be terminated by the mutual agreement of both parties. A franchise can be subject to forfeiture due to misuse or failure to provide adequate services; and a franchise can be sold or transferred conditional on legislation.

4.5.1 Case Study: Sydney Ferries

In May 2012, Harbour City Ferries, a partnership between Veolia Transdev and Transfield Services, won the contract to operate Sydney Ferries. Under the franchise model developed by the NSW Government, ownership of Sydney Ferries' vessels and the Balmain Shipyard remained with the NSW Government, and the Government retained full control over the fares and service levels.

A key responsibility of the new operator was to improve the customer experience for the 14 million trips carried out on ferries each year. According to a government press release, the operator was selected based on its packaged offerings of customer service, safety, operations, maintenance and the management of the Sydney Ferries workforce.

In contrast to the Sydney Airport Case, the Sydney Ferries had flexibility in developing improved service delivery and new routes. As the case involved existing staff members who were transferred across with their existing entitlements, the cost structure was characterised by high wages and benefits. The new operators would need to manage sick leave, worker's compensation and overtime more closely in order to reduce operating costs. On the other hand, determination of fares remained a government decision, as were the stringent service levels which were to be met.

4.6 Social Benefit Bonds

A Social Benefit Bond is a financial instrument that provides access to private capital to pay for public services (The Centre for Social Impact 2012, p. 1). A return on investment is paid based on the achievement of agreed social outcomes. Part of the government savings which accrue from not investing in the new service are used to repay the investors' principal and yield (conditional on the outcome).

The benefit of this approach is that it gives service providers the flexibility to choose or abandon approaches as long as certain outcomes can be met, hence incentivising for service innovation. Moreover, public funding only gains limited risk exposure since it is spent after the benefits have been achieved.

In the United Kingdom, the bond is referred to as a Social Impact Bond. The first trial was developed in 2010 by Social Finance UK in conjunction with the UK Ministry of Justice, and launched at Peterborough Prison. Further trials are planned.

In the United States, an amount of $US100 million was provided in the 2012 Budget for up to seven Pay for Success Bonds, and a number of US states have begun their own development work.

4.6.1 Case Study: Pilot Social Bonds in NSW

The NSW Government recently introduced a trial Social Benefit Bond, which will be the first in Australia. Three private and community sector groups were selected to develop pilot social bonds aimed at reducing foster care and preventing young criminals from returning to prison. The Benevolent Society, backed by Westpac Corporation and the CBA of Australia, would develop a $10 million bond to support 400 families over 5 years to reduce the number of days that children spent in foster care. A second $7 million bond would involve Uniting Care Burnside working with children up to 5 years of age and their parents over a period of 7 years to achieve similar results. Social Finance, a Sydney-based organisation, would collaborate with Mission Australia on a $7 million bond to assist 500 young adult repeat offenders for up to 6 years.

From a BM perspective, the value proposition of the social bond was the improvement of social outcomes, but through the resources provided by the private sector. Private funding is used to finance community services delivered by external providers with good track records, and the private investors get a financial return from the public sector only when social outcomes are improved to certain levels. In contrast to some of the earlier examples of inter-sector collaborations, the private sector in this case provided only the financial resources with the actual operations managed through the non-profit sector. The government, which orchestrated the collaborative arrangements, also shaped the risk profile of the social bond by determining desired social outcomes and consequently the revenue/cost structures. But overall, the other sectors can be seen as having considerable flexibility in achieving service innovation with reduced government interference (The Centre for Social Impact 2012, p. 6).

5 Towards a New Business Model Framework for Public Sector Innovation

From the above analysis, we are able to identify certain gaps between practice and the RCOV theoretical framework. In addition to the fundamental elements of Resource, Competencies, Organisation and Value Proposition, two most prominent trends have emerged as follows:

- Customer as a key resource, and
- Collaborations across public, private and non-profit sectors.

5.1 Customer as a Key Resource

There has been a rising trend of customer participation in various service processes, and customers are being mobilised by innovative organizations to jointly generate higher margins (Plé et al. 2010). In contrast to their traditional role of consumers, or mere receivers of services, customers are increasingly being tapped into as an important organisational resource capable of providing a range of inputs for more effective design, production and/or delivery of products and services.[6]

The traditional public sector was characterised by a captive market. One risk of taking customers for granted is that their role tends to be narrowly defined as resource users, their potential as contributors of certain inputs is neglected. This may lead to inefficient management of customer affairs, because by definition the service level may be restrained by the agency's narrower conceptualisation of the available resource pool. Following public agencies' shift away from their monopolistic status, it is timely that we challenge the traditional view of customers, and start assessing the appropriateness of incorporating customers into the core business model as a valuable resource.

As indicated earlier, it is possible to gain additional insights from the case studies if we apply 'customer' as a key resource in the RCOV model. Next, we will briefly revisit the first three case studies using the framework provided by Plé et al. (2010) as summarised in Table 3. Their "Customer-Integrated Business Model" (CIBM) was based on the RCOV model, with customer as additional resource which enacts a new range of dynamics among other BM components, therefore leading to potential increase of revenues and/or reduction in costs, i.e. improved performance through innovations originated from, as well as leading towards, customers.

5.2 Innovation Ecosystem: Cross-Sector Collaboration

As evident in the case studies, innovation in the public sector today involves working with organisations from other sectors and their stakeholders e.g. customers. Indeed, a public agency is arguably unlikely to achieve innovation without the development of a collaborative 'innovation ecosystem' (Green et al. 2013) with partners across other sectors.

The contemporary public sector can be seen as a complex social system wherein public agencies, private companies, non-profit organisations and other stakeholders including people in the local communities exhibit dynamic and complex interactions. Three broad features of a complex system are identified by Cilliers (1998) as:

[6] Please see Plé et al. (2010) for a detailed review of seven inputs of customer participation—mental inputs, physical inputs, emotional inputs, financial inputs, temporal inputs, behavioural inputs and relational inputs.

Table 3 Customer's role in public service innovation—through the lens of customer-integrated business model (CIBM). Adapted from Plé et al. (2010)

How 'customer' is incorporated into RCOV model?	Innovative service mode	Case company	Discussion of the 'customer' dimension in relation to the case study
1. Customer(s) as the basis of a value proposition (Resources and competencies → value proposition)	Privatisation	Commonwealth Bank (CBA)	Having established a broad banking customer base, such resource became the basis of the valuation in its own right (e.g. geographic coverage, number of outlets and ATM's)
	Public private partnership	Sydney Airport Link (SAL)	The identity of the SAL consumer matched the traditional definition of consumers, who were seen as sources of revenues but not resources. The link between the number of travellers and the service offerings was not obvious (if not negative). The challenge of SAL was developing an on-going customer base, which proved to be insufficient despite the optimistic forecasts
	Contracting-out	Department of Immigration and Citizenship (DIC)	Refugees arriving without proper documentation and approvals had become a major political issue. From the contractors' perspective, the influx of refugees had provided them with the necessary arena to pursue various organisational objectives (e.g. religious, secular, philanthropic or profit motives)
2. Acquisition of new customers (Value proposition → resources and competencies)	Privatisation	Commonwealth Bank (CBA)	Due to positive network externalities (that is, as more users adopted a service, the more useful the service became), the bank was able to acquire further customers as the former base expanded. Furthermore, more customer interaction led to more friendly and tailored banking services, which form an important aspect of CBA's value propositions
	Public private partnership	Sydney Airport Link (SAL)	In contrast to the CBA case, negative network externalities could be argued for SAL. As more travellers used its services, deteriorated value propositions could be expected due to limited carriage capacity and lack of luggage facilities. Furthermore, customer inputs involve physical labour, waiting time between and during travels and negative emotions felt in the underground and confined spaces. These posed additional challenges for attracting new customers

(continued)

Table 3 (continued)

How 'customer' is incorporated into RCOV model?	Innovative service mode	Case company	Discussion of the 'customer' dimension in relation to the case study
	Contracting-out	Department of Immigration and Citizenship (DIC)	From DIC's perspective, placing refugees in detention centres (i.e. an overall 'bad' experience) was used as the mechanism to deter future refugee influx. For commercial contractors, however, refugees were drivers for profit hence expanded refugee influx would fuel their growth strategies
3. Organisational socialisation of the customer (Organisation → resources and competencies)	Privatisation	Commonwealth Bank (CBA)	To more actively transform customers into valuable resources, the bank had deployed incentive programmes to encourage customer participation, as well as integration mechanisms to facilitate clear and seamless transition of basic customers into "expert customers" (e.g. using on-boarding process and rewards programmes to socialise member customers)
	Public-private Partnership	Sydney Airport Link (SAL)	Due to the separate ownership structure of SAL, the socialisation process could be seen as fragmented and inconsistent. Travellers might enjoy the newly constructed modern stations at the more exclusive privately owned terminals. On the other hand, they would mingle with daily passengers in crowded and sometimes run-down public carriages during the trip. Its overall effect on customer loyalty could be seen as mixed
	Contracting-out	Department of Immigration and Citizenship (DIC)	In direct opposition to most commercial business models, the government agency had purposefully designed the refugee processing experience to be unpleasant and socially 'disintegrating', so that potential 'customers' were discouraged. Such discouragement was not absolute, to the extent that other contractors had provided guaranteed reliefs such as accommodation, medical assistance and spiritual guidance

(continued)

Table 3 (continued)

How 'customer' is incorporated into RCOV model?	Innovative service mode	Case company	Discussion of the 'customer' dimension in relation to the case study
4. Customer learning (Resources and competencies → organisation)	Privatisation	Commonwealth Bank (CBA)	As a consequence of customer socialisation under (3), the customers also gained better knowledge of how activities were organised within the bank. Not only were the customers able to fit better into the banking process (e.g. properly filled out paperwork), they had also provided valuable feedback on how to improve the efficiency of the bank's organisation (e.g. re-designing the paperwork and streamlining the underlying administrative procedures)
	Public–private partnership	Sydney Airport Link (SAL)	The transportation services provided by SAL were mass produced and distributed. Customers' learning process might affect their individual experience, but its effect on how SAL was organised could be seen as limited
	Contracting-out	Department of Immigration and Citizenship (DIC)	The use of disincentives and disintegration (instead of incentives and integration) mechanisms by DIC might lead to unintended customer learning about the organisation, as well as the weaknesses, of the detention centres. Unfortunate events such as riot or arson would put all stakeholders at risk. Positive customer learning might be possible. However this remained a challenge due to direct goal incongruence between refugees and DIC
5. Value proposition specification, production and/or distribution (Organisation → value proposition)	Privatisation	Commonwealth Bank (CBA)	Over time, the bank's operation started to incorporate more customer participation and seek customer inputs. This allowed the bank to take further advantages of customer participation and inputs which in turn informed the design, production and delivery of new banking services. More efficient operations improved the bank's competitive positioning in the marketplace (e.g. more tailored financial services and/or lower service costs)

(continued)

Table 3 (continued)

How 'customer' is incorporated into RCOV model?	Innovative service mode	Case company	Discussion of the 'customer' dimension in relation to the case study
	Public private partnership	Sydney Airport Link (SAL)	The inconsistent experience in which passengers interact with their environments (private terminal vs. public carriages) might not be consistent with the premium positioning of more expensive SAL services
	Contracting-out	Department of Immigration and Citizenship (DIC)	Unpleasant customer participation and coercive customer input (e.g. physical confinement and temporal detention) were part of the plan to maintain a negative value proposition to potential refugees. Social services provided by the contractors on the other hand would guarantee acceptable level of social welfare of detainees. The overall value proposition matched the criteria driven by the dynamic political environment
6. Organisational learning and adaptation (Value proposition → organisation)	Privatisation	Commonwealth Bank (CBA)	The bank's new customer centric value proposition had significantly influenced the design and operation of its internal processes. Learning processes at both individual level (i.e. service employees) and firm level would ensure the on-going exploration of customer base as well as exploitation of customer resources
	Public–private partnership	Sydney Airport Link (SAL)	SAL was an infrastructure project which by definition had limited flexibility for organisational learning and change. The private sector in this case played an important role in obtaining debt financing and in administrating the four terminals, but exhibited relatively less effectiveness in managing customer affairs in a dynamic travel marketplace
	Contracting-out	Department of Immigration and Citizenship (DIC)	Dictated by the Government's stance regarding the refugee situation, the processing centre's value proposition remained customer unfriendly. Organisational learning and adaptation would be utilised to deal with various challenges (e.g. various political, financial and social barriers for operating detention centres), so that the centre might continuously deter potential refugees and detain current residents

- Stakeholders,
- Connections or Inter-Sector Relationships, and
- Information sharing.

5.2.1 Stakeholders

One of the shortcomings of existing BM frameworks is the inadequate explanation of the political aspect in managing public sector affairs. The sector can indeed be seen as political arenas housing conflicting individual and group interests. Furthermore, it has been established that Government departments do not run or innovate the public sector in isolation. They are part of a complex system encompassing players such as private companies and NGOs, as well as a coalition that includes Ministers, Parliament, the media and the public. Within this system of power relations, conflict is inevitable. For instance, private contracters at the processing centre may have economic incentives to expand their market size, while the immigration agency's priority is to model the operation so that future 'customers' are discouraged and deterred. But through a process of discussion, negotiation and deal making, policies are being developed and implemented. Factors contributing to certain stakeholder salience during such political process include power, legitimacy and urgency (Mitchell et al. 1997).

5.2.2 Connections or Inter-sector Relationships

Connections, or relationships link various stakeholders within the complex social system. One of the main drivers for the formation of inter-sector relationships is the need to take advantage of pooled resources and competencies that a single organisation would not have access to. Collaborative relationships between organisations are also part of the broader governance structure which enables co-ordinated service production and delivery across large geographic areas, to multiple client groups and with differing requirements. One example is the joint development and subsequent commercialisation of Cochlear implants by multiple organisations through multiple distribution networks. Relationships, when viewed in their networked context, therefore map out the level of complexity of the innovation ecosystem.

5.2.3 Information Sharing

Related to connections is the information which facilitates decision-making in the complex system. One issue relevant to the public sector may be the transparency of timely and accurate data, which then imposes restrictions on any business model analysis. Getting access to such data possessed by other organisations will be challenging, especially when decision rights are reserved within the public agency

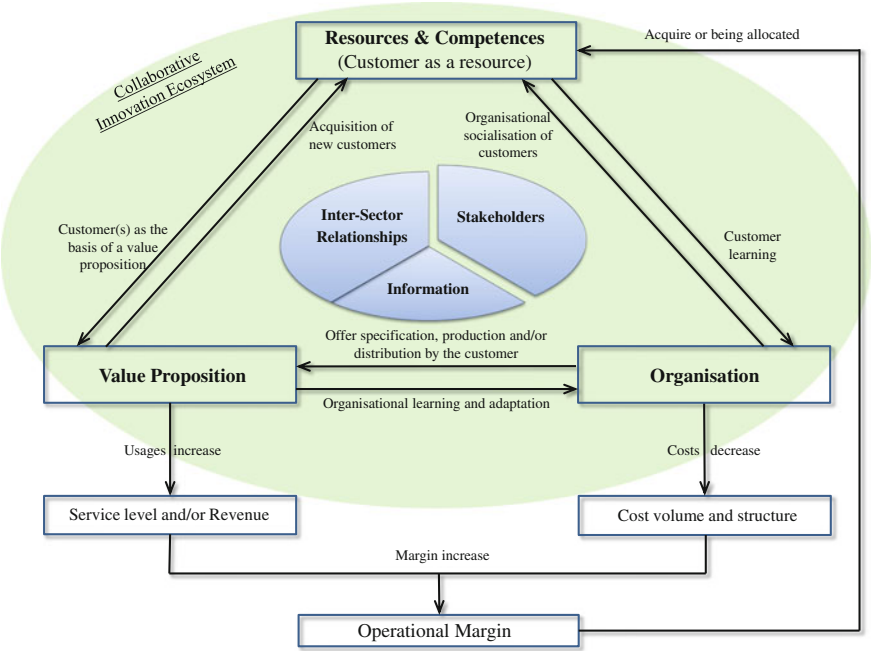

Fig. 2 Proposed business model framework for public service innovation (adapted from the CIBM model in Plé et al. 2010)

and/or there are legal and political barriers for sharing data across different sectors. Without reliable and timely data, activities may not be effectively coordinated in the complex system, which could result in sub-optimal performance for all stakeholders.

Figure 2 represents the complete BM framework as a result of the analysis. Following the CIBM framework in Plé et al. (2010), the dynamic relationships between the fundamental RCOV components are demonstrated through the 'customer' dimension (one of many forms of resources). Additionally, Stakeholders, Inter-Sector Relationships and Information are added to represent key components of a cross-sector complex system which provides a collaborative ecosystem nurturing innovations in the public service sector.

