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Handbook on Business Process Management 2

Strategic Alignment, Governance, People and Culture

2nd Edition

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ISBN 978-3-642-45102-7, 2nd Edition

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Handbook on Business Process Management 2

Strategic Alignment, Governance, People and Culture

Second Edition

Springer

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ISBN 978-3-642-45102-7 ISBN 978-3-642-45103-4 (eBook)
DOI 10.1007/978-3-642-45103-4
Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014947230

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

to my wonderful wife Christina and our lovely kids Moritz and Marieke

from Jan

to Louise, Noah and Sophie – with love

from Michael

Foreword to the 2nd Edition

The *BPM Handbook* brings the thought leaders around the globe together to present the comprehensive body of knowledge in Business Process Management (BPM). The first edition summarized the work of more than 100 of the world's leading experts in the field in 50 chapters and two volumes. Following the structure of BPM's six well-established core elements—strategic alignment, governance, methods, information systems, people, and culture—the *BPM Handbook* provides a comprehensive view of the management of processes using an enterprise-wide scope. After more than 5,000 hard copies sold and more than 60,000 single chapters downloaded, we are overwhelmed by and grateful for the positive reception of this book by BPM professionals and academics. Today, the BPM handbook ranges among the top 25 % most downloaded eBooks in the Springer eBook Collection.

Since the first edition was published in 2010, BPM has further developed and matured. New technologies provide new process design options. For example, in-memory databases afford new opportunities in the form of real-time and context-aware process execution, monitoring, and mining, and social media plays a vital role in embedding business processes in corporate and wider communities. At the same time, new challenges, such as increased demand in process innovation, process analytics, and process agility, have emerged. These and other organizational developments have expanded the status and the possibilities of BPM and motivated us to conduct a detailed review, update, and extension of the *BPM Handbook*, the second edition.

The structure of this second edition still centers on the six core elements of BPM while incorporating new topics and providing substantial revisions in the areas of theoretical foundations of BPM, practical applications to real-life scenarios, and a number of updates in order to reflect the most current progress in the field.

The new chapters address recent developments, such as in-memory technology and social media, as well as cases that show how BPM can be applied to master the contemporary challenges of process innovation, agility, and sustainability. We learned from our readers that introductory chapters to the six core elements of BPM are useful, as are advanced chapters that build on rigorous BPM research.

Therefore, we added a number of chapters to provide such introductions to the work on process frameworks, process simulation, process value, process culture, and process technologies. In the process, we welcomed a number of BPM experts to our team of authors, including Anna Sidorova, Jerry Luftman, and Hasso Plattner and their respected co-authors.

Some parts of the Handbook remain untouched, such as the contributions from Michael Hammer and Geary A. Rummler, who both passed away in 2008. Their thoughts remain and will always be inspirational for the BPM community.

We are grateful to the many people who worked enthusiastically on making the second edition of the *BPM Handbook* possible. In particular, we thank Christian Sonnenberg, from the Institute of Information Systems of the University of Liechtenstein, who brought order and discipline to the first edition and who has again been instrumental in the editorial process of the second edition. His strong commitment to this Handbook has been a critical factor in its success. We also thank Christian Rauscher from Springer for his strong support of this second edition and all of the authors for the significant time and effort they invested in writing and revising their chapters.

We trust that this consolidated work will find a wide audience and that this updated and extended edition will further contribute to shaping the BPM field as a management discipline.

May 2014 Jan vom Brocke
Vaduz, Liechtenstein/Brisbane, Australia Michael Rosemann

Foreword to the 1st Edition

Business Process Management (BPM) has emerged as a comprehensive consolidation of disciplines sharing the belief that a process-centered approach leads to substantial improvements in both performance and compliance of a system. Apart from productivity gains, BPM has the power to innovate and continuously transform businesses and entire cross-organizational value chains. The paradigm of "process thinking" is by no means an invention of the last two decades but had already been postulated by early economists such as Adam Smith or engineers such as Frederick Taylor.

A wide uptake of the process paradigm began at an early stage in the manufacturing sector, either as a central principle in planning approaches such as MRP II or as a factory layout principle. Yet, it took an amazingly long period of time before the service industries actually recognized the significance of processes as an important organizational variable. The ever increasing pressure in the ultimate journey for corporate excellence and innovation went along with the conception of a "process" as a unit of analysis and increasingly appeared in various disciplines.

As part of quality management, the critical role of process quality led to a plethora of process analysis techniques that culminated in the rigorous set of Six Sigma methods. In the information technology discipline, the process became an integral part of Enterprise Architectures and conceptual modeling frameworks. Processes became a "first class citizen" in process-aware software solutions and, in particular, in dedicated BPM-systems, formerly known as workflow management systems. Reference models such as ITIL or SCOR postulated the idea of best (process) practices, and the accounting discipline started to consider processes as a controlling object (Activity-Based Costing). Universities are now slowly starting to build Business Process Management courses into their curricula, while positions such as business process analysts or chief process officers are increasingly appearing in organizational charts.

However, while the role of processes has been widely recognized, an all-encompassing discipline promoting the importance of process and providing integrated BPM methodologies has been lacking for a long time. This may be a major reason why process thinking is still not as common as cost awareness, employee focus, or ethical considerations.

BPM is now proposed as the spanning discipline that largely integrates and completes what previous disciplines have achieved. As such, it consolidates how to best manage the (re-)design of individual business processes and how to develop a foundational Business Process Management capability in organizations catering for a variety of purposes and contexts.

The high demand for BPM has encouraged a number of authors to contribute and capture different facets in the form of textbooks. Despite a substantial list of references, the BPM community is still short of a publication that provides a consolidated understanding of the true scope and contents of a comprehensively defined Business Process Management.

It has been our motivation to fill the gap for a point of reference that reflects the holistic nature of BPM without compromising the detail. In order to structure this Handbook, we defined BPM as consisting of six core factors, i.e., Strategic Alignment, Governance, Methods, Information Systems, People, and Culture. These six factors had been derived as part of a multiyear global research study on the essential factors of BPM maturity.

We now present a Handbook that covers these six factors in two volumes comprising more than 1,500 pages from over 100 authors including the world's leading experts in the field. Different approaches of BPM are presented reflecting the diversity of the field. At the same time, we tried to provide some guidance, i.e., by means of the six core elements, to make it easy to open up the various facets of BPM according to individual preferences. We give further comment on that in the "how to read this book" section.

Both volumes together reflect the scope of BPM. Each volume has been organized to have its own focus. The first volume includes the introduction to BPM and concentrates on its Methods and Process-Aware Information Systems. The second volume captures in three sections: Strategic Alignment, Governance, and People, and Culture. Both volumes combine the latest outcomes of high standing BPM research with the practical experiences gained in global BPM projects.

This first volume is clustered in three sections.

1. A set of five introductory chapters provides an overview about the current understanding of the aims, boundaries, and essence of BPM. We are particularly proud that we were able to secure the contributions of the global BPM thought leaders for this critical section.
2. The second section is dedicated to the heavily researched area of BPM Methods covering, in particular, process lifecycle methods such as Six Sigma and the essential role of process modeling in 12 chapters. Further, complementary chapters discuss process simulation, process variant management, and BPM tool selection.
3. The third section covers Process-Aware Information Systems and elaborates in nine chapters on the foundational role of workflow management, the agility that results from service-enabled business processes and the new potential related to the uptake of recommender systems or collaborative networking tools.

We are very grateful to the outstanding, carefully crafted, and responsibly revised contributions of the authors of this Handbook. All contributions have undergone a rigorous review process, involving two independent experts in two to three rounds of review. The unconditional commitment to a high quality Handbook required, unfortunately, in some cases, rejections or substantial revisions. In any case, all authors have been very responsive in the way they addressed the requested changes. We are very much aware of the sum of the work that went into this book and cannot appropriately express our gratitude in the brevity of such a foreword.

While producing this Handbook, the authors' enthusiasm was truly interrupted as we in the community were confronted with and saddened by the tragic loss of two of the most inspirational BPM thought leaders the world has seen. Michael Hammer, founder of the Business Process Reengineering discipline and maybe the most successful promoter of the process paradigm, passed away in September 2008. Shortly after, Geary A. Rummler, a pioneer in terms of the role of business process as part of the corporate search for organizational performance, died in October 2008. We are honored that this Handbook features some of the last inspirations of these two admirable individuals; we also recognize that the BPM community will be a poorer place without them.

A special expression of our gratefulness goes to Karin-Theresia Federl and Christian Sonnenberg, Institute of Information Systems, University Liechtenstein, who brought order and discipline to the myriad of activities that were required as part of the compilation of this Handbook. We hope that this Handbook on Business Process Management will provide a much appreciated, sustainable summary of the state of the art of this truly exciting discipline and that it will have the much desired positive impact for its future development and uptake.

June 2010 Jan vom Brocke
Vaduz, Liechtenstein/Brisbane, Australia Michael Rosemann

How to Read this Handbook

This book brings together input from BPM experts worldwide. It incorporates a rich set of viewpoints all leading towards an holistic picture of BPM. Compiling this Handbook, we did not intend to force all authors to go under one unique doctrine. On the contrary, we felt that it is rather the richness of approaches and viewpoints covered that makes this book a unique contribution. While keeping the original nature of each piece, we provide support in navigating through the various chapters.

- *BPM Core Elements:* We identified six core elements of BPM that all authors are using as a framework to position their contribution. You will find an introductory chapter in volume 1 of this Handbook explaining these elements in detail.
- *BPM Cross-References:* We asked each author to thoroughly read corresponding chapters and to include cross-references to related sections of the BPM Handbook. In addition, further cross-references have been included by the editors.
- *BPM Index:* Both volumes have a detailed index. In order to support a maximum of integration in each volume the keywords of the other volume are also incorporated.
- *BPM Who-is-Who:* We added an extended author index to each volume serving as a who-is-who. This section illustrates the individual background of each author that might be helpful in contextualizing the various contributions to the BPM Handbook.

We truly hope that these mechanisms help you in choosing the very the chapters of this BPM Handbook most suitable for your individual interest.

Contents

Part III People and Culture

Part I
Strategic Alignment

BPM must be aligned with organizational strategy in order to ensure BPM's relevance and contribution to the corporate long-term priorities. Strategic alignment is not necessarily a unidirectional undertaking in the sense that a BPM strategy must be oriented toward the corporate strategy; successful BPM can also shape corporate strategy when innovative process designs or improved process performance provide an opportunity for BPM to be a competitive differentiator. In addition, BPM has proven to be a powerful means by which to innovate business models in a great number of cases, such as through the creative appropriation of IT.

While the significance of strategic alignment is widely acknowledged, its operationalization often remains a challenge in BPM initiatives, and it remains a largely open question in the BPM community. Since there is often a gap between the overall strategy and the more operational issues of process operations, how we can demonstrate the strategic relevance of process-related initiatives or ensure strategy-supportive process design is a central issue.

In the opening chapter of this section Jerry Luftman introduces the field of strategic alignment by presenting the concept of strategic alignment maturity. Based on a thorough understanding of the role of process in strategic alignment, Luftman distinguishes five levels of strategic alignment maturity and six alignment maturity criteria and discusses measures by which to overcome gaps in alignment. Subsequently, Luftman presents an approach to measuring the strategic alignment maturity of an organization and reports on the results from 362 global companies across four continents that have gone through the assessment. After deriving a six-step-process on how to increase strategic alignment maturity, Luftman closes the chapter with a report on research that validates the contribution of strategic alignment maturity (SAM) to company performance based on the data gathered from the 362 organizations.

In the second chapter in this section, Roger Burlton focuses on the challenges of strategic alignment in BPM, referring to the problem of being "Lost in Translation." Burlton begins by unfolding the nature of this problem and provides specific methodological support for strategically aligning BPM. The approach also provides a framework for the subsequent chapters, which examine the various strategic options BPM offers. The study from Mathias Kirchmer focuses on innovation and agility as cornerstones of many corporate strategies and discusses the role of process automation as a means by which to leverage these objectives.

Key to strategic alignment is the value assessment of Business Process Management initiatives. Jan vom Brocke and Christian Sonnenberg report on this stream of research that has emerged over the past years. After a thorough discussion of the concept of value, the authors present several methods as examples of how to assess the strategic value contribution of process-related work, including the return-on-process transformation as an effective performance measure. Along these lines, Markus Brenner, André Coners, and Benjamin Matthies introduce the concept of process capital management and illustrate the approach by means of a real-life example from Lufthansa.

In order to implement the strategic objectives, the "right" processes have to be dealt with in the "right" way. Frameworks are needed for this purpose to facilitate the selection of process and action. In the sixth chapter Constantin Houy, Peter Fettke, and Peter Loos introduce business process frameworks. The article analyzes and systemizes the various facets of process frameworks, describes and explains the classes of business process frameworks, and presents a number of exemplary process frameworks. Then business process reference models (as one prominent class of process frameworks) are presented in more detail. The seventh chapter by Chris Aitken, Christine Stephenson, and Ryan Brinkworth discusses how organizations can build on business frameworks in order to classify company-specific processes. Their results are summarized in a comprehensive framework that may serve as a starting point for developing an individual corporate process schema. Case studies from the health sector and the investment management industry, in which the framework is used to align descriptions of organizational behavior to produce useful integrated behavioral reference models and unified process model sets, are described. Their contribution shows that process frameworks must be individualized for an organization's specific context (e.g., products, customers, competition). Drawing from empirical studies, Tobias Bucher, David Raber, and Robert Winter present a taxonomy of BPM approaches to support choosing the right BPM approach for the specific contextual situation of an organization. The chapter concludes with a practical application of the approach.

The performance assessment of processes plays an important role in managing existing processes. Drawing from management accounting and performance measurement in particular, Diana Heckl, Michael Leyer, and Jürgen Moormann provide an overview of contemporary approaches to process performance measurement and apply process mining, as an example, to real case data to demonstrate the approaches. Given the attention big (process) data and related analytics have recently attracted, Michael zur Muehlen, and Robert Shapiro's chapter introduces business process analytics. The authors show how data generated by PAIS can be used for the cost-effective, real-time assessment of processes.

The strategic focus on corporate performance is increasingly constrained by conformance requirements that make process design a balancing act between performance and conformance. The contribution by Shazia Sadiq and Guido

Governatori addresses the management of business processes regulatory compliance. The authors describe a methodology for aligning business and control objectives, homing in on the role of BPM as a driver in achieving regulatory compliance.

Considering the various strategic implications of BPM initiatives, management must make decisions about the alternative BPM initiatives to be implemented by ranking initiatives according to their strategic contribution. The chapter by Wasana Bandara, Alain Guillemain, and Paul Coogans provides an overview of methods for prioritizing process-improvement initiatives and reports on related practical experiences in the financial services sector, rounding off the section on strategic alignment in BPM.

Strategic Alignment Maturity

Jerry Luftman

Abstract Strategic Alignment is one of the six core elements of BPM. In this chapter, an introduction to Strategic Alignment is given. Against the background of foundations on IT-Business Alignment, several important insights are provided for the strategic alignment in BPM. A maturity model is presented in order to assess different levels of capabilities based on key criteria to evaluate alignment maturity. Also, results from a global empirical study are presented and discussed in the light of BPM.

1 Introduction

The global importance of alignment has remained on the top of information technology surveys for almost three decades. Alignment addresses both how IT is aligned with the business and how business should or could be aligned with IT. Consequently, strategic alignment is also one of the six core elements of BPM (Rosemann and vom Brocke 2014). Terms such as harmony, link, fuse, fit, match, meld, converge, interwoven, and integrate are frequently used synonymously with the term alignment (perhaps a reason why alignment has been so evasive). Whatever term you prefer, it is a persistent/pervasive problem that demands an ongoing process to ensure that IT and business strategies adapt effectively and efficiently together. Perhaps most important is recognizing that there is significant research available that demonstrates the relationship of alignment to firm performance (Luftman 2007; Luftman et al. 2011). More specifically, successful alignment ensures that organizations can create value out of their IT assets by furnishing these assets in a way that supports business processes according to business strategy (vom Brocke et al. 2014). Figure 1 illustrates this relationship and also indicates the

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_1,

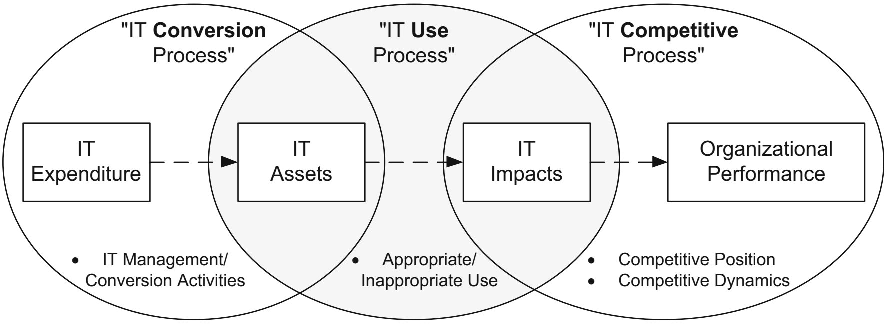


Fig. 1 How IT creates business value (Soh and Markus 1995, p. 37)

relationship between business process management (BPM) and IT business alignment.

Mature IT business alignment requires a mature "IT use process", i.e. business processes with well-defined requirements regarding IT support. Therefore, business process management translates between the business side and the IT side via the definition, execution, and control of "IT use processes" (vom Brocke et al. 2012). Mature IT business alignment also contributes to successful BPM (Luftman 2007) since it facilitates the management of "IT use processes" and thus increases the potential to translate IT investments into business value. In this regard, IT business alignment can be understood as being essentially a BPM task that primarily addresses both the strategy and the technology dimension of BPM (see the chapter on the six core elements of BPM in this handbook by (Rosemann and vom Brocke 2014) without neglecting governance, methods, people, and culture dimensions (see discussion below). Given the significance of IT business alignment maturity for BPM the question is how alignment maturity can be measured and how it emerges?

This chapter presents a Strategic Alignment Maturity (SAM) assessment tool that was developed from the author's work since 2000 (Luftman 2007; Luftman and Kempaiah 2007b; Luftman 1997, 2000). SAM, which has been applied globally by organizations of all sizes, evaluates six components (and 41 factors) of an organization to identify an alignment maturity score and more importantly specific opportunities to improve the IT business relationship will be elaborated on in this chapter. As an introduction, the six components (Communications, Value Metrics, Governance, Partnership, Technology Scope, and Human Resources) for assessing alignment maturity along with the 41 specific criteria/factors measured for each component are illustrated in Fig. 4 (X axis). Also illustrated in Fig. 4 are the average overall scores and the differences in the scores as assessed by business and IT leaders. The scores an organization achieves for each of the 41 factors included in the six components of maturity are based on a five-level maturity model. The model denotes the organization's IT-business alignment maturity, with Level 1 indicating the lowest maturity and Level 5 indicating exemplar maturity.

Business-IT alignment refers to applying Information Technology (IT) in an appropriate and timely way, in harmony with business strategies, goals, and needs. It has been a fundamental concern of business and IT executives since the 1970s. This definition of alignment addresses:

1. How IT is aligned with the business
2. How the business should or could be aligned with IT.

It does not matter whether one considers alignment from either a business-driven perspective (IT enabled) or from an IT-driven perspective; the objective is to ensure that the organizational strategies adapt harmoniously. The evidence that IT has the power to transform whole industries and markets is strong (Luftman 2007; Luftman et al. 2011; Luftman and Kempaiah 2007a; Luftman and Derksen 2012). Important questions that need to be addressed include the following:

- How can organizations assess alignment?
- How can organizations improve alignment?
- How can organizations achieve mature alignment?

The purpose of this chapter is to present an approach for assessing the maturity of a firm's business-IT alignment and its importance to business process management (BPM). Until recently, nothing has been available. The alignment maturity assessment described in this chapter provides a comprehensive descriptive and prescriptive vehicle for organizations to evaluate business-IT alignment in terms of where they are and what they can do to improve the alignment. The maturity assessment applies the previous research that identified enablers/inhibitors to achieving alignment (Luftman 2007; Luftman and Derksen 2012; Luftman and Brier 1999), and the empirical evidence gathered by management consultants who applied the methodology that leverages the most important enablers and inhibitors as building blocks for the evaluation.

2 Why Alignment Is Important

Alignment's importance has been well known and well documented since the late 1970s. (Luftman and Kempaiah 2007a; Luftman and Derksen 2012; Luftman and Brier 1999; Keen 1996; Henderson and Venkatraman 1996) Over the years, it has persisted among the top-ranked concerns of business executives. IT and business alignment was the second highest-ranked issue in the 2012 trends survey of IT leaders from 362 global organizations (Luftman and Kempaiah 2007a; Luftman and Zadeh 2011).

With the enduring economic uncertainties prevailing, organizations are focusing on leveraging IT to swiftly reduce business expenses by leveraging IT for BPM initiatives and, new to 2012, increase revenues. IT appears to be quite resilient, with IT budgets, hiring, and salary increases on the rise, and slowly approaching pre-recession levels.

BPM is considered one of the most important solutions for leveraging IT's ability to reduce business expenses, including working with business partners, to improve, or to re-engineer processes (vom Brocke 2011). Technology alone is not sufficient; strong collaboration with the business to change how they leverage technology is required. This collaboration is mediated through business process management using business processes (or the "IT use process") as a sense making device.

Alignment seems more important as companies strive to integrate technology and business in light of dynamic business strategies and the continuously evolving technologies. In addition to the importance of alignment, what has not been clear is how to achieve and sustain this harmony between business and IT, how to assess the maturity of alignment, and what the impact of misalignment might be on the firm. To achieve and sustain this synergistic relationship is anything but easy.

There are several reasons why attaining IT-business alignment has been so elusive.

The first reason is that the definition of alignment is frequently focused only on how IT is aligned (e.g., converged, in harmony, integrated, linked, synchronized) with the business. Alignment must also address how the business is aligned with IT. Alignment must focus on how IT and the business are aligned with each other; IT can both enable and drive business change.

The second reason is that organizations (practitioners, consultants, academics) have often looked for a silver bullet. Originally, some thought the right technology (e.g., infrastructure, applications) was the answer. While important, it is not enough. Likewise, improved communications between IT and the business help, but are not enough. Similarly, establishing a partnership is not enough nor is balanced metrics that combine appropriate business and technical measurements. Clearly, mature alignment cannot be attained without effective and efficient execution and demonstration of value, but this alone is insufficient. More recently, governance has been touted as the answer – to identify and prioritize projects, resources, and risks. Today, we also recognize the importance of having the appropriate skills to execute and support the environment. Our research has found that all six of these components must be addressed to improve alignment.

The third reason IT-business alignment has been elusive is that there has not been an effective tool to gauge the maturity of IT-business alignment – a tool that can provide both a descriptive assessment and a prescriptive roadmap on how to improve. As you will see the insights from the alignment maturity benchmarking provides extensive insights to this longstanding conundrum.

The fourth reason that IT-business alignment has been so difficult to achieve is that there is a tendency in many organizations (even ones where the importance of alignment is recognized) to focus their attention on IT infrastructure considerations. This unbalanced approach can often lead to missed opportunities to identify elements of the business infrastructure that are in need of improvements.

Finally, the fifth reason that the advancement of IT-business alignment has been stalled involves semantic differences in how to refer to it. Disagreements regarding alignment terminology ("linked" vs. "converged"; "integrated" vs. "harmonized") have ironically become a barrier to alignment itself.

While there is no silver bullet for achieving alignment, progress has been made. In fact, the research demonstrates that "a line" has been drawn. When organizations cross it, they have identified and addressed ways to enhance IT-business alignment.

The alignment maturity model is thus both descriptive and prescriptive. CIO's can use it to identify their organization's alignment maturity and identify means to enhance it. Yet, that "line" is dynamic and continually evolving. So alignment can always be improved.

From measuring the six components in organizations in the United States, Latin America, Europe, and India, it can be observed that most organizations today are in Level 3 of a five-level maturity assessment model. Hence, the pronouncement of the "death of alignment" is premature; there is still a long way to go in the journey for aligning IT and business.

Identifying an organization's alignment maturity provides an excellent vehicle for understanding and improving the business-IT alignment. As elaborated on in this chapter, alignment maturity focuses on six important areas. ALL must be simultaneously addressed to improve the harmony among IT and business. Too frequently consultants and practitioners, looking for the silver bullet, focused their attention on only one or a subset of these important considerations. As companies strive to link technology and business they must address both

- Doing the right things (effectiveness), and
- Doing things right (efficiency). (Luftman 2007; Luftman and Kempaiah 2007a; Luftman and Brier 1999)

In recent years, a great deal of research and analysis focused on the linkages among Business and IT (Luftman 2007; Luftman et al. 2011; Luftman 2012; Luftman and Kempaiah 2007a; Luftman and Brier 1999), the role of partnerships among IT and business management (Keen 1996), and the need to understand the transformation of business strategies resulting from the competitive use of IT (Luftman 2007; Luftman and Derksen 2012; Davidson 1996). Firms need to change not only their business scope, but also their infrastructure as a result of IT innovation (Luftman 2007; Weill and Broadbent 1998). Much of this research, however, was conceptual. Empirical studies of alignment (Luftman and Kempaiah 2007a; Henderson and Venkatraman 1996; Baets 1996) only examined a single industry and/or firm. Conclusions from such empirical studies are potentially biased and may not be applicable to other industries. These studies lacked the consistent results across industries, across functional positions, and across time. This provided the impetus for defining a vehicle for assessing business-IT alignment, along with providing a roadmap for how best to improve it: IT alignment maturity.