6 Conclusion

The perpetual pressures on the public sector for change have motivated both practical and theoretical inquiries for new modes of service delivery and service innovation. As discussed in this chapter, the 'Business Model' approach has great potential to serve as the theoretical framework for establishing new modes of service delivery, and for analysing and modifying existing practices in the public sector.

In this chapter, we have analysed six innovative modes of service delivery through the lens of the BM framework. Our analysis shows that RCOV emerges as the most appropriate framework for managing affairs related to public service innovation. Under this framework, the service is created by making choices in relation to the following components or dimensions: Resources; Competencies; Organisation (internal and external); and Value proposition to the customers.

To compensate for the lack of and/or inadequate focus on a number of emergent factors relevant to public sector innovation, the following four factors have been integrated to the RCOV framework to accommodate for service innovation in the public sector: customer as a Resource (by following CIBM), Stakeholders, Connections or Inter-Sector Relationships, and Information Sharing amongst agencies. The later three components represent a complex system, which makes up the broader cross-sector public sector ecosystem that facilitates and nurtures innovations in delivery of public services. By collaborating with private and not-for-profit sectors, decision makers are taking advantage of additional resources and competencies through various contractual arrangements. Fresh and innovative approaches to achieving greater social outcomes are encouraged, as organisations are less restrained by the structural and political barriers limiting innovations in the traditional public sector. Therefore, it is reasonable to expect a continuing and increasing transfer of public services to the private and not-for-profit sectors in the foreseeable future. The shift in the role of the public agency, as well as the need to manage new forms of collaborations across different sectors (and with customers), and the urge to innovate have led to the authors' belief that the development of a collaborative business model framework will be of value to the public sector in the future.

Appendix 1

Overview of the Ten Existing Business Model Frameworks

Zott and Amit (2010) conceptualise a firm's business model as an Activity System. In this view, the business model is seen as a system of interdependent activities and links (i.e. transactions) that transcend the focal firm and spans its boundaries. An activity in the firm's business model can be viewed as the engagement of human, physical and/or capital resources of any party relevant to the business model—the focal firm, end customers, vendors and so on—to serve a specific purpose toward the fulfilment of an overall objective.

Interdependencies among activities are created by entrepreneurs or managers, drawing on design elements and themes. The concept of design element covers the selection of activities (content), how the activities are linked (structure) and who performs the activities (governance). On the other hand, the design theme of the business model can be new ways of doing things (novelty), switching costs

(lock-in), bundling (complementarities) and/or reduction in transaction costs (efficiency). The authors distinguish between a business model and a revenue model, with the latter complementing the former.

Gordjin and Akkermans (2001) propose the e-3 Value Methodology, a model of a network of enterprises creating, distributing and consuming objects of economic value. The model has the following elements:

- Actor: An actor is an economically independent entity;
- Value object: A value object is a service, good, money or experience which is of economic value to an actor;
- Value port: An actor uses a value port to provide or request value objects to or from other actors;
- Value interface: Actors have one or more value interfaces, grouping value ports and showing economic reciprocity;
- Value exchange: A value exchange connects two value ports;
- Market segment: A market segment breaks actors into segments of actors that assign economic value to objects equally;
- Value activity: An actor performs one or more value activity, which is assumed to yield a profit;
- Dependency path: A path consists of consumer needs, connections, dependency elements, and boundaries. A consumer need is satisfied by exchanging value objects.

Demil and Lecocq (2010) propose the RCOV model. A RCOV firm builds its business model by making various choices to sustain operational margin (i.e. difference between revenues and costs). These choices encompass resources and competencies, the internal and external organisation of the business, and the firm's value proposition to its customers. More specifically, the resources are both physical and human, and competencies are the abilities and knowledge of managers. The organisation encompasses the choice of the firm's internal operations (or value chain) and its relations with external stakeholders (suppliers, customers, competitors, regulators etc.). The value propositions are the products and services delivered to customers, and how they are marketed. In general, a firm's organisation will drive its costs, while its value proposition will determine the revenues. The RCOV can be seen as the most appropriate business model in supporting managerial decision making in the public sector. This is partly due to its focus on maintaining operational margin, as well as its adaptive approach towards shifts in the firm's external environments and internal elements.

Hedman and Kalling (2003) propose the Business Model Concept that consists of the following components:

1. Customers;
2. Competitors;
3. Offering;
4. Activities and Organisation;
5. Resources;

6. Factor (capital and labour) and Production Inputs;
7. A longitudinal process component to cover the dynamics of the business model over time and the cognitive and cultural constraints faced by the managers.

The dynamic element of the business model is important, as the firm needs to modify the existing model to adapt to company growth and expanded offerings. Impact from internal and/or external changes may be initially reflected on one part of the model. However, any modification to one part of the model will affect other parts, therefore the dynamic is described as a longitudinal process.

Morris et al. (2005) propose an Entrepreneur's Business Model with three levels of decision making termed 'foundation', 'proprietary' and 'rules'. The foundation level involves making general decisions about what the business is and is not. The proprietary level of the model involves innovation unique to the venture. The rules level determines how the foundation and proprietary elements are reflected in ongoing strategic actions. At each level, six decision areas are considered:

1. How do we create value?
2. Who do we create value for?
3. What is our source of competencies?
4. How do we competitively position ourselves?
5. How we make money?
6. What are our time, scope, and size ambitions?

A process of experimentation may be required before the right Entrepreneur's model emerges.

Yunus et al. (2010) explain the Social Business Model as being close to social entrepreneurship, where the primary purpose of the business is to serve society and become self-sustaining. Stakeholder value maximisation is the goal, rather than profit maximisation, and they emphasise the need to define the social profit expected from the business. The focus of the model is on co-operation and collaboration—rather than on competition—and reducing bureaucracy.

Kim and Mauborgne (2000) propose the Business Model Guide, a series of questions designed to open up the way that managers think about production, distribution, capabilities and pricing. The questions are as follows:

- What is the cost target?
- Who can we partner with?
- Which price model should we use?

The authors suggest that the price of the product or service (what they call the 'cost target') should be determined by strategic considerations. For example, if we set a price that is cheaper than our competitors, we must work backwards to re-engineer the product or service in order to reduce costs and market it at the nominated price. Instead of trying to fulfil all aspects of the design, manufacture and distribution of the product or service, the authors suggest consideration be given to focussing on one or two key capabilities, and partnering with other organisations to provide the missing capabilities. Finally, they propose alternatives to selling the

product or service, including rental, time-share, slice-share or exchanging it for an equity interest in the customer's business.

Wirtz and Lihotzky (2003) have suggested the 4C Internet Business Model Typology, comprising four basic internet business model types: Content, Commerce, Context and Connection. A firm specialising in the content-orientated business model generates revenue through online content. The commerce-orientated business model relates to trade transactions using electronic media. Context business models relate to the aggregation and structuring of information existing on the internet, whereas connection business models relate to the network infrastructure. They recommend a variety of strategies that can be used to retain customers, and the strategies differ depending on the business model. For example, trust building as a retention strategy works best for commerce business models.

Lumpkin and Dees (2004) conceptualise the Internet Business Model as the primary model by which the internet adds value. They identify four activities that have been enhanced by internet capabilities—search, evaluation, problem solving and transaction. These activities are supported by three different types of content—customer feedback, expertise and entertainment programming. Finally, they identify seven business models used by internet firms—commissioning, advertising, mark-up, production, referral, subscription and fee for service.

Osteralder (2004) proposes the Business Model Ontology with the following building blocks:

1. Value proposition: overall view of products and services;
2. Target customer: the segments of customers being offered value;
3. Distribution Channel: the various means by which the organisation keeps in contact with its customers;
4. Relationship: the established links between the organisation and its customer segments;
5. Value Configuration: the arrangement of activities and resources;
6. Capability: the ability to execute a repeatable pattern of actions in order to create value for the customer;
7. Partner network: partnerships with other organisations necessary to provide the service;
8. Cost Structure: the cost of the means employed in the model;
9. Revenue Model: the way the organisation generates income.

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Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation

Jane Andrew

Abstract The last four decades have witnessed increasing research, policy discourse and the investment in government programs to foster innovation within the private sector manufacturing and service industries. Despite the adoption by many governments of the language of complexity theory and systems thinking in business and organisational management, and a growing awareness of the breadth of contexts and outcomes resulting from the innovation process, a broader commitment to investments in supporting skills development and capacity building for service innovation in businesses have yet to catch up. This chapter examines the factors that have contributed to the perpetuation of a limited conceptualisation of the forms in which innovation contributes economic value, and the government policy instruments invested into foster and sustain a diverse regional innovation system. This tangle of academic discourse, policy rhetoric and government programs aimed to support innovation will be examined through a case study of South Australia's strategic plan and the agencies charged with fostering and supporting innovation in the state.

Keywords Innovation policy · Organisational culture · Discourse analysis · Endogenous growth theory (EGT) · Evidence-based policy making (*EBPM)*

1 Introduction

Research into national innovation systems (NIS) and regional innovation systems (RIS) has emphasised the importance of systemic connectivity, evolving institutions and organisational capabilities. Much policy rhetoric echoing the importance of these academic observations is expressed in the context of supporting private industry innovations. Despite evidence to support that governments play an

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important role in supporting regional innovation systems, there appears to be a comparative lack of research on the innovation of government policy instruments and programs aimed at supporting innovation on a national or state basis in Australia. The predominant logic behind policy choices remains one of addressing market failure, with the primary focus of policy on science and research rather than demand-led approaches. (Dodgson et al. 2011, p. 1) Similarly, Nijssen et al. (2006) note that research on innovation has been dominated by research on products and systems, rather than on services and systems.

Whilst an innovative manufacturing sector is an important contributor to South Australia's economic competitiveness and sustainability, this chapter examines the perpetuation of a policy bias to supporting innovation focused on science, technology and manufacturing sectors. This has created and perpetuated a conceptual and value bias toward product innovation, obscuring the important role service innovation plays within a regional innovation system.

Since the late 1990s, the notion of regional innovation systems gained the attention of politicians and policy makers. As Reenen argues, the only sensible approach to regional economic development is a systems approach (Reenen 2001, p. 72). This perspective is supported by Roos et al. (2005). Again in 2008, Terry Cutler's Review of the National Innovation System asserted that 'many government workplace and innovation programs in Australia are directed at technological or scientific innovation while only a few are directed at strengthening innovation management inside organisations, including leadership and culture'. Cutler (2008), p. 5 Drawing from a broad literature including policy analysis, endogenous growth and regional innovation systems theory, organisational psychology and management theory, this chapter seeks to disentangle the underlying factors that influence policy approaches to regional economic development and the types of investments in innovation programs. In doing so, the chapter seeks to illustrate a common contradiction between innovation theory, and the culture and structures of government agencies charged to support innovation. Using a South Australian case study, the chapter will illustrate this contradiction and the tangle of policy agencies, culture and instruments that seek to support the development of innovation capacity in the state.

1.1 Identifying a Limited Portfolio of Investments in Fostering Innovative Activity

In a speech responding to the Government's innovation white paper, *Powering Ideas: An Innovation Agenda for the 21st Century* Green (2009a, b) argued that Australia has under-invested in knowledge and innovation, thus limiting the nation's prospects of longer term, sustainable growth. At a subsequent conference Green et al. (2009) argued that:

> Innovation is more than science and technology; … it is non-linear with multiple sources (conference PowerPoint)

He highlights that often the development of an innovative product or service does not necessarily occur as core business of an organisation, but that:

> Hidden innovation' occurs in the spaces and interfaces within and between organisations, … low tech and high tech industries are driven by collaboration not silos.

The persistent policy discourse and placement of innovation programs within siloed government agencies and the focus on scientific and technological product innovation implies a bias towards certain sectors and industries; however, innovation, its process, and its outcomes are experienced broadly across the economy. Considering the influence of respected Australian academics such as Roy Green Australia's innovation policy discourse, why does this conceptual and program bias persist; moreover, what are the factors that influence the perpetuation of a limited array of policy responses to support innovation across the Australian economy? In seeking to address this question, the following section considers the policy discourses that have informed the tangle of policy responses to supporting innovation in Australia.

2 Understanding Policy Discourse

Oughton et al. (2002) observe that a critical enabling factor for fostering endogenous economic development is the nature of the regional governance system and the wider institutional framework that shapes the effectiveness and the efficiency of regional knowledge building/transfer amongst the different integrating parts of the system. By disentangling the theoretical and policy discourse, and considering the structures and cultures of government agencies delivering programs to foster and support innovation, this chapter seeks to highlight factors that have inhibited the appreciation of the value of service innovation to business and government.

Governments play an important role in determining the policy environment and services that foster and support the regional innovation systems; however, in Australia it appears that there has been little innovation within the innovation policy and program realm. As Greif observes:

> past, present, and future economic growth is not a mere function of development, technology, and preferences. It is a complex process in which the organization of society plays a significant role. The organization of society itself, however, reflects historical, cultural, social, political, and economic processes (Greif 1994. Cited Woolcock 1998, p.187).

Further, Reich suggests that exploring the ideas that are the foundations and fundamental media of all policy conflicts is key to explaining the normative effects of policy decisions and their programs (Reich 1988).

2.1 Policy Language—A Layering of Perspectives, Values and Meaning

Markusen (1999, p. 870) draws our attention to 'fuzzy concepts', in which examinations of regional development are observed merely as characterisations of the causes of regional economic growth. Further she argues:

> the displacement of agents and actions by process nouns entails a shift away from the study of actors, bureaus and social groups, the structures within which they operate, their actions and outcomes, toward a discourse in which processes themselves become the causal agents (Markusen 1999, p. 870).

Innovation, like creativity and design are processes that are carried out by individuals and groups of people to produce artefacts, products and services. Innovation is not a product in its own right; however, it is commonly conceptualised as such. This factor is a significant influence on the policy programs that focus on innovation within a product development and manufacturing context. Thus distracting policy attention and investment in research that seeks to understand and invest in other forms of innovative activity and outcomes within the entire value network that includes a spectrum of actors and agents, from raw materials suppliers to the place of purchase and disposal.

Good policy theory, Markusen (1999) argues:

> must encompass both process and institutions, both structure and agency. If state activity, based on complex politics and inter-bureau competition, is central to the evolution of regions, it must be built into our theories (1999, p. 187).

Hajer and Wagenaar (2003) make the claim that the problems industrialised societies face today cannot be resolved using the framework for policy analysis developed using the traditional positivist method of inquiry. Fischer criticises the positivist or empiricist approach and states:

> In the policy sciences the attempt to separate facts and values has facilitated a technocratic form of policy analysis that emphasizes the efficiency and effectiveness of means to achieve politically established goals. Much of policy analysis, in this respect, has sought to translate inherently normative political and social issues into technically defined ends to be pursued through administrative means….Often associated with this orientation has been a belief in the superiority of scientific decision-making (Fischer 2003, pp. 4–5).

Unlike the empiricist approach to policy analysis, the postmodern analysis tools of the 1980s and 1990s focused predominantly on the social construction of policy problems, policy discourses, and the politics of the policy process (Radin 2000, cited in Howlett and Lindquist 2004, p. 6). Howlett and Lindquist (ibid.) acknowledge the arguments of Castles 1990; Eisner 1993, 1994; Harris and Milkis 1989, as informing their assertion that 'the policy analysis function is influenced by the precepts of the governance and administrative model constituting its operating environments' (Howlett and Lindquist 2004, p. 11). Brunner argues that positivism assumes that only the empirically observable can contribute to knowledge, only a

limited number of discrete factors matter and that these factors often operate independent of context, subjectivity and value considerations (Brunner 1992).

Language and discourse if unquestionably and frequently repeated mobilises intentionally or not a conceptual and action biases. As Hajer (1993, p. 45) observes:

> The linguistic turn … provides the policy analysts with useful … tools to analyse how certain relationships of dominance are structured and reproduced. The study of language and discourse opens new possibilities to study the political process as 'mobilisation of bias'.

Furthermore, he states:

> Determining the way a phenomenon is linguistically represented [the metaphors chosen] has repercussions for the politically essential questions such as, who are responsible; what can be done; what should be done (ibid.).

Iterating this view Dryzek (2001) observes:

> A policy discourse will always feature particular assumptions, judgements, contentions, dispositions, and capabilities (2001: 658).

2.1.1 Examining Policy Intention Verses Choice of Policy Instrument

Developing a means to understand the underlying and often unrecognised and unarticulated influencing factors in the policy development process, Yanow (2000) suggests, compliments the quantitative analysis techniques commonly applied by government in assessing the costs of a policy or the limits of expenditures on implementation. This form of analysis provides a means for understanding the relationship between the policy intention and its actual impact on multiple stakeholders.

Yanow (2000) explains the means by which Discourse Analysis can be applied to Interpretive Policy Analysis. The underlying influence in the development of her methodological framework has been the academic theory of phenomenology; in particular, the work of Schein (1992) that considers the influence of organisational culture on the conceptualisation of issues arising within that organisation.

Schien (1992) defines the culture of an organisation or group as:

> A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems 'that 'culture' is the primary source of resistance to change (1992, p. 18).

Further, Schein (1992) divides organisational culture into three levels:

artefacts: These are at the surface, those aspects (such as dress) which can be easily discerned, but are hard to understand.
espoused values: Beneath artefacts are 'espoused values' which are conscious strategies, goals and philosophies.

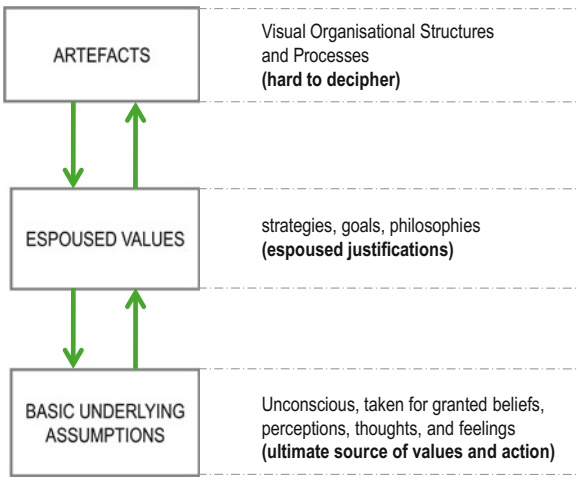

Fig. 1 Interpretation of Schein's (1992) three levels of culture and the relationship between them

basic assumptions and values: The core, or essence, of culture is represented by the basic underlying assumptions and values, which are difficult to discern because they exist at a largely unconscious level. Yet they provide the key to understanding why things happen in a particular way. These basic assumptions form around deeper dimensions of human existence such as the nature of humans, human relationships and activity, reality and truth (Fig. 1).

Bringing the organisation's underlying assumptions and espoused values out into the open—from internal organisational culture to communicating them to the outside world, are the discourses and artefacts that continually and recursively act on individual meaning making, the most enduring of which is through the operation of texts. Potter and Wetherell (1987) observe:

> Critical discourse analysis posits three categories of social phenomena that are produced out of this relationship between text, discourse, and social context. First, subject positions are locations in social space from which actors produce texts. …with some individuals warranting a louder voice than others, whereas others may warrant no voice at all.
> Inhabiting certain subject positions affords actors a degree of agency in producing texts that may subsequently affect discourse (cited Potter and Wetherell 1987; Phillips et al. 2008, pp. 272–273).

The sources of theoretical and policy knowledge drawn from to inform policy choices play an important role in determining within which government agencies the delivery of programs to support policy strategies stem. Influential in the innovation discourse since the 1990s the OECD also offered the opinion that:

> The configuration of national (regional) innovation systems, which consists of the flows and relationships among industry, government and academia in the development of science and technology, is an important economic determinant (OECD 1996, p. 7).

Many governments view the OECD's work as a benchmark from which to compare policy experiences, seek answers to common problems, identify good practice (as determined by the theoretical and ideological viewpoints of the dominant member countries) and coordinate domestic and international policies. The research undertaken by the OECD has provided policy makers with reason to increase its support and investment in industries that rely on science and technology as their primary knowledge base and input to production.[1]

Buchanan (1992) argues that the reason for the persistence of mono-industry and linear approaches to fostering innovation has been the increasing specialisation of learning and knowledge through the growth in size and status of academies from the Renaissance to now. The specialisation of fields of study has contributed to the increasing fragmentation of the spheres of knowledge used in examining issues and solving problems faced by society. Buchanan notes that as spheres of knowledge and disciplines have become progressively narrow in scope and more numerous, they have lost 'connection with each other and with the common problems and matters of daily life from which they select aspects for precise methodological analysis' (Buchanan 1992, p. 6). This observation is reinforced by the UK based Creative Clusters (2002) who state:

> Aspects of creativity [artistic/scientific] have diverged so much in our minds that we now see them as distinct, even incompatible, kinds of activity, with different types of learning, behaviour and language. It can be seen in universities, with their separate schools for arts, science, and business, in government departments and in the long standing isolation of business from the arts (creative clusters, online).

This raises the question: has the narrowing scope and specialisation of fields of study and knowledge domains had a follow on effect in the narrowing of knowledge bases and organisational cultures within government agencies?

As will be discussed further in the case study following, the South Australia government's intention for the South Australian Strategic Plan was to provide a cohesive whole-of-government agenda and approach to delivering public value within which innovation and creativity are identified as playing a pivotal role. However, have the historically embedded theoretical arguments stemming from influential agencies such as the OECD in fact limited South Australia conceptualisation of the industries and forms of innovation that are valuable within the economy?

[1] Despite broadening its agenda to encompass research in areas outside of the field of science and technology, the early advocacy arguments emanating from the OECD asserting the primary importance of science and technology to regional economic growth have left an enduring legacy of ensuring that investments in education and developing South Australia's pool of human capital are heavily weighted towards scientific knowledge and new technologies.

3 Exploring the Constellations of Academic Discourses Informing Innovation Policy in South Australia

3.1 Endogenous Growth Theory

Since the 1980s, aspects of new growth theory or endogenous growth theory have been woven into neoliberal approaches to macro- and micro-economic policy. Instead of considering economic growth primarily through transaction cost theories and analysis, importantly, EGT recognises that non-market interactions are also important in fostering and sustaining regional economic development.

Endogenous growth theorists such as Romer (1990, 1993, 1994, 2007) considers knowledge and knowledge spillovers as important factors in fuelling most innovation and regional economic growth. Romer argues that the country that takes the lead in the twenty-first century will be the one that implements an innovation that more effectively supports the production of new ideas in the private sector. Thus, the process of innovation has become a critical factor in enabling businesses to maintain their competitive advantage. From a similar perspective, Nelson and Winter (2001, p. 13) argue that companies and economies that are able to break their maintenance of historical modes of operation or what they term 'organisational inertia' are more likely to be able to respond more rapidly to opportunities and changes by investing in and applying new knowledge to the development of their products and services.

Informed by the work of Pavitt (1984), the OECD defines four sectoral types of innovation thus:

> *Supply-dominated sectors*—such as traditional clothing and furniture where firms generate few important innovations themselves, but rather import them from other firms
> *Scale-intensive sectors*—(such as food processing and cement) in which process innovations predominate
> *Specialised suppliers*—(such as engineering, software and instruments) are characterised by frequent product innovations, often developed in collaboration with their customers
> *Science-based producers*—(such as chemicals, biotechnology and electronics) who develop both new products and processes, sometimes in close collaboration with universities and research institutes (OECD 2001, p. 13).

This widely held typology identifying the places of markets for innovations implies that the innovation process conforms to a linear or scientific approach. Edquist (1997) suggests that the innovation process is much more complex than a simple liner progression adhering to a single methodological approach. Further he argues innovations emerge and are translated into new products and services through a complex feedback mechanism, and 'interactive relations involving science, technology, production, policy and demand' (cited OECD 2001, p. 13).

Offering a similar argument, yet broadening the industries or spheres of knowledge that engage in the innovation process, Roy Green states, 'Innovation is more than science and technology; it is non-linear with multiple sources, incremental as well as breakthrough, low tech and high tech industries, and driven by collaboration not silos'. From this observation, he asserts that regional economies need to invest in developing and transferring capabilities and skills for innovation which includes investment in the management of innovation and invest in collaboration (2009a, b).

This strand of innovation discourse sees a shift in conceptualising and articulating innovations as primarily the result of product improvements within the manufacturing sectors, to acknowledge the role of service innovations across all industry sectors. This also shifts the consideration regarding the process and focus of innovation from an internal individual business or cluster of like businesses within a linear supply chain, to that of a trans-disciplinary and trans-industry network of agents, intermediaries, functions and forms of service within a regional innovation system. Working in a highly networked yet less-structured manner requires collaboration and sharing of explicit and tacit knowledge across all arenas of the innovation system, including both private businesses and public sector organisations.

3.1.1 Successful Innovation—An Exchange and Application of Knowledge

A broader and less product-focused definition of innovation's role in economic development posed by the OECD in 2001 is that 'innovations are understood as new creations, which have economic significance by virtue of their adoption within organisations. Therefore, they embody knowledge that is in demand' (OECD 2001, p. 12).

In the 1990s knowledge-based industries became defined as those that had the following three characteristics: a high level of investment in innovation; intensive use of acquired technology; and a highly educated workforce (Webb 2000, 2001 cited in Godin 2006). Within the sphere of regional innovation systems discourse, three differing types of knowledge bases are described as contributing to innovation. These types of knowledge are illustrated using professional domains and include: the synthetic (engineering based), the analytical (science based) and the symbolic (creative based) (Sporer and Bhatia 2004, p. 2, 4).

Ideas and new technologies in themselves are inert manifestations. Until they are translated and applied in new combinations, do new possibilities arise to inspire business opportunities? As Carlsson (2004) observes:

> only when the actors in the innovation systems and competence blocs interact with each other closely and frequently enough do the new technical possibilities result in economic growth. …Through better connectivity the design space becomes denser: more ideas are created, new ideas can be tried and implemented (or rejected) more quickly, and the knowledge base can expand through more experimentation (Carlsson 2004, pp. 248–249).

This shifts thinking about the means of stimulating economic development and innovation from a product-focused, linear predictable translation of specialist knowledge and its application within a single enterprise, to sites of diffused knowledge sharing and application within a diverse network of industry actors, agents, intermediaries and markets.

Amidon and Macnamara (2001) refer to this as a "Knowledge Zone" which they define as a "geographic region, product/service/industry segment or community of practice in which knowledge flows from the point of origin to the point of need or opportunity (cited Dvir and Pasher 2004). Storper (cited Lagendijk 1997, p. 10) recognised these elements as 'untraded dependencies'.

As Raspe and van Oort (2006) and Baum (1999) suggest, economic benefit from the application of knowledge is reliant on the interactive relations between market actors and others, while producing and using goods and services, from the first idea to the final products. Significant others in this respect include politicians and government agencies charged with developing and implementing strategies and programs to foster innovation.

4 Enculturation Within Policy Domains

Howlett and Lindquist (2004) observe that policy problems are often complex and comprise many different elements together with many different political arguments and actors participating in more than one discourse at a time[2]. Recent Economic Development theory and policy discourse acknowledges that innovation is not a process that is confined to a specific industry or type of outcome, and that successful regional innovation systems are flexible and highly networked. Accordingly, successful economic regions display attributes and characteristics of postmodern management in which organisations are fluid, organic and adhocratic (Planning 2013). Yet, the development and delivery of government policy focusing on innovation contradicts this, emanating from bureaucratic, highly-structured and risk-averse government business agencies increasingly compliant with the political objectives of their Ministers.

Osborne and Gaebler's (1992) observation, occasional participation and published commentary in the series *Reinventing Government* had a major impact on the

[2] "Enculturation is the process where the culture that is currently established teaches an individual the accepted norms and values of the culture or society where the individual lives. The individual can become an accepted member and fulfill the needed functions and roles of the group. Most importantly the individual knows and establishes a context of boundaries and accepted behavior that dictates what is acceptable and not acceptable within the framework of that society. It teaches the individual their role within society as well as what is accepted behavior within that society and lifestyle" (Kottak and Conrad 2010. *Window on humanity: a concise introduction to anthropology, 4th edition.* New York: McGraw-Hill. Cited http://en.wikipedia.org/wiki/Enculturation June 2013).

way democratic governance was viewed, theorised and implemented through political and administrative systems. Embedded within a neoclassical economic framework, the driving premise of the political theory of reinvention is that business and enterprise are the key drivers of regional economic success. Nearly a decade later purporting a similar philosophy but using slightly different terminology, New Public Management (NPM) reforms focused on efficiency and emphasised management over policy competence.

The current approach to economic policy development, articulation and implementation has continued to follow the lead of British policy makers who in the late 1990s began to favour *evidence-based policy making* (EBPM). As Parsons (2002) notes, the EBPM approach breaks down the policy-making process into distinct sets of management tasks that in turn can be processed within a mechanistic system. The implication of a mechanised system is that it will provide certainty and stability of outcomes and thus serve to legitimise policy choices and implementation strategies. Added to the managerial tools adopted by EBPM was 'strategic planning' emanating from business theory and management discourse.

Turning his attention to the process of policy analysis within the EBPM model, Parsons (2002) argues that:

> EBPM intention was not to produce 'evidence' to drive policy but to facilitate the clarification of values and contexts. EBPM is about what works rather that what you believe. It is about efficiency effectiveness and economy in delivery rather than ethics (2002, p. 54).

4.1 Adopting Strategic Planning to Support Evidence-Based Policy Making

Mintzberg (1994) observes that since the 1960s when the notion of strategic planning (SP) came to the fore as a tool for corporate managers. Increasingly it has become regarded as one of the most expedient and normative techniques to devise goals and encourage behaviours that will enhance the competitiveness of organisations and business units. The idea of strategic planning fits very well with the objectives and philosophy of EBPM, and its champions for using SP as a policy tool claim that: 'it provides a set of concepts, procedures, and tools that can help public sector organisations deal with the recent dramatic changes in their environments' (Bryson and Roering 1987, p. 9). In this way, the economic agenda of many governments, as well as their policy-making processes came to fit the dominant neoliberal economic theory and the business structures and practises that support it. In order to maintain stability within the government system, evidence is required to support decisions about investment and management, which in turn need to be guided by a set of core values and strategies articulated coherently in a plan, a plan through which Parsons suggests 'key actors can secure their ideas and policy recommendations' (Parsons 2002, p. 54).

This increase in government agencies acting like businesses has resulted in influential individuals, industry lobby groups or agencies acting in their individual self-interest pursuing particular short-term policies, including industry support programs and service delivery dimensions. Although associated with varying degrees of consultation, their influence hinders the development of more deliberative policy and programs that support a broader long-term public, social and economic interest. Moreover, their activity impacts on the means and ways governments invest for the public good, but also on the ways government agencies behave as part of the economic system, in some cases acting as service providers actively competing with private businesses, as well as each other for resources and clients.

Di Francesco (2001, p. 104) describes NPM [EBPM] as the 'transplant of market mechanisms for the delivery of public services', and highlights the tensions that have arisen with increasing ministerial control which has undermined the value of independent bureaucratic policy advice relative to that sourced from political advisers. These factors compound a 'hollowing out' of the state bureaucracy capacity, a loss of expertise and escalating fragmentation, thus raising a significant challenge for governments seeking to emulate innovative behaviours and a more holistic approach to fostering innovation on an economy-wide basis.

Although not officially stated as such, South Australia's adoption of the whole-of-government strategic planning model as articulated in South Australian Strategic Plans (2004, 2007, 2011), was an attempt to address the policy-making deficiencies produced by adhering to the New Public Management ethos and more deliberative approaches to the policy development process. The promotion of a more outwardly deliberative process of defining the states policy framework could be regarded as a potential catalyst for service innovation within government agencies; but did it actually facilitate government agencies ability to do things differently and thus prompt real service innovation with states bureaucratic system. The following case study illustrates the attempt by the South Australian government to innovate the way in which the government and government agencies engaged in the process of policy and the development of new (or the repetition of existing) programs to foster innovation and creativity.

5 A Case Study—The South Australian Strategic Plan: Predictability and Control Versus Creativity and Innovation

The 2004 *South Australian Strategic Plan—Creating Opportunity* (SASP) was developed to provide an overarching, whole-of-government statement on the state's strategic priorities, and attempted to address the issue of individual agencies developing separate sectoral plans in isolation from each other. The six nominally interrelated objectives of the 2004 plan are:

- growing prosperity
- improving wellbeing
- attaining sustainability
- fostering creativity
- building communities
- expanding opportunity.

The following case study will outline the objectives of the first iteration of South Australian Strategic Plan and the policy instruments aimed at fostering innovation and creativity and compare it to the 2011 iteration of the plan. In doing so, the case study will ascertain if the SASP encouraged service innovation in government agencies charged with supporting the states innovation strategies or was it essentially business as usual with little innovation in the sites and approaches to supporting the development of increased innovative capacity across the economy.