As previously discussed, alignment maturity evolves into a relationship in which the function of IT and other business functions adapt their strategies together. Achieving alignment is evolutionary and dynamic. IT requires strong support from senior management, good working relationships, strong leadership, appropriate prioritization, trust, and effective communication, as well as a thorough understanding of the business and technical environments. Achieving and sustaining alignment demands focusing on maximizing the enablers and minimizing the inhibitors that cultivate the integration of IT and business.

Alignment of IT strategy and the organization's business strategy is a fundamental principle advocated for several decades (Luftman 2007; Luftman and Kempaiah 2007a; Rogers 1997; Rockart et al. 1996). IT investment has been increasing since its inception, as managers look for ways to manage IT successfully and to integrate it into the organization's strategies. As a result, IT managers need to:

- Be knowledgeable about how the new IT technologies can be integrated into the business, and with existing/emerging technologies
- Be privy to senior management's tactical and strategic plans
- Be present when corporate strategies are discussed
- Understand the strengths and weaknesses of the technologies in question and the corporate-wide implications (Rockart et al. 1996)

Several proposed frameworks assess the strategic issues of IT as a competitive weapon. They have not, however, yielded empirical evidence; nor have they provided a roadmap to assess and enhance alignment. Numerous studies focus on business process redesign and reengineering as a way to achieve competitive advantage with IT. This advantage comes from the appropriate application of IT as a driver and enabler of business strategies.

3 Strategic Alignment Maturity

The concept of alignment *maturity* as a necessary precondition for an organization's ability to implement its strategy emerged as a concept in the late 1990s as it became increasingly evident that organizations were, by and large, failing to successfully execute nominally well-defined strategic objectives. Why was this the case? Early research into this issue (Luftman 2007; Luftman and Kempaiah 2007b) hypothesized that an organization's ability to successfully implement strategy was related to the "level" of strategic alignment between IT and the business, which reflects both the dynamic nature of alignment and the fact that alignment is, itself, a *process* that reflects key organizational practices which enable (or inhibit, in their absence or misapplication) alignment (Luftman and Brier 1999; Luftman 2000). A model of alignment maturity emerged from this research that reflects these concepts. As Fig. 1 illustrates, the *Strategic Alignment Maturity* model involves the following five conceptual levels of strategic alignment maturity:

1. Initial/Ad Hoc Process – business and IT are not aligned or harmonized
2. Committed Process – the organization has committed to becoming aligned
3. Established Focused Process – Strategic Alignment Maturity established and focused on business objectives
4. Improved/Managed Process – Reinforcing the concept of IT as a "Value Center"
5. Optimized Process – Integrated and co-adaptive business and IT strategic planning

Each of the five levels of alignment maturity focuses, in turn, on a set of six components based on practices validated in 2001 with an evaluation of 25 "*Fortune 500*" companies. As of the writing of this Chapter 362 Global 1,000 organizations from around the world (and several hundred smaller companies) and 2,100 business and IT executives have participated in formally assessing their IT business alignment maturity. Some of the insights from these assessments are discussed in the

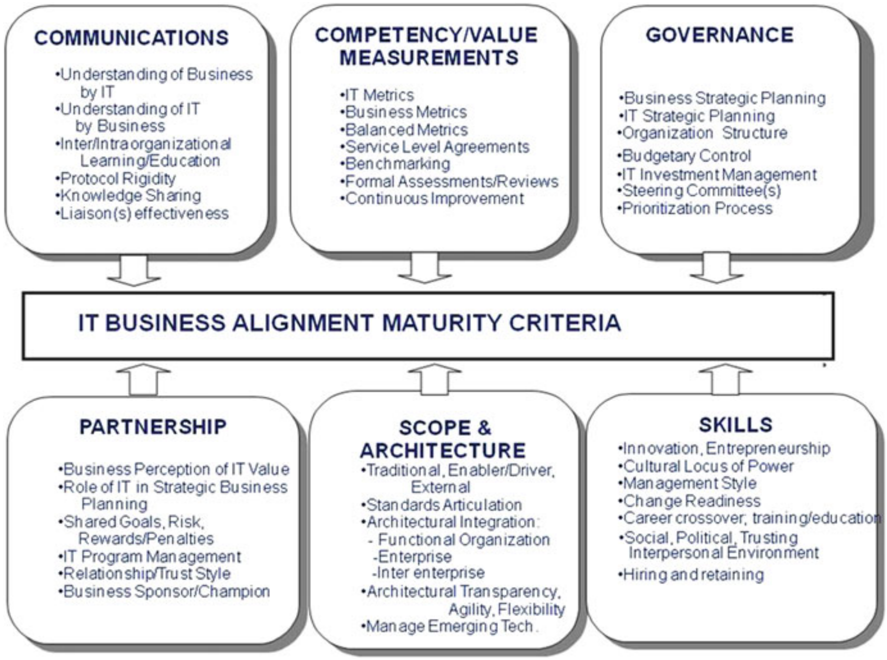


Fig. 2 Alignment maturity criteria

section of this chapter that describes the different maturity components. Assessments continue to be performed; what about your organization?

As discussed above, organizations have often looked for a silver bullet to improve the alignment of IT-business; fundamental for successful BPM. Some thought the right technology (e.g., infrastructure, applications) was the answer. While important, it is not enough. Likewise, improved communications between IT and the business help, but are not enough. Similarly, establishing a partnership is not enough, nor is balanced metrics that combine appropriate business and technical measurements. More recently, governance has been touted as the answer – to identify and prioritize projects, resources, and risks. Today, we also recognize the importance of having the appropriate skills to execute and support the environment. Research has found that all six of these components must be addressed to improve alignment.

Additionally, there has not been an effective tool to gauge the maturity of the IT-business alignment – a tool that can provide both a descriptive assessment and a prescriptive roadmap on how to improve. From measuring the six components in organizations in the United States, Latin America, Europe, and India, most organizations today are in a low Level 3 of a five-level maturity assessment model; there are still many opportunities for improvement.

The six IT-business alignment criteria are illustrated in Fig. 2 and are described in the following section of this chapter. All six must be addressed to ensure mature alignment; looking for a single silver bullet answer, will just not do it. These six criteria are:

1. *Communications Maturity* – ensuring effective ongoing knowledge sharing across organizations
2. *Competency/Value Measurement Maturity* – demonstrating the value of IT in terms of contribution to the business
3. *Governance Maturity* – ensuring that the appropriate business and IT participants formally discuss and review the priorities and allocations of IT resources
4. *Partnership Maturity* – how each organization perceives the contribution of the other, the trust that develops among the participants and the sharing of risks and rewards
5. *Scope & Architecture Maturity* – The extent to which IT is able to:

   - Go beyond the back office and into the front office of the organization to directly impact customers/clients and strategic partners
   - Assume a role supporting a flexible infrastructure that is transparent to all business partners and customers
   - Evaluate and apply emerging technologies effectively
   - Enable or drive business processes and strategies as a true standard
   - Provide solutions customizable to customer needs

6. *Skills Maturity* – Human resource considerations such as training, salary, performance feedback, and career opportunities are assessed to identify how to enhance the organization's cultural and social environment as a component of organizational effectiveness

Knowing the maturity of its strategic choices and alignment practices makes it possible for a firm to see where it stands with respect to its "alignment gaps" and how it can close these gaps. The pyramid in Fig. 3 illustrates the alignment gap on each level of alignment maturity vividly. The five levels of alignment maturity are introduced in this section and then will be elaborated in the following section of this chapter.

Level 1: Initial or ad-hoc processes. Organizations at Level 1 generally have poor communications between IT and the business and also a poor understanding of the value or contribution the other provides. Their relationships tend to be formal and rigid, and their metrics are usually technical rather than business oriented. Service level agreements tend to be sporadic. IT planning or business planning is ad-hoc. And IT is viewed as a cost center and considered "a cost of doing business." The two parties also have minimal trust and partnership. IT projects rarely have business sponsors or champions. The business and IT also have little to no career crossovers. Applications focus on traditional back-office support, such as e-mail, accounting, and HR, with no integration among them. Finally, Level 1 organizations do not have an aligned IT-business strategy.

Level 2: Committed processes. Organizations at Level 2 have begun enhancing their IT-business relationship. Alignment tends to focus on functions or departments (e.g., finance, R&D, manufacturing, marketing) or geographical locations (e.g.,

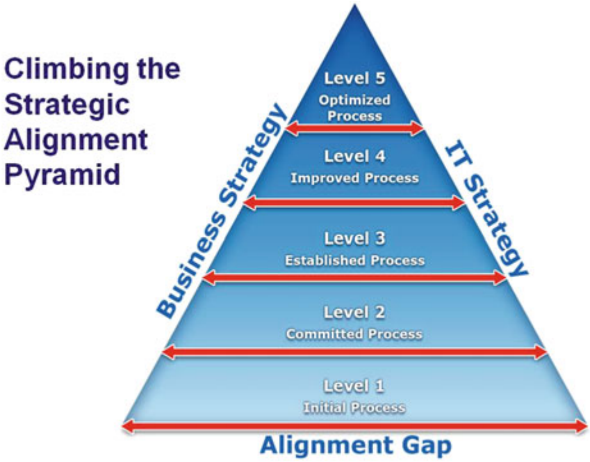


Fig. 3 Alignment gaps

U.S., Europe, Asia). The business and IT have limited understanding of each others' responsibilities and roles. IT metrics and service levels are technical and cost-oriented, and they are not linked to business metrics. Few continuous improvement programs exist. Management interactions between IT and the business tend to be transaction-based rather than partnership-based, and IT spending relates to basic operations. Business sponsorship of IT projects is limited. At the function level, there is some career crossover between the business and IT. IT management considers technical skills the most important for IT.

Level 3: Established, Focused processes. In Level 3 organizations, IT assets become more integrated enterprise-wide. Senior and mid-level IT management understand the business, and the business's understanding of IT is emerging. Service level agreements (SLAs) begin to emerge across shared or acted upon. Strategic planning tends to be done at the business unit level, although some inter-organizational planning has begun. IT is increasingly viewed by the business as an asset, but project prioritization still usually responds to "the loudest voice." Formal IT steering committees emerge and meet regularly. IT spending tends to be controlled by budgets, and IT is still seen as a cost center. But awareness of IT's "investment potential" is emerging. The business is more tolerant of risk and is willing to share some risk with IT. At the function level, the business sponsors IT projects and career crossovers between business and IT occur. Both business and technical skills are important to business and IT managers. Technology standards and architecture have emerged at both the enterprise level and with key external partners.

Level 4: Improved, Managed processes. Organizations at Level 4 manage the processes they need for strategic alignment within the enterprise. One of the important attributes of this level is that the gap has closed between IT understanding the business and the business understanding IT. As a result, Level 4 organizations have effective decision making and IT provides services that reinforce the concept of IT as a value center. Level 4 organizations leverage their IT assets enterprise-wide, and they focus applications on enhancing business processes for sustainable competitive advantage. SLAs are also enterprise-wide, and benchmarking is a routine practice. Strategic business and IT planning processes are managed across the enterprise. Formal IT steering committees meet regularly and are effective at the strategic, tactical, and operational levels. The business views IT as a valued service provider and as an enabler (or driver) of change. In fact, the business shares risks and rewards with IT by providing effective sponsorship and championing all IT projects. Overall, change management is highly effective. Career crossovers between business and IT occur across functions, with business and technical skills recognized as very important to the business and IT.

Level 5: Optimized processes. Organizations at Level 5 have optimized strategic IT-business alignment through rigorous governance processes that integrate strategic business planning and IT planning. Alignment goes beyond the enterprise by leveraging IT with the company's business partners, customers, and clients, as well. IT has extended its reach to encompass the value chains of external customers and suppliers. Relationships between the business and IT are informal, and knowledge is shared with external partners. Business metrics, IT metrics, and SLAs also extend to external partners, and benchmarking is routinely performed with these partners. Strategic business and IT planning are integrated across the organization, as well as outside the organization.

Figure 4 summarizes the results of the 362 Global 1,000 companies that have gone through the assessment to date. It illustrates where there is relative agreement regarding which areas are strong and which are weak, and it identifies the gaps between business and IT executive's opinions. The Y-axis represents the five levels of maturity; the X-axis expands each of the six components of maturity. This figure clearly identifies the maturity elements as the strongest and those that are assessed as the lowest (hence the areas leased aligned). A summary of the responses IT executives and corresponding assessments from business executives can also be observed. The areas where the IT and business executive responses/lines converge or overlap depict areas where there is the most agreement (and thus synergy) between business and IT. Conversely, areas with large gaps between the respective responses/lines are the ones that show disagreement among IT and business executives; these are area that need to be reconciled. For example, Fig. 4 illustrates a tighter synergy between business and IT in the areas of partnership and skills than for communications. The major elements will be discussed later in this chapter.

Figure 5 summarizes these results by region. A general trend that Fig. 5 illustrates is that across most components, Asian organizations have higher maturity scores, followed by American and Latin American organizations, and then European organizations. The pattern of maturity scores for Australian organizations (denoted by the thick line) reveals that in some dimensions they score as high as or higher than Asian organizations, while for other dimensions they score lower than all other regions. (Since there is only one African organization is represented in the data, no trends for African organizations are assumed.)

With an overall average maturity score of 3.09, it is clear that there are still opportunities to improve the IT business relationship; alignment is not dead.

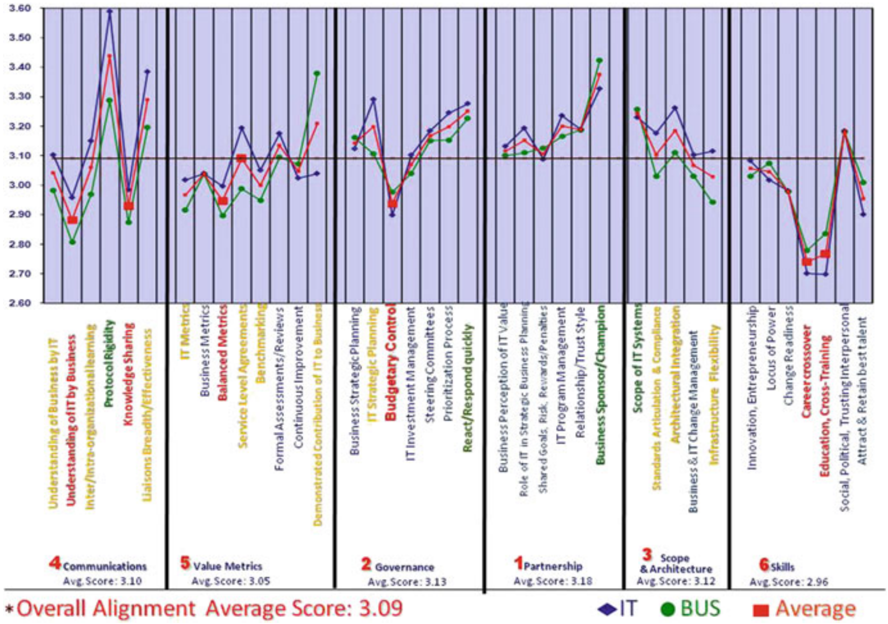


Fig. 4 Overall SAM assessment maturity

A similar graph may be used to plot the responses from an individual organizations assessment to identify opportunities for improvement (using the assessment as a prescriptive tool) and to benchmark things such as how a specific organization compares to:

- the overall average set of responses
- the responses from exemplar organizations
- other organizations in their industry (Finance, Pharmaceutical, Utility, Retail, Health Care, Education)
- respondents from similar positions (e.g., CIO's, CEO's, CFO's,) in other firms

Once the maturity level is understood, the assessment method provides the organization with a prescriptive roadmap that identifies opportunities for enhancing the harmonious relationship of business and IT. This alignment process is expanded in this chapter.

4 The Six Strategic Alignment Maturity Criteria

This part of the chapter describes each of the six components (illustrated in Fig. 2) that are evaluated in deriving the level of strategic alignment maturity. Examples taken from actual assessments illustrate the kinds of insights that can be identified. Most organizations today appear to be around a level 3, as illustrated in Fig. 6.

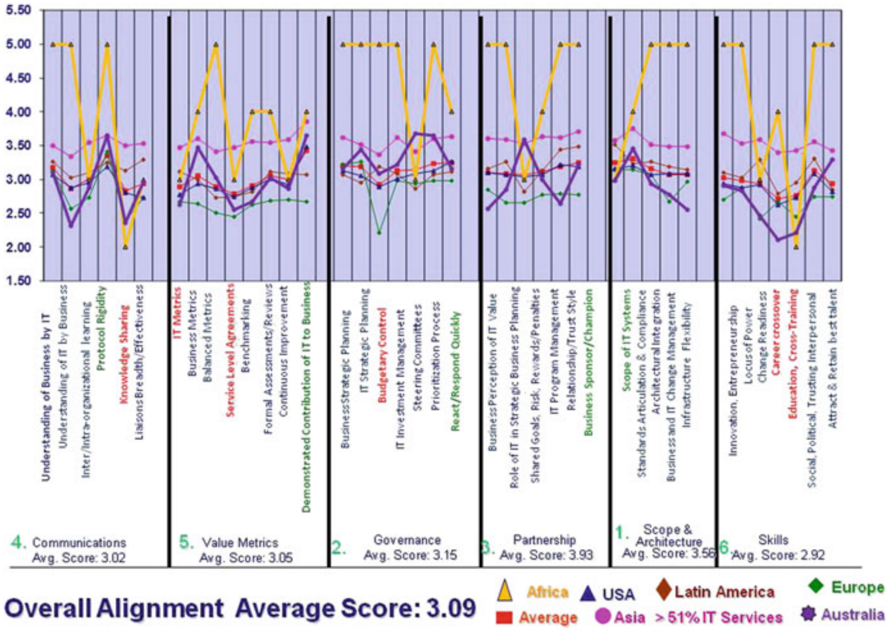


Fig. 5 Geographic SAM summary

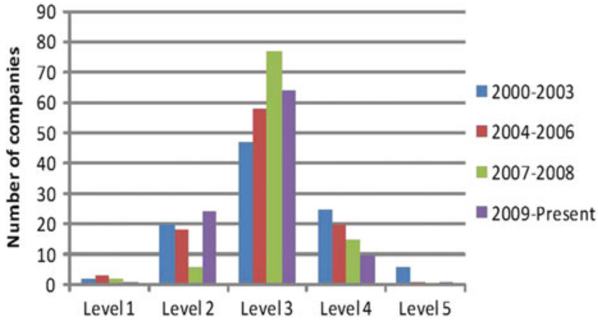
That means that the average results from the 362 Global 1,000 companies' formal assessments (and the several hundred additional informal assessments from multiple years of Society for Information Management surveys) to date are around a level 3. A gradual increase in the overall maturity level over the past decade can be observed Table 1. The results are similar to what has been found by the Carnegie Software Engineering Institute development process model that assesses the comparable stages of application development maturity.

So, while IT business alignment seems to be improving, it is still a pervasive persistent problem. Naturally, the objective of the Strategic Alignment Maturity model is to identify opportunities to move the organization to a higher level (i.e., higher than a Level 3) of Strategic Alignment Maturity. Keep in mind that the primary objective of the assessment is not the maturity level used just as a descriptive tool of an organizations maturity; albeit it provides interesting benchmark comparisons. The primary objective of the assessment is to understand (as illustrated in Figs. 4 and 5) where IT and business executives:

– agree that a criteria needs to be improved
– agree that a criteria is good, but can be better
– disagree with how good/bad a criteria is
– desire to focus their efforts to improve

As illustrated in Fig. 5, there were differences in the overall SAM alignment scores by region. On average, Asian organizations had higher scores than their

Fig. 6 Distribution of SAM scores



American, Australian, and European counterparts. The SAM scores by criteria and by region are summarized in Table 2, below. It is valuable to benchmark organizations by geography as well as comparing alignment trends across the geographies. This will be discussed later in this chapter.

When there is agreement among the participants regarding the criteria assessment, the model can be used as a prescriptive roadmap to identify how alignment maturity can be improved. However, when there is disagreement, the key stakeholders (i.e. any groups or individuals who can affect or are affected by IT in the firm) need to understand the points-of-view of the participants and come to an agreement regarding the criteria and how to enhance it. The organization cannot identify an appropriate road to take if they cannot come to agreement regarding where they want to go. Once the group has identified an agreed to list of areas for improvement, they can proceed to use the model as a prescriptive roadmap. Hence, it is not the maturity "number" that is important. It is what the organization does as a result of identifying how they can work together to improve the alignment maturity.

The next six sub-sections discuss each of the Strategic Alignment Maturity criteria in more detail and include examples of how they manifest themselves in organizations. These examples have been abstracted from recent research done with a number of major U.S. and global organizations (Luftman and Zadeh 2011). Table 3 summarizes the data from this research across the six SAM components by industry. In terms of their alignment maturity, it is evident that industries can vary considerably in their overall scores. For example, the service sector out-performed the transportation sector by an overall score of 3.31 to 2.84, while the gap between the retail and educational sectors was almost a full point (3.62 vs. 2.63).

Since this research is still ongoing and the companies that have participated have been assured anonymity, it is not possible to share the specific names of the participating organizations. However, each section illustrates specific issues of strategic alignment maturity that have been uncovered in the research and identifies the industry of the participating organizations.

Table 1 Maturity levels by year

Years	Number of companies	% of companies in level 1	% of companies in level 2	% of companies in level 3	% of companies in level 4	% of companies in level 5	Overall average
2000–2003	**83**	2	20	47	25	6	**2.99**
2004–2006	**99**	3	18	58	20	1	**3.06**
2007–2008	**64**	2	6	77	15	0	**3.11**
2009–Present	**116**	1	24	64	10	1	**3.19**
Overall	**362**	1.25	12.92	56.67	27.92	1.25	**3.17**

Overall alignment average score: 3.09

Table 2 Geography maturity by component

Geography	Number of Companies	Communication	Competency	Governance	Partnership	Scope of IT architecture	Skills	Overall average
Europe	61	2.85	2.63	2.94	2.78	3.01	2.70	**2.82**
Australia	28	2.88	3.01	3.15	2.96	2.96	2.68	**2.94**
USA	184	2.93	2.93	3.07	3.09	3.12	2.84	**3.00**
Latin America	44	3.17	2.94	3.03	3.16	3.27	3.00	**3.10**
Asia	44	3.52	3.59	3.58	3.64	3.60	3.55	**3.58**
Africa	1	4.0	3.71	4.13	4.4	4.0	4.0	**4.05**

Overall alignment average score: 3.09

Table 3 Industry maturity by component

Industry name	# of companies	Communications	Competency	Governance	Partnership	Tech. scope	Skills	Overall average
Retail	10	3.54	3.52	3.70	3.75	3.73	3.45	**3.62**
Hotel/Entertainment	10	3.23	3.39	3.38	3.49	3.77	3.35	**3.44**
Service	48	3.26	3.23	3.34	3.36	3.34	3.35	**3.31**
Insurance	11	3.19	3.34	3.51	3.31	3.34	2.89	**3.26**
Oil\Gas\Mining	13	3.05	3.31	3.36	3.06	3.37	2.98	**3.19**
Manufacturing	54	3.21	3.03	3.10	3.15	3.24	3.07	**3.13**
Financial	106	2.93	2.87	3.13	3.17	3.14	2.82	**3.01**
Utility	7	3.09	3.21	2.64	2.76	3.40	2.75	**2.98**
Pharmaceutical	15	2.95	2.77	2.98	2.89	3.00	2.97	**2.93**
HealthCare	18	2.94	2.85	3.02	2.97	3.04	2.73	**2.92**
Transportation	21	2.77	2.97	2.82	2.93	2.84	2.68	**2.84**
Government	9	2.91	2.54	3.03	2.99	2.86	2.49	**2.80**
Chemical	7	2.75	2.64	2.86	2.81	3.08	2.44	**2.76**
Telecommunication	11	2.68	2.68	2.94	2.69	3.03	2.44	**2.74**
Agriculture	11	2.54	2.61	3.13	2.63	2.50	2.41	**2.64**
Educational	11	2.66	2.48	2.83	2.53	2.72	2.56	**2.63**

Overall alignment average score: 3.09

4.1 Communications

Effective exchange of ideas and a clear understanding of the key ideas that ensure successful strategies are high on the list of enablers and inhibitors to alignment. Too often there is little business awareness on the part of IT or little IT appreciation on the part of the business. The 362 Global 1,000 benchmark firm results indicate that 21 % of the IT organizations either do not understand or have a limited understanding of business; while 39 % of the business executives either do not understand or have a limited understanding of IT. Given the dynamic environment in which most organizations find themselves, ensuring ongoing knowledge sharing across organizations is paramount.