In April 2003, the Economic Development Board (EDB) was formed by South Australia's Premier Rann's Labour government. The EDB was charged to specifically focus on guiding long-term economic growth and prosperity for the state. The EDB's report*, A Framework for Economic Development in South Australia—Our Future Our Decision (2003)*, contained 72 major recommendations for action by government, business and the community. The report articulates the issues that the EDB and the some 10,000 South Australians consulted considered fundamental to the state's ability to build a more robust and globally competitive regional economy. The recommendations made by the EBD are set out in a broad framework within which are identified 'economic building blocks' that would form the foundations on which all industries would thrive and from which new industries would emerge (EDB 2003).

In its *Framework for Economic Development in South Australia,* the EDB makes specific reference to the *Fahey Report* (2002) regarding government efficiency, effectiveness and the need to redress the 'pronounced culture of risk aversion' which, amongst other issues, impedes the delivery of timely decisions and innovative processes for delivering better outcomes. The report states:

> In the absence of an overarching, whole-of-government statement on the State's strategic priorities, individual agencies have developed their separate sectoral plans in isolation from each other (Fahey 2002 cited EDB 2003, p. 24).

The report acknowledges South Australia's current strengths; i.e. in the automotive, wine, water technology, food, defence, electronics tourism and the creative industries and highlights the historical practice within government of determining priorities and resource allocations mainly at the portfolio level, without giving adequate consideration to broader cross-government priorities. This narrow focus is reinforced by an approach to budget allocations, whereby individual Ministers negotiate separately with Treasury (often very late in the process) for departmental allocations (EDB 2003, p. 23).

In examining the core themes and language used in the Economic Development Board's report, it is clear the writers have drawn heavily from the discourse around the New Economy and Endogenous Growth Theory within which the role and value of creativity and innovation within regional innovation systems was gaining increasing attention. The articulation of the importance of innovation to the growth and sustainability of the South Australian economy had been stimulated during 1990s by Henton et al. (1997), influential in South Australia's Economic development policy environment at the time. They argued:

> Innovation and the successful entrepreneurs that drive innovation are embedded in regional networks that connect assets in ways that create wealth and opportunity for both firms and individuals. Innovation is a social process. It rarely occurs because a single individual or firm takes an idea to market. Instead it involves many people playing many roles in a dynamic collaborative process built around creative teams and face-to-face interaction (Henton et al. 1997, p. 2).

Interestingly, the EDB states that the framework they propose represents a fundamental shift away from the industry-based approaches of previous government economic plans.

5.1 Fostering Creativity and Innovation Across the Economy—Reality of Rhetoric?

In their call for a whole-of-government plan, the EDB asserted that the framework should not focus on particular industries or attempt to formulate a 'magic recipe' that could fix all the State's ills' (ibid., p. 11). This is reflected in the statement regarding the overall strategy of the 2004 South Australian Strategic Plan:

> Our priority is to reinforce South Australia as a place that thrives on creativity and innovation. This capacity to do things differently will be one of the keys to achieving all of our objectives (Department of the Premier and Cabinet 2004, p. 3).

This objective is reinforced in the summary of Objective 4 Fostering Creativity of the *South Australian Strategic Plan* states:

> Innovation and creativity provide South Australia's future capital for growth and expansion. The Government recognises its role in providing the right environment for these attributes to flourish in sectors ranging from the arts to manufacturing, and its ability to provide a lead for the rest of the community. Our capacity to do things differently will be one of the keys to achieving all of our objectives (Department of the Premier and Cabinet 2004, p. 3).

The prologue to the Fostering Creativity targets in SASP 2004 purports that 'creativity and innovation are now seen as the most important factors in economic growth and prosperity. They are particularly important in advanced societies because of the contribution they make in meeting broader social, economic and sustainability objectives' (ibid., p. 40). This suggests that investments in innovation

would be clearly articulated and made across all of the SSAP's strategic objectives. Similarly, the 2011 SASP states as its overarching objective for fostering creativity and innovation that:

> South Australia has a proud heritage in arts and creativity. Since 1960, we have held one of the world's premier arts festivals and the South Australian Film Corporation was the first state film corporation established in Australia. The Plan's targets have founded strategies which have led to an enormous increase in attendance at arts activities, with an audience of 7.5 million people in the two years to June 2009, a rise of 89 % from 2004. In addition, there has been a constant increase in the rate of production of feature films in our state.
>
> Public expenditure on science, research and innovation in South Australia has risen substantially and we have achieved our target to 'exceed average investment compared to other states'. Positive movement towards the target of increasing business expenditure on research and development has also been recorded, with an upward trend from 0.68 % of GSP in 2000–2001 to 1.18 % in 2008–2009.

As has been discussed previously in this chapter, the Regional Innovation System literature identifies three differing types of knowledge bases: the synthetic (engineering based), the analytical (science based) and the symbolic (creative based) (Sporer and Bhatia 2004, p. 2, 4). In South Australia, this typological division is reflected in the policy units and agencies charged with supporting creativity and innovation. It is interesting to note that the design process is increasingly being considered and applied for its ability to draw together knowledge from all fields in developing the most appropriate solution to the issue at hand. *Design* is what links creativity and innovation. It shapes ideas to become practical and attractive propositions for users or customers (DTI 2005, UK Treasury 2005, cited in Howard 2008, p. 8).

The siloing of knowledge typologies and the omission of design within the creativity and innovation policy framework and agencies is illustrated by the following Table 1.

Despite observations and concerns raised in numerous consultation sessions and reports regarding the fragmentation of government policies and programs, at the time the 2004 SASP was released, both the Department of Trade and Economic Development (DTED) and Department of Further Education Employment, Science and Training (DFEEST) claimed aspects of the state's innovation mantle.

Although the government arts agency ArtSA was responsible for the management and delivery of the 'creative' sectors, interestingly, DFEEST gathered under its remit the digital media sectors to which the name 'creative industries' was applied, seemingly ignoring the fact that the term 'creative industries' was normatively accepted as applying to a much broader filed of creative practises.

Despite acknowledging the need in the 2004 SASP, the 'capacity to do things differently will be the key to achieve all of our objectives' the division of policy development, and investment in instruments to support creativity and innovation was not only exhibited structurally, but also organisationally by agencies with very different values, languages and cultures.

Table 1 Summary of knowledge type and sectors supported by South Australian government agencies charged with supporting creativity and innovation

Knowledge type	Government department	Role/sectors supported
Synthetic (engineering based)	DMITRE	Manufacturing
		Trade
		Mineral energy resources
		Energy
		Small Business
Analytical (science based)	DFEEST	Science and research
		ICT/digital economy (Including 'creative industries'—digital media sector)
		Employment, skills and workforce development
Symbolic (creative based)	ArtSA	• Managing the Government's funding assistance to artists and arts organisations
		• Developing, facilitating and administering the Government's vision and strategy for the arts and cultural sector
		• Recognising and promoting the strengths and needs of our State's makers, presenters
		•And collectors of art and cultural heritage
		•Supporting the development and maintenance of our State's cultural heritage collections

6 Identify Conflicting Values in Policies and Programs to Foster Creativity and Innovation

Behavioural Economics has increasingly been drawn upon to inform public policy. The core element of Behavioural Economics applies scientific research to understanding human, social, cognitive and emotional factors influencing economic decisions by consumers, borrowers, investors and other economic actors (Roos 2012, p. 44).

In seeking to identify the social and political influences on choices of instruments to achieve the policy objectives, Talbot (2003) explored the application of the Competing Values Framework (CVF) to public sector reform. The Competing Values Framework (CVF) emerged in the 1980s from studies of public sector organisational effectiveness in the US. In *Beyond rational management*, Quinn (1988) characterised organisations as complex, dynamic and contradictory systems in which managers must fulfil many competing expectations. This is true also of the role of government's policy agencies and the conflicts between stated goals in political platform papers, policy documents and the development and implementation of the strategies to achieve the policy objectives and targets.

Quinn (1988) identified four cultures, or models of organising, reflecting what he saw as the four major models in organisational theory. These cultures vary along

two dimensions in terms of the extent to which they favour flexibility over control and an internal focus over an external focus. As Quinn and Rohrbaugh (1983, p. 10) observed, human organisations are commonly shaped by two fundamental contradictions: the desire for flexibility and autonomy, versus the need for control and stability; and the focus on internal concerns and needs versus responsiveness to the external environment.

Subsequent to Quinn's (1988) early work, an article analysing written and spoken management messages by Rogers and Hildebrandt (1993) argued that Quinn and Rohrbaugh's (1983) competing values framework was particularly appropriate to illustrate the interplay between the contrasting, and often conflicting, communication goals managers face when seeking to craft messages that get the job done. The following summarises the nature of the four quadrants:

> The human relations (HR) culture is characterised by flexibility and an internal focus, and is broadly orientated towards human commitment, typically valuing human resources, training, cohesion and staff morale.
> The open systems (OS) culture is characterised by flexibility and an external focus, is orientated towards expansion and adaptation to the external environment, and values adaptability, readiness, growth, resource acquisition and external support.
> The internal process (IP) culture has an internal focus and a control orientation, being orientated towards consolidation and continuity, and valuing information management, communication and stability.
> The rational goal (RG) model is characterised by an external focus and control orientation, aiming to maximise output and valuing productivity, efficiency, planning and goal setting.
> Each model has a polar opposite—the HR model contrasts with the RG model, while the IP model contrasts with the OS model—but parallels among models are also important (Quinn 1988, p. 49):
> The HR and OS models share flexibility.
> The OS and RG models share an external focus.
> The RG and IP model are both rooted in the value of control.
> The IP and HR models share an internal focus (on the human and/or technical systems inside the organisation).

The interplay of values and organisational norms is illustrated in Fig. 2.

The following diagrams situate the theoretical and policy discourse surrounding successful regional innovation systems, and identify where on the CVF framework South Australia's government agencies charged with stimulating and supporting the development of innovation (Figs. 3, 4, 5, 6).

The above diagrams illustrate the sites of government departments seeking to foster and support innovation do not in the most part do not overlap, and that the governance and bureaucratic system is on the opposite side of the quadrant to the site where innovation thrives. This is at odds with Carlsson's (2004) observation

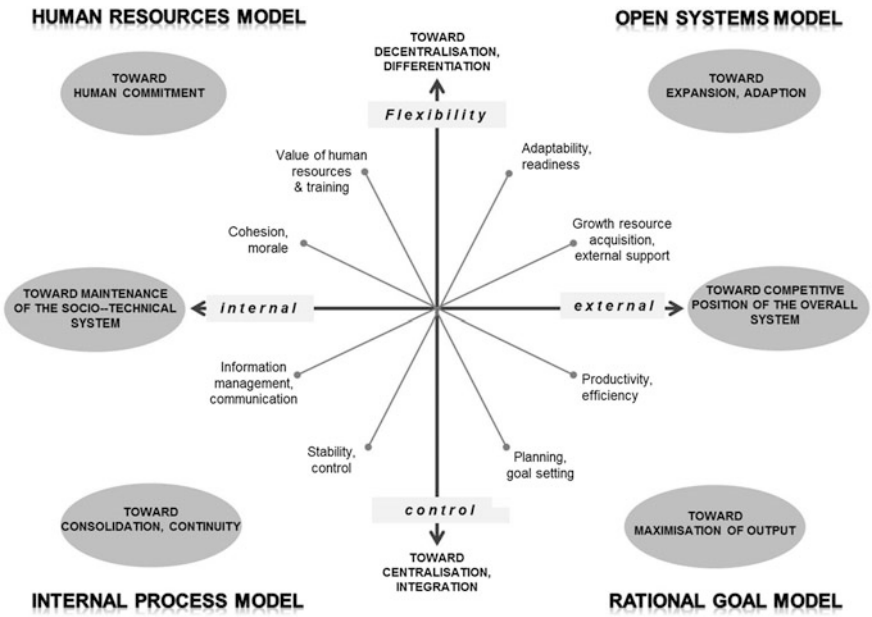

Fig. 2 Interpretation of Quinn (1998) and Rogers and Hilderbrant's (1993) competing values framework

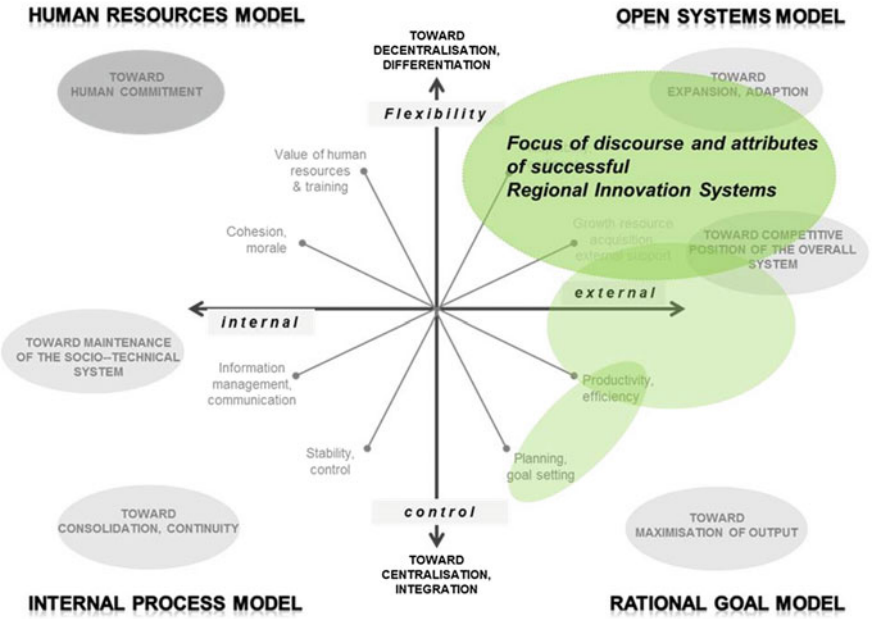

Fig. 3 Focus of discourse and attributes of innovative organisations and successful regional innovation systems

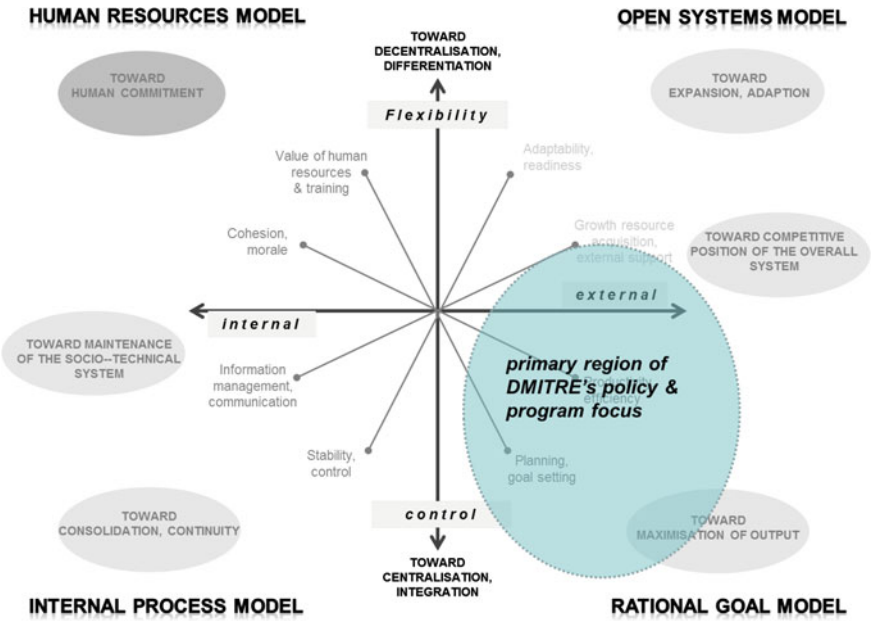

Fig. 4 Focus of DMITRE's policy objectives and programs to support innovation

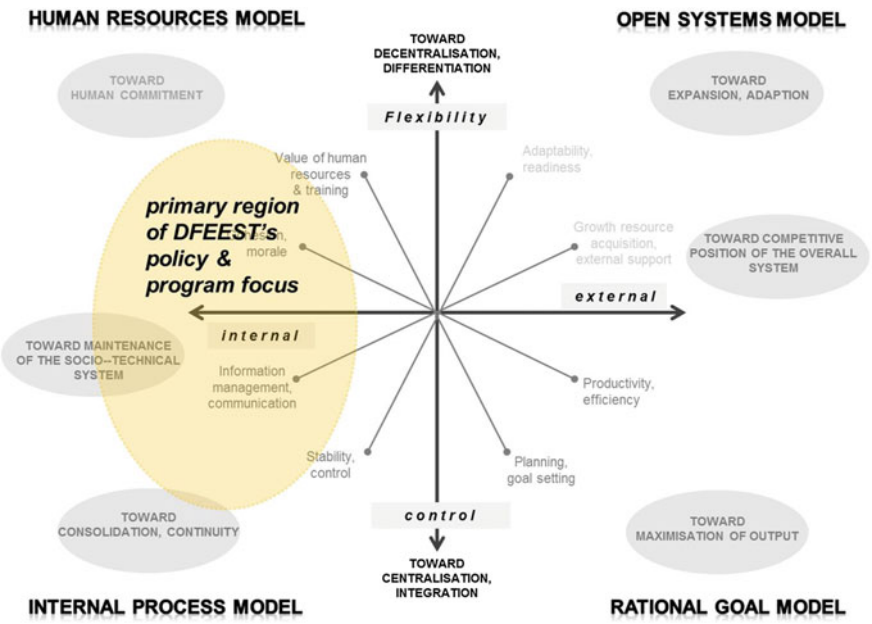

Fig. 5 Focus of DFEEST's policy objectives and programs to support innovation

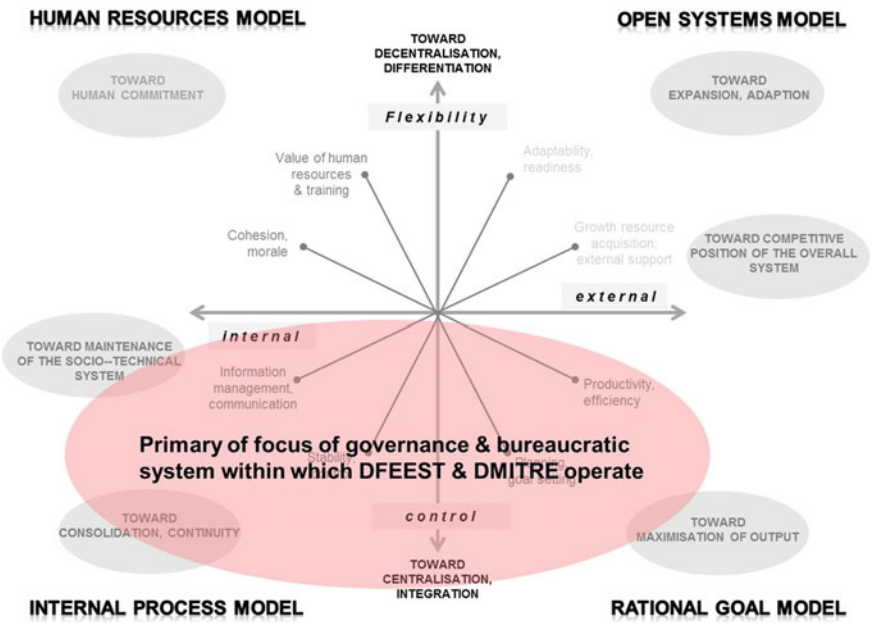

Fig. 6 The region in which governments and bureaucracies perpetually function

'that only when the innovation systems and competence blocks interact with each other closely and frequently enough do the new technical possibilities result in economic growth' (Carlsson 2004, pp. 248–249).

7 Conclusion

The linear mechanistic approach of policy silos to defining and developing policy systems utilising EBPM, together with the focus on efficiency and profit of business-orientated Strategic Planning in government sit in opposition to the theory and policy discourse of regional innovation systems.

The structures employed by governments are developed to provide stability and predictability around the articulation, administration, investment, and analysis of the outcomes of implementing policy instruments. Similarly, the documents that articulate policy objectives, and justify the choices of policy strategies and instruments in the majority of cases, are produced within clearly defined agency-based policy silos, in which policy research is either undertaken directly or commissioned from individuals conforming to the departments knowledge and cultural biases. It is therefore likely that policy perspectives and strategies will express biases towards methodologies and validity of certain knowledge types directly associated with their

educational history and the culture of the agency rather than a more holistic economy wide consideration of the impact of their policy choices.

Thus it follows, that empirically focused forms of policy analysis that provide objective generalisations about policy and its impact are favoured policy analysis methods and result in investments in policy instruments where the results of that investment are predictable and can be easily measured. Approaches to stimulating innovation such as design thinking and service innovations that produce both tangible and intangible benefits to the community and economy require analysis methods that tease out the inherent variables in the level of understanding of and value placed on an industry. The variables within the espoused values of policy and industry stakeholders influence the choice and means of gathering 'facts' to inform policy development. This is perhaps why there has been a persistence in focusing on innovation stemming from the science and technology sectors rather than a broader conceptualisation and valuing of other forms of innovation that are considered in the literature as critical enabling factors in a sustainable economy wide innovation system.

Stemming from the 1990s, "National Systems of Innovation" encompassed the idea of a new and more holistic perspective on the roles of policy governance and institutions for innovation. This concept became very influential both inside and outside of academia. Despite this argument becoming more prevalent in innovation literature and being adopted in other economic regions such as Sweden, and Finland, it does not appear to have gained traction within economic and industry development agencies in South Australian government. This is evidenced by the static conceptual and investment types for stimulating industry innovation that were characterised by a thematic preference for the economic aspects of R&D, technology and innovation and its short-term contribution to GDP. Arguably this is one of the consequences of adopting the ideology and process of New Public Management (NPM) as a means of coherence and control of policy making and the measurement of its outcomes. As Rhodes (1997 cited Di Francesco 2001: 107) suggests, NPM is framed around what is achieved rather than how things are done, thus misdiagnosing the policy problems facing the state and 'restructures without restructuring—the NPM is in reality little different from to existing bureaucratic structures and remains insensitive to a policy environment requiring the management of diverse networks of organisations'(ibid., p. 107).

A major blockage to effective learning and innovation for government agencies seeking to refocus and modify the types of investment and programs to foster innovation on an economy wide basis is the continuing difficulty in learning from 'honourable' failure as well as success. Innovation is unpredictable. Not all innovations, however, well considered and well developed, will be successful. In highly risk-averse political environments, governments and their agencies all too often perpetuate inappropriate organisational and policy instruments to avoid the scrutiny of 'failed' innovations in government programs.

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Epilogue

This Handbook traverses a wide field, starting with what service innovation means within different contexts, exploring governance and structure and providing valuable literature reviews on how to approach and understand both the intrinsic and instrumental nature of service innovation.

Open service innovation has altered the world we inhabit, with blurred boundaries on what constitutes customer engagements and citizenship. The partitions that historically dominated the market place are shifting and disappearing, with customers fully present and engaged in their relationships to purchase products and services. Such 'presence' has altered the customer to no longer being a passive recipient, but one that plays a dominant role in the development, design and improvement of both the service experience and content.

In terms of skills and capability building in service innovation the Handbook offers conceptual frameworks on how organizations can create systematic service innovation processes. Also highlighted is the concept of ideas assessment and newly adopted approaches such as 'serious games' and 'enterprise crowdfunding'. Such methods show that innovations do not always originate from experts and specialized groups, but also emerge from 'non-experts' and their respective communities. The Handbook highlights notions such as creativity in practice and active engagement of community members, where the community group is seen as 'bricoleurs'. These activities strengthen the social ties within the market place, thereby incorporating social capital and how it improves the experiential aspects of living within communities. The Handbook addresses these concerns with chapters covering design issues and how design thinking can improve the social dynamics of human existence. Moreover, the Handbook shows that foresight is the precursor to the innovation process and how service design is entwined with this process in creating vibrant futures. This also includes the movement of manufacturing firms into service providing organizations through servitization.

In terms of technological development, the Handbook focuses specifically on how the growth of data and the development of the 'semantic web' open the door to inspiring applications. In addition, disruptive innovations, exemplified in healthcare delivery, show that technology platforms have the capacity to transform the industry in critical ways that make health care both more efficient and effective.

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Another technology example is service-oriented computing which facilitates application and enterprise system integration.

Future trends point to emerging markets addressing service innovation within their unique environment and limited resources in a more sustainable manner. New approaches are being sought to address multi-level concerns about sustainability and depleted global resources. The Handbook provides examples of solutions, such as the one developed by Ariston which offers the consumer access to washing machines for washing on a pay-per-use basis, leading to a new paradigm that embraces sustainability. It is based on a number of pre-paid loads, and includes aside from use, maintenance, upgrades, and electricity, end-of-life collection; and uses recyclable products. Product-Service System (PSS) innovations represent a promising approach to sustainability through the role of design in radical sustainable service innovations. Such new approaches embrace the *circular economy,* where approaches to waste are turned upside-down and *"today's goods are tomorrow's resources"*.[1]

In the current political and economic climate, there has been a significant shift in many countries towards public services being rationalized through cost cutting. The Handbook explores Public Service Innovation as a process to renew and invigorate government sectors, presenting models that encompass the valuable resources and services needed for functioning economies. Moreover, managing these processes entails a keen understanding of the global pressures and market forces that continuously change the operating environment. This encourages the twenty-first century manager to have a suite of tools and perspectives, and a well-honed sensitivity to intercultural aspects of service innovation. The Handbook covers some of this domain through its discussion of 'frugal services innovation', service offshoring, location choice, innovative tax policies and managerial practices, transfer pricing and multinational subsidiaries. Cases in India, China and Ireland highlight the complexities of these international dimensions as they influence service innovation.

In conclusion, future trends highlight that service innovation, though connected to dynamic aspects of a global environment, such as the notion of a circular economy, has a common thread of the *human element,* and very much thrives on relational aspects. These include the insight and knowledge brought to the fore through collaboration with regard to both intangible and tangible elements that drive service innovation.

Renu Agarwal, Willem Selen, Göran Roos, Roy Green

[1] Trends E-Magazine, Trend #2, September 2012: 11.

Terminology

Below is a list of terms used in The Handbook of Services Innovation. This list is not exhaustive and covers terms as they appear in the relevant chapters. The source of the term can be found at the end of the short definition, where you can turn to for further reading or to explore the term used in its contextualized form with complete references.

absorptive capacity the ability of network members to access and appropriate new knowledge from their partners Chapter "Service Innovation: A Review of the Literature" (See also Chapters "Open Service Innovation: Literature Review and Directions for Future Research", "Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis")

acupunctural planning a set of synergic self-standing local initiatives that, adopting the metaphor of the practice of the traditional Chinese medicine, aim to generate changes in large and complex systems operating on some of their sensible nodes (Chapter "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations")

alliance network a firm's set of direct and indirect relationships (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")

alliance portfolio a firm's set of relationships, all alliances of a focal firm (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")

alliance structure pertains to the governance form adopted by the partners that provides them with incentives to act consistently with alliance goals, while simultaneously providing them with sufficient rewards and safeguarding them against opportunistic behaviour (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")

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bricolage a process of co-shaping an emerging path where participants offer inputs to generate a virtuous learning circle. The boundaries blur between design and implementation and between rule making and rule following (Chapter "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework")

BPO business process offshoring/outsourcing (Chapter "Services Offshoring: Location Choice and Sub-national Regional Advantages in China")

Business Model (BM) business model concept (or BM) is provided by Osteralder, Pigneur and Tucci (2005, p. 5): "A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with which financial consequences" (Chapter "Business Model Approach to Public Service Innovation")

Capability Maturity Model Integration for Services (CMMI-SVC) the Capability Maturity Model Integration for Services (CMMI-SVC)—maintained by the Software Engineering Institute (SEI) of Carnegie Mellon University—belongs to a family of CMMI frameworks that date back to the early 1990s. The overall purpose of CMMI-SRV is said to *be "providing guidance for applying CMMI best practices in a service provider organization" (CMMI Product Team 2010, p. i).* (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")

Circular Economy Is a concept introduced by Boulding (1966). It is a generic term for an industrial economy that is, by design or intention, restorative and in which material flows are of two types, biological nutrients, designed to re-enter the biosphere safely and technical nutrients, which are designed to circulate at high quality without entering the biosphere (Wikipedia 2014a) (Chapter "Services Innovation in a Circular Economy")

co-creative practices practices where a design practice and one or more communities of practice participate in creating new desired futures. Lave and Wenger (1991) describes similar processes from a situated learning perspective, where professional development typically goes from peripheral participation in a community of practice to full participation (Chapter "Co-creative Practices in Service Innovation")

co-design co-design recognizes that people have assets such as knowledge, skills, characteristics, experience, friends, family, colleagues and communities, and they use these assets to support their health and well-being (Feeley and Mair 2012, p. 4). Co-design changes the dynamics between individuals and communities, creating more collaborative relationships. Frontline staff is more able, confident and ready (than management) to accept user experience (Needham and Carr 2009; Burns 2012, p. 13) (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production") (See also Chapters "Service Innovation: A Review of the Literature", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", "Systemic Development of Service Innovation", "Service Innovation Through an Integrative Design Framework", "Co-creative Practices in Service Innovation", "Managing Online User Co-creation in Service Innovation")

collaborative agility Sambamurthy et al. (2003) define agility as *customer agility*, *partnering agility* and *operational agility*. *Customer agility* forms the basis of a dynamic and adaptive capability provided by service system in response to customer needs and demands. *Partnering agility* is an organization's ability to explore and exploit opportunities through sourcing and staging service delivery processes, or customer interfaces and customer support assets and resources. *Operational agility* in a service system can then be seen as the managerial capability to rapidly adapt and change network structures and organizational cultures, integrate modular processes to rapidly change and redesign existing processes and create new processes for exploiting a dynamic marketplace. These three forms of agility make up the collaborative agility of the service system (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

collaborative design collaborative designing means to design together with others. In such explorations, identifying the problem and finding the solution often go hand in hand by making sense of the current systems, experiences, solutions and practices and at the same time seeking insights for future ideas (Chapter "Co-creative Practices in Service Innovation")

collaborative innovative capacity (CIC) is the ability to come up with innovative ideas, which gives partnering organizations the capacity to introduce

new services, new or modified processes, new or modified operating structures, new ways to market products or services, or ideas through the integration of capabilities and resources in an urge to incite innovation (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

competence-based view the perspective of competence-based competition integrates concepts of resources (Penrose 1959; Wernerfelt 1984; Barney 1986, 1991; Dierickx and Cool 1989), dynamic capabilities (Amit and Schoemaker 1993; Nelson and Winter 1982; Teece et al. 1997), as well as assumptions of works on core competences (Prahalad and Hamel 1990; Hamel 1991). The competence-based perspective clarifies the link between a firm's performance and its resource endowment. It is argued that a firm needs to possess specific competences in order to exploit its resources in a goal-oriented manner (Freiling 2004) (Chapter "On the Way to a Systematic Service Innovation Competence Framework")

competing values framework Competing Values Framework (CVF) relates to public sector reform. The Competing Values Framework (CVF) emerged in the 1980s from studies of public sector organisational effectiveness (Chapter "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

complexity theory involves a diverse array of concepts rather than a coherent 'theory'. Complexity approaches have developed as an interdisciplinary endeavour, moving from biological to social systems and share rejection of positivist frameworks. By relying on a multidimensional conceptualization, theory concerning complex systems can be translated to the domain of service innovation. Although the elements within a system are commonly associated with individual components (Frenken 2006), functions, routines (Nelson and Winter 1982), or activities (Porter and Siggelkow 2008), the complexity principles hold for more abstract dimensions as well. In the case of services, scholars did express the expectation that prompting a change in one dimension is likely to require changes in other dimensions (den Hertog et al. 2010; Van Riel et al. 2013; Cooper et al. 1999; Chae 2012) (Chapters "Exploring a Multidimensional Approach to Service Innovation", "Innovating Universities: Technocratic Reform and Beyond")

configurational approach An approach based "on the fundamental premise that patterns of attributes will exhibit different features and lead to different outcomes depending on how they are arranged" (Fiss 2007, p. 1181). It assumes complex causality and nonlinear relationships, and that variables that are causally related in one configuration may be differently related or even unrelated in other configurations (Meyer et al. 1993). The configurational approach also places emphasis on the argument of equifinality (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")

contextmapping The *contextmapping* approach, developed by Sleeswijk Visser (2009), is built on the same foundation as probes; on collaborative sense-making in which the insight generation process is believed to be a non-linear process that has both rational and non-rational arguments. The process starts by engaging users to discuss their experiences through assignments. The process continues by discussing insights with the designers in open-ended dialogues that aims to support empathy as well as collaborative creation (Chapter "Co-creative Practices in Service Innovation")

creativity creativity is the generation of new ideas—either new ways of looking at existing problems, or seeing new opportunities, perhaps by exploiting new technologies or changes in markets (Chapters "Innovation or Resuscitation? A Review of Design Integration Programs in Australia", "Innovating Universities: Technocratic Reform and Beyond") (See also Chapters "Service Innovation: A Review of the Literature", "On the Way to a Systematic Service Innovation Competency Framework", "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation")

creative destruction Schumpeter argued that new ideas rarely come into being because firms innovate and transform themselves; rather, capitalism develops through a process of creative destruction. Schumpeter (1942, p. 83) defined the notion of creative destruction as a "process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one." For Schumpeter, extremely significant innovations begin

with the creative destruction of existing fields (Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

crowdfunding involves "an open call, mostly through the Internet, for the provision of financial resources either in form of donation, or in exchange for some form of reward and/or voting rights". Crowdfunding is driven by advances in ICT and Internet use. It became particularly popular amongst initiators of charity, creativity, or investment related grassroots projects (Ordanini 2011). Crowdfunding builds on the idea of crowdsourcing (Howe 2009), which can be described as sourcing something from a large crowd that would have normally been provided by one self or paid employees (Geiger et al. 2011) (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")

crowdsourcing where a firm's innovative activities are outsourced to a large crowd of people, also an example of a radical service business model innovation. Crowdsourcing involves soliciting ideas or solutions from a wide range of contributors. Generally, firms set a prize amount, provide a remit or problem to solve and select the best solutions generated by the competition, providing a very efficient way for firms to generate possible solutions and ideas to problems (Chapters "Service Innovation: A Review of the Literature", "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