Many firms choose to employ people in formal inter-unit "liaison" roles or cross-functional teams to facilitate this knowledge sharing. The key word here is "*facilitate*". Some organizations have facilitators whose role is to serve as the sole conduit of interaction among the different units of the organization. This approach tends to stifle rather than foster effective communications. Rigid protocols that impede discussions and the sharing of ideas should be avoided. The 362 Global 1,000 benchmark firm results indicate that 54 % of the firms identify liaisons as a major opportunity for improvement.

For example, a large aerospace company assessed its communications alignment maturity at level 2. Business-IT understanding is sporadic. The relationship between IT and the business function could be improved. Improving communication should focus on how to create the understanding of IT as a strategic business partner by the businesses it supports rather than simply a service provider. The firm's CIO made the comment that there is "no constructive partnership". However, in an interview with the firm's Director of IT Infrastructure, he stated that he views his organization as a "strategic business partner". One way to improve communications and, more importantly, understanding, would be to establish effective business function/IT liaisons that facilitate sharing of knowledge and ideas.

In a second case, a large financial services company's communication alignment maturity placed it in level 2 with some attributes of Level 1. Business awareness within IT is through specialized IT business analysts, who understand and translate the business needs to other IT staff (i.e., there is limited awareness of business by general IT staff). Awareness of IT by the firm's business functions, is also limited, although senior and mid-level management are aware of IT's potential. Communications are achieved through bi-weekly priority meetings of the senior and middle level managers from both groups, where they discuss requirements, priorities and IT implementation. But it is still a 2 because of the effectiveness of the interaction.

In a third example, a large utility company's communication alignment maturity places it at a level 2. Communications are not open until circumstances force the business to identify specific needs. There is a lack of trust and openness among some business units and their IT team. IT business partners tend to be bottlenecks in meeting commitments. IT's poor performance in previous years left scars that have not healed.

From a geographic perspective (as illustrated in Table 2) Asian organizations achieved the highest level of maturity in the communications component with an overall score of 3.52, followed by Latin America with a score of 3.17. The United States, Australia, and European scores were 2.93, 2.88, and 2.85, respectively.

4.2 Competency/Value Measurements

Too many IT organizations cannot demonstrate their value to the business in terms that the business understands. Frequently business and IT metrics of value differ. A balanced "dashboard" that demonstrates the value of IT in terms of contribution to the business is needed (see also vom Brocke and Sonnenberg 2014). The 362 Global 1,000 benchmark firm results indicate that two-thirds of the firms can improve this important area.

Service levels that assess IT's commitments to the business often help. However, the service levels have to be expressed in terms that the business understands and accepts. The service levels should be tied to criteria (see criteria 4. Partnership, below) that clearly define the rewards and penalties for surpassing or missing the objectives. The 362 Global 1,000 benchmark firm results indicate that 63 % of the firms can significantly improve their SLAs.

Frequently organizations devote significant resources to measuring performance factors. However, they spend much less of their resources on taking actions based on these measurements. For example, an organization that requires analyzing ROI before a project begins, but then does not review how well objectives were met after the project was deployed provides little to the project's success. It is important to assess these criteria to understand (1) the factors that lead to missing the criteria and (2) what can be learned to improve the environment continuously.

For example, a large aerospace company assessed its competency/value measurement maturity to be at a level 2. IT operates as cost center. IT metrics are focused at the functional level, and Service Level Agreements (SLAs) are technical in nature. One area that could help to improve maturity would be to add more business-related metrics to SLAs to help form more of a partnership between IT and the business units. Periodic formal assessments and reviews in support of continuous improvement would also be beneficial.

A large software development company assessed its competency/value measurement maturity at level 3. Established metrics evaluate the extent of service provided to the business functions. These metrics go beyond basic service availability and help desk responsiveness, evaluating such issues as end-user satisfaction and application development effectiveness. The metrics are consolidated on to an overall dashboard. However, because no formal feedback mechanisms are in place to react to a metric, the dashboard cannot be considered to be managed.

At a large financial services company, IT competency/value was assessed at a level 2 because the company uses cost efficiency methods within the business and functional organizations. Balanced metrics are emerging through linked business and IT metrics, and a balanced scorecard is provided to senior management. Service level agreements are technical at the functional level. Benchmarking is not generally practiced and is informal in the few areas where it is practiced. Formal assessments are done typically for problems and minimum measurements are taken after the assessment of failures.

Table 2 shows significantly different IT competency SAM scores across regions. Asian organizations lead the way with an overall score of 3.59, followed by Australian firms with a score of 3.01; Latin American firms (2.94) are followed closely by American firms (2.93). European organizations scored the lowest in this dimension, with a score of 2.63.

4.3 Governance

The considerations for IT governance were defined briefly in Fig. 1. Ensuring that the appropriate business and IT participants formally discuss and review the priorities and allocation of IT resources is among the most important enablers/inhibitors of alignment. This decision-making authority needs to be clearly defined. The 362 Global 1,000 benchmark firm results indicate that 57 % of the firms should be improving this important component of alignment.

For example, IT governance in a large aerospace company is tactical at the core business level and not consistent across the enterprise. For this reason, they reported a level 2 maturity assessment. IT can be characterized as reactive to CEO direction. Developing an integrated enterprise-wide strategic business plan for IT would facilitate better partnering within the firm and would lay the groundwork for external partnerships with customers and suppliers.

A large communications manufacturing company assessed its governance maturity at a level falling between 1 and 2. IT does little strategic planning because it operates as a cost center and, therefore, cost reduction is a key objective. In addition, priorities are reactive to business needs as business manager's request services.

A large computing services company assessed their governance maturity at a level 1+. A strategic planning committee meets twice a year. The committee consists of corporate top management with regional representation. Topics or results are neither discussed nor published to all employees. The reporting structure is federated with the CIO reporting to a COO. IT investments are traditionally made to support operations and maintenance. Regional or corporate sponsors are involved with some projects. Prioritization is occasionally responsive.

From a geographic perspective (as illustrated in Table 2) Asian organizations achieved the highest level of maturity in the governance component with an overall score of 3.58. Australian organizations came in second with a score of 3.15, followed by American companies with a score of 3.07. Latin American and European organizations earned scores of 3.03 and 2.94, respectively.

4.4 Partnership

The relationship that exists between the business and IT organizations is another criterion that ranks high among the enablers and inhibitors. Giving the IT function the opportunity to have an equal role in defining business strategies is obviously important. However, how each organization perceives the contribution of the other, the trust that develops among the participants, ensuring appropriate business sponsors and champions of IT endeavors, and the sharing of risks and rewards are all major contributors to mature alignment. This partnership should evolve to a point where IT both enables AND drives changes to both business processes and strategies. Naturally, this demands having a good business design where the CIO and CEO share a clearly defined vision.

For example, a large software development company assessed their partnership maturity at a level of 2. The IT function is mainly an enabler for the company. But IT does not have a seat at the business table, either with the enterprise or with the business function that is making decisions. In the majority of cases, there are no shared risks because only the business will fail. Indications are that the partnership criterion will rise from a level 2–3 as top management sees IT as an asset, and because of the very high enforcement of standards at the company.

Partnership for a large communications manufacturing company was assessed at level 1. IT is perceived as a cost of being in the communications business. Little value is placed on the IT function. IT is perceived only as help desk support and network maintenance.

For a large utility company, partnership maturity was assessed at a level of 1+. IT charges back all expenses to the business. Most business executives see IT as a cost of doing business. There is heightened awareness that IT can be a critical enabler to success, but there is minimal acceptance of IT as a partner.

Partnership for a large computing services company was assessed at level 2. Since the business executives pursued e-commerce, IT is seen as a business process enabler as demonstrated by the Web development. Unfortunately, the business now assigns IT with the risks of the project. Most IT projects have an IT sponsor.

From a geographic perspective (as illustrated in Table 2), Asian organizations have a partnership maturity score of 3.64. The next closest region was Latin America, with a partnership score of (3.16). The American, Australian, and European partnership scores were 3.09, 2.96, and 2.78, respectively.

4.5 Scope and Architecture

This set of criteria tends to assess information technology maturity and the fitness of IT assets to support business process (see "IT use process" in Fig. 1). Therefore, these criteria assess the extent to which IT is able to:

- Go beyond the back office and into the front office of the organization
- Assume a role supporting a flexible infrastructure that is transparent to all business partners and customers
- Evaluate and apply emerging technologies effectively
- Enable or drive business processes and strategies as a true standard
- Provide solutions customizable to customer needs

Scope and Architecture was assessed at a level of 2+ at a large software development company. This is another area where the company is moving from a level 2 to a level 3. ERP systems are installed and all projects are monitored at an enterprise level. Standards are integrated across the organization and enterprise architecture is integrated. It is only in the area of Inter-enterprise that there is no formal integration.

A large financial services company assessed their scope and architecture at level 1. Although standards are defined, there is no formal integration across the enterprise. At best, only functional integration exists.

Once again, Asian companies led in this dimension, scoring 3.6 for the scope & architecture component. Latin America came in second, with a score of 3.27, followed by the United States, which scored 3.12. European and Australian organizations scored 3.01 and 2.96, respectively.

4.6 Skills

Skills were defined in Fig. 1. They include all of the human resource considerations for the organization. Going beyond the traditional considerations such as training, salary, performance feedback, and career opportunities are factors that include the organization's cultural and social environment. Is the organization ready for change in this dynamic environment? Do individuals feel personally responsible for business innovation? Can individuals and organizations learn quickly from their experience? Does the organization leverage innovative ideas and the spirit of entrepreneurship? These are some of the important conditions of mature organizations. The 362 Global 1,000 benchmark firm results indicate that 55 % of the benchmarked firms do not effectively support career crossover opportunities (IT into the business and the business into IT) and that 55 % of the benchmarked firms do not effectively support education cross training.

For example, a large aerospace company assesses their skills maturity at a level 2. A definite command and control management style exists within IT and the businesses. Power resides within certain operating companies. Diverse business cultures abound. Getting to a non-political, trusting environment between the businesses and IT, where risks are shared and innovation and entrepreneurship thrive, is essential to achieve improvements in each of the other maturity tenets. Organizational behavior research has demonstrated that sharing information that is based on expertise is often the most successful approach to influencing others to cooperate and trust one another (Luftman 1997).

Skills maturity at a large computing services company is assessed at a level of 1. Career crossover is not encouraged outside of top management. Innovation is dependent on the business unit, but in general is not encouraged. Management style is dependent on the business unit, but is usually command and control. Training is encouraged but left up to the individual employee.

Finally, from a geographical perspective, Asian companies earned a maturity score of 3.55. Latin American organizations came in second, earning a score of 3.00. American, European, and Australian organizations received SAM Skill scores of 2.84, 2.70, and 2.68, respectively.

4.7 Results by Geography and Industry

As noted above, results from the assessment from the 362 Global 1,000 companies by region reveal higher alignment scores by Asian organizations across all maturity components. As a group, they scored 3.58, as compared to 3.00 for the United States and 2.82 for Europe. A complete illustration of regional SAM scores by component is shown in Table 2 and Fig. 5.

What was it that made Asian organizations score higher in every SAM component than their European, American, and Latin American counterparts? An examination of the factors that have led to the remarkable success of India's service sector offers several lessons. A strong culture that promotes communication between employees, the emphasis of CMM/CMMI-based continuous improvement efforts, and well-planned strategies that promote organizational flexibility are just some of the factors that are fundamental.

An analysis of SAM data shows that the retail, hotel/entertainment, service, and insurance sectors performed well above the average SAM score of 3.09 in all dimensions. As noted in Table 3, these industries scored 3.62, 3.44, 3.31, and 3.26, respectively. (Note – there were relatively few retail and hotel/entertainment companies in the sample, however.) The well-represented industry in the Global 1,000 was the financial industry, which earned an overall SAM rating of 3.01. The manufacturing industry performed closest to the mean, with an overall average of 3.13.

5 Levels of Strategic Alignment Maturity

5.1 Level 1: Initial/Ad Hoc Process

Organizations that are at Strategic Alignment Maturity Level 1 can be characterized as having the lowest level of Strategic Alignment Maturity. For example: in the "Communications" criteria of the model, understanding of the business by IT is very low (see the "Communications" criteria box in Fig. 7). Similarly, the attribute called "Understanding of IT by the business" is also very low for an organization at Level 1 maturity.

It is highly improbable that these organizations will be able to achieve an aligned IT business strategy, leaving their investment in IT significantly unleveraged. See Fig. 7 for the specific criteria for Level 1.

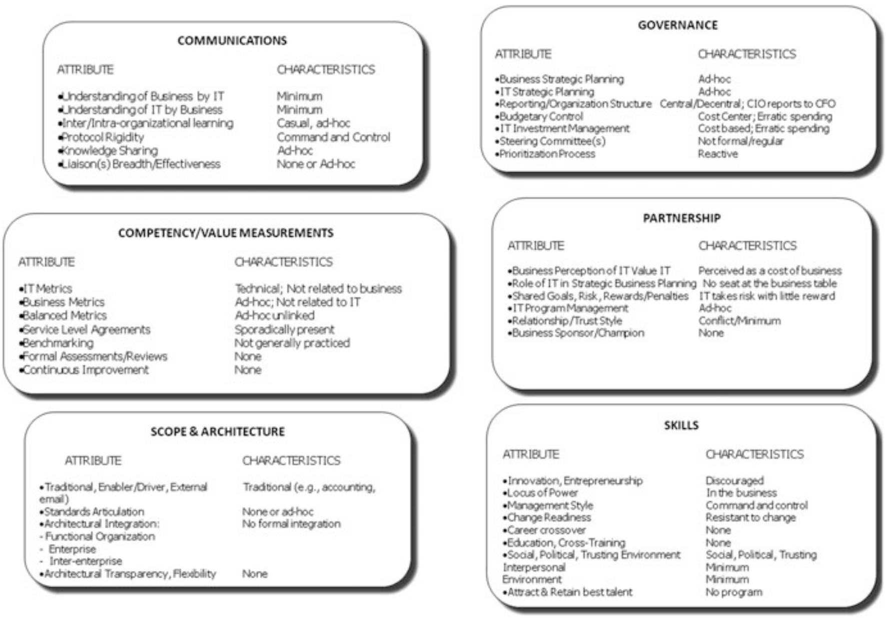


Fig. 7 Level 1 Strategic Alignment Maturity criteria

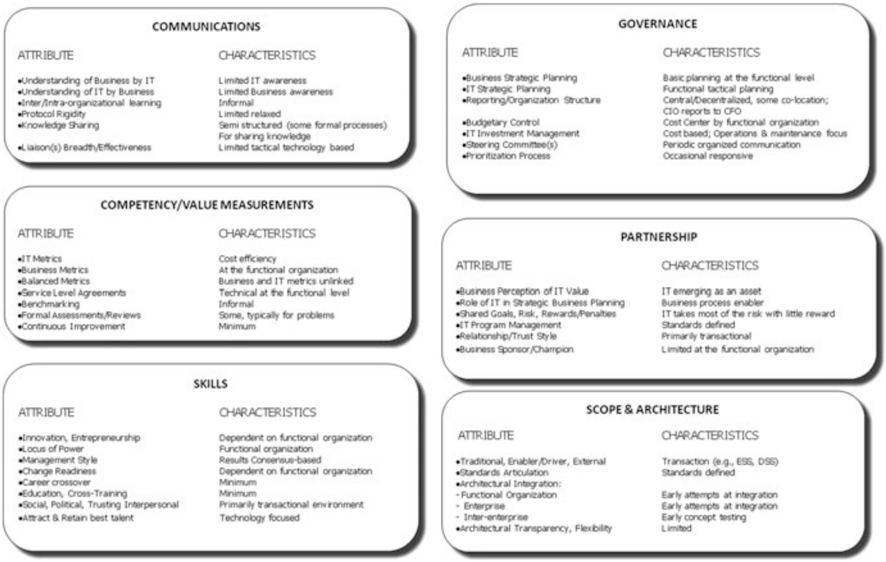


Fig. 8 Level 2 Strategic Alignment Maturity criteria

5.2 *Level 2: Committed Process*

Level 2 organizations can be characterized as having committed to begin the process for Strategic Alignment Maturity. For example: in the "Competency/ Value Measurements" criteria of the model, IT metrics (an "attribute") are focused on cost and efficiency (see the "Competency/Value Measurements" criteria box in Fig. 8). Similarly, in the "Partnership" criteria of the model, the business perception of IT (again, another "attribute") is that IT is emerging as an asset to the organization.

This level of Strategic Alignment Maturity tends to be directed at local situations or functional organizations (e.g., Marketing, Finance, Manufacturing, H/R) within the overall enterprise. However, due to limited awareness by the business and IT communities of the different functional organizations use of IT, alignment can be difficult to achieve. Any business-IT alignment at the local level is typically not leveraged by the enterprise. However, the potential opportunities are beginning to be recognized. See Fig. 8 for the specific criteria for Level 2.

5.3 *Level 3: Established Focused Process*

This level of Strategic Alignment Maturity concentrates on governance, processes and communications towards specific business objectives. The reasons for this focus are:

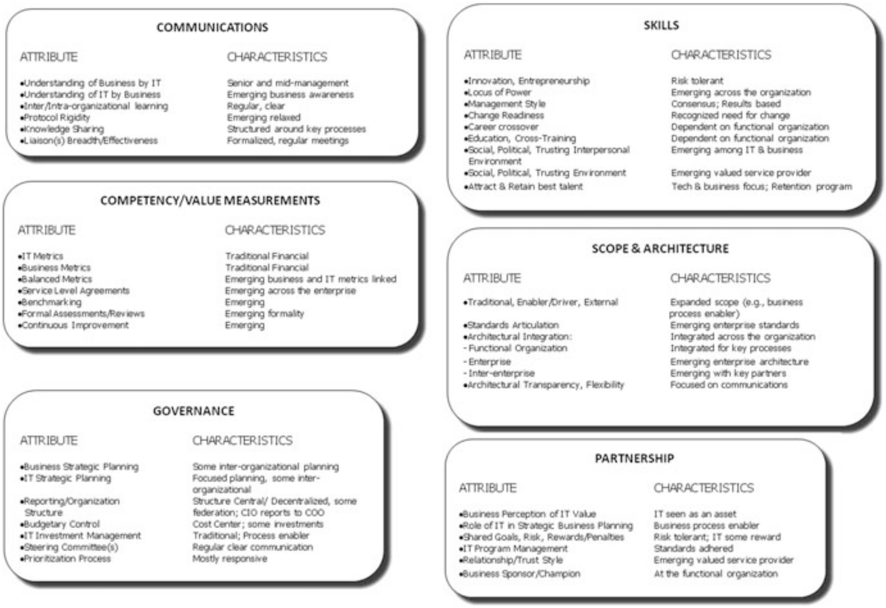


Fig. 9 Level 3 Strategic Alignment Maturity criteria

- The organization needs better decision-making processes (governance) around which business processes to invest scarce IT dollars
- The organization wants to focus on those business processes that generate the most long-lasting competitive advantage (and presumably, profitability), and
- The organization has to effectively communicate its vision and get "buy-in" from all employees and management

IT is becoming embedded in the business. Level 3 leverages IT assets on an enterprise-wide basis and applications systems demonstrate planned, managed direction away from traditional transaction processing to systems that use information to make business decisions. The IT "*extrastructure*" (leveraging the inter-organizational infrastructure) is evolving with key partners. For example: in the "Communications" criteria of the model, the sharing of knowledge (an "attribute") tends to be structured around key processes (see the "Communications" criteria box in Fig. 9). Similarly, in the "Governance" criteria of the model, the prioritization process (again, another "attribute") tends to be reactive. See the Fig. 9 for the specific criteria for Level 3.

5.4 Level 4: Improved/Managed Process

Organizations at Level 4 leverage IT assets on an enterprise-wide basis and the focus of applications systems is on driving business process enhancements to obtain

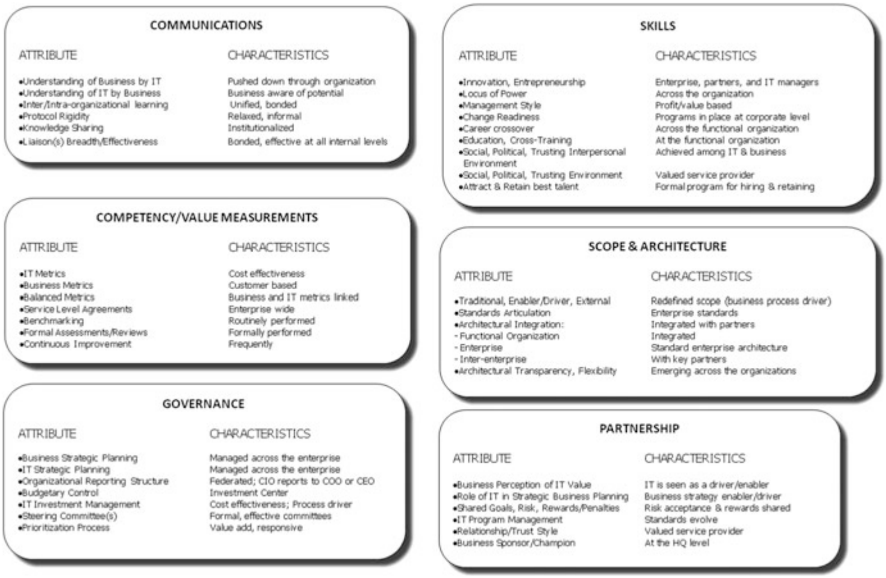


Fig. 10 Level 4 Strategic Alignment Maturity criteria

sustainable competitive advantage. A Level 4 organization views IT as an innovative and imaginative strategic contributor to success. The enterprise-wide emphasis of Level 4 organizations breaks down the "process silos" that exist among business units in lower level organizations in order to capitalize on the information and knowledge embedded in an organization's business processes and practices. Level 4 organizations also utilize IT "hard" (i.e., hardware and software) and "soft" assets (e.g., knowledge and information about customers, competitors and products and employee skills) by consciously deploying enterprise-wide architectures. One example of such architecture might be an enterprise intranet portal for collecting, categorizing and sharing customer/product information as well as unstructured information (e.g., web URLs, journal articles, etc.) about competitor products.

This level of Strategic Alignment Maturity demonstrates effective governance and services that reinforce the concept of IT as a value center. For example: in the "Communications" criteria of the model, the sharing of knowledge (an "attribute") is institutionalized. Similarly, in the "Scope and Architecture" criteria of the model, the organization has established enterprise standards. See the Fig. 10 for the specific criteria for Level 4.

5.5 Level 5: Optimized Process

Level 5 organizations leverage IT assets on an enterprise-wide basis to extend the reach (of the IT extra-structure) of the organization into the supply chains of

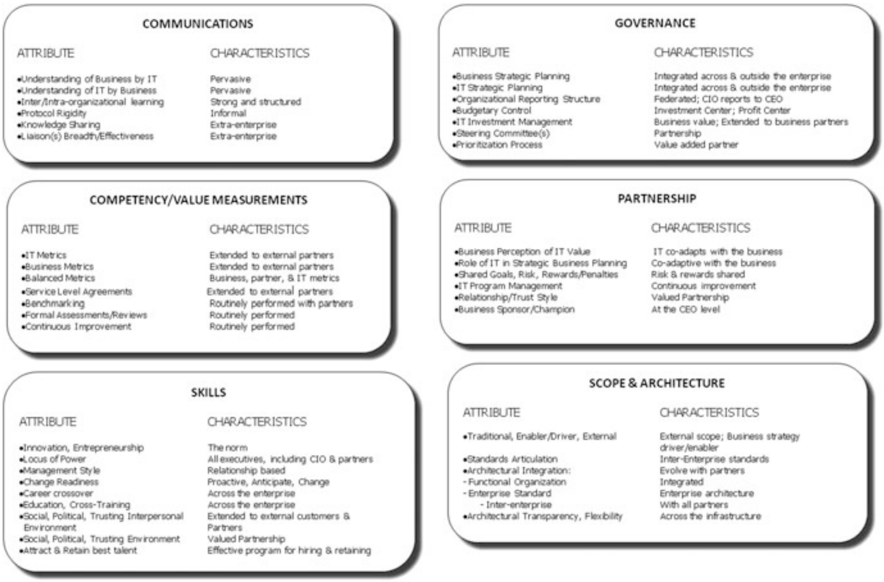


Fig. 11 Level 5 Strategic Alignment Maturity criteria

customers/clients and suppliers/partners. For a Level 5 organization, it is often difficult to determine if they are more an information technology company than a commercial company (e.g., securities, insurance, travel (e.g., Travelocity), retail (e.g., Amazon)).