Customer engagement is the ability of the service system to encourage customers to participate and engage during the service encounter (face-to-face or technology mediated), and through the customer's engaging and learning process, judge and respond to customer's needs and expectations with agility and innovativeness (Agarwal and Selen 2009) (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

Customer Integrated Business Model (CIBM) Customer-Integrated Business Model" (CIBM) was based on the RCOV model, with customer as additional resource which enacts a new range of dynamics among other BM components, therefore leading to potential increase of revenues and/or reduction in costs, i.e.

	improved performance through innovations originated from as well as leading towards, customers (Chapter "Business Model Approach to Public Service Innovation")
customized services	are produced to meet particular customer needs and the outputs are fully adapted to them (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")
DC	Developed Countries (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")
design	The simplest definition (Roos 2011) is that design is a system-level optimisation intended to change the behaviour—and, as such, the preferences—of the user. Whereas technology-based innovation tends to take a "component improvement leads to system improvement" view, design-based innovation tends to take a "system optimisation leads to user-behaviour change" view (Chapter "Services Innovation in a Circular Economy")
design integration programs	Design integration programs aim to increase the competitiveness of business through the application of design services and design thinking within the business model. Typically design integration programs provide auditing, mentoring and business modelling with selected companies to plan and implement strategies to utilise professional design services and apply design thinking methods to develop new products, services or processes (Chapter "Innovation or Resuscitation? A Review of Design Integration Programs in Australia")
design probes	self-documenting diaries, where a customer documents his/hers personal context by, for example, taking photos of objects and events over a specified period (Chapters "Co-creative Practices in Service Innovation", "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")
design thinking	Design thinking is described as human-centered discovery process followed by iterative cycles of prototyping, testing and refinement (Brown 2009). Design driven innovators look for new ways to think about the innovation, spend time with all kinds of consumers and capture unexpected insights that more precisely reflect what people want. By taking the human-centred approach, design thinkers can imagine solutions that

are inherently desirable and meet explicit or latent needs. Both design thinkers and service innovators need to imagine the world from multiple and often contradictory perspectives—those of colleagues, clients, end users and future customers. Design thinking aims at creating *meaningful solutions* (Verganti 2009). Observations are translated into insights and insights into products and service solutions (Brown 2009). According to Griesbach (2010, p. 200), design thinking can be considered as "a special way of problem solving which creates more value by better satisfying human needs in the long run than other ways of problem solving might do" (Chapters "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", "Systemic Development of Service Innovation") (See also Chapters "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation", "Innovation or Resuscitation? A Review of Design Integration Programs in Australia")

disembodied innovations are intangible and constructed from newly formed knowledge (Chapter "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations")

disruptive innovation a disruptive innovation is one that affects its domain in large volume, which creates a new market and value and eventually replaces existing technologies/processes (Chapters "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations", "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

dynamic capabilities competencies or capabilities which facilitate the rapid creation of new products and processes by the agile coordination of "internal and external organizational skills, resources, and functional competences" in response to dynamic market conditions. Dynamic capabilities can be defined as routines within a company's managerial and organizational processes that aim to gain, release, integrate and reconfigure resources (Teece et al. 1997) (Chapters "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", "Dynamic Capabilities for Service Innovation in Service Systems", "Service-Oriented Architecture as a Driver of Dynamic

	Capabilities for Achieving Organizational Agility") (See also Chapters "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches", "Service Innovation Through an Integrative Design Framework")
EC	Emerging Countries (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")
economic geography	research in economic geography has been mainly concerned with spatial distribution and spatial organisation of economic activities at sub-national levels, focusing on key questions such as why certain economic activities occur at certain locations and how the economic activity at one place relates to others at its surrounding areas (Dicken and Lloyd 1990) (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China") (See also Chapter "Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis")
elevated service offering (ESO)	Service innovation in such a service system can be seen as a new or modified service offering, where the service offering is "elevated" beyond what is possible by the individual firm through collaborative efforts and/or expertise of the network partners. Hence, the notion of an "elevated service offering" or ESO (Agarwal and Selen 2009, 2011, 2014) is brought about through the deployment of particular dynamic capabilities (Teece 2009) (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")
enculturation	"the process where the culture that is currently established teaches an individual the accepted norms and values of the culture or society where the individual lives. The individual can become an accepted member and fulfill the needed functions and roles of the group. Most importantly the individual knows and establishes a context of boundaries and accepted behaviour that dictates what is acceptable and not acceptable within the framework of that society. It teaches the individual their role within society as well as what is accepted behaviour within that society and lifestyle" (Kottak and Conrad 2010) (Chapter "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

endogenous growth theory (EGT) since the 1980s, aspects of new growth theory or endogenous growth theory have been woven into neoliberal approaches to macro and micro economic policy. Instead of considering economic growth primarily through transaction cost theories and analysis, importantly, EGT recognises that non-market interactions are also important in fostering and sustaining regional economic development (Chapter "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

effectuation Effectuation replaces predictive logic with *a means oriented approach*, which begins from available resources and allows the goals to emerge in the courses of action. In line with S-D logic, it highlights that any given resource can be made more or less valuable and capable of producing long-term advantages: thus, what participants do with resources matters. Effectuation and bricolage both emphasize the significance of *individuals' actions and control over resources* (Fisher 2012) (Chapter "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework")

e-health health services and information delivered via internet and related technology. e-health, characterized as internet enabled medicine, is the latest development in the telemedicine stream of applications and is defined as health services and information delivered via internet and related technologies (Chapter "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations") (see also Chapter "Role of Web 3.0 in Service Innovation")

evidence-based policy making (EBPM) the EBPM approach breaks down the policy making process into distinct sets of management tasks that in turn can be processed within a mechanistic system. The implication of a mechanised system is that it will provide certainty and stability of outcomes and thus serve to legitimise policy choices and implementation strategies. Added to the managerial tools adopted by EBPM was 'strategic planning' emanating from business theory and management discourse (Chapter "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

eVisit service provides patients with online consultation through a series of secure message exchanges with a physician, providing an alternative for onsite office visits and

non-reimbursed phone-based care (Chapter "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations")

embedded services although commonly assessed as separate product categories, researchers acknowledge that there are numerous service activities that firms 'embed' with products (Bowen et al. 1989; Dunning 1989; Robinson et al. 2002; Ulaga and Reinartz 2011). These can range from services delivered before the production of a good, such as customised design, to post-production services, such as installation and ongoing post-sale service support for a good (Chapter "Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets")

embodied innovations are tangible such as medical devices and pharmaceutical products (Chapter "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations")

employee-driven innovation (EDI) refers to "the generation and implementation of ideas, products, and processes—including the everyday remaking of jobs and organizational practices—originating from interaction of employees, who are not assigned to this task" (Høyrup 2012 p. 8, see also Kesting and Ulhøi 2010) (Chapter "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework")

entrepreneurial alertness the "dynamic capability of an organization to explore its marketplace, and detect areas of current and future market place threats and opportunities" (Sambamurthy et al. 2003, p. 250) (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

equifinality the situation where "a system can reach the same final state (e.g., the same level of organizational effectiveness) from differing initial conditions and by a variety of different paths" (Katz and Kahn 1978, p. 30). (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")

expansive learning expansive learning perspective offers theoretical and analytical means to explore, in a nuanced way, the emergence and development of resource integrator roles and practices in service innovation (Chapter "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework")

external service innovations the addition of, or changes to, a firm's service offering to a consumer segment (Chapter "Towards an

Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

FDI Foreign Direct Investment (Chapters "Services Offshoring: Location Choice and Subnational Regional Advantages in China", "Innovative Strategies in Servicing International Markets from Ireland")

frugal innovation is a response to limitations in resources, whether financial, material or institutional and transforms these constraints into an advantage using a range of methods (Bound and Thornton 2012). Frugal innovation results in lowering the costs of products and services through minimizing use of resources or by leveraging them in new ways (Govindarajan and Ramamurti 2011; Bound and Thornton 2012; Radjou, Prabhu et al. 2012) (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

futures thinking the term "futures thinking" is used when speaking about looking into futures as a general approach, and "foresight" when focusing on the concrete forward-looking work aimed at mapping the change and influencing it (see Bishop and Hines 2012). Futures thinking has generated a rich and wide-ranging literature (see e.g. Slaughter 2009), and, as a holistic and synthesizing field, it draws on methods from many disciplines (Popper 2008). Futures studies discover, examine, evaluate and propose possible, probable and preferable futures (Bell 2009) (Chapter "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation")

fuzzy set qualitative comparative analysis (fs/QCA) Fs/QCA is an analytic technique that studies how different causal conditions combine to contribute to a certain outcome of interest (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")

goods-dominant (G-D) logic focuses on discrete transactions of primarily tangible units of output. Value is added by producing output throughout the production process. Hereby, the product itself and its competitive features are of interest, rather than value-in-use. The customer is merely seen as a consumer of value, whereas value creation is limited to the firm (Chapters "On the Way to a Systematic Service Innovation Competency Framework", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of

	Literature", "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation", "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework" and "Practices for Involving Organizational Customers in Service Innovation")
google wallet	new payment providers to the financial sector such as PayPal and Google Wallet enables payments and online money transfers, a service which once belonged in the domain of financial institutions (Chapter "Technology-Driven Service Innovation in the Banking Industry")
hub-and-spoke systems	structures of firms, whereby central service firms act as service intermediaries that can disseminate various service, technological, or management innovations to periphery firms. Firms on the periphery get access and exposure to knowledge that is often difficult to be developed internally (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")
human-centred approach	Brown describes design thinking as a 'human-centerd approach to innovation that draws from the designer's toolkit to integrate the *needs of people, the possibilities of technology and the requirements for business success'* (http://www.ideo.com/about/) (Chapter "Innovation or Resuscitation? A Review of Design Integration Programs in Australia") (See also Chapters "Service Innovation: A Review of the Literature", "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation", "Systemic Development of Service Innovation", "Service Innovation Through an Integrative Design Framework", "Co-creative Practices in Service Innovation")
hybrid value chain	revised understanding of value creation through services; shifting value chains from being linear to hybrid (Rabelo et al. 2007; Sabat 2002) comprising of a network of stakeholders such as suppliers, customers, partners and intermediaries (Lusch et al. 2009; Vargo et al. 2008; Normann and Ramirez 1999) (Chapter "Service Innovation: A Review of the Literature") (See also Chapter "Servitization as Innovation in Manufacturing—A Review of the Literature")
idea assessment	*idea assessment* is a very important phase of the innovation process (Schulze et al. 2012, p. 11). Synonyms include decision-making on service ideas, idea screening, idea selection and service proposal

	screening. Given the close relationship of service innovation to open innovation, the documented importance of idea assessment also applies to service innovation (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")
incremental innovation	incremental innovation makes small and continuous improvements to an existing product (Chapter "Innovation: A Critical Assessment of the Concept and Scope of Literature") (See also Chapters "Open Service Innovation: Literature Review and Directions for Future Research", "Innovation, Service Types, and Performance in Knowledge Intensive Business Services", "On the Way to a Systematic Service Innovation Competency Framework" and "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")
innovation	the creation of novelty that provides economic value through the creation of new products and services. Less often, given the origins of a great deal of innovation scholarship in a concern with new products and to a lesser extent, services, it may entail a focus on organizational changes, including the establishment of new work practices (Marceau 2008, p. 670). The diversity in innovation definitions is enormous, including factors, elements, theories, and thoughts on technology, process, product, service, organisation, market, consumer, creativity, knowledge, learning, culture, etc. and thereto the categorization of *degrees* of innovation; radical, incremental, or discontinuous innovation, etc. At its broadest, the following definition, drawn from an extensive literature review, is useful: "An innovation can be a new product or service, a new production process technology, a new structure or administrative system, or a new plan or program pertaining to organization members" (Keupp et al. 2012, p. 367) (Chapter "Innovation: A Critical Assessment of the Concept and Scope of Literature") (See also Chapter "Business Model Approach to Public Service Innovation")
Innovation Capability Maturity Model (ICMM)	*Innovation Capability Maturity Model (ICMM)* of Essmann and du Preez (2009), pursues the concept of a maturity model as introduced by CMMI-SVC. In contrast with CMMI-SVC, this framework focusses explicitly on innovation capabilities. Although the framework addresses innovation capabilities more

generically and cannot be thought of as service specific, it was evaluated in an exploratory manner via case studies from the professional services and financial services domains. Therefore, the capability framework provides insights that are arguably relevant to innovation in services (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")

inside out-open innovation in which a company allows some of its own ideas, technologies or processes to be used by other businesses. Openness here means overcoming the "not sold here" syndrome, in which the company monopolizes the use of its innovations, prohibiting use outside of its own business. Opening up the inside means that revenues from external use of a company's ideas are welcomed (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation"). Henry Chesbrough cites two kinds of openness in his concept of open innovation: "outside in," in which an organization incorporates external ideas and technologies in its services; and "inside out," in which an organization allows others to use its ideas, technologies or processes (Chesbrough 2011) (Chapter "The Architecture of Service Innovation")

insight generation activities that explore the users' and other stakeholders' aims and needs, and seeks alternative ways to approach the design solution space. Insight generation is part of the fuzzy front end of the innovation process and often goes hand in hand with many other activities such as stakeholder inclusion, setting up relations, setting the scope of the innovation project, etc. Many of the tools created for insight generation are open-ended and aim to trigger, inform and inspire the ongoing process. Insight generation is about identifying needs, wants and potentials and, thus, deals with exploring and being curious about what users experience and could experience in the desired future situation (Chapter "Co-creative Practices in Service Innovation")

internal service innovations new ideas or practices within an organisation (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

international design scoreboard *International Design Scoreboard* (Moultrie and Livesey 2009) employed seven absolute and relative

indicators to determine the design capability of twelve nations (Chapter "Innovation or Resuscitation? A Review of Design Integration Programs in Australia")

inseparability The term 'inseparability of production and consumption' is applied to describe this service process and has emerged as a significant point of difference between services and goods (Berry 1984; Lovelock 1983) (Chapter "Leveraging Value Across Borders—Do 'Market Place Interactions' Trump 'Market Space Transactions'?: Evidence from Australian Firms in Industrial Markets")

ITO information technology offshoring/outsourcing (ITO) (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China")

KIBS (Knowledge Intensive Business Services) firms enterprises whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customized service (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services"). KIBS are suppliers of intermediate inputs built from the codification of specialized knowledge related to a specific (technical) discipline or (technical) functional domain (den Hertog 2000; Miles et al. 1995). KIBS firms are problem-solvers with expertise in locating, developing, combining and applying generic knowledge to specific issues (Chapter "Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis") (See also Chapters "Service Innovation: A Review of the Literature", "Open Service Innovation: Literature Review and Directions for Future Research")

Knowledge management pertains to knowledge co-production and to the degree to which partners create new knowledge through mutual interactions (Blazevic and Lievens 2008). Through (informal) knowledge sharing with partners (including customers), new products and service are developed (Gottfridsson 2010; Smedlund 2008; Taminiau et al. 2009; He and Wong 2009) (Chapter "Open Service Innovation: Literature Review and Directions for Future Research") (See also Chapter "Role of Web 3.0 in Service Innovation")