A sustained governance process integrates the IT strategic planning process with the strategic business process. For example: in the "Communications" criteria of the model, "understanding of the business by IT" and "understanding of IT by the business" (two elements) are pervasive. Similarly, in the "Skills" criteria of the model, "Innovation and Entrepreneurship" are the norm for the organization. See the Fig. 11 for the specific criteria for Level 5.

6 Assessing Strategic Alignment Maturity

An essential part of the assessment process is recognizing that it must be done with a team including both business and IT executives. The convergence on a consensus of the maturity levels and the discussions that ensue are extremely valuable in understanding the problems and opportunities that need to be addressed to improve business-IT alignment. As previously discussed, the most important part of the process is the creation of specific recommendations that address the problems and opportunities identified from the assessment. The most difficult step, of course, is actually carrying out the recommendations. This section ties the assessment metrics together. The examples and experiences provided in the preceding section on the Six Strategic Alignment Criteria, together with the procedure described in the next section, served as the vehicle for validating the model.

Each of the criteria and levels are described by a set of attributes that allow a particular dimension to be assessed using a 1–5 Likert scale, where:

1 = this does not fit the organization, or the organization is very ineffective
2 = low level of fit for the organization
3 = moderate fit for the organization, or the organization is moderately effective
4 = this fits most of the organization
5 = strong level of fit throughout the organization, or the organization is very effective

Different scales can be applied to perform the assessment (e.g., good, fair, poor; 1, 2, 3). However, whatever the scale, it is important to evaluate each of the six criteria with both business and IT executives to obtain accurate assessment perspectives. The intent is to have the team of IT and business executives converge on a maturity level. Typically, the initial review will produce divergent results. This outcome is indicative of the problems/opportunities being addressed. A summary of the 362 Global 1,000 companies' results for all six components and their respective criteria can be found in Figs. 4 and 5.

The relative importance of each of the attributes within the criteria may differ among organizations. For example, in some organizations the use of SLAs (Service Level Agreements) might not be considered as important to alignment as the effectiveness of liaisons. Hence, giving SLAs a low maturity assessment should not significantly impact the overall rating in this case. However, it would be valuable if the group discussed why the organization does not consider a particular attribute (in this example, SLAs) to be significant.

Using a Delphi approach with a Group Decision Support Tool often helps in attaining the convergence (Luftman 1997). Experience suggests that "discussions" among the different team members helps to ensure a clearer understanding of the problems and opportunities that need to be addressed.

Keep in mind that the primary objective of the assessment is to identify specific recommendations to improve the alignment of IT and the business. The evaluation team, after assessing each of the six criteria from level one to five, uses the results to converge on an overall assessment level of the maturity for the firm. They apply the next higher level of maturity as a prescriptive roadmap to identify what they could/should do next. A trained facilitator is typically needed for these sessions.

As previously discussed, there have been over 362 Global 1,000 organizations from around the world (and several hundred smaller companies) and 2,100 business and IT executives that have participated in formally assessing their IT business alignment maturity. As illustrated in Figs. 4, 5, and 6, the average level of maturity is about a 3. Given the number of companies that have participated exemplar benchmarks based on factors such as industry, company age, company size, and job tiles have been factored into the research to obtain their effect on alignment maturity. Some of the benchmark insights have been discussed in this chapter.

7 Strategic Alignment as a Process

Attaining and sustaining business-IT alignment must first focus on understanding the current level of Strategic Alignment Maturity; followed by steps that concentrate organizational energy on maximizing alignment enablers and minimizing inhibitors. This process embraces the steps (Henderson and Venkatraman 1996) illustrated by Fig. 12 and elaborated in the following text.

1. *Set the goals and establish a team*. Ensure that there is an executive business sponsor and champion for the assessment. Next, assign a team of both business and IT leaders. Obtaining appropriate representatives from the major business functional organizations (e.g., Marketing, Finance, R&D, and Engineering) is critical to the success of the assessment. The purpose of the team is to evaluate the maturity of the business-IT alignment. Once the maturity is understood, the team is expected to define opportunities for enhancing the harmonious relationship of business and IT. Assessments range from three to twelve half-day sessions. The time demanded depends on the number of participants, the degree of consensus required, and the detail of the recommendations to carry out.
2. *Understand the business-IT linkage*. The Strategic Alignment Maturity Assessment is an important tool in understanding the business-IT linkage. The team evaluates each of the six criteria. This can be done via executive interviews, group discussion, a questionnaire, or a combination. A trained facilitator can be valuable in guiding the important discussions.

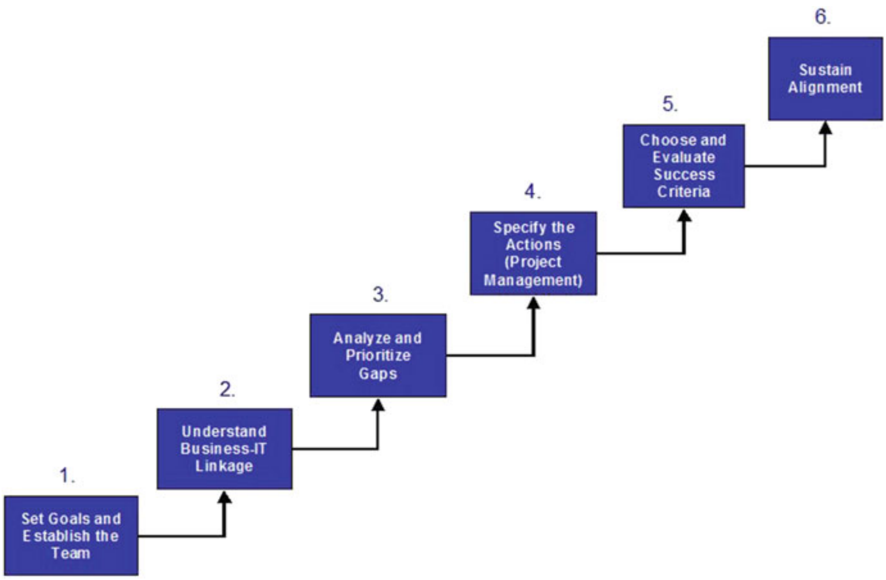


Fig. 12 Strategic alignment as a process

3. *Analyze and prioritize gaps*. Recognize that the different opinions raised by the participants are indicative of the alignment opportunities that exist. Once understood, the group needs to converge on a maturity level. The team must remember that the purpose of this step is to understand the activities necessary to improve the business-IT linkage. The gaps between where the organization is today and where the team believes it needs to be are the gaps that need to be prioritized. Apply the next higher level of maturity as a roadmap to identify what can be done next.
4. *Specify the actions (project management)*. Knowing where the organization is with regards to alignment maturity will drive what specific actions are appropriate to enhance IT-business alignment. Assign specific remedial tasks with clearly defined deliverables, ownership, timeframes, resources, risks, and measurements to each of the prioritized gaps.
5. *Choose and evaluate success criteria*. This step necessitates revisiting the goals and regularly discussing the measurement criteria identified to evaluate the implementation of the project plans. The review of the measurements should serve as a learning vehicle to understand how and why the objectives are or are not being met.
6. *Sustain alignment*. Some problems just won't go away. Why are so many of the inhibitors IT related? Obtaining IT-business alignment is a difficult task. This last step in the process is often the most difficult. To sustain the benefit from IT, an "alignment behavior" must be developed and cultivated. The criteria described to assess alignment maturity provides characteristics of organizations that link IT and business strategies. By adopting these behaviors, companies can increase their potential for a more mature alignment assessment and improve their ability to gain business value from investments in IT. Hence, the continued focus on understanding the alignment maturity for an organization and taking the necessary action to improve the IT-business harmony are keys. Implicit in this is to periodically repeat the process to see how the organization evolves over time.

Fundamental to the effective use of the Strategic Alignment Maturity assessment is to not only measure the maturity level of IT-business alignment but also to identify the problem/opportunity areas; and more important use the model as a roadmap to define specific initiatives for improvement. Repeating the assessment periodically can be insightful.

For example, when the strategic alignment maturity model was first used to assess the level of alignment maturity for a large financial company (fictitiously referred to as Stonehenge), they were assessed at a Level 2 (Committed Processes). At the time, Stonehenge had recently adopted the federated IT organization model, so no one considered that the IT organization structure would be the area to consider in identifying why this financial giant was only at level 2. After all, the federal (or hybrid) IT organization design has been found to produce higher alignment maturity scores over centralized and decentralized IT organization alternatives; because it captures the benefits of both centralized and decentralized IT organizations. The federated IT organization deployed at Stonehenge essentially centralized

IT architecture and common systems, while decentralizing the strategic business unit applications and resources. The centralized IT structure supports the development of strong and efficient IT infrastructures while the decentralized IT group fosters business-IT relationships. Following the above logic, Stonehenge had decentralized its formally centralized application development staff, expecting that the relationships with the business management would improve. However, the analysis of the Stonehenge SAM assessment data showed that:

- The indicators that measure the understanding of business by IT and the understanding of IT by business, which are covered in the "communications" area of the SAM model, were very low. Knowledge sharing in the organization was at a minimum to none. IT and business met occasionally (only during major walkthroughs) in a formal setting.
- IT-business relationship and trust measures that are covered under the "partnership" area were also at the minimum. Business viewed IT as a cost of doing business. There was an ongoing conflict between business and IT; they blamed each other for every late or unsuccessful delivery.
- Competency metrics –measuring value of IT area showed that IT operated as a cost center.
- Social-interaction indicator, which is covered under the HR area, was pointing to minimal IT-business interaction.

These and several other criteria used in the assessment suggested that there was conflict in the IT-business relationship in Stonehenge and that trust levels were at a minimum – typical in a centralized IT organization with poor linkages between business and IT. The fact that the company had already adopted the federated model motivated managers to further analyze the data to find out why the relationship with the business management did not improve.

Several other indicators, such as the differences between the IT and the business managers' opinions and the differences between the top and the middle managers' opinions in the SAM model pointed to the problem in the implementation of the federated model. Looking at the organization charts and the grouping of the departments, they seemed in line with the federated model, meaning that the application development groups were created within the business units and dual reporting relationship for the divisional IT heads were created. Yet, the location of the development teams and the way they were functioning were not different from what they would be like in a typical centralized IT organization. At the end of the study, it was apparent that the management couldn't diverge from the routine they followed for many years. Indicators such as the tendency of the employees' resistance to change (measured in the HR area) were also in support of this hypothesis.

As illustrated in this example, SAM not only helped identify Stonehenge's' maturity score, but it also allowed managers to identify specific problems and opportunities to improve the IT-business alignment. Once again, organizations should not be in pursuit of a silver bullet. All six components of alignment maturity should be considered to determine the areas that require improvements and the opportunities that exist to help improve the IT-business alignment maturity level of the organization.

The periodical SAM measurement and results at Stonehenge are reviewed by both business and IT managers to ensure appropriate alignment. SAM provides guidance for business changes as well for a better alignment. SAM assessment should be considered as a continuous process of improvement in the organizations facing turbulent changes in business environment to enable organization-led increased strategic alignment maturity in the organization.

8 Strategic Alignment Maturity and Business Performance

The concept of performance underlies a lot of the research in strategic management and information science. A broader conceptualization of business performance would include emphasis on indicators of operational performance in addition to indicators of financial performance. Under this conceptualization it would be logical to treat measurements such as market-share, new product introduction, product quality, marketing effectiveness, manufacturing value-added, and other measurements of technological efficiency within the domain of business performance.

Research done by Luftman, et al., validated the contribution of Strategic Alignment Maturity (SAM) to company performance based on the data gathered from 362 global organizations across four continents. The research identified that the six SAM components (Communications, IT Governance, Value, Partnership, Technology Scope, and Skills) have approximately equal contribution to form the overall SAM score and they are strongly correlated to each other, as illustrated in Fig. 13. Regarding the relationship of SAM and company performance, the regression weight (.34) for SAM in the prediction of Performance is significant, hence this proves the contribution of strategic alignment maturity as a major contributor to a company's performance (see Fig. 13). This relationship was found to be valid across all industry types, cultures, and geographic locations.

In addition, research has shown that the organization's structure – whether it follows a centralized, decentralized, or federated model – also has an impact on SAM maturity (see Fig. 13). Notably, companies with federated IT structures are able to combine the benefits of centralized structures (such as standardization and economies of scale) and decentralized structures (local flexibility and control). These companies tend to have higher alignment maturity ratings (Luftman 2007; Luftman and Zadeh 2011).

This relationship also supports the contention that achieving alignment is not a matter of addressing a single "magic bullet" issue. If IT-business alignment leads to better performing organizations, then the implication is inescapable. An organization that fixates on one component at the expense of others is all but certain to be an underperforming organization.

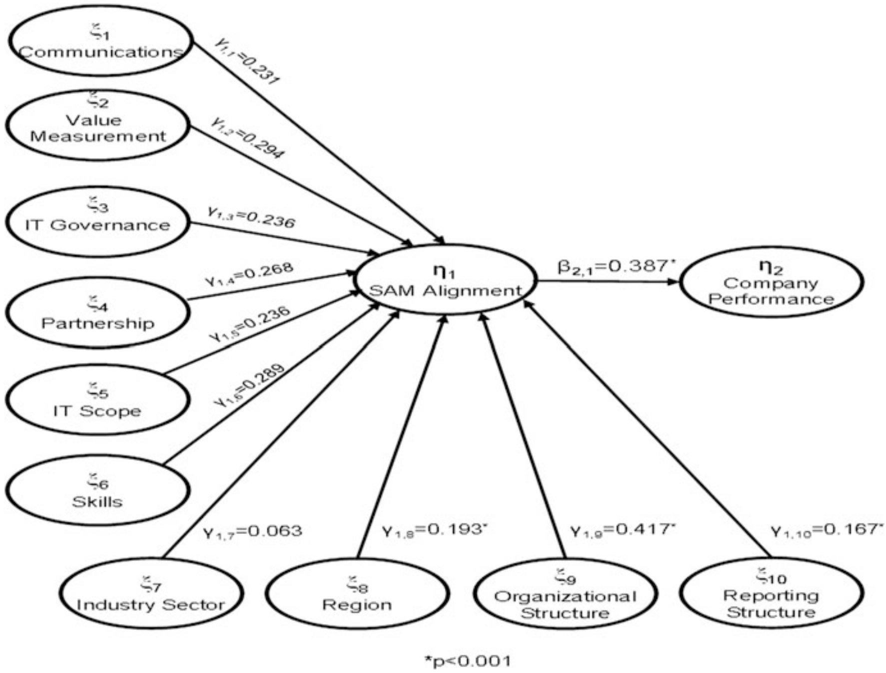


Fig. 13 Structural equation: IT value & SAM

This research builds upon the work done in 1993 by Henderson and Venkatraman, whose strategic alignment framework was based on four components: business strategy, IT strategy, organizational infrastructure, and IT infrastructure. This was the first time that a strategic alignment framework was used by both researchers as well as practitioners in the field.

As an example of the relevance of alignment for business results, Figs. 14 and 15 provide significant insights regarding the correlation between pharmaceutical companies ranking based on their alignment maturity score and the respective ranking of sales and productivity. Nine pharmaceutical companies are represented. It is clear that the higher the alignment maturity, the higher the respective ranking for the success of the company.

There is no better example than the success of Indian IT Service Companies to illustrate the significant contribution SAM has on the business performance. Given the consistently higher SAM scores for the Indian IT service companies, the remainder of this section will elaborate on many of our observations from working with these firms. For example, see Figs. 16 and 17 for SAM's contributions to Indian IT Service Companies.

The rise of Indian service companies has been a notable success when measured against other service companies from other geographic regions in standard indicators such as sales, exports, and employment. There is no single element that has contributed to the accomplishment of these firms but, elements such as legal

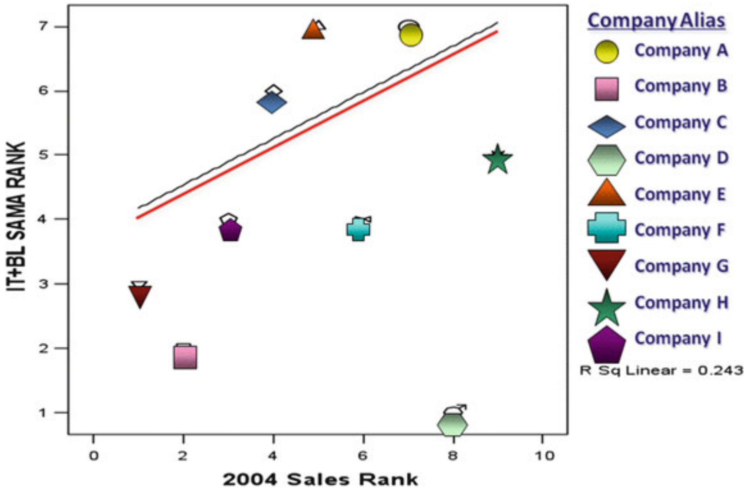


Fig. 14 Correlation between strategic alignment maturity & sales (pharmaceutical industry)

transparency, education, culture, population base, low labor costs, and quality have all contributed to their success. The growth of IT service firms has been possible not just because India is a less expensive alternative, but also because of the well planned strategy of building and marketing the domain skills adopted by these companies. Leaders of these service companies have carried out successful

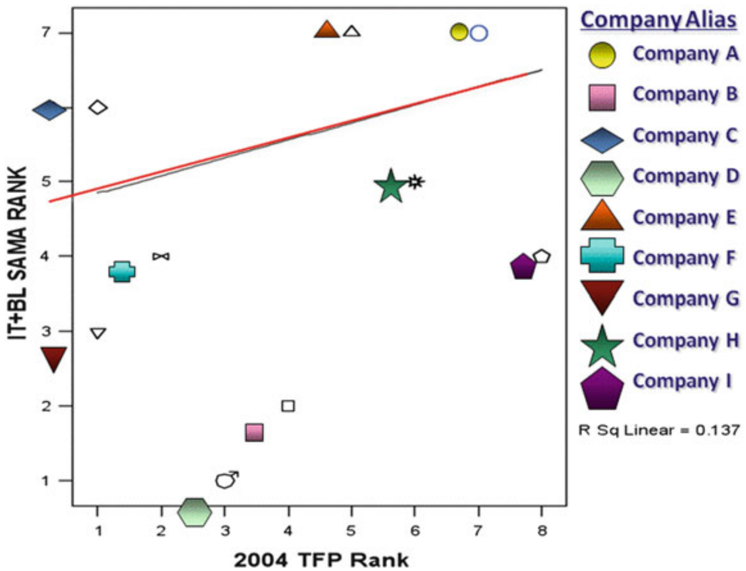
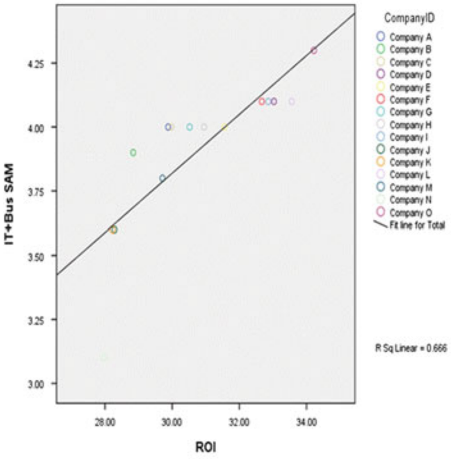


Fig. 15 Correlation between strategic alignment maturity & productivity (pharmaceutical industry)



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			SAM Total	.000
Kendall's tau_b	SAM Total	Correlation Coefficie	1.000	.401**
		Sig. (2-tailed)		.000
		N	.000	90
	ROI	Correlation Coefficie	.401**	1.000
		Sig. (2-tailed)	.000	.
		N	90	90
Spearman's rhc	SAM Total	Correlation Coefficie	1.000	.542**
		Sig. (2-tailed)		.000
		N	.000	90
	ROI	Correlation Coefficie	.542**	1.000
		Sig. (2-tailed)	.000	.
		N	90	90

**. Correlation is significant at the .01 level (2-tailed).

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.995	1	106.995	37.017	.000[a]
	Residual	254.360	88	2.890		
	Total	361.356	89			

a. Predictors: (Constant), SAM Total

b. Dependent Variable: ROI

Coefficients[a]

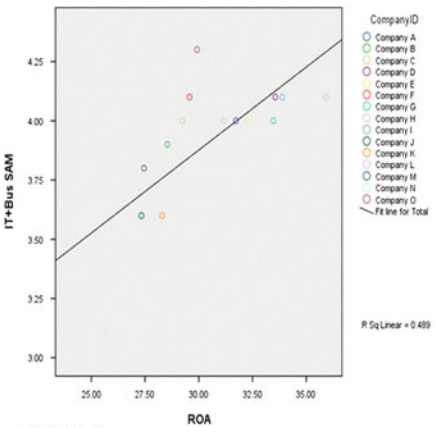
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	19.901	1.803		11.037	.000
	SAM Total	2.787	.458	.544	6.084	.000

a. Dependent Variable: ROI

Fig. 16 Correlation analysis of SAM scores to return on investment (ROI) – Indian IT service firms

initiatives to increase market penetration by expanding their global presence and by acquiring strategically important companies abroad. The outsourced business model has incorporated certain complementary organizational capabilities such as the human resource ability to scale up quickly in response to growth in demand,

Shows significant positive correlation of .345 at the .01 level



Kempaiah

Correlations

			SAM Total	ROA
Kendall's tau_b	SAM Total	Correlation Coefficient	1.000	.345**
		Sig. (2-tailed)	.	.000
		N	90	90
	ROA	Correlation Coefficient	.345**	1.000
		Sig. (2-tailed)	.000	.
		N	90	90
Spearman's rho	SAM Total	Correlation Coefficient	1.000	.468**
		Sig. (2-tailed)	.	.000
		N	90	90
	ROA	Correlation Coefficient	.468**	1.000
		Sig. (2-tailed)	.000	.
		N	90	90

**. Correlation is significant at the .01 level (2-tailed).

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	162.871	1	162.871	25.926	.000[a]
	Residual	552.831	88	6.282		
	Total	715.701	89			

a. Predictors: (Constant), SAM Total

b. Dependent Variable: ROA

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	17.057	2.658		6.417	.000
	SAM Total	3.439	.675	.477	5.092	.000

a. Dependent Variable: ROA

Fig. 17 Correlation analysis of SAM scores to return on assets (ROA) – Indian IT service firms software process management capabilities, and the ability to manage global operations.

IT Metrics: Demonstrating process quality and expertise in IT service delivery are the key elements driving India's sustained leadership in global IT services. From the birth of the industry, there has been a culture of quality. Various quality control and process management tools have been developed and improved in India. Indian IT service firms have been focusing on quality initiatives to ensure compliance with international standards. ISO 9001, COPC, Six Sigma are examples of some of the established quality initiatives. In fact, 90 out of the world's 117 SEI CMM Level 5 companies are from India (NASSCOM Strategic Review 2007); albeit their overall SAM is at 3.7. This implies that while India is exemplary in tactical and operational aspects of IT, they still have opportunities to improve in strategic areas.

Over the years, the Indian IT service industry has built robust processes and procedures to offer world class IT software and technology related services by developing next-generation tools, technology concepts, and standards. The quality of the software has not only impacted India directly (e.g., making India a favored destination for IT enabled services), it has also impacted the overall IT field by raising the software quality bar for all IT applications and services.

Indian IT service firms have a reputation for better, faster, and cheaper project delivery. These firms hire top talent who they immediately provide training in their SEI CMM Level 5 standardized methodology. They follow rigorous processes, employing quality management techniques and using the latest technology. They have developed a new generation of project-management skills that enables work to be carried out from multiple locations simultaneously. Core to this global delivery model is a heavy emphasis on quality standard.

Human Resources/Skills: Low-cost, highly skilled IT professionals are widely believed to be the key to India's success story. India has the single largest pool of engineering talent among the emerging countries. Over 50 % of the population in India is less than 25 years old. India's young demographic profile is a unique advantage, complemented by a vast network of academic infrastructure and the legacy effects of British colonization. These have all contributed to an unmatched mix and scale of educated, English speaking talent. 80 % of the IT professionals have engineering degrees. Having engineering degrees has helped IT service firms with problem solving skills, a rigorous method of thinking logically, and in learning tools that helps in adapting quickly with rapid changes in technology, domains, and tasks. This is in comparison to the reduction of these engineering and related computer science skills in the United States. Additionally, given the strong demand to have an appropriate balance of technical, business/management, interpersonal (communications, teams), it is clear that academic changes are required everywhere.