KPO knowledge process offshoring/outsourcing (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China")

mash-ups web sites that combine content data from multiple sources. For search-engine spiders to rate the significance of pieces of text they find in HTML documents,

	for creating mash-ups and other hybrids, and for more automated agents when developed, HTML semantic structures need to be widely and uniformly applied to bring out the meaning of published text (Shadbolt et al. 2006; Hendler 2001) (Chapter "Role of Web 3.0 in Service Innovation")
mobile banking	Internet banking. Many of these service process innovations (often coupled with innovation in product services) have given consumers accessibility to their financial account without having to enter a bank branch or contacting a bank officer (Chapter "Technology-Driven Service Innovation in the Banking Industry")
modularization	the breaking down of services into modules (Chapter "Innovation: A Critical Assessment of the Concept and Scope of Literature") (See also Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")
modular services	represent an alternative pattern that combines standardization and customization as it achieves customization by mixing and matching standard elements, i.e., the modules (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")
multi-level perspective on transitions	(Geels 2002) describes the dynamics regulating complex and long-term processes. The multi-level perspective distinguishes three analytical concepts: the *socio-technical regime*, which can be defined as the dominant way of innovating, producing, distributing, consuming; the *niche*, a protected space that is "isolated" from the influence of the dominant regime; the *landscape*, that is, the relatively stable social, economic and political context in which actors interact and regimes and niches evolve (Chapter "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations")
national systems of innovation	systems of innovations that involve the collaboration within the network of institutions in both public and private sectors for development, diffusion and use of innovation (Freeman 1987), and include wider economic, social, political and institutional factors (Edquist 1997) (Chapter "Service Innovation: A Review of the Literature")
NDC	Newly Developed Countries (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

network competences network competences are composed of customer competences, and suppliers or competitors competences. Competences that customers bring to the design phase are creativity and the aptitude to precisely express their ideas. Often customers have just a vague feeling of what they would like to have, or of which service ideas could be promising. For firms this means that they have to find ways as to how to extract customers' ideas, e.g. with tools, or in workshops to be able to manage customers' competences (Chapter "On the Way to a Systematic Service Innovation Competence Framework")

network effect an important phenomenon guiding the evolution of business ecosystems, i.e. value co-creation systems, is network effect. Network effect makes an offering more valuable when more people use it (Katz and Shapiro 1985). Direct network effects occur through direct physical effects, whereas indirect network effects are mediated by the market, as when there is better availability of complementary goods or services (Katz and Shapiro 1994) (Chapter "Managing Online User Co-creation in Service Innovation")

network management a firm's ability to extend control beyond its set of direct relationship to indirect relationships (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")

New Public Management traditional public administration saw public servants acting in the public interest and New Public Management suggested ways in which service providers could be made more responsive to the needs of users and communities, the co-production approach assumes that service users and their communities can be part of service planning and delivery. Bovaird considers this change as a revolutionary concept in public service (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production") (See also Chapters "Business Model Approach to Public Service Innovation", "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

new service design life cycle (NSD lifecycle) process, end-to-end from conceptualization of service bundles (to meet customer needs) to design to operations, and eventually service exit or withdrawal (Chapter "Service Innovation Through an Integrative Design Framework") (See also Chapters

"Servitization as Innovation in Manufacturing—A Review of the Literature", "Services Innovation in a Circular Economy")

new service development (NSD) Service innovation is delivered through the process of new service development (NSD) that encompasses stages from idea generation to market launch of new service offerings (Goldstein et al. 2002). In developing a new service, attention needs to be paid not only to designing the core service features and attributes, but also to the service delivery processes that augment the value for its consumers (Papastathopoulou et al. 2001; Trott 2012) (Chapter "Service Innovation: A Review of the Literature") (See also Chapters "Open Service Innovation: Literature Review and Directions for Future Research", "On the Way to a Systematic Service Innovation Competence Framework", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", "Service Innovation Through an Integrative Design Framework", "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation"). Although the two terms "service innovation" and "new service development" are often used synonymously, some authors see a difference between the terms: according to Bettencourt, Cooper and Edgett service innovation is the "process of devising a new or improved service concept…" and "service development refers to all the activities involved in bringing that concept to market" (Bettencourt 2010, p. XIX, Cooper; Edgett 1999, p. 72). It can therefore be interpreted as a subsequent process to service innovation (Chapter "On the Way to a Systematic Service Innovation Competence Framework")

Occupational Information Network (O*NET) The Occupational Information Network (O*NET) is an electronic database of the US Department of Labour (DOL). The O*NET classification uses the Standard Occupational Classification (SOC) system and is therefore aligned with other sources of occupational information such as the US Bureau of Labor Statistics (BLS) (Chapter "Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis")

online innovations tools online innovation tools can be used to involve users and customers into sharing experiences, spawning ideas, test products or design products (Gangi et al. 2010; Prandelli et al. 2006). However, empowering users with tools and technologies have significant effects on the

	firm's capabilities as firms' have to adapt to a new way of dealing with users and user knowledge (Ogawa and Piller 2006; Prahalad and Ramaswamy 2004). Interactive features of the online service innovation tools stimulate the development of proactive user attitudes. Users are then more prone to involve themselves in co-creation of new offerings (Ryzhkova 2012) (Chapter "Managing Online User Co-creation in Service Innovation")
online service exploitation capability	exploitation capability is about transferring, integrating and combining the service concepts and service prototypes into the firm's own service portfolio, systems or other firms' portfolios and systems. It includes finding marketing and distributing channels in the firm, combining new service concepts with other current services, reconfiguring current services, or combining them with other firms' current or newly developed service concepts (Chapter "Managing Online User Co-creation in Service Innovation")
online service innovation	online service innovation exploration process gives the firm the opportunity to understand the user in more detail and the usage environment of the service. For instance, by engaging in dialogue with users and their complaints about services might not only give information about the complaint itself but also the nature, the causes, the consequences and possibly the remedies of the complaint (Chapter "Managing Online User Co-creation in Service Innovation")
open governance	open governance is a government which provides citizens with information on decisions (transparency), on how to obtain their legitimate service (accessibility) and on how to be heard (consultation and participation) (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")
OpenIDEO	an online platform created and managed by the design firm, IDEO, to address social problems and issues (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")
open innovation	innovation that occurs as outside-in and inside-out processes, whereby inflows integrate external information into the firm, and outflows where the firm makes information available for the expansion of markets (Chapter "Towards an Understanding of Open

Innovation in Services: Beyond the Firm and Towards Relational Co-creation") (See also Chapters "Service Innovation: A Review of the Literature", "Open Service Innovation: Literature Review and Directions for Future Research", "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches", "Practices for Involving Organizational Customers in Service Innovation")

open innovation model in the open innovation model, there are *two complementary kinds of openness*. One is "*outside in*", where a company makes greater use of external ideas and technologies in its own business. Openness in this context means overcoming the "not invented here" syndrome, where the company monopolizes the source of its innovations, and instead welcomes new external contributions. The other kind of openness is "*inside out*", in which a company allows some of its own ideas, technologies or processes to be used by other businesses. Huizingh (2011) further distinguishes between openness as outcome, and openness as process. This schema enables us to understand three different framings of openness defined as: 'Private Open Innovation', where the process is open, but the outcome is closed; 'Public innovation', where the outcome is open, but the innovation process is closed; and, 'Open source innovation' where both the outcome and process are open. Whilst Huizingh (2011) was primarily concerned with open innovation broadly defined, this categorisation enables us to understand when the service innovation is considered 'open' (Chapters "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

open service innovation Chesbrough (2011) refers to two types of openness in the open service innovation model: 'outside in', where firms incorporate external ideas and technologies within their business, and 'inside out', where firms open their ideas and technologies for other business to use. The collaborative and distributed processes of open service innovation that combine ideas, knowledge and resources among a network of actors can be challenging as it calls for a balance between multiple aspects such as: 1. identification of the rationale for co-innovation; 2. coordination of the processes and mechanisms of co-innovation; 3. maintenance of policies to deal with conflicts between collaborating entities; and

	4. maintenance of service quality and consistency (Bughin et al. 2008). Chesbrough (2011) suggests that placing customers as the core of the value network, and working closely with all stakeholders to develop new solutions that focus on utility rather than product features are core strategies to foster open service innovation within organizations (Chapter "Service Innovation: A Review of the Literature") (See also Chapters "Open Service Innovation: Literature Review and Directions for Future Research", "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")
open source co-innovation	the 'ideal type' of co-created value-in-use. Here, the service is created by the users for the users. It is both open in the process of the creation of the service, and open in the outcome (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")
open source innovation	where both the outcome and process are open (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")
operant resource	a dynamic proactive resource that is capable of acting on other resources to create value for itself (Vargo and Lusch 2008). A customer is regarded as an *operant resource* (Chapter "Service Innovation Through an Integrative Design Framework") (See also Chapters "On the Way to a Systematic Service Innovation Competence Framework", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation")
organizational agility	organizations that are agile and adaptable to not only survive, but thrive amid disorder and emerge stronger than before (Chapter "Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility")
organizational relationship capital (ORC)	the combination of *relational capital, employee capital* and *prior relationship*. *Relational capital* refers to the wealth in the form of mutual trust, respect, friendship and high reciprocity among individuals at the personal level between partner organizations. *Employee capital* refers to inter-organizational product, service and process knowledge present in their employees' minds, whereas the management-driven reward systems relates to recognition mechanisms prevailing across partnerships as a means for personal motivation. *Prior*

relationship is based on trust, defined as "the extent to which a firm believes that its exchange partner is honest and/or benevolent" (Geyskens et al. 1998) and interaction, which is believed to generate a high degree of learning and information or know-how exchange between partners (Ring and Van de Ven 1992; Gulati 1995) (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

outside in-open innovation creative thinking where a company makes greater use of external ideas and technologies in its own business. Openness in this context means overcoming the "not invented here" syndrome, where the company monopolizes the source of its innovations and instead welcomes new external contributions (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

patient portals technology where users have the ability to self-service and research their own health information and health issues. Requests for prescription refills, appointments, medical advices—appropriate medication use and follow-up questions/updates after discharge—and other related information can be received electronically, automatically routed to the correct resource and managed in a timely fashion that integrates into workflow with minimal disruption to the patient or staff (Chapter "Disruptive Digital Innovation in Healthcare Delivery: The Case for Patient Portals and Online Clinical Consultations")

PEST Analysis is one specific technique for a structured way to analyze factors in the environment. In this context, change in the environment is analyzed from a political (P = political), economical (E = economical), social (S = social) and technological (T = technological) perspective (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")

portfolio configuration the structural characteristics of a focal firm's set of partnerships and may pertain to partner diversity and tie strength (Chapter "Open Service Innovation: Literature Review and Directions for Future Research")

portfolio management dynamic decision process, whereby a business's list of active new product projects is constantly updated and revised (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")

private open Innovation where the process is open, but the outcome is closed (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

probes method the *probes* method, was originally developed by Bill Gaver and his colleagues (Gaver et al. 1999; Gaver and Dunne 1999) under the label Cultural Probes, and was used to inspire and inform designers about the contextual issues and personal opinions and lifestyles of people involved. The probes method is based on self-documentation, i.e. the probes are open-ended and often ambiguous assignment kits given to the users to document and reflect, by themselves, about their experiences in the context they happen. Probes are descriptive and predictive, in other words they try to capture the current experiences and trigger the people involved to reconsider possible expectations and solutions (Chapter "Co-creative Practices in Service Innovation")

process based a process-based definition of service highlights the important role customers play in the service production process, where the customer themselves are an input to the service delivery process (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

process innovations introduce changes only at the production and delivery procedure levels (not at the service level) (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services") (See also Chapters "Services Innovation in a Circular Economy", "Practices for Involving Organizational Customers in Service Innovation")

product innovation alters both the service content and the procedures involved in its production and delivery (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Open Service Innovation: Literature Review and Directions for Future Research", "Exploring a Multidimensional Approach to Service Innovation", "On the Way to a Systematic Service Innovation Competence Framework", "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches", "Systemic Development of Service Innovation", "Services Innovation in a Circular Economy", "Exposing an

Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

product and process innovation Porter (1996) differentiates between product and process innovation: product innovation means doing new things while process innovation is about doing things differently. Further, product and process innovations may be radical or incremental (Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Services Innovation in a Circular Economy")

Product-Service System (PSS) PSSs can be described as specific types of value proposition that shift the business focus from selling products to offering a combination of products and services jointly capable to achieve a final user satisfaction (Goedkoop et al. 1999; Mont 2002). In other words a PSS is oriented to satisfy customers through the delivery of functions (e.g. mobility, having clean clothes, thermal comfort, etc.) rather than the selling of products (e.g. cars, washing machines and powder, boilers and methane, etc.). PSS innovations represent a promising approach to sustainability, but their implementation and diffusion is hindered by several cultural, corporate and regulative barriers (Chapters "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations", "Services Innovation in a Circular Economy")

public innovation where the outcome is open, but the innovation process is closed (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

pubic private partnership describes a business venture which is funded and operated through a partnership of government and one or more private sector companies (Chapter "Business Model Approach to Public Service Innovation")

radical innovation radical innovation fundamentally changes the products offered (Chapter "Innovation: A Critical Assessment of the Concept and Scope of Literature"). Totally new products (such as the automobile or the airplane) or technological revolution are radical discontinuous innovations ("How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production"). Further, Mulgan (2007, p. 6) defines radical innovations in public sector as a systemic change, such as the creation of a national health service or a move to a low-carbon economy. (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to

Co-Production") (See also Chapters "Open Service Innovation: Literature Review and Directions for Future Research", "On the Way to a Systematic Service Innovation Competence Framework", "Systemic Development of Service Innovation", "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations", "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

RCOV Resources, Competencies, the internal and external Organisation, and the Value Proposition. RCOV stands for the resource-based view of the firm, as a theoretical framework in management literature, has been influential in deriving competitive advantage (Barney 1991; Kraaijenbrink, Spender and Groen 2010; Penrose 1955; Wernerfelt 1984), as such the Resource-based view can particularly be useful for explaining the rise of collaborative relationship between public and private sectors as an attempt to facilitate resource sharing and joint value creation. The dynamic nature of the model is also a powerful feature in explaining the interactions between core organisational concepts and their ability and adaptation to change (Chapter "Business Model Approach to Public Service Innovation")

resource based view (RBV) a resource based view (RBV) of the firm, conceives of the firm as a unique bundle of asymmetric resources to be stewarded wisely towards competitive advantage by management (Wernerfelt 1984), seen by Vargo and Lusch as the backbone to their framework (2008). The RBV has more recently begun to stress the importance of having dynamic capabilities that focus on innovation, (Helfat et al. 2007; Menguc and Auh 2006; Teece et al. 1997) (Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Dynamic Capabilities for Service Innovation in Service Systems") (See also Chapter "On the Way to a Systematic Service Innovation Competence Framework"). Service innovation in a service ecosystem is centered on the *resource-based* definition, where services are treated as an application of competencies, making use of knowledge, skills and experience of all stakeholders (Chapter "Dynamic Capabilities for Service Innovation in Service Systems") (See also Chapter "Business Model Approach to Public Service Innovation")

reverse innovation the origin of innovation is the EC, and the target segment ultimately includes customers from DCs. The scholars who coined the phrase suggested, "When a multinational corporation learns to generate successful innovations in emerging markets and then exports that knowledge and those innovations to the developed world, new business possibilities suddenly burst forth. The limits imposed by its traditional operations become surmountable, and the company can rethink all its products and attack new markets in search of growth" (Immelt, Govindarajan et al. 2009; Govindarajan 2012) (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")

Saas (software as a service) Google heralded the *software as a service* ('SaaS') concept. Arguably, the SaaS concept became an enabler of innovation, making IT computational power more ubiquitous, as well as analytics readily accessible with little investment (Chapter "Role of Web 3.0 in Service Innovation")

Semantic web or Web 3.0 manifests itself as a web of data rather than a web of documents—is a quantum change on the method of linking data by a method of ontology of meaning. Functionally, it overcomes limitations of the conventional Web (now also known as Web 1.0) and Web 2.0 which encompasses social networks, blogs, microblogs and 'wikis'. The new Web tools aggregate the 'Wisdom of Crowds' for superior decision making and focus collective effort on prioritized outcomes (Cake 2011) (Chapter "Role of Web 3.0 in Service Innovation")

serious games are "games for purposes other than entertainment", incorporating elements of strategic thinking, communication, collaboration, negotiation, planning and also strengthening related skills (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches")

services The traditional view of services holds that four attributes of services distinguish them from goods, namely *intangibility, simultaneity, heterogeneity and perishability* (see Lovelock and Gummesson 2004). Among those attributes, the attributes of *simultaneity and perishability* imply that services have to be produced and consumed at the same place and time; and services are 'non-tradable', meaning that it is difficult to establish and transfer ownership in services