In-house testing and training has become a regular and significant component in the Indian service firm hiring process. Companies have also established dedicated facilities for employee skill enhancement initiatives. NASSCOM (National Association of Software and Services Companies) has developed a comprehensive skill assessment and certification program for entry-level IT talent. It also has implemented an image enhancement program to create the awareness of opportunities in the field of IT. The HR Skills maturity component for Indian Service companies is at an average score of 3.71.

Improvement in the quality of their education system is being actively discussed at the highest level of policy formulation in India. The educational curriculum is being upgraded to international standards at many institutions. When it comes to senior IT professionals or managers, IT service companies are able to manage with either the local experienced IT professionals or returning expatriates, whom IT service companies have found very useful in bridging cultural gaps between local IT professionals and foreign clients.

Partnership: For Indian IT service companies' culture and closer customer relationships are keys to competing successfully in providing high-end services. However, immigration rules for obtaining work visas create project planning and management risks. Recognizing these difficulties, Indian IT service companies are acquiring consulting firms in the United States and Europe, and are aggressively hiring hundreds of IT professionals from within the U.S. and Europe.

The irony, of course, is that as global companies from the West are trying to set up less expensive offshore delivery capabilities, the Indian IT service firms are building front-end consultancy in the West. Major IT service companies such as IBM Global Services, Accenture, EDS, and Ernst & Young are aggressively expanding their own operations in India because of the considerations discussed above.

Governance: Indian IT service firms are enjoying minimal regulatory and policy restrictions along with a range of incentives provided by both the state and the central governments. Software Technology Parks of India (STPI) have also helped the growth of IT service firms across the nation. Some of the major reforms such as rationalization of international taxation policies, mutual trade agreements with partnering countries, and a proactive and positive stance on international free trade are helping IT service firms to grow. Until the recent Satyam scandal, India had a relatively untarnished reputation.

9 Conclusions

Achieving and sustaining IT-business alignment continues to be a major issue, and is fundamental to successful BPM. Experience shows that no single activity will enable a firm to attain and sustain alignment. There are no silver bullets. The technology and business environments are too dynamic. The research to derive the business-IT alignment maturity assessment has just begun and the tools and processes are still being refined.

Much work still needs to be done to refine hypotheses around Strategic Alignment Maturity and to measure its impact on organizations and their ability to execute strategy.

Research conducted over the course of a decade clearly shows that companies are getting better at aligning their business and IT; albeit alignment is still a pervasive and persistent problem. Overall maturity scores have increased from 2.99 in 2000–2003 to 3.17 for 2009–2010. There is evidence that higher levels of alignment have positive effects on company performance regardless of industry type or organization structure. However, results from the assessment of 362 Global 1,000 companies demonstrates that some industries clearly do a better job of aligning their IT and business operations than others, Additional studies have linked high alignment maturity levels with better company performance measures, including sales, productivity, ROI, ROA, ROE, and NPM. The research also indicates that there are differences by region. This suggests that the strategic alignment of a company may depend both on industry norms as well as local factors.

Achieving significantly higher levels of IT-business alignment across a wider range of organizations is a long-term journey. The journey in each organization begins with a complete assessment of how business views IT, and how IT views business. The journey continues with how business and IT executives work together to close the gaps and improve the performance of the organization. And in the quest for continuous improvement within a dynamic global environment, the journey may never end.

10 Epilogue

This chapter has discussed the concept of Strategic Alignment Maturity as a critical enabler to an organization's ability to execute its strategic objectives and has explored the concepts of a model that can be used to assess alignment maturity for any organization. We have also explored the concept of strategic alignment as an ongoing process and reviewed a series of activities that organizations should follow in measuring and sustaining business-IT alignment.

It is not a question of whether an organization is aligned or not aligned. It is a question of how to enhance the IT-business relationship to help improve opportunities for leveraging IT. The Strategic Alignment Maturity Assessment is a proven vehicle for attaining this objective.

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Delivering Business Strategy Through Process Management

Roger T. Burlton

Abstract There is no shortage of planning activities in organizations today. However, the concept of a process to develop the connections between an organization's intent and its capabilities to enable that intent is woefully weak and inconsistent in most cases. This chapter strives to outline how an organization can develop a more rigorous statement of strategic intent as the starting point for all investments in change. It delves into what is needed to ensure that the hope expressed in such strategic plans and annual reports is actionable and becomes a reality. It provides a structured and repeatable method to articulate environmental pressures, intent, stakeholder interests, strategy, business processes, and various other capabilities and the relationship among them with integrity. It provides a process for establishing the business process architecture of the organization and uses it as the alignment linchpin to provide traceability from choices made in prioritized programs of change in technology, human capability, policy, and other supporting mechanisms back to their raison d'être: the enterprise strategy.

1 Introduction

This chapter will describe what organizations must do if they wish to see their bold statements of intent and strategic direction realized through the mechanism of business processes. In enterprise after enterprise in all sectors and countries there is no shortage of strategic plans and documented statements of positioning. In addition, there is no shortage of human effort and financial resources expended on programmes, initiatives and projects for change within many different professional domains. There is a large gap, however, between the performance and behavioural outcomes anticipated and the reality of what sees the light of day.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_2,

In my view, the prime role of Business Process Management (BPM) at this enterprise level is to assure that the various developed capabilities are aligned with one another and together they deliver traceable process performance back to the stated strategic goals and objectives of the "Organization-in-Focus" (OIF). The prime role of enterprise level process management, then, is to ensure that capability investment decisions for change and ongoing management of process operations are always in synch with a set of agreed strategic criteria and not to personal preferences of managers. Our processes should act as the coordinator to ensure we optimally allocate scarce resources consistent with delivering enhanced value to the customers of the OIF within the constraints of other stakeholders' requirements such as regulatory bodies.

The chapter is an update to my book: Business Process Management: Profiting from Process (Burlton 2001) that shows a framework for establishing or validating strategic intent in a form that can be leveraged. It will identify means for identifying and resolving potential conflicts among various stakeholders' needs and expectations, products and services and business drivers. It will show how customer relationship lifecycles can be used to ensure we focus on the core value proposition, value chains and value streams against which all other internal efforts and capabilities should be assessed. It will define the processes to manage the relationships with all stakeholders and to support the core value chain to customers, also known as business process governance. It will establish a set of reconciled stakeholder-based criteria to help prioritize and manage changes downstream.

The chapter will consider the role of industry reference frameworks which, along with stakeholder and asset lifecycles, will produce a stable process architecture defining 'what' the OIF does today and will do in the future. This architecture along with the strategic and stakeholder criteria developed earlier will assure that improvements in 'how' the processes perform are prioritized and resourced according to traceable strategic drivers resulting in an aligned program of change.

It will briefly discuss the performance management aspects of BPM made possible by the process architecture and the stakeholder analysis and how these plus the strategic objectives of the OIF provide the basis for a better scorecard and human motivation system.

Also, the chapter will briefly introduce the connection to the capability aspects of the enterprise including technology, human competencies and culture, organizational design, facilities, equipment and locations, policies and business rules and knowledge sharing.

2 Lost in Translation

2.1 Today's Reality

By now, we all know that many grand ideas are never realized. Classically somewhere in the range of half of all ideas described in strategic plans never see the light of day and a high proportion of those that do are late or misaligned, thereby robbing the enterprise of opportunity promised in some form of compelling business case. These are sad numbers and they have led many organizations to be very wary of strategic planning; sometimes seen as not worth the effort. Consequently, many of these organizations have reverted to disconnected functional and tactical planning instead. These functionally oriented approaches, however, have actually led to value streams and workflows full of disconnects and waste. Today, moreover, everything an enterprise does is interconnected and the rippling effect of a change in one domain or department can spill over to many others with severe unintended consequences. We still see plans developed by functional managers that largely disregard their peers' needs and are blind to the ultimate value proposition to customers. The assumptions made by these domain managers are often self serving due to incentives to be that way. They may optimize their parts while sub optimizing the whole. This should be no surprise since their motivation, as driven by formal accountability mechanisms, encourages localized behaviour.

Functional managers request services and capabilities from enabling parts of the organization such as Information Services and Human Resource departments based on their functional needs and in many cases the functional groups own the budget for change making it difficult to paint a bigger picture from an enterprise capability perspective. The resource allocation processes often drive support groups to become tactical order takers at the expense of their own future credibility. This is how many organizations ended up with 20 or 30 applications and databases all supposedly containing the same but redundant customer information that cannot be consolidated.

In this vein, a number of management styles have proven to be sub optimal:

- Management by order-taking
- Management by decibel level
- Management by bullying and ridicule
- Management by hope and slogans

There is a better way than taking an all too prevalent inside-out approach that ignores enterprise strategic intent and customer value creation.

2.2 The Outside-in Perspective: The One That Counts

Customers and consumers do not care at all about our insides. As a matter of fact no external stakeholders do. They only value what they get and how they are treated. There are many approaches to becoming capable that have been in existence for some time that recognize this. Fortunately these are becoming better and better recognized, especially in difficult economic or competitive circumstances.

- Lean and its predecessors Kaizen and value analysis are completely built around the concept of starting by understanding what the customer values and assessing all activity in order to eliminate "waste" or unnecessary non value added work.

- Michel Porter brought us the concept of Value Chains whereby we evaluated how well all the key aspects of work could be planned to optimize the whole company not just the parts of an enterprise.
- Kaplan and Norton brought us the powerful models of Value Proposition (Kaplan and Norton 2001) to help organizations sort out the predominant style, thinking and behaviours they needed to differentiate themselves in the marketplace.

If we take a customer centric approach, then all of these methods just reflect the common sense that places the consideration of 'ends' before 'means'. Fortunately we are starting to see organizations take aligned strategy and capability management more seriously.

- A BPTrends survey in 2006, 2007, 2009 and 2011 asked the question 'What does BPM mean to your organization?' Approximately 40 % responded that it is *'A top-down methodology designed to organize, manage and measure the organization based on the organization's core processes*' (BPTrends 2009).
- Under the industry leadership of John Zachman, mature levels of Enterprise Architecture have become more than just technology planning for IT organizations (Zachman 2009).
- Kaplan and Norton's Balanced Scorecard, used intelligently, is becoming adopted as a way of seeing more than just a financial perspective on corporate performance (Kaplan and Norton 2006).
- Compliance programs such as Sarbanes Oxley and Basel II, as well as many others, can be implemented to help cross functional management of value chains as well as meeting compliance regulations.
- The concept of Customer Relationship Management has the potential to be more than a technology if it starts with customer relationship values and not software as its perspective. Other forms of Enterprise Resource Planning (ERP) have the same potential.
- Service Oriented Architecture (SOA) starts with the goal of reusable software assets across a set of enterprise processes.

Our risk is perhaps now having too many choices of potentially competing and confusing cross functional programs that will vie for management attention and lead to a hope that one of these is sufficient and can solve all problems and deliver on the enterprise strategy with traceability of performance and alignment of capabilities. To stay connected to intent they will all require a common process perspective and set of artifacts.

2.3 Methodology Implications

With so many pressures and options facing managers an integrative approach seems necessary. Modern methods recognize the need to work at many levels in many domains but also to be connected among them. The BPTrends Associates Pyramid

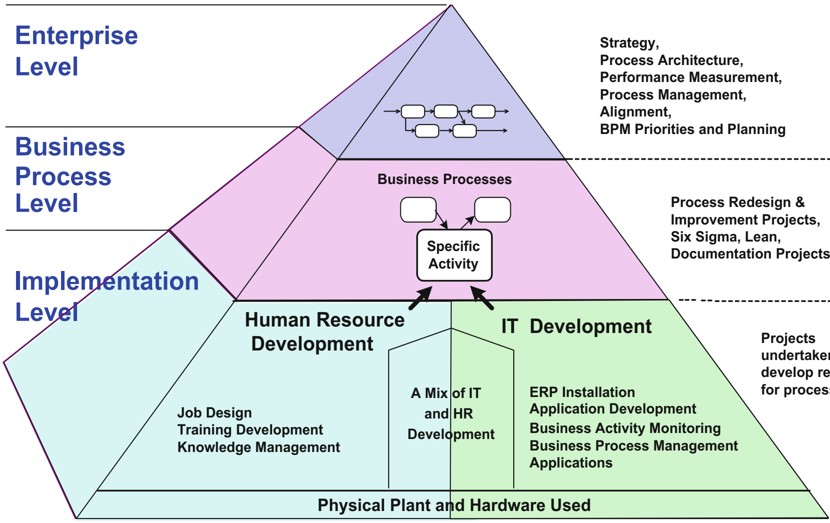

Fig. 1 The BPTrends Associates Pyramid (Harmon 2014)

conceived by Paul Harmon in Fig. 1 shows an Enterprise level that deals with overall strategic alignment and management of the process asset with governance, prioritization and resource allocation for process transformation. The Process level takes individual processes or activities and scopes, analyzes and designs new ways of working with a healthy dose of project management thrown in. The Implementation level builds the technological, human and infrastructural resources required for the processes to work and intent to be achieved. These can be done independently but strategic alignment is best served starting at the top and working down selectively within the scope of the architecture.[1]

The BPTrends Methodology, derived from the Process Renewal Group (PRG) Methodology is shown in Fig. 2 developed over a decade ago, it has always provided a multi-level approach that connects the enterprise, process and implementation aspects of the BPTrends Pyramid and adds the post project aspect of governance and continuous improvement.

The Burlton Hexagon shown in Fig. 3 shows that processes are the mechanisms that are measurable and deliver performance through the definition of the process KPIs in support of the stakeholder relationship and corporate objectives. It also shows that work flows by themselves are not sufficient. The processes must also consider the constraints or empowerment delivered by policies and rules, software technologies, facilities, all aspects of human capital, human motivation and organization design.

[1] Harmon (2014) provides an in-depth discussion of these levels with regard to the scope and evolution of Business Process Management.

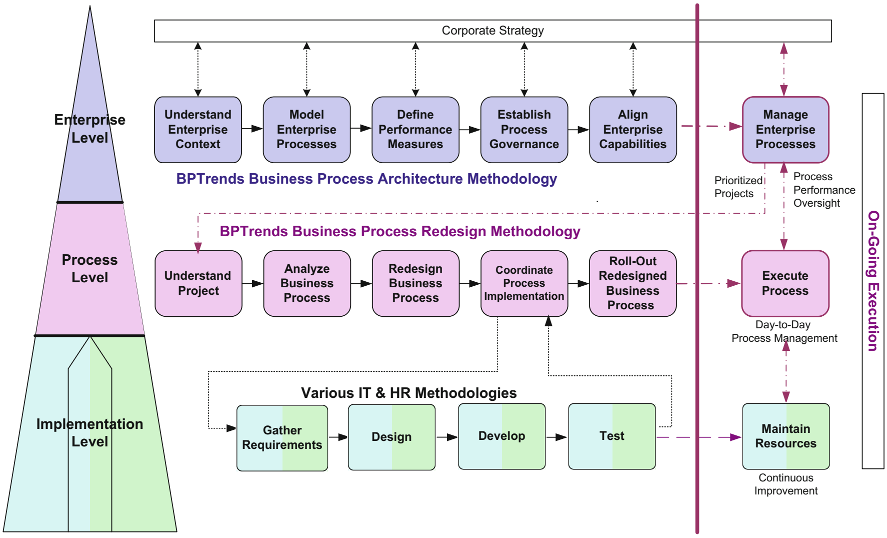

Fig. 2 BPTrends' business process management methodology

At all levels of the pyramid, alignment among the hexagonal components must be established and maintained. In addition, with processes being managed as corporate assets at the enterprise level then traceability of the hexagonal components to strategic intent is mandatory. Clearly the management of the information asset is also critical since information is created, consumed and updated by business processes.

3 An Integrative Model from Drivers Through Aligned Capability

Figure 4 is essential to align all capability to Strategic Intent. External factors are understood, strategic intent understood and strategy derived including stakeholder value propositions. Processes and other capabilities needs are compared to current capabilities of various sorts, gaps are identified, aligned and prioritized aligned programs of change established. Cross functional capability enhancement programs and projects are resourced and conducted. Traceability of changes is carefully monitored against strategic intent.

Figure 4's approach is supported by the first three activities in the enterprise phase in the BPTrends Enterprise level work as well as one aspect of the last one: Manage Enterprise Processes.

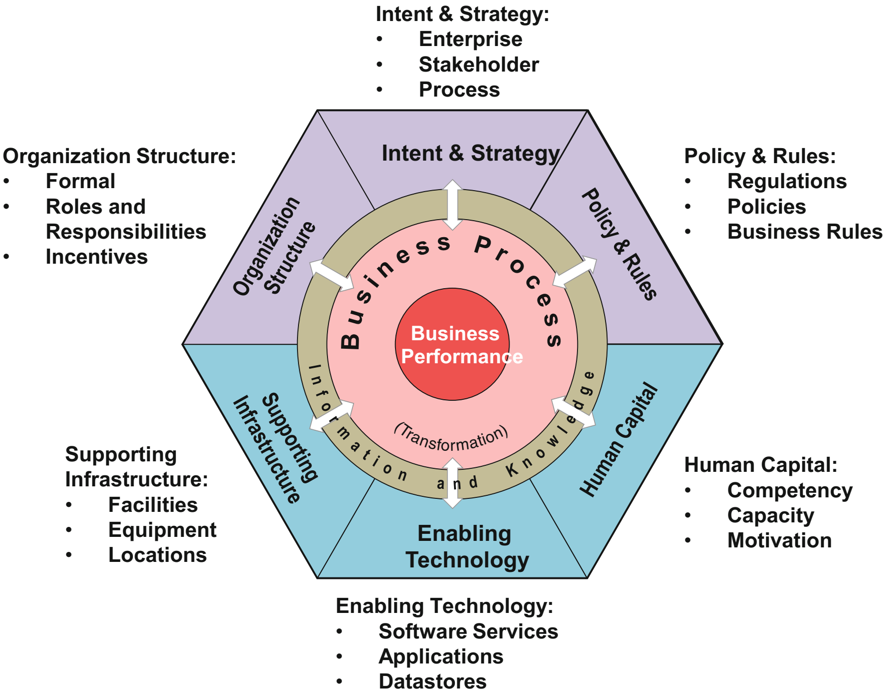

Fig. 3 The Burlton hexagon: using business processes as aligner of capabilities

The chapter will describe in turn the activities and deliverables that the top line of enterprise activity encompasses It will cover:

1. Understand Enterprise Context
2. Model Enterprise Processes
3. Define Performance Measures
4. Establish Process Governance
5. Align Process Capabilities
6. Manage Enterprise Processes

I will deal with each of this in order with only a brief discussion of the last two (5 and 6) which will be covered elsewhere.

It should be recognized that the activities will naturally build off of one another in a never ending cycle from year to year. The next round of enterprise strategy formulation may be constrained or enhanced by current and planned capabilities from the previous round. If you are fortunate then your new capabilities will be leveragible into new strategic plans that exploit them. Consequently, the activities in the two boxes are significantly iterative although, for the sake of explanation, I will show these sequentially.

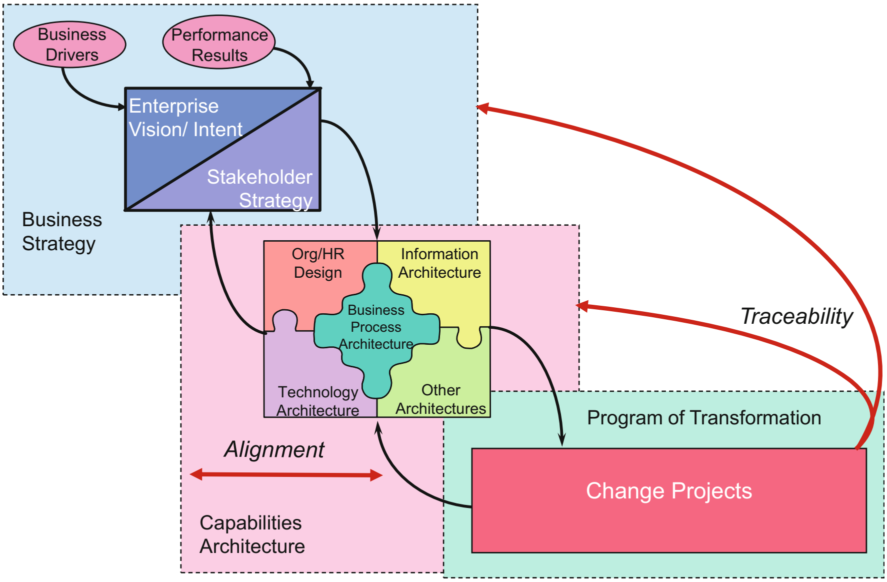

Fig. 4 Process centric strategic integrity model

3.1 Understand Enterprise Context (Methodology 1)

3.1.1 Purpose of the Activity

The purpose of this methodology activity is to understand and validate:

- The planning horizon for the strategic statements
- The scope of the enterprise "Organization in Focus" (OIF)
- External and internal business drivers
- The strategic intent of the OIF
- Organizational principles
- Known OIF strategies
- Existing OIF scorecards
- The strategic criteria for future decision-making in all following process work

It is important to note that, when it comes to the perspective of managing processes as enterprise assets, the work of the architects has a context that is traceable to the intended direction of the OIF. Consequently, the effort conducted at this point is NOT to be confused with actually developing corporate strategy but instead it is to understand what has been done and be sure that the interpretation of it is a commonly understood and accepted one. Lack of agreement is a warning flag that cannot be ignored since processes have purposes and the analysis of performance and capability gaps must be assessed against a common set of accepted criteria. If some members of the senior management team see the OIF as being all about customer relationships and others believe that cost reduction and operations

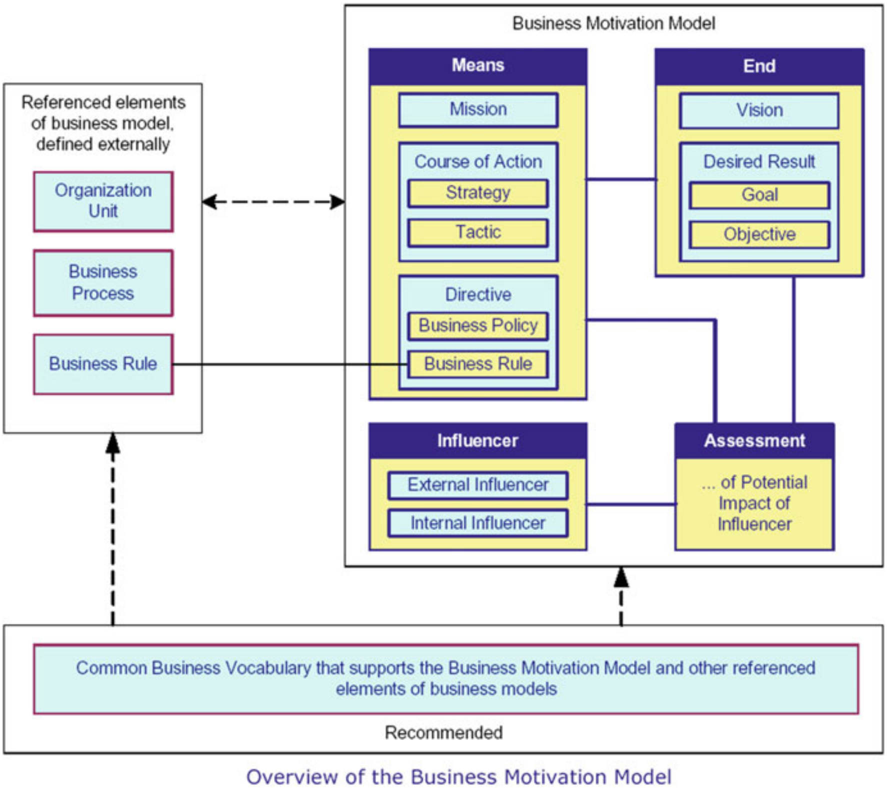

Fig. 5 Object management group's business motivation model

should be the emphasis then the remainder of the enterprise level BPM work will thrash and stall.

3.1.2 Strategic Concepts

A good starting point and repeatable metamodel for this work has been evolving over the past several years thanks to the work of the Business Rules Group. This work is now published as the Business Motivation Model (BMM) standard (OMG 2009) by the Object Management Group. One only has to look at any number of strategic documents across organizations to find that words such as 'Mission' and 'Vision' become confused. 'Goals' and 'Objectives' are freely used interchangeably despite their differences. Even the term 'Strategy' itself is inconsistently applied. This problem of lack of precise wording has made it difficult to document statements of direction in any repeatable fashion. It also means that it is difficult to communicate higher statements of intent and approach to lower levels of the enterprise and to ensure traceability of performance tracking from bottom to top.

The BMM shown as Fig. 5, defines both the structure of the strategic concepts as well as the semantics of the terms used. It not only covers the traditional components of strategic planning but also includes the concepts of Influencers (stakeholders in the remainder of the chapter) and Assessments. These will be covered in later sections. An important feature of this model is the perspective offered on its components by Reference Elements. The ones of most interest from the point of view of BPM are Organization and Process. The message is that every level of the organization and also the processes of the organization should have a model with a consistent structure as depicted by the BMM framework.