(Doh, Bunyaratavej and Hahn 2009). However, these notions of services have been greatly challenged by emerging trends in service offshoring. Services are nowadays not only provided from globally dispersed locations to distant customers, but also are outsourced to external partners and 'traded' among different economic units (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China"). Grönroos (2000:46) defines a service as: A process consisting of a series of more or less intangible activities that normally, but not necessarily, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems (Chapter "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

service architecture service architecture is conceptualized to systematize service design and innovation. Leveraging concepts from product architecture, service architecture aims to create a common language (comprised of nodes and linkages) across different views on service design and a systematic way to operationalize and measure the degree of service architecture modularity.Service architecture is constituted in accordance with the principle of *modularity*, which in turn is characterized by five dimensions: *components* and systems as the basic modular units, the *interfaces*, *degree of coupling*, and *commonality sharing* between components, and *platform* as the overarching configuration of components and interfaces that make up the service architecture (Fixson 2005) (Chapter "Service Innovation Through an Integrative Design Framework") (See also Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services", "Systemic Development of Service Innovation", "The Architecture of Service Innovation")

service co-design process can be implemented through user-driven innovation and service design. The different phases of the innovation process are *discovery*, *creation*, *reality check*,

and *implementation* (Mager 2009; Miettinen 2009, p. 13). Moritz (2005, p. 123) groups these phases into six categories: understanding, thinking, generating, filtering, explaining and realizing. This more detailed classification by Moritz emphasizes the basic idea of service design as to gain an understanding of what clients and users of the service need, before generating ideas and testing these ideas in the early stage of planning (Koivisto 2007, p. 7). In these different phases of the innovation process, different participatory design methods are used (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")

service design service design (Moritz 2005, p. 5) integrates management, marketing, research and design. It also acts as an interface and connects organizations and customers in a new way (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production") (See also Chapters "Technology-Driven Service Innovation in the Banking Industry", "Systemic Development of Service Innovation", "The Architecture of Service Innovation", "Service Innovation Through an Integrative Design Framework", "Services Innovation in a Circular Economy", "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation", "Co-creative Practices in Service Innovation")

service-dominant (S-D) logic S-D logic provides an integrated understanding of the purpose and nature of organizations, markets and society, where the basic assumption is that organizations, markets and society are primarily concerned with exchange of service—that is, the use of capabilities like, for example, the knowledge of operating a machine (like a drill), or the skill of selling. In S-D logic the service becomes the common denominator of exchange. Hence, all firms are service providers and service receivers, and in taking this perspective managers should then follow a service-based logic that embraces the ideas of the value-in-use and co-creation of value, rather than the value-in-exchange and embedded-value concepts of traditional G-D logic. Co-created value is relational and prioritizes our understanding of innovation as processes embedded in networks (Hsueha et. al 2009). (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation") (See also Chapters "Innovation:

A Critical Assessment of the Concept and Scope of Literature", "On the Way to a Systematic Service Innovation Competence Framework", "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework", "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation", "Practices for Involving Organizational Customers in Service Innovation")

service system design service system design, broadly, must address *four* variables: *physical setting*; *process design*—the service blueprinting or mapping which designs 'quality' into the service delivery system; *job design*—the social technical job design which include addressing the employee motivational requirements; and *people*—the staff (competence) selection (Goldstein et al. 2002) (Chapter "Service Innovation Through an Integrative Design Framework") (See also Chapter "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations")

service innovation a service innovation is considered to be a new or significantly improved service concept that is effectively taken into practice. Aiming to give a comprehensive account of the forms a service offering can take, a wide range of service typologies has been proposed over the past decennia (Cook et al. 1999). These typologies, however, tend to focus entirely on the proposition that is finally offered. Just like in the case of physical goods, it is possible that the functional properties of a product (i.e. the service experiences it renders) remain equal while aspects of the delivery or cost-structure are largely improved. Scholars of service innovation search for conceptualizations that embrace not only the 'pure' service aspects of an innovation, such as the final offering (the solution or experience) or how it is delivered, but also give room to the technology it involves (Gallouj and Savona 2009; Windrum and Garcia-Goñi 2008) (Chapter "Exploring a Multidimensional Approach to Service Innovation") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation") a new or considerably change service concept, client interaction channel, service delivery system or technological concept that individually, but most likely in

combination, leads to one or more (re)new(ed) service functions that are new to the firm and do change the service/good offered on the market, and do require structurally new technological, human or organizational capabilities of the service organisation (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China") Agarwal and Selen (2011) conceptualise service innovation as an "elevated service offering" that is made up of "new client interface/customer encounter; new service delivery system; new organizational architecture or marketing proposition; and/or improvements in productivity and performance through human resource management", further highlighting its multi-dimensional aspects (Chapter "Service Innovation: A Review of the Literature") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "Exploring a Multidimensional Approach to Service Innovation", "On the Way to a Systematic Service Innovation Competence Framework", "Systemic Development of Service Innovation", "Services Innovation in a Circular Economy", "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation", "Managing Online User Co-creation in Service Innovation", "Practices for Involving Organizational Customers in Service Innovation")

service innovation capabilities a stream has emerged in service innovation research, focusing on the concept of organizational capabilities that enable continuous service innovation, termed service innovation capabilities, as part of a firm's sustained competitive advantage. Several frameworks of such service innovation capabilities were developed based on this research (Essmann and du Preez 2009; den Hertog et al. 2010; CMMI Product Team 2010). These capabilities are represented by a number of firm-specific resources, such as processes, competences, tools, knowledge (Kohler et al. 2013). As a whole, they contribute to all major phases of an innovation process (Chapter "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches") (See also Chapters "On the Way to a Systematic Service Innovation Competence Framework", "Service Innovation Capabilities for Idea Assessment: An

Appraisal of Established and Novel Approaches", "Managing Online User Co-creation in Service Innovation")

service innovation competence On the macro level, service innovation competence refers to a firm's ability to purposively combine assets enabling new combinations of tangible and/or intangible service elements resulting in a new service offering, whereas on the micro level it refers to an employee's knowledge, skills and aptitudes to serve these changes (Chapter "On the Way to a Systematic Service Innovation Competence Framework") (See also Chapter "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation")

service offshoring defined as "the transnational relocation or dispersion of services activities" (Doh et al. 2009, p. 927). Service offshoring activities could be in-house (captive), which are performed by the company itself; or be outsourced by the company to an external service provider. Offshore services are broadly categorized into those primarily involving information technology offshoring / outsourcing (ITO), business process offshoring/outsourcing (BPO), or knowledge process offshoring/outsourcing (KPO). The phenomenal growth of service offshoring activities is a result of advances in technology and innovation in organization and management practices (Chapter "Services Offshoring: Location Choice and Subnational Regional Advantages in China")

service-oriented architecture (SOA) a framework that, independently of the underlying technologies, requires service providers to advertise their services with associated service-level agreements (SLAs) in registries that can be discovered, accessed and used by clientsThe associated Service Oriented Architecture (SOA) establishes a defined relationship between such services offering discrete business functions and the consumers of these services, independent of the underlying technology implementation of the service and its location. SOA is essentially an interconnected set of services which in its basic form is a message-based interaction between software components, each accessible through standard interfaces and messaging protocols. These components can be service providers or service requesters (clients) interacting with service discovery agencies to access the service

providers (Chapter "Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility")

service operations management (SOM) logic service operations management logic is built upon the belief that operations strategy and operational systems and their respective capabilities and functionalities constitute important managerial determinants as to whether mutual value creation is realized for both customers and the firm (Chapter "Illuminating the Service Provider's Strategic Mandate on Realizing Apt Quality and Value Through Service Innovation")

service-oriented computing (SOC) service-oriented computing (SOC) has emerged as an architectural approach to flexibility and agility, not just in systems development, but also in business process management. There is, however, a lack of critical research assessing the practical usage of SOA as a technology and business infrastructure and its efficacy in achieving organizational agility (Chapter "Service-Oriented Architecture as a Driver of Dynamic Capabilities for Achieving Organizational Agility")

service process innovation how it is produced delivered and consumed (Chapter "Service Innovation: A Review of the Literature")

service product innovation what is produced delivered and consumed (Chapter "Service Innovation: A Review of the Literature")

service strategy service strategy fits what the customer will value with what the company can deliver. This means aligning the *service concept* (what it would take to deliver on the customer value propositions), and hence the service architecture, with firm's capabilities, resources, culture and strategy (Chapter "Service Innovation Through an Integrative Design Framework") (See also Chapter "Systemic Development of Service Innovation")

service value networks system of entities which include suppliers, intermediaries, customers and partners that combine core capabilities to co-create service offerings for the consumer (Chapter "Service Innovation: A Review of the Literature") (See also Chapter "Exploring a Multidimensional Approach to Service Innovation")

service voucher allows service users to use private services as an alternative, or a complement, to the services provided by the municipality. The municipality determines the services that can be purchased using the voucher, as well as the value of the voucher. Further, it accepts those private companies whose services can be paid for

with a service voucher (Chapter "How to Manage a Service Innovation Process in the Public Sector: From Co-Design to Co-Production")

servitization a change process wherein manufacturing firms embrace service orientation and/or develop more and better services, with the aim to satisfy customer needs, achieve competitive advantages and enhance firm performance. "servitization is the generic term that has come to mean any strategy that seeks to change the way in which product functionality is delivered to its markets" (Slack 2005, p. 326). Baines et al. (2007, 2009), on the other hand, emphasize the concept of Product Service-Systems (PSS). There servitization is understood as the innovation of an organization's capabilities and processes to better create mutual value through a shift from selling products to selling integrated product and services offerings that deliver value-in-use (Baines et al. 2009) (Chapter "On the Way to a Systematic Service Innovation Competence Framework") (See also Chapters "Service Innovation: A Review of the Literature", "Service Innovation Capabilities for Idea Assessment: An Appraisal of Established and Novel Approaches"). Servitization describes the growing trend for manufacturing firms to use their physical product as a vehicle for service provision. The term was first used by Vandemerwe and Rada (1988, p. 314) who defined servitization as "the increased offering of fuller market packages or "bundles" of customer focussed combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings". More recently servitization has been defined by Baines et al. (2009a) as "the innovation of an organization's capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use". (Chapter "Servitization as Innovation in Manufacturing—A Review of the Literature")

Servitization business model The business models of Roos (2013) and Salkari et al. (2007) can be combined to provide a good basis for a servitization business model. By combining product and service offerings (and sometimes newly developed service offerings) a complete offering can be provided. (Chapter "Servitization as Innovation in Manufacturing—A Review of the Literature")

Servitized manufacturing servitization means all service concepts, systems service, processes and related service activities offered and carried out by, or on behalf of, a manufacturing firm linked to the products produced by this firm. In the twenty first century, this means that servitization has become an integral part of manufacturing (Chapter "Servitization as Innovation in Manufacturing—A Review of the Literature")

Servuction the focus on the interactivity between suppliers and customers in service innovation as opposed to the innovation of the actual product or process (Chapter "Service Innovation: A Review of the Literature")

social benefit bond A Social Benefit Bond is a financial instrument that provides access to private capital to pay for public services (The Centre for Social Impact 2012, p. 1). A return on investment is paid based on the achievement of agreed social outcomes. Part of the government savings is used to repay the investors' principal and yield (conditioned on the outcome) (Chapter "Business Model Approach to Public Service Innovation")

socio-technical experiment can be described as a partially protected environment where a broad network of actors can learn and explore how to incubate and improve radical innovations and how to contribute to their societal embedding (Chapter "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations")

standard services are undifferentiated between customers and are thus provided without any customer-specific change (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services") (See also (Chapter "Systemic Development of Service Innovation")

Standard service with minor customizations allows for the inclusion of some customer-specific changes that usually do not change the attributes of the standard service (Chapter "Innovation, Service Types, and Performance in Knowledge Intensive Business Services")

supply chain view deploys a network rationale which enables collaborating organisations in the network to cope with uncertainty, complexity and risk management through fostering skills and appropriate resource allocations (Cravens and Shipp 1993) (Chapter "Dynamic Capabilities for Service Innovation in Service Systems")

synthesis approach tries to analyse innovation in highly different sectors with the same tools and frameworks (Chapter "Exploring a Multidimensional Approach to Service Innovation")

system innovations are complex and long-term processes that require changes in the social, economic, technological and policy domains (Chapter "The Role of Socio-Technical Experiments in Introducing Sustainable Product-Service System Innovations")

systemic innovation systemic innovations such as new healthcare systems or new transportation systems cause changes e.g. in the market, in the consumer behaviour, in politics and in culture. These changes in general are difficult to predict and this notion challenges leaders at national, regional and organizational levels to evaluate the impact of innovation systematically (Chapter "Systemic Development of Service Innovation")

systems of innovation where firms such as suppliers, customers, competitors; and non-firm entities consisting of universities, schools and government institutions collaborate to create and sustain innovation (Chapter "Service Innovation: A Review of the Literature") (See also Chapter "Innovating Universities: Technocratic Reform and Beyond")

system-theory applying system-theory is a popular way for understanding how new products come about (Kauffman 1993; Levinthal 1997; Porter and Siggelkow 2008). Essential is that a product, be it a good or service, is conceived as a system of elements that are to a certain extent related to each other (Chapter "Exploring a Multidimensional Approach to Service Innovation") (See also Chapters "Innovation, Service Types, and Performance in Knowledge Intensive Business Services", "Systemic Development of Service Innovation")

systems thinking each entity is seen as a system that consists of parts within a larger system. Every system and their parts are interconnected to other systems, interacting in ways that can produce surprising results. (Chapter "Foresight and Service Design Boosting Dynamic Capabilities in Service Innovation") (See also Chapter "Exposing an Economic Development Policy Clash: Predictability and Control Versus Creativity and Innovation")

technovation Agarwal and Selen (2005) have further developed the matrix approach by introducing the degree of technovation (technology, channels and organizational

	structures) and collaboration as a third dimension in the matrix (Chapter "Systemic Development of Service Innovation")
theory of complementarities	according to the theory, two practices are complementary when the advantage of one is greater if both of the practices are present. Basically it means that organization benefits more from adopting complementary practices than solitary best practices (Chapter "Systemic Development of Service Innovation")
uni-dimensional innovation	concerns the relation between services and goods, both of them forming the extremes of a continuum between tangible and intangible products (Chapter "Exploring a Multidimensional Approach to Service Innovation")
user-driven innovation (UDI)	users act in several roles, ranging from the suggestion of ideas to acting as sole innovators (e.g., Edvardsson et al. 2010; Nordlund 2009). Recent literature suggests a growing range of methods that enable users' participation in a controlled manner in different phases of an innovation process (e.g., Alam 2006). Users also innovate without service providers' guidance by creating new solutions for their own use (e.g., von Hippel 1978) and by re-inventing and modifying an innovation after its launch (Tuomi 2002; Sundbo 2008) (Chapter "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework") (See also Chapters "Managing Online User Co-creation in Service Innovation", "Frugal Services Innovation—Lessons from the Emerging Markets and an Adoption Framework for First-World Corporations and Governments")
value co-creation	value co-creation refers to the interactional and contextual nature of the process, where value is extracted from the service. All social and economic actors integrate resources to create value for themselves and for others (Vargo and Lusch 2008). This way value is co-created in a network of interacting and resource integrating actors (Chapters "Services Innovation in a Circular Economy", "Practices for Involving Organizational Customers in Service Innovation") (See also Chapters "Service Innovation: A Review of the Literature", "Employees and Users as Resource Integrators in Service Innovation: A Learning Framework", "Systemic Development of Service Innovation", "Service Innovation Through an Integrative Design Framework")

value-in-action firms may be able to create and capture value by engaging in relational approaches where value is created 'in action' (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

value-in-use Vargo and Lusch (2004) make a distinction between product and service by defining a service as an interactive process of "doing something for someone" that is valued. They also suggest that goods ultimately provide service and hold, what they call, a "value-in-use". The rationale is that customers often do not value the product itself, but rather want what the product produces (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation") (See also Chapters "Innovation: A Critical Assessment of the Concept and Scope of Literature", "On the Way to a Systematic Service Innovation Competence Framework", "Practices for Involving Organizational Customers in Service Innovation")

virtual currency creation of currency in a virtual world (e.g. gaming) for closed-loop payments and align to real world currency. Examples: MintChip by the Royal Canadian Mint, Other emerging digital currency/Social currency, Bitcoin (Chapter "Technology-Driven Service Innovation in the Banking Industry")

wicked problems a class of social system problems, which are ill-formulated; where the information is confusing; where there are many clients and decision makers with conflicting values; and where the ramifications in the whole system are thoroughly confusing (Chapter "Towards an Understanding of Open Innovation in Services: Beyond the Firm and Towards Relational Co-creation")

wikis web sites (developed collaboratively by a community participation) that allow any user to add or modify content. It allows rapid sharing and growth of information on a particular topic and builds a shared knowledge usually within communities of practice. Such communities or teams use the wiki as a central place to collaborate on a subject (Chapter "Role of Web 3.0 in Service Innovation").