3.1.3 Scope of the Strategic Models

The BMM implies, as does common sense, that every part of the enterprise from the whole to specific units should be able to articulate its Mission, Vision, Goals and Objectives as well as other driving motivations. The same is true for each and every process. Of course, the set of organizational and process attributes should also be connected, aligned and traceable among one another.

At the enterprise level a good starting point is to determine the scope of what is being addressed. Once again I will refer to this as the Organization in Focus (OIF). The OIF can be wide or narrow but must be clear. Some choices are:

- Group of corporations
- Corporation
- Division
- Department
- Internal Group

The advantages of a wider scope are better integrity of overall value creation and customer value chain benefits, however going too big can become time consuming due to complexity and is almost always political. The advantages of a more narrow scope are easier effort and less political struggles internally, however, sub-optimization is a common risk.

3.1.4 External Assessments

For the strategies of the OIF to have grounding external assessments must be understood by all. These external assessments can be opportunities or threats for us depending on our relative strengths and weaknesses. One of a number of variations of business environmental analysis approaches is labeled the STEEPL model (Kotter and Schlesinger 1991). The STEEPL components are:

- Social
- Technological
- Political
- Economic
- Environmental
- Legal

These are the realities from which we cannot escape. Separately or taken in combination, the enterprise strategy must honestly assess its ability to deal with them or better yet, be able to anticipate a range of external possibilities for them and be ready should they occur. For some, the drivers may represent great opportunities waiting to be exploited for business gain so long as resources are available to take advantage of them. For others, they may be seen as threats to be managed to mitigate risk. The response strategically will depend on whether the enterprise has internal strengths that can help leverage new business opportunity or mitigate the threat. Alternately if there are internal weaknesses it must determine how to overcome them to prevent business erosion or lost opportunities.

3.1.5 Strategic Analysis of External Assessments

There are a number of ways, described below, to discover strategies to deal with the opportunities and threats posed by the external drivers. A few of these are Business Scenario Analysis, Value Proposition, and the Balanced Scorecard. All have their strengths and are more powerful when used in conjunction based on a common process architecture framework.

Business Scenario Analysis

Responding to threats and opportunities as they happen is required but risky. Many organizations are trying to mitigate this as well as build more agile capabilities by using Business Scenario Analysis (Schwartz 1991) techniques originally developed by Shell Oil in the sixties. This approach assumes that no set of drivers is totally predictable so a range of possibilities should be considered from pessimistic through optimistic and assembled into possible scenarios. These are then used to test proposals for solutions and design for differing possibilities under 'what-if' situations. It emphasizes the planning elements (drivers) that have highest impacts and greatest uncertainty. Although there will be a range for each element some will be more likely than others. Some will be inevitable, some strongly possibilities and other just possibilities.

Value Proposition

A key component that subtly but strongly will drive the strategy and also the management of processes is the determination of the Value Proposition. Kaplan and Norton have stated that *"The Core of any business strategy is the customer value proposition, which describes the unique mix of product and service attributes that a company offers. It defines how the organization will differentiate itself from competitors to attract, retain and deepen relationships with targeted customers.*

The Value proposition is crucial because it helps an organization connect its internal processes to improved outcomes with its customers" (Kaplan and Norton 2001).

The Value Proposition observes that no organization can be best at everything and that although it must be competent in all things it has to lead with one of:

- Operational Excellence
  Customers value the efficiency and reliability of what the organization provides. Utility companies would fall into this category for the most part.
- Customer Intimacy
  Customers value the relationship with the organization above anything else. The products and services are secondary and can change based on the trust relationship with the organization. Knowledge intensive industries such as personal financial advisors would fall into this category for the most part.
- Product Leadership
  Customers value the uniqueness and novelty of the company's offerings. The company will focus on fast time to market and innovation primarily. Certain innovators such as some fashion or electronics companies would qualify.

Different companies can operate with differing propositions in the same industry. Each of them, however, reaches out in different ways of interacting with customers and consumers in the market. Finding the appropriate proposition can be hard and political but the process architecture depends on it and the allocation of resources for capability change demands it.

Balanced Scorecard

Kaplan and Norton also developed the concept of Balanced Scorecard and Strategy Maps as a response to the shortcomings of traditional financially oriented and backward looking measurement systems observed in most companies. They arrived at the concept that organizations should also be looking at a quadrant of measures that adds customer measures, process measures and learning and innovation measures to the traditional lagging ones. Over the years I have been using a slightly wider view of the measurement system to ensure alignment among all stakeholders, all processes, and all capabilities and building a traceability line of sight up, and across down the set of organizational units (Atkinson et al. 1997). Sometimes referred to as an "Accountability Scorecard" I and others have found it more suitable than a classic Balanced Scorecard when it comes to ensuring process performance traceability. The traceability line states that poor capability means ineffective or inefficient processes that affect customers and other stakeholder relationships negatively and ultimately poor bottom line performance at the enterprise level. Likewise strength at all levels drives hard to match business performance.

3.1.6 Documenting the Strategic Intent

Experience has proven that following the structure of the BMM from OMG shown earlier is useful in documenting the OIF's strategic statements in a form that will help the enterprise level BPM work to be conducted with integrity. Separating ends (vision, goals, objectives) from means (mission, strategies and tactics) crystallizes the articulation of the guides for the establishment of process prioritization and design later.

There are other strategic factors of interest such as principles and values but this set is a great starting point as an irrefutable context for relationship management and process management that follows. The strategy becomes more tangible when we add an analysis of the products and services we currently exchange and we want to exchange in the future with each of our external stakeholders in the next activity.

3.2 Determine Stakeholder Relationships

3.2.1 Purpose of the Activity

The purpose of the stakeholder analysis activity is to understand or determine:

- Customer segmentation
- Other external stakeholder types and sub types
- Today's and tomorrow's products, services and information given to and received from each stakeholder type (interactions)
- The starting point for process architecture development and process analysis
- The health of the current interactions between stakeholders and the OIF
- Consensus on the types of external relationships
- The expected needs and expectations (our goals) of the relationships
- The performance indicators and objectives (goals with KPIs and targets) of the relationship
- The supporting capabilities required to be successful

Especially useful will be the ends, means and assessments attributes described in the last section for the OIF but applied in a more focused way for each stakeholder relationship.

The first questions to be answered regarding external connections are 'Who cares about us?' and 'Who do we care about?' Some stakeholders interact with us on a regular basis and exchange things with us. Some stakeholders may not interact with us much but certainly affect what we do or are affected by what we do. Others may be interested but are not as close as the first two groups. We need to care about all of them and get them to care about us for the right reasons of course. Once we understand them we can decide what we need to do to optimize our part in the ecosystem within which we all participate. It all starts with gaining agreement on the classification of the various types of stakeholders that we wish to see. It is important to note that this classification most likely will not be identical to the classic marketing segmentation used for advertising or sales campaigns. The segmentation through processes is more based on how we interact with or deal with the various types. For example we may organize and structure sales messaging for selling to the banking marketing segment and the telecommunications market with different teams. However, the way we do the work and the sales approach itself may not need to differ even if the sales proposal terms themselves do. In this case we would say for the purposes of process management that the stakeholder type is the same at the higher level of composition even if the ads themselves differ. Be careful regarding the stakeholder segmentation names used and the definitions of them since this can be the source of major semantic, cultural and political disconnection.

The classic starting top levels of stakeholder types prior to decomposition are:

- Customers and Consumers: those we are in business to serve.
  This category is often not as simple as it may seem since there may be many intermediaries or channels to market, many types of products and services for different markets and differences among buyers, influencers and users.
- Owners: those who invest in or direct our activity.
  This category includes all the investors, boards of directors and senior executives. Again there will likely be sub levels depending on degree of control.
- Staff: those who work on serving and supporting the enterprise and its stakeholders.
  Staff is considered to be an external stakeholder type since members are part of the enterprise due to their own free will and will have to be attracted and satisfied personally as well as assuming internal roles once hired. There may be several types based on the permanency of their tenure or association with collective bargaining units.
- Suppliers: those who provide products, services and resources to us.
  Suppliers may be segmented according to their nature of supply.
- Community: those who govern, guide or influence what and how we do what we do.
  This can be a very broad category with many segments since those who provide regulatory and compliance requirements and certification will be different to those who may be simply influencers on us or for us.
- Competitors: those who fight in our markets for our customers.
  Competitors may be targets for capacity enhancement through acquisition of them or them of us.
- Enterprise: the enterprise itself.
  This category is somewhat esoteric in that it considers the enterprise to be a different stakeholder than its staff or owners or customers in that its perspective is sustainability and freedom to act in the best interest of its longer term health.
- Overlaps and Oddballs: those who play conflicting roles.
  There will always be other types that do not fit the normal sectors. There will also be those that play multiple roles such as customers or suppliers that compete with you or competitors that own part of your company.

These are all decomposable into sub types but there will be a practical limit to breaking down too far to the point where the further levels are not useful for enterprise level work. Each can also be weighted so that some will be considered more heavily when it comes to influencing choices and design decisions. The weighting is a strategic choice. You will have to ask yourself the question if the five customers that make up 75 % of your business volume should be considered the same as the thousands that make up the remainder. Your value proposition should help you since weights will differ among each possible choice. Remember if you do not weight them, you are saying they are all equally strategic and important and you are in fact weighting them.

3.2.2 The Stakeholder Business Context

The Stakeholder Business Context is a model of stakeholder interactions and exchange health. It is represented by drawing a simple diagram of the actual and planned exchanges delivered to and received from each stakeholder type and the “Organization in Focus” We can show all current and future exchanges including:

- Products delivered or received
- Services provided or received
- Information exchanged
- Knowledge shared
- Commitments (formal and informal) made
- State changes of various assets or relationships

When building a context model expect to find that an incoming item will often be paired with one or more outgoing exchange items. For example a request for credit may come in and a rejection or acceptance may go out in response.

A triage-like assessment of each exchange can be made to get a good start on understanding relationship issues and opportunities. Taken together it becomes obvious which relationships are in good health overall and which need serious attention in terms of the processes that support them or are supported by them. The real value of the exercise lies in the common insights gained across a typically diverse and silo’d group of internal decision makers.

3.2.3 Stakeholder Relationship Analysis

We will need a gauge of current versus future performance gap to discover the capabilities needed and the extent of change. Start with gaining an agreement on the future we want to see with each stakeholder type, determine how to measure the success and progress towards it and then derive the capabilities or critical factors required to close the gaps.

3.2.4 Stakeholder Expectations and Goals

A useful technique for sorting out the stakeholder vision is called Time Machine Visioning. In this ‘back to the future’ scenario the architect and strategist imagine themselves going to the future they would like to see at the planning horizon time when all results are in and the OIF is performing as desired. Statements are postulated as to what each stakeholder type would say, or better yet what you want them to say. It then becomes the OIF’s role to do everything necessary to make the statements come true. The statements become the voice of the customer and the other stakeholders as well. These are referred to as the stakeholder needs and expectations indeed become our goals for the relationship. The technique defines value criteria and keeps everyone aimed squarely at the purpose of the initiative but the criteria must be used as the guide to all design decisions. This is not to say that all stakeholders will love what we want for them but since it is our business we must choose. It is also good practice to write the statements as if the stakeholder were actually saying it in real sentences that may start with words such as ‘As a result of the success of the enterprise transformation program, we can now say . . .’ James G. Barnes book ‘Secrets of Customer Relationship Management’ (Barnes 2001), offers a set of categories for these statements that can be reused and interpreted in this exercise. This approach applies equally well when examining a single process for its stakeholder goals.

3.2.5 Measurement of Relationship Performance

The stakeholder goal statements are the basis for the determination of the performance indicators required to be able to monitor success of the relationship and progress towards success. These will now become contributing Key Performance Indicators (KPIs) towards the strategic intent ones. They measure value creation from the perspective of the stakeholder as well as the OIF. Both sides must realize value from the relationship to attain its expectations. These will be a combination of effectiveness, efficiency, quality, and adaptability. To avoid sub-optimization one KPI will not do. A balance among these will be needed.

The goal statements are also the basis for establishing the relationship objectives. That is the target values of the KPIs that the organization will aim for. These will be set for the same timing as the time machine destinations. They may also be established for interim points in time as milestones to be achieved along the way. These KPIs now become part of the Scorecard which in turn will be supported by process measures that will be derived from the process architecture.

3.2.6 Critical Success Factors (CSFs) and Required Capability for Relationship Success

The gap in current versus target goals and objectives will indicate the state of the relationship change required and the extent of supporting capability changes needed. The size of changes in each Burlton hexagon segment will be greater and more of the segments will be affected when the performance relationship gap is larger. Small performance gaps will not require launching major new systems but a big gap may. Small gaps will not require significant organizational changes but large ones may depend on them.

In order to discover the CSFs, make sure you answer the following question: "In order to achieve our vision and improvement targets from where we are today it is absolutely vital that . . ..". Obtain three to five responses from the perspective of each stakeholder type. Consider all aspects of the hexagon as well as dependencies on other processes. The responses should be linked to strategic intent and the stakeholder goals and objectives discovered earlier.

Taken together, the results of the stakeholder analysis will provide additional strategies and criteria for later decision making as well as the beginning of the design of the process architecture. There will be conflicts among stakeholder perspectives that will have to be sorted out. This is the time to do it not later in the middle of design, or worse, implementation.

3.3 Consolidate Strategic Criteria

3.3.1 Purpose of the Activity

The purpose of this methodology activity is to:

- Discover and reconcile inconsistencies and conflicts among stakeholder views
- Gain agreement on the decision making criteria to be used to:
  - Assess alternatives and prioritize resource allocation
  - Remove personal biases toward solution design in later transformation activities
- Balance the enterprise's intent with the stakeholder criteria

This activity provides assurance that the process architects will subsequently design an architecture that truly helps the enterprise manage the capabilities required to attain its corporate objectives with the appropriate value proposition. It will validate the fit among strategic components, contradictory programs and among conflicting stakeholder perspectives.

Ideally this will be a simple negotiation that will also summarize the results into a brief OIF and Stakeholder Charter upon which programs of change will be chosen. It also will be the starting point for defining the process architecture that will define the structure and organization of OIF processes.

3.4 Model Enterprise Processes (Methodology 2)

3.4.1 Purpose of the Activity

The purpose of this methodology activity is to determine:

- All value chains, value streams, business processes and sub processes of value to the enterprise stakeholders
- The relevance of any published industry process frameworks to the OIF
- The Core Processes of value to the customers of the organization
- The Guiding and Enabling Processes supporting the Core
- High Level Process Map and Attributes
- The KPIs of the architected processes

The BPTrends pyramid articulates the levels of process work we can conduct. Our challenge is to optimize process performance at all of these levels. However, the Process Architecture that describes what we do in terms of what's important to those for whom we do it, starts at the top. Its existence provides significant benefits to business process decomposition since it automatically provides context and scope for each. Since the performance scorecard must provide traceability from what everyone does everyday to full process results to stakeholder value to attainment of strategic objectives there is no other way to connect these dots. We need integrity delivered by a sound and elegant architecture.

The architecture is built from the perspective of a clear "Organization in Focus" with defined boundaries and responsibilities. An architecture level process is defined by the Business Process Manifesto (Burlton 2012): Now translated into more than 12 languages. 'An organization's Business Processes clearly describe the work performed by all resources involved in creating outcomes of value for its customers and other stakeholders.'

It starts with an understanding of the exchanges developed as part of stakeholder analysis conducted earlier. Common sense will tell us that everything coming into the OIF must come from an external stakeholder and be received by at least one process and likewise everything leaving the OIF must go to an external stakeholder and be produced by at least one process. This is the essence of integrity.

The interactions that come from and go to the customers, consumers and main value chain partners will mostly define our Core Processes. The ones that involve owners, regulatory or influencing stakeholders will define our Guiding Processes. Those which send and receive reusable resources such as technologies, people and facilities will establish our Enabling Processes. The typical depiction of these with Guiding at the top, Core in the middle and Enabling at the bottom is shown conceptually in Fig. 6.

A well formed architecture will exhibit a set of processes consistent with well formed naming conventions also as defined by the Business Process Manifesto

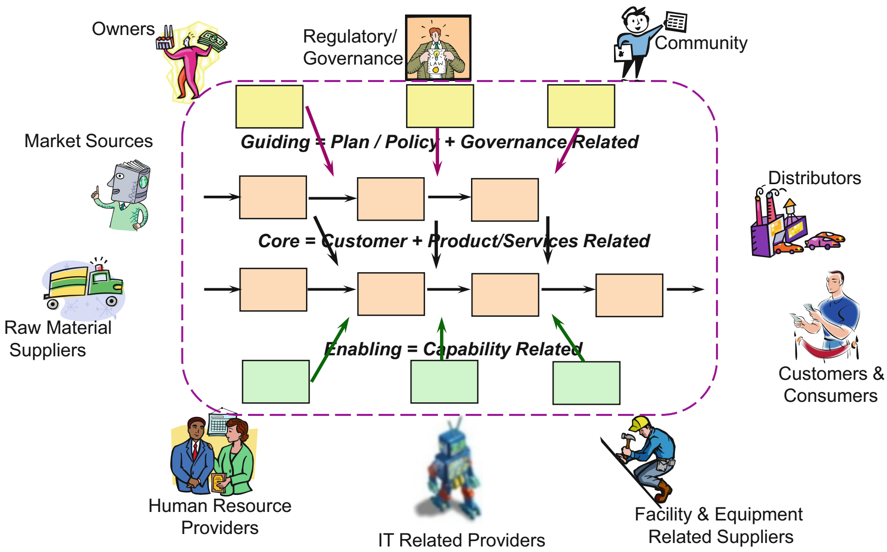

Fig. 6 Stakeholder-driven processes

(Burlton 2012). The first of these is simply that each process, activity and task, should be named by an active *verb-noun* combination. Just as a sentence needs verbs to indicate action or transformation so does a process. In addition, the name should be strong and not employ some non-descript or lazy verb. The process name should unambiguously communicate the intent of the process not its start or some vague action. That means that non–verb structures cannot be tolerated. Gerunds and other noun forms with endings such as . . .ing, . . .ent, . . .tion and . . .al must not be used.

'Marketing' is not a name for a process. 'Procurement' is not a name for a process. 'Evaluation' is not a name for a process. 'Approval' is not a name for a process. All of these are unclear and in many cases extremely confusing with imprecise starts and stops and a strong association with an organizational function. Unfortunately this vague form of the language is used by many Enterprise Architects who have chosen to name the organization's capabilities this way rather than using clear process names as the foundation of defining the abilities required. Process names must be crisp, unambiguous and convey commonly understood meanings. This means that, despite what some process modeling academics have shown in their works, the following lazy or vague verbs such as manage, handle, process, and do should be avoided if possible and replaced by something definitive that is outcome oriented. Rather than say 'handle order' say 'fulfill order' which shows the result of the process. Rather than saying 'Manage IT' say Provide IT Capability. Show the process value proposition in its name and do not clump several processes together under a functional heading. This is not a trivial suggestion. Do it and you will thank me later.[2]

3.4.2 Lifecycle Approach to Building the Architecture

Business Processes move stakeholder relationships through a lifecycle of state changes – from unawareness through termination of the relationship. They also move enterprise assets and other items of interest through a lifecycle of their own – from idea through retirement or termination. There is a time when our customers do not know we exist. There is also a time when they will no longer be customers or potential customers for whatever reason. There is a time when a product has not yet been thought of. There is also a time when it has been retired from service. In between these extremes are a series of state changes that require someone to do something to move them to the next progressive state. These are processes in value streams that we have to make work otherwise potential customers will not be identified, qualified or sold to. There are also processes that take product ideas and test them, launch them and sell them. Among the relationship cycles and the asset cycles there may be redundancies. The customer cycle will sell products as will the product cycle. The lifecycle approach is typically easy for staff to articulate one at a time and it avoids the normal problems of seeing processes within organizational boundaries since it looks at the life of a relationship from the stakeholder perspective and not the internal organizational one. The lifecycle approach does not miss much and is easier for subject matter staff to work through methodically and for architects to facilitate.

3.4.3 Reference Frameworks Approach to Building the Architecture

In the past decade we have witnessed the growth of a number of industry and specific value chain process frameworks or reference models that articulate a set of best practices for viewing and managing the work of organizations. These frameworks serve the purpose of providing a starter kit or a point of comparison for organizations that want a consistent way of evaluating themselves against a benchmark. Typically organized as a hierarchy of functions, processes and activities with or without dependencies among them, they provide names, descriptions,

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[2] Methodological aspects of how to architect high quality business processes are covered elsewhere in this handbook. Reijers et al. (2014) present a framework for realizing high quality process models and discusses additional parameters for deriving a well-formed architecture. Koschmider and Oberweis (2014) suggest an approach to design business processes with a recommendation-based editor. This approach can help overcoming productivity barriers and low process model quality by reducing the need for the user to study the modeling notation. Becker et al. (2014) point out that it is not only important to create models which can be readily understood by humans, but also by computers in order to improve decision making on process architectures.

performance indicators and other attributes that may be reused. These frameworks are not always relevant due to the peculiar nature of the business. They may also use names that clash culturally. Few organizations can expect to simply take the reference models and apply them without thought or some amount of assessment and modification. For process areas that simply require a best practice, these often work well. After all, if you are building capability that will not differentiate you no matter how good you are in it, why would you want to stray from what is proven? Why would you not examine the documented results of work performed by many intelligent professionals who typically would have collaborated over a long period of time to reach consensus and subsequently had the ideas tested in the real world. However, in the areas that you have chosen to be the basis for competition or differentiation, taking on the industry best practice alone will make you the same as the industry at best. Is that 'best' good enough for you? If not, you have to develop your own models or variations and then keep quiet about them.

Generic Enterprise Models

There are a number of models intended to describe organizations of all types in all sectors. The best example of these is the original Process Classification Framework from The American Productivity and Quality Center (APQC) (APQC 2009). The PCF is very general in nature since it does not try to be industry specific. It is, however a useful reference in that it is comprehensive, covering not only core processes but also, enabling, guiding and management ones that some other frameworks overlook. It tends, however, to quite functionally-oriented in places where it takes an area such as the finance function and drills into its activities rather than seeing these as components of other wider processes viewed from an outside-in stakeholder perspective. Nonetheless it is a useful reference but cannot be relied upon alone to replace good enterprise analysis of processes.[3]

Industry-Specific Models

There are a number of industry models in place and emerging that aim to describe an industry in whole. The implicit assumption is that every player in the industry is essentially the same as all the others at the basic level. One of these is e-TOM from the Telemangement Forum (TeleManagement Forum 2009) which describes a generic telecommunications organization. In places it is remarkably useful as a process reference, especially in the area of provisioning and similar engineering like processes. Recently APQC has released a set of industry specific frameworks for certain industries that are more helpful. In all of these be careful of a tendency to

[3] Aitken et al. (2014) propose a generic approach to develop organizational models based on process classification frameworks such as the APQC framework.

be functionally oriented. Nonetheless, many do contain just about everything a company might wish to do if you look hard enough.

Domain-Specific Models

There are a number of models developed surrounding particular functions within the organization and the processes within them. Some of the best examples of these can be seen in the IT function. Most prevalent is ITIL (IT Infrastructure Library) (IT Governance Institute 2009) which is a framework of best practices supporting IT services management. It is particularly strong in the areas of service support and weaker in the general IT management aspects for which one might supplement with other models. Its use is very widespread in the IT community and recognized as best practice. Another model that works well in the IT Domain is COBIT (Control OBjectives for Information and related Technology) which was originally developed as an IT audit framework by the non-profit ISACA organization but is now being recognized more for IT management in general (IT Governance Institute 2009). It is a good partner model for IL especially as the two frameworks start to converge in their latest releases (ISACA 2009).

Process, Lifecycle and Value Chain Models

The longest running framework that takes the perspective of end to end business processes as the point of view would be SCOR (Supply-Chain Operations Reference) (Supply Chain Council 2009). Its purpose is to examine all work in a connected business process chain from the supplier's supplier through to the customer's customer across and within enterprises. In existence for about a decade and supported by over 800 member organizations, it is well respected and highly adopted in companies and industries with significant logistics challenges especially across multiple partners. A growing perspective, however, is that supply chains exist in various guises beyond the movement of physical goods and advocates of SCOR will use it for non traditional process customer – supplier challenges.

The VRM (Value Reference Model) has a wider perspective than SCOR although it also tackles supply chains (Value Chain Group 2009). It has added product development and customer relations perspectives as well and, when taken together, these provide a wide value creation framework more universal than SCOR. These describe the normal process sequences and dependencies in order to take and deliver an order, get a product to market and optimize a customer relationship. They do not cover the general management of the business nor the provisioning of reusable resources. While weak on these guiding and enabling processes, these two are quite robust in their areas of focus.

A government-oriented services framework has been developed by the Government of Canada. GSRM (Governments Strategic Reference Model) takes the lifecycle perspective of a generic government service from concept through decommissioning (Treasury Board of Canada Secretariat 2009). Its patterns are intended for use by governments to manage the life of services at each of the stages of maturity.

3.4.4 Architecture Consolidation

Both the process lifecycle and the process frameworks approaches have merit. The combination of them is unbeatable in completeness, richness and relevance. Both approaches tend to delve to a level of detail that is deeper that the single page snapshot that is often seen in the first view of process architecture diagrams. Careful layering is needed to ensure that a manageable architecture is derived. A rough guideline of 10–15 core business processes and an equivalent number of guiding and enabling business processes for a total of about 30 should exist at the top layer showing the value chains and value streams has been found to be useful. This mile-wide and inch deep perspective ensures we see the full picture at all levels. Each of these top level processes can be broken into a similar number of sub processes depicted on their own diagram.

Keep in mind that the structure and semantics of the architecture will be political, there will be a functional bias and it will be confusing for those not exposed to process thinking. Be prepared to make those managers aware before trying to sell the models to them. You are changing the semantics and to some degree the culture of the enterprise as you do this so be patient and give it enough time to steep.

3.5 Define Performance Measures (Methodology 3)

3.5.1 Purpose of the Activity

The purpose of this methodology activity is to:

- Identify the key performance indicators (KPIs) to be used for each business process
- Associate the process architecture KPIs with the strategic objectives and stakeholder measures
- Determine traceability of measures across the start to end of the value streams and end to end business processes
- Identify which measurement data can only be captured in processes later in the value stream that reflect those ones earlier such as customer complaints

Measurement attributes at this level must be consistent with or contribute towards the enterprise scorecard. They will have a vertical perspective connecting business processes to the more strategic measures and a horizontal one connecting to the prior and following processes as well. Both are important.

Top Down and Horizontal Perspectives

By now we should have a good start towards the strategic measures of the OIF and the ways to measure stakeholder relationship success. If not we must go back and get this clear or the process architecture level will have no measurement context or criteria. For each business process at the top level of the architecture we determine which processes are relevant in support of the strategic direction of the OIF, which are of value to the stakeholders, and the KPIs for each process in terms of the support for the higher level strategic and stakeholder KPIs. We must also establish the KPIs for each process that can only be captured in a later process if there are any. For example the measures of customer satisfaction or dissatisfaction with the taking of an order may only be measured in a downstream process that receives and settles returned goods from the customer. Effectiveness measures typically fall into this category only becoming apparent later in the value stream. We can also set the targeted performance objectives for the process at this time. Remember that an objective is a KPI with a target level by a defined time.

It is critical to have well-formed KPIs since in many cases the ones proposed are not truly measurable. A well-formed KPI has the following characteristics:

- Relevant: supports the assessment of a purpose, vision or goal
- Comparable: has a Unit of Measure
- Time-bound: is associated with a period of time or a point in time
- Measurable: reliable data can be attained without bias or excessive time and cost
- Trustworthy: people feel confident that it is accurate

Finding a combination of KPI types is best practice since focusing on one type alone often leads to sub-optimization in the others for the same business process. For example becoming too efficient can affect resource availability and hence service to customers. In addition, the performance of an early process may affect those that follow in a way that diminishes the downstream process' performance due to questions not asked or inattention to data quality. Once again, four types of measures are efficiency, effectiveness, quality and adaptability. Look for one of each for each process and never lose sight of effectiveness.

Efficiency and Quality measures are traditional based in more traditional industrial engineering disciplines and are typically the easiest to measure since they can be easily counted up, divided and compared at all levels of a process decomposition.

Effectiveness measures are those which are associated with the value received by the business process customer or output recipient. Effectiveness measures are typically harder to measure since they require the receiver's perception of value to be known. They have their basis in total quality management disciplines such as Lean and consequently measuring effectiveness at lower levels of process decomposition may not be useful if it truly is the whole stream that is important to the receiver. In these cases proxies that stand in for the overall KPI may have to be found.

Efficiency and Effectiveness measures do not question the product or service or capability that is being produced. They assume that these are stable. Adaptability measures are those which are associated with timing of product and service availability or the ease of capability change. In response to or anticipation of strategic or product changes.

Measurement sounds much easier that it is and means of gathering reliable measurement data are sometimes the biggest issue. Some information may not be affordable or even possible to capture in a timely fashion. Some may be highly suspect in terms of bias and reliability. Sampling theory requires statistical significance. It also questions relevance as to the time the sample is taken. All too often, projecting the sample results to the full population from which the sample is taken will be biased by the time of day or year when the sample is taken. The anthropic principle (Bostrom 2002) tells us that the act of measuring often changes the measurement results due to motivational or physical factors involved in the measuring. For example watching staff conduct the work will surely result in different behavior that when no one is around. In considering the KPIs we must consider the feasibility of the means of gathering reliable data in addition to the unit of measure itself.

3.6 Establish Process Governance (Methodology 4)

3.6.1 Purpose of the Activity

The purpose of this methodology activity is to:

- ensure clear responsibility for all processes
- establish sustainable process governance and start-to-end management
- start to define an organizational migration path to a new way of managing

Process Governance can be confused with process management supporting services normally found in a process support group or center of expertise that provides capability and consulting to process projects. That is not what this section will deal with. Other chapters in the book will look at those issues of support and enablement. Here we will discuss the activities required to take responsibility for continually optimizing and managing the process assets of the OIF; its performance and timely improvement. We must answer 'Who will manage process execution and govern performance and improvement on a sustainable basis and how will this be done?'

There are a number of key roles that must be played in order to assure that processes continue to be effective assets at their best. At this point the reader may have expected a discussion on process ownership. Instead we will discuss a wider set of concepts since 'ownership' as a uni-dimensional concept is proving to be too simplistic given that the management and governance aspects of processes are far more complex than that. The term 'owner' will not be used here since the emotion and resistance from non-'owners' of processes who are day to day managers of staff that work in the process can be too great and often lead to a conflict of motivational alignment at the personal manager level. I will articulate a set of roles that are required in order to maintain optimal process performance at multiple levels of value chain, value stream, business process and activity responsibility. As in data management, which abandoned the term 'owner' years ago since the data asset is a corporate one and therefore not owned but shared, I will use the term 'steward'.

In larger mature organizations, specific process instances will be executed and managed operationally in multiple locations. They will be monitored for performance and consistently improved across all locations, and along with the total set of all processes, governed for optimization and alignment. This will require a number of roles to be clearly differentiated:

- A *process lead* is responsible for ensuring the completion of a specific process instance for a specific customer or requestor all the way from the initiating through to the closing event and result delivery.
- A *process manager* plans, directs and monitors defined sets of processes instances and resources and adjusts them to produce expected outputs and business results day to day. Sets of instances may pertain to specific locations, transactions, projects, clients, accounts, etc. The process leadwill typically line-report to this manager operationally.
- A *process steward* is responsible for the designs of a related enterprise business process and its guides and enablers. He or she plans and sponsors their development and deployment universally. The steward also periodically monitors their performance and assesses their continued fit in light of market conditions and recommends funding of changes. This person will act as project champion for any transformation of the project to deliver change.
- A *process executive* governs a logical group of enterprise processes at the value stream or value chain levels of complex and large enterprises. The *executive* will ultimately be responsible for both performance and change oversight.

Other optional roles are:

- A *governance coordinator*, supports, enables and coaches the stewards and provides executives and stewards with required services.
- A *process management council* brings together stewards and executives for standards setting, coordination, change prioritization and change issue resolution. This council also makes process change prioritization recommendations or decisions

These can be seen graphically in Fig. 7.

Note that these are roles and not positions and the titles may vary from enterprise to enterprise. In large complex organizations they may be assumed by different people. However, in simpler enterprises multiple roles may be assumed by one person. For example, the process steward and process manager will most likely be the same person when the process only runs and is managed in one place as opposed to multiple locations.

To assure overall knowledge sharing, motivation and consistency as well as architecture control and overall synchronization, a process management council can be formed for governance purposes. It is comprised of process stewards and

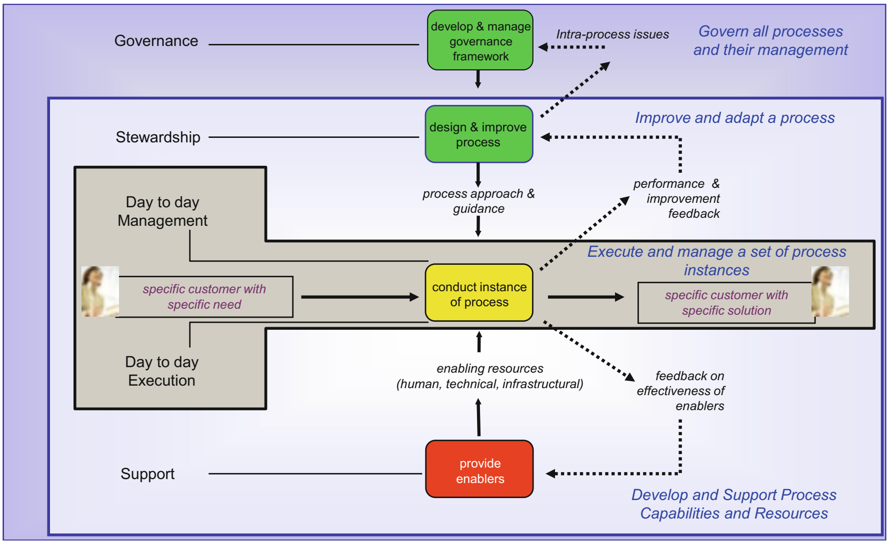

Fig. 7 Process governance roles

executives and supported by the governance coordinator who may be from the centre of expertise.

3.6.2 Motivation Alignment and Stewardship Support

The deliverables from the first three methodology sections must come together and be in complete alignment. Governance without an agreed process architecture means we have no consistency in what we are managing. A business process architecture with no measures for performance paints a nice picture with no ways of assessing results. Governance with measurement and reporting is required in order to have business process accountability for managers, stewards and executives. Conflict between the goals of the processes and the personal performance plans of the stewards is a certain recipe for dysfunction at best. Governance will not last long because no one will care about it.

Another challenge is that the process executives and stewards typically need help in becoming effective even at the best of times when their motivation is in synch with the stakeholders receiving value from the business process. These are new and unfamiliar roles that are often overlaid on existing responsibilities and often seen as more work. The BPM Center of Expertise, if experienced enough, can be important contributors in enabling sound process governance.

With the governance model in place it is now possible to prioritize opportunities for process and capability renewal according to process performance and outcomes and manage cross functional change.

3.7 Manage Enterprise Processes (Methodology 6)

Author note: I have jumped over Methodology Activity 5 for the moment since in many cases a comprehensive alignment with other capabilities will take too long and the alignment will be done in a phased manner in synch with the priority processes. I will return to it immediately following this section in Sect. 3.8. This section will discuss one aspect of Methodology 6. Also please note that this section will only deal with the prioritization of changes and not the many other aspects of Managing Enterprise Processes.

3.7.1 Purpose of the Activity

The purpose of this methodology activity is to:

- Determine which processes are critical to the achievement of Strategic Business Objectives and Stakeholder Value Creation (Highest Gain)
- Identify the gaps in process performance between current state performance and ideal state target performance (Highest Pain)
- Find the potentially best choice to improve value according to the strategic criteria created earlier
- Begin the ranking of processes and related capabilities for feasibility assessment, business case analysis and renewal

Now that we know the criteria for what is important to the enterprise and its stakeholders and we have a shared understanding of what our end to end business processes are, we can connect up the stakeholder based strategic criteria to give us a ranking of where our biggest return on investment for change will come from.

This will be comprised of an assessment of process strategic value contribution ranking based on each process' individual Direct Outcomes and process performance gaps using real performance data or consensus of anecdotal feedback. The best opportunities for raising enterprise performance will be in business processes that have both the highest potential value to stakeholders in support of our strategic intent (the north star of the OIF) and those that also have the largest performance (KPI) gap today from where we need them to be at the end of our planning horizon. In order to do this we can produce a series of matrices and grids of process-value contribution versus potential process-performance gap that are carefully aligned. We may do this in a very formally manner or in a more subjective way if time pressures demand.

		Scoring for all criteria: 1. None, 2. A Little,3. A Moderate Amount, 4. A Large Amount, 5. A Significant Amount					
Process Name		Strategic Outcome Statements and Weighting					Gain Summary
		Sustain the quality of our food	Sustain our licenses	Increase revenue, profitability with positive cash flow	Increase customer satisfaction	Decrease our carbon footprint	
	Process #	15%	30%	30%	20%	5%	
Plan the business	1	3	2	4	3	3	3.00
Determine regulatory requirements	2	3	5	3	2	2	3.35
Develop polices and rules	3	2	4	2	3	2	2.80
Assess compliance	4	4	5	3	2	3	3.55
Develop marketplace strategy	5	2	2	5	4	1	3.25
Plan restaurant operations	6	3	2	4	4	1	3.10
Update finances	7	1	3	2	1	1	1.90
Design business processes and capabilities	8	4	4	4	4	3	3.95
Advertise restaurant	9	1	1	5	3	1	2.60
Purchase supplies	10	5	2	4	4	1	3.40
Prepare food	11	5	5	3	4	1	4.00
Serve restaurant customers	12	5	2	4	4	1	3.40
Deliver pizza order	13	5	4	5	4	4	4.45
Provide customer services	14	2	3	3	4	1	2.95
Provide and maintain facilities	15	3	4	3	2	2	3.05
Acquire and maintain equipment	16	5	4	3	4	2	3.75
Assign human resources	17	4	3	4	3	2	3.40
Provide IT capability	18	1	1	3	3	1	2.00

Fig. 8 Process/strategic outcome matrix (GAIN)

3.7.2 Matrix Alignment Approach

The Process/Strategic Intent Matrix

By cross referencing the Strategic Outcomes of the OIF, developed from Stakeholder Outcomes and the OIF's value proposition to the business processes in the architecture in a matrix we can assess the value that each process should or could provide to the chosen direction of the enterprise. When summed up and weighted by the relative values (i.e. importance) of each strategic outcome statement, defined earlier, we can identify the level of *GAIN* the business process can contribute towards the North Star goals and objectives. Figure 8 illustrates how this may be structured. This evaluation uses the OIF stakeholder analysis and strategic intent results.. In the illustration A scale of 1–5 can be applied for each process towards the strategic intent statement and the sum of all scores for each process will allow a ranking scale of most value added process to the strategic intent to least value added.

Process Name	Process Number	Scoring for all criteria: 1: Always, 2: Mostly, 3: Sometimes, 4: Rarely, 5: Never				
		Process Performance Pain Criteria (1 - 5) Relative to the ideal state of the process.				
		The process achieves its ideal direct outcome	The process can be executed consistently	All resources are efficiently utilized in the execution of the process	Pain Summary	Pain Ranking
Plan the business	1	4	4	2	10	7
Determine regulatory requirements	2	1	2	2	5	16
Develop polices and rules	3	4	4	3	11	5
Assess compliance	4	4	4	2	10	7
Develop marketplace strategy	5	3	3	3	9	10
Plan restaurant operations	6	3	4	2	9	10
Update finances	7	1	2	2	5	16
Design business processes and capabilities	8	4	4	4	12	2
Advertise restaurant	9	2	3	3	8	13
Purchase supplies	10	1	2	2	5	16
Prepare food	11	2	4	3	9	10
Serve restaurant customers	12	2	2	3	7	14
Deliver pizza order	13	4	4	5	13	1
Provide customer services	14	4	4	3	11	5
Provide and maintain facilities	15	4	3	3	10	7
Acquire and maintain equipment	16	4	4	4	12	2
Assign human resources	17	2	3	2	7	14
Provide IT capability	18	5	3	4	12	2

Fig. 9 Process performance-gap matrix (PAIN)

The Process Performance Gap Matrix

The Process Performance Gap Matrix is similar to the Process/Strategic Intent Matrix in structure. It contains the same process rows but the columns vary since they are assessing performance and capability gaps not strategic contribution. The intersecting cells, obviously, reflect a different assessment. This time they reflect the potential gaps of the process while holding constant the value or importance of the process in the first matrix. The question is one of how well will today's process design, and its current supporting capabilities, be able to meet the future strategic and stakeholder performance needs? Note that today's performance and capabilities may not have a large gap but future requirements may mean that current abilities will not keep up with changing requirements and hence a gap is recognized. This is referred to as the level of *PAIN* as shown in Fig. 9.

Pain and Gain

By assembling the results of the two matrices' rankings we can map Pain rank versus Gain rank and produce a grid of Highest to Lowest Gain versus Highest to Lowest Pain as depicted in Fig. 10.

Plan the business	1
Determine regulatory requirements	2
Develop polices and rules	3
Assess compliance	4
Develop marketplace strategy	5
Plan restaurant operations	6
Update finances	7
Design business processes and capabilities	8
Advertise restaurant	9
Purchase supplies	10
Prepare food	11
Serve restaurant customers	12
Deliver pizza order	13
Provide customer services	14
Provide and maintain facilities	15
Acquire and maintain equipment	16
Assign human resources	17
Provide IT capability	18

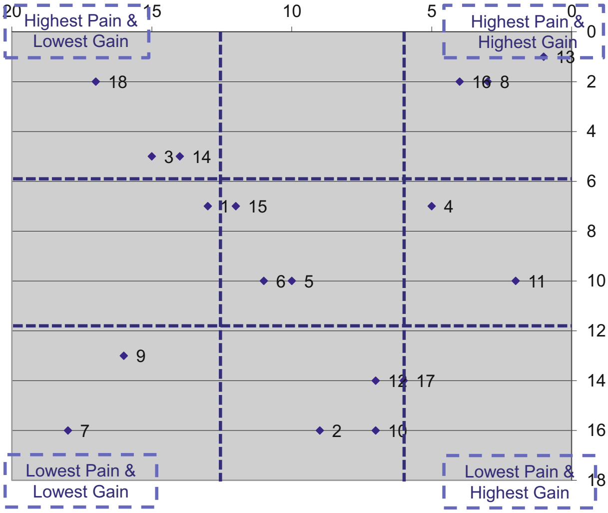

Fig. 10 Process/capability migration strategy grid

The processes in the Lowest Gain column represent those that must be done competently but do not make much difference to value creation if they are performed exceptionally well relative to the others so these can be dropped from further analysis right away. The processes in the Lowest Pain row represent those that we perform very well relative to the others so are not really candidates for major transformational changes from a business point of view. The ones remaining in the grid of medium to high in both Pain and Gain are the ones that will give us more bang for the buck.

The Highest Pain/Highest Gain quadrant is clearly where the greatest advantage can be realized and most of the transformation focus and resources should be allocated. Processes here solve the largest performance problems that are most important to the value proposition and intent of the OIF. Lower Gain/Highest Pain processes are not as rewarding enterprise wide and are a second choice. Highest Gain/Lower Pain is better but we must be careful not to fall behind on these and we must remain aware of potential threats and opportunities that change the assessment. Lower Gain/Lower Pain may be better served by remaining in continuous improvement mode while we attack the others. The findings from the grid must still be vetted and adjusted from a cost/benefit, dependency, political and other types of feasibility perspectives to build the transformation plan.

A fast-track version of this grid can be performed using a nine-block triage approach that uses a relative comparison of the processes in the architecture against the enterprise value proposition and company vision, goals and objectives as the Gain perspective. The three Gain categories are whether or not each process is a differentiator towards world class performance (Highest Gain), is a requirement not requiring industry leadership but needing best practice parity or simply a commodity process that will never make a big difference no matter how well we make it perform. The Pain perspective is also triaged into potential performance gap from biggest at the top to smallest at the bottom. Together they provide another way to pick priorities when time does not allow a more structured assessment.

3.7.3 Establish Enterprise Transformation Portfolio

This activity identifies all existing projects of any type currently underway, all planned and funded projects of any type, all planned and unfunded projects of any type and current budgets and commitments-to-complete; maps and assesses the fit of existing and planned projects against priority processes and required enabling capabilities. In addition, this activity determines any constraints that will hinder changes in the priority processes, produces funding criteria for continuation or freezing of existing projects and initiation of new ones, recommends approval or freezing projects; and produces the Enterprise Transformation Portfolio.

The tasks performed during this activity are:

- Validate Priorities
- Identify Existing Programs/Projects
- Rationalize Current with Required Future Initiatives
- Create/Update Enterprise Transformation Program

Detailed methods for this part of the method will be covered elsewhere in this book but if this work is not managed continuously starting with the strategy, process and capability architectural activities described in this chapter then it will quickly revert to a process of fielding and reacting to internal special interests and politically biased misaligned resource allocation.

3.8 Align Process Capabilities (Methodology 5)

3.8.1 Purpose of the Activity

This method activity determines the information needed in order to be able to conduct the envisioned processes and identifies the gaps in information quality; assesses the contribution of knowledge to the processes, identifies barriers to process performance due to overly constraining, inappropriate or inadequate guides, determines which policies and core rules should and must be changed, initiates the knowledge and policy changes; and determines the supporting capabilities and assets (strategic technologies, human competencies and physical facilities) needed to conduct the envisioned processes in the optimal manner for their stakeholders. The tasks performed during this activity are:

- Determine Enterprise Information Fit/Gap
- Determine Knowledge Fit/Gap
- Identify Organizational Structure Fit/Gap

- Identify Policy Fit/Gap
- Identify Technology Fit/Gap
- Determine Human Competency Fit/Gap
- Establish Physical Facility Fit/Gap

Detailed methods for this part of the method will be covered elsewhere in this book but without our the foundational strategic and process methodological work described in this chapter all of these will be misaligned and change will not be delivered holistically.

4 Conclusion

The work described in this chapter is the foundation for managing a modern enterprise; one that is customer-focused, strategically-aligned and process-centric. Customers do not care about our departments, functions or organization chart and should not be exposed to the navigational problems across them. Business strategies are not paper documents to be ignored. They must be used and connected to everything that everyone does every day. Business processes are the only things that connect the dots to create stakeholder value consistent with enterprise strategic intent. This fundamental shift in work towards linked performance management and change management must become a relentless pursuit for change agents. It will happen sooner or later to all organizations that survive. What I have attempted to describe here is a simple and common sense approach to remain true to the ideals of managing by process for stakeholder outcomes not by function for internal reward.

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Management of Process Excellence

Mathias Kirchmer

Abstract In order to be successful, enterprises have to adapt quickly to new opportunities and threats. They have to take smart decisions and execute fast. Innovation and agility become main success factors. The Management of Process Excellence (MPE) is a key enabler. It is a value-driven approach to business process management that can result in dynamic operations of an enterprise. MPE links business strategy with people and technology based execution – at pace with certainty. Technologies such as Service Oriented Architectures (SOA), software-as-a-service (SAAS), cloud-computing or the Web 2.0 support this approach. MPE enables business outcomes through those technology architectures. Knowledge assets such as reference models increase productivity again. The resulting next generation enterprise is ready for long-term success since it can adjust to the volatile business environment. This chapter discusses MPE, an approach to achieve agility and innovation through Business Process Management. It describes the relation between process management and innovation and how next generation process automation can support that effort. Finally, an appropriate process governance approach for MPE is presented.

1 Management of Process Excellence (MPE) Requirements and Approach

The *requirements* for the Management of Process Excellence (MPE) (Kirchmer 2011a) result from its specific goals. MPE takes a holistic and value-driven Business Process Management (BPM) approach (Franz and Kirchmer 2012a) and focuses it on achieving two key goals:

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_3, © Springer-Verlag Berlin Heidelberg 2015

- Innovation
- Agility

Consequently, MPE is closely linked to an organization's strategy. It transfers business strategy into people and technology based execution – at pace with certainty. The business process is the critical link between both. A company following a traditional BPM approach may launch a process automation initiative to achieve a cost reduction. They are proud of their new automation tool. However, when later on new products have to be launched, the automated processes may not be flexible enough to handle that situation. An organization following an MPE approach would, from the beginning on, drive an automation initiative in a way that leads to a flexible process execution, using people and technologies in a way that allows an easy adaptation to changing requirements, while still achieving the desired cost effects. The company is proud of the business outcomes as well as the new process and its capabilities to adjust it. This flexibility can, for example, be achieved by using a process repository to capture all process-related documentation as basis for the automation or by applying the right process monitoring approaches. The resulting transparency enables the required flexibility.

MPE must achieve two important key outcomes:

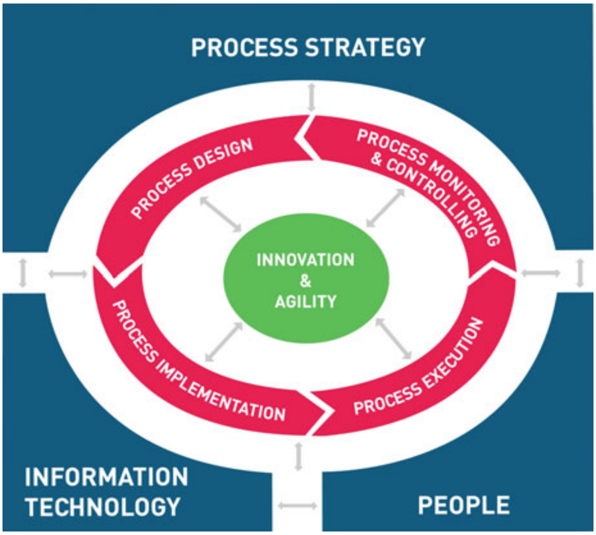
- Enable smart decisions regarding the transfer of strategy into execution – in other words, high- quality decisions made in a timely manner
- Enable the fast execution of the actions resulting from those decisions

MPE not only does clarify strategic direction, align resources, and increase discipline, as "traditional" BPM approaches do but it also provides quality information in the required time frame to support the right decisions on all levels of an organization and delivers the infrastructure necessary to enable the fast execution of resulting tasks, making change easier. MPE can help setting the right focus – on business outcomes and the high impact processes that affect those outcomes most.

MPE must enable the desired results at the lowest cost level and combine efficiency with quality, reflecting management's desire to get "more for less" (Spanyi 2006). Only the economically feasible approach is relevant in practice. Therefore, MPE requires the use of available standards and best practices wherever possible, based on an approach known as "open BPM" (Kirchmer 2007). This "open" approach leads to high flexibility around the process lifecycle because of the integration of the various process- management phases. This is achieved in a resource-efficient way by establishing an appropriate process management organization and governance to identify and roll out the necessary tool, delivery and transformation standards and guidelines applied through Open BPM. It is all about establishing the right "process of process management". Examples are methodologies for incremental improvement like Six Sigma or transformation approaches, architecture standards or standards for modeling methods and tools, process automation engines, or business activity monitoring (BAM) systems.

The MPE *approach* is illustrated in Fig. 1. It has been developed based on Scheer's ARIS Three Level Framework for Process Excellence (Jost and Scheer 2002;

Fig. 1 MPE approach



Kirchmer and Scheer 2004; Scheer 1998a, b), a widely used general methodology for business process lifecycle management. In addition to this and other general approaches (e.g., Kirchmer and Scheer 2004), MPE places explicit focus on innovation and agility. Every phase of the process lifecycle has to be aligned with those objectives; other process goals are reflected as "sub-objectives". The entire "process of process management" is organized appropriately (Franz and Kirchmer 2012a). This creates the basis for a high-performance business focused on business outcomes and value-creation – and with that on the customers. MPE underlines BPM's role of enabler for innovation and agility.

MPE begins with the business process strategy of an organization. The process strategy transfers the overall business strategy into appropriate process structures and its hierarchical decomposition.

First, the main business processes of a company are identified. Next, innovation potentials and their general process impacts are defined, delivering the basis for the definition of the business process structure and its hierarchical decomposition and the related process goals. Result are process models identifying a company's end-to-end processes. Innovation areas as well as processes and sub-processes that are especially important to achieve competitive advantage are identified using this process map which is linked to the relevant innovation and agility goals, the strategic imperatives of an organization. The overall goals can be described using concepts such as the "balanced scorecard" (Kaplan and Norton 1996) and then connected with the process definition in a "process impact matrix". This allows to identify the high impact processes a company competes with – about 20–25 % of all processes (Franz and Kirchmer 2012a). The underlying application system architecture is planned accordingly, supporting the required agility. This means flexible application architecture with componentized systems are preferred in "high impact processes" to huge monolithic applications that are difficult to adjust. Commodity processes may still be executed based on standard systems like ERP since a company doesn't compete with those processes. All aspects combined set the guidelines and strategic directions for a process-centric organization focused on innovation and agility. The guidelines and directions deliver the overall basis for all process-related activities in the following phases of MPE. The process strategy provides drives the process governance implemented in the process of process management.

The strategic guideline is passed to the process design phase, where the business processes are specified in detail. Here, the approach of the "process factory" is used to define process in form of process models as efficiently and effectively as possible to enable the highest agility in the day-to-day process management activities. A process factory is an "industrialized" environment to support the development and the systematic reuse of process and other information models (Kirchmer 2008). Core is an integrated process model repository that stores the process-related "knowledge assets" in an easy-to-use format. Thus, a process design can be quickly modified and used as input in the other phases of the process life cycle. Every process initiative delivers its design results in the repository format so that it can be reused in other initiatives. High impact processes are then optimized and examined for potential process innovation, using appropriate tools and techniques like process simulation, Lean or Six Sigma (Snee and Hoerl 2003; Harmon 2003; George 2003). Commodity processes (about 75–85 %) can be addressed through copying common practices in an industry (Franz and Kirchmer 2012a). An important aspect, especially to address commodity processes, is the use of process reference models as starting points for process design (Fettke and Loos 2007). This reduces design and modeling time and increases model quality. A process factory is necessary to enable a quick move from strategy to the implementation and execution phase while still having sufficient time to focus on desired process innovations. In the design phase, business processes must be specified in detailed and consistent descriptions, which can be used to drive the process implementation and execution. In other words, the created knowledge assets must include all relevant information about the processes to be executed to support the close link between strategy and execution. The result is a process blueprint consisting of business process models that form the enterprise's process knowledge assets and drive the following phases of the business process life cycle.

Based on these process models, all physical and information-processing activities of a process are implemented within an enterprise and across organizational boundaries. The results are intra- and inter-enterprise processes, ready for execution. The implementation can be carried out based on IT to support the following automated execution or manual execution through people. Generally, it is a mixture of both: automation may deliver the necessary speed and efficiency to be agile; manual steps provide the required flexibility and adaptability. Some parts of a process may even need to be executed in teams [e.g., brainstorming activities in a research department (Harmon 2007)] to ensure the appropriate creativity to support innovation activities. This implementation phase includes the software configuration or development, as well as the people change management, consisting of information, communication, and training (Kirchmer and Scheer 2003). For the implementation phase, it is important to have the process design in a format that enables a very time-efficient implementation, so that the execution can start quickly. This can be ensured through the aforementioned process factory approach. In this phase, the organization goes through a transformation process to achieve the defined innovation and agility.

During the process execution phase, processes are executed based on the implemented IT or people resources. The software systems can be standard application packages, such as enterprise resource planning (ERP), supply chain management (SCM), or customer relationship management (CRM) systems, that primarily support best practice processes. Alternatively, processes can be executed based on more flexible application solutions, such as next-generation business process automation systems, based on a service-oriented architecture (SOA). Software-as-a-Service or “Cloud computing” bring additional flexibility since you can procure quickly and in a focused way the required functionality. An MPE approach has to ensure that processes identified in the process strategy as high impact and “innovation candidates” are executed using application systems with the highest flexibility so that they can be easily adjusted to the necessary change. These are processes “built to change”. The people- based execution may be supported by continuous learning and talent management initiatives, for example, through computer-based training approaches or regular face-to-face training initiatives. The execution has to deliver the targeted innovation and agility.

The actual executed processes are measured and controlled in the process monitoring and controlling phase of MPE. In order to do that efficiently, systems for Business Activity Monitoring (BAM) and Process Analysis should be used. These software applications can help to acquire relevant information fast and to move quickly from insight to action. If there are negative differences observed between the actual values and the planned KPIs that were defined based on the goals identified in the process strategy, action must be taken. Either a “continuous process improvement” (CPI) is initiated through the process design phase (the design is improved to meet the defined goals and passed on to implementation and then to execution) or the situation is resolved on a strategic level if the business environment has changed significantly. Hence, a larger process transformation initiatives may be launched. This phase of MPE overlaps with the execution phase. In this monitoring and controlling phase, process performance improvement methodologies, such as Six Sigma (Snee and Hoerl 2003; Harmon 2003), Lean, or combinations of such approaches (George 2003), can be applied to support incremental improvements and fix specific issues. This phase delivers necessary information about the execution to enable smart decisions based on process KPIs and initiates their execution. It enables a continuous focus on the goals defined in the process strategy and helps measure the business outcomes and success.

An organization can begin a BPM initiative at any of the phases of MPE. Of course, the typical entry point is process strategy, followed by the analysis and design of processes. However, some organizations start with the monitoring and controlling of existing processes, which leads to strategy and process design. The implementation of a process-based software solution can also serve as a starting point. The decision about the MPE starting point should be based on the company-specific situation: the current issues and budgeted initiatives, the political situation, the staffing situation, and similar aspects.

In many cases, companies select a two-step approach and begin with a pilot project focused on one or two processes. The first nucleus of a process organization, for example, in the form of a Center of Excellence is established. Based on the result, the entire MPE approach can be rolled out. Whatever starting point is chosen, it is important to envision the entire MPE concept, so every initiative becomes a building block of a successful overall MPE approach.

The design phase, including the process strategy, and the implementation phase comprise the process build-time activities. In this instance, companies created the ability to act fast in order to achieve MPE's goal of "fast execution." The process execution, as well as the monitoring and controlling phase, consist of the run-time activities of the process life cycle. They deliver the necessary information to ensure timely and high-quality decisions.

All phases of MPE should be supported by available BPM software, especially modeling software and repositories (as required by the process factory). The data volume to be handled by BPM activities and MPE's specific demand for speed and high-quality information make this request even more important. The necessary integration and consistency of process-related knowledge, especially the business process models, cannot be achieved manually.

2 Innovation: Key Target of MPE

To master the continuous changes and new developments of today's business environment, innovation – especially business process innovation – has become a core focus area for successful organizations. To ensure long-term survival, an enterprise must make innovation part of day-to-day business. Only then, can enterprises attain desired revenue and profit stability, growth and high performance in general. Consequently, business processes have to be managed in a way to support and drive innovation. MPE makes innovation a key target. But what exactly do processes and innovation have to do with each other? That question has to be clarified to be able to organize MPE appropriately (Kirchmer 2011b).

More and more companies are built on the principles of process innovation. Dell, for example, did not invent the PC. But it did invent new business processes to bring PCs to market, eliminating unnecessary steps in the supply chain, while offering more flexibility and control to the customer. These processes were Dell's main differentiator in the competitive marketplace. Process innovation was the basis for starting and growing this company. Amazon.com did not invent the book, but it introduced a now-popular process of buying books online from the comfort of your living room. This is a process innovation based on the Internet with its new technical capabilities. eBay did not invent the auction, but its online, easy-to-use processes increased the popularity of the auction. This is again a process innovation as the basis for a new business.

Traditional companies are also focusing on process innovation. For example, enterprises in the machinery industries offer more convenient and reliable service processes based on Internet connections to their clients or directly to the delivered equipment. Airlines have simplified the ticketing process to reduce cost and increase, or at least stabilize, service levels through online ticketing. This is a process innovation that eventually became the standard, an industry best practice. Banks reduce cost and improve their service levels through online banking.

Business process innovation is clearly of the highest importance for every company. But what is it all about? How do "innovation" and "business processes" really fit together? Innovation is defined as the act of "introducing something new." A useful structure of innovation is proposed by Davila et al. (2006). According to them, innovation has two major directions:

- Business model innovation
- Technology innovation

Business model innovation includes a new or modified value proposition, new business processes (especially in the supply chain), or new target customers and markets. Let us look at a few examples. Levis Strauss & Co. introduced denim jeans. Because of the company's new process of putting rivets in pants for strength, jeans were introduced as working clothes for farmers and factory workers. Since the first introduction of the denim jeans, the company's value proposition has changed and evolved as denim jeans have become an expensive fashion product. In its PC offerings, Dell's value proposition was the convenient custom configuration and ordering of products – the supply chain processes eliminated dealer networks and enabled individual configuration by the client, while the target customers remained, more or less, the same as those of competitors. The opening of new markets for existing offerings is another kind of business model innovation. If a company has always sold to the US market, but now decides to also deliver products to Europe, this is a form of business model innovation (new market). Sometimes, the pricing is considered as an additional component of the business model; however, it may also be seen as part of other elements (e.g., aspect of the general value proposition).

Technology innovation has the following levers: offerings, including products and services; process technologies; and enabling technologies. New product technologies (e.g., the introduction of digital cameras) are some of the most obvious forms of innovation. Process technologies support efficient and effective business processes. ERP systems, for example, were able to make specific processes more efficient and effective. Supporting technologies improve either product or process technologies. For example, the development of efficient relational databases supported the development of integrated application software, especially the aforementioned ERP systems.

Innovation in the fields of processes and process technologies show the direct link between "process" and "innovation." But the other forms of innovation also lead to new processes. New value propositions and expansion into new markets

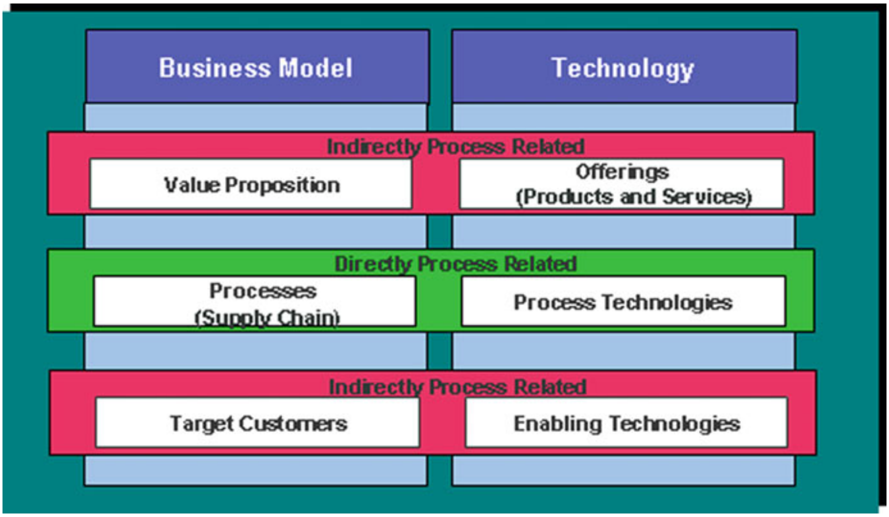


Fig. 2 Levers of innovation and the relation to processes

require appropriate business processes. A product innovation generally leads to new production or distribution processes. The result is an indirect link between "business processes" and "innovation." Basically, any form of innovation requires new or modified business processes and needs business process innovation: processes with new structures, more accurate, granular or timely data, new organizational responsibilities, new functions or superior process deliverables. MPE supports innovation by encouraging an innovation focus in each phase of the process life cycle: the process management is organized in a way that it makes the changes required by innovation easy, for example, by identifying the innovation areas already in the process strategy, applying the concept of the process factory in the design, using flexible automation architectures like SOA, or measuring processes effectively through BAM.

The levers of innovation are shown in Fig. 2.

But how does an enterprise organize innovation? Once again, the answer is BPM: the management of innovation within an enterprise is a business process in and of itself. This process must be defined, implemented, executed and controlled just like any other business process. It goes through the same process life cycle. The "innovation process" has to be a key process to be managed by MPE.

An example of one such innovation process is shown in Fig. 3. The process develops from the preparation of an innovation initiative, to the "idea finding" activities, and finally to the execution of the innovation idea. The innovation manager identifies relevant mega trends and, based on those, the relevant innovation fields. These innovation fields guide the definition of the company-specific innovation focus. This focus directs the "idea finding", using internal and external resources. The innovation ideas are evaluated, and the most interesting ones become innovation projects. These projects develop prototypes and business

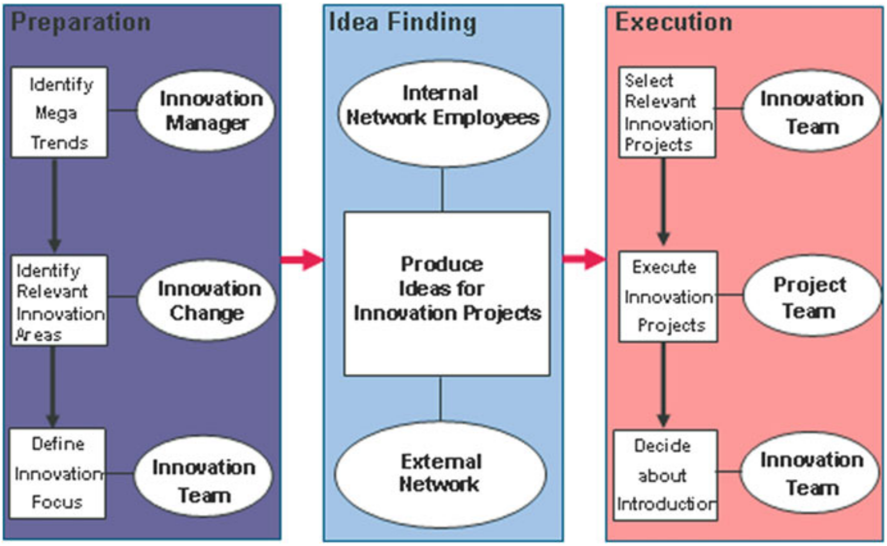


Fig. 3 Example of an innovation process

cases based on the innovation idea. Then, the innovation team can decide which innovation ideas will be brought to market, or the ideas that will actually become innovations.

Owing to the importance of process innovation, the innovation process must support this form of innovation effectively. For many traditional companies, this will require a big shift because they formerly thought of innovation in terms of technology innovation, especially product innovation. This shift can be supported by selecting the appropriate external partners, like universities or research institutions, to participate in the innovation process.

When implementing and improving an innovation process, it is of highest importance to accelerate the time until the innovation can be introduced into the market. This reduces innovation cost and increases the probability of high-revenue effects (George et al. 2005; Johnson and Suskewicz 2008). An MPE approach has to optimize the innovation process regarding cycle times.

Hammer, the renowned BPM thought leader, recognized that operational innovation, or business process innovation, is not easy to achieve. For a successful innovation process, he recommends six key factors (Hammer 2005):

- Business process focus, from the beginning of an innovation initiative
- Definition of process owners, including a senior executive who can make change happen
- Full-time design team
- Managerial engagement, ensuring the implementation of the innovation
- Building buy-in
- Bias for action

Once a process innovation has been implemented, one must recognize that the interrelation with other processes may require additional change. Therefore, one process innovation initiative may immediately trigger the next process change project.

The innovation process can be centralized in an organization or carried out in decentralized units. The more effective approach has to be defined based on a company's specific strategy. This is especially true for organizations working in a global business environment an important topic (Bartlett and Ghoshal 2002).

MPE provides a business infrastructure with the flexibility necessary to facilitate innovation, especially business process innovation. It sets the parameters so that an organization is able to react to change efficiently and effectively. Process innovation is simply a special driver of such change.

3 Information Technology Enabling the Execution of MPE

Most business processes within an organization are at least partially supported by IT. The IT support influences the management of those processes and can encourage or hinder innovation and agility. ERP, CRM, SCM, or similar systems are present in one or the other way in almost every enterprise. Some executives are already considering new IT architectures based on SOA or are in the midst of such an implementation. Some companies even take these ideas to the next level, such as those working toward the use of Web 2.0 applications and acquiring "Software-as-a-Service" (SaaS) or through "the Cloud". But what does it all mean? How do these IT components fit into MPE – or better, why does MPE require their use?

During the last 15–20 years, an increasing number of business processes have been supported by standard software packages, such as ERP, SCM or CRM systems (Kirchmer 1999). The most popular are ERP systems, covering the majority of a company's operational activities, such as sales, material management, production planning and control, maintenance, asset management, finance, financial controlling, human resources, etc. The use of standard software has numerous advantages when compared to individually developed software systems.

A key advantage of these "traditional" standard software solutions is that they not only deliver technology to execute a specific process but also provide best or at least common business practices. The software reflects its vendor's business knowledge regarding a certain topic or industry, as well as the experience of the vendor with other customers in the same area. Hence, the software can deliver common industry practices on which to standardize the 80–85 % of commodity processes of an organization.

The successful use of standard software, such as ERP systems, implies the design and execution of business processes according to the delivered best or common practices of the software solution. If you buy an ERP system, you don't just purchase a piece of technology; you also buy a set of predefined business processes. In turn, you have to adapt at least part of your organization to the requirements of the software-based business processes. For example, you may be forced to create some material master data before you send out a procurement order. ERP systems include a process definition that is more or less coded in the software. The software only allows very limited changes or adjustments of its process definition. These adjustments can be done during the software configuration through the setting of specific parameters. This is a key task of ERP implementation activities, together with the people change management, discussed later. The configuration of such systems is also more and more simplified through the use of pre-configured component and related assets.

Modifications to the delivered process logic often result in modification to software that lead in most cases, to tremendous cost. Many of the advantages of standard software are lost if you decide to modify that software. However, most of the standard systems allow the integration of "add-on software" through predefined interfaces. But this is, in many cases, insufficient, especially for the support of a high impact process that is critical to achieving competitive advantage and that is important for process innovation. As a result, new business processes are not adequately supported by traditional software solutions, which leads to negative impacts on the overall process performance. This is obviously not consistent with an MPE approach.

Key processes tend to be strongly influenced by a company's specific offerings (products or services) and the related customer and channel demands, so standard software applications such as ERP cannot deliver the required best-possible IT support because they reflect the needs of wider user communities. SOA and its process orchestration capabilities as well as next generation process automation systems (to be used for specific processes or as part of an enterprise wide SOA architecture), so called Business Process Management Suits (BPMS), offer a solution for those needs. They enable separation of the business process design and support through appropriate software applications or application components delivered as so-called services (we will use "service" as synonym for an application software component, delivering specific results needed to support one or several functions of a business process). This means that application software can be used exactly as required by business processes. SOA and BPMS provide the environment to link the required application components and exchange data as necessary to support the overlying business processes design (Kirchmer and Scheer 2004; Woods 2003; Kalakota and Robinson 2003; Woods and Mattern 2006). This enables the execution of "next-practice" business processes, that of business process innovation. In other words, it is IT for business process innovation, as Woods and Mattern, some of the first authors of a book about SOA, describe SOA (2006) – a perfect fit to support the goals of innovation and agility of MPE.

The use of SOA can lead to significant reductions in IT maintenance costs because expensive program-to-program interfaces of traditional software environments are avoided. All software components are simply linked into the integration environment of the SOA (Woods and Mattern 2006). This resolves many of the issues of extending ERP systems through add-on applications supporting enterprise-specific processes or sub-processes.

These integration capabilities are also the basis for the reuse of software components in the case of custom developments, thus resulting in cost savings. Once a software component or service is developed, it can be used to support several processes. It can be part of another integrated process-oriented software system.

The true value of SOA, however, is only delivered when the environment is used to support business change, to enable agility and process innovation. It can help to build “process to change”. MPE enables this business-driven use of SOA and BPMS by integrating it in the “process factory” and use the process models stored in the repository to drive the SOA configuration. The process design can be improved and cost and time efficiently implemented, through the selection and adjustment of the application components needed to support the specific processes. New “services” can be added, and others deleted or modified, according to the requirements of the business processes. These services can mow more and more often be acquired through the internet as “software-as-a-service” (SaaS) or even be hosted outside the organization in the “Cloud”. These concepts are widely discussed and have great potential although the current use in practice is still limited.

The same procedure can be used to realize completely new or strongly modified processes, thus enabling business process innovation. SOA can be used to support the fast execution of process designs, reflecting strategic directions. Thus, SOA plays a critical role of transferring strategy into execution and operational performance through MPE.

New IT architectures are clearly driven by the World Wide Web (WWW). The common opinion that the Internet hype would end after the burst of the dot-com bubble in 2001 has been proven wrong. On the contrary, Web capabilities have continuously improved, and the ability to bring people and organizations together in communities has become more important than ever (Fingar 2006). The new generation of WWW capabilities is often called “Web 2.0.” Web 2.0 can be perceived as the second generation of Web-based communities and hosted services, which aim to facilitate creativity, collaboration, and the sharing of ideas and data between users. The term was created and promoted in a conference organized by O’Reilly Media in 2004 (O’Reilly 2005).

There are already many current initiatives to transfer the capabilities of Web 2.0 into the business world, targeting enterprise clients. The result is the “Enterprise 2.0” (McAffee 2006). Enterprise 2.0 is a company using the capabilities of Web 2.0 for its business purposes (Kemsley 2014). A large retail chain has for example built and internal web community to collect all the information about the BPM experts across the organization and their capabilities. Employees interested in that topic grow the content accessible and help building BPM assets necessary to keep MPE alive.

The Enterprise 2.0+ is highly integrated with the business environment, as shown in Fig. 4. A company may be member of many online communities. Imagine using an environment like Youtube to exchange business process models. Instead of posting videos, companies could post process models representing their organization’s best business practices or other interesting process ideas. This could facilitate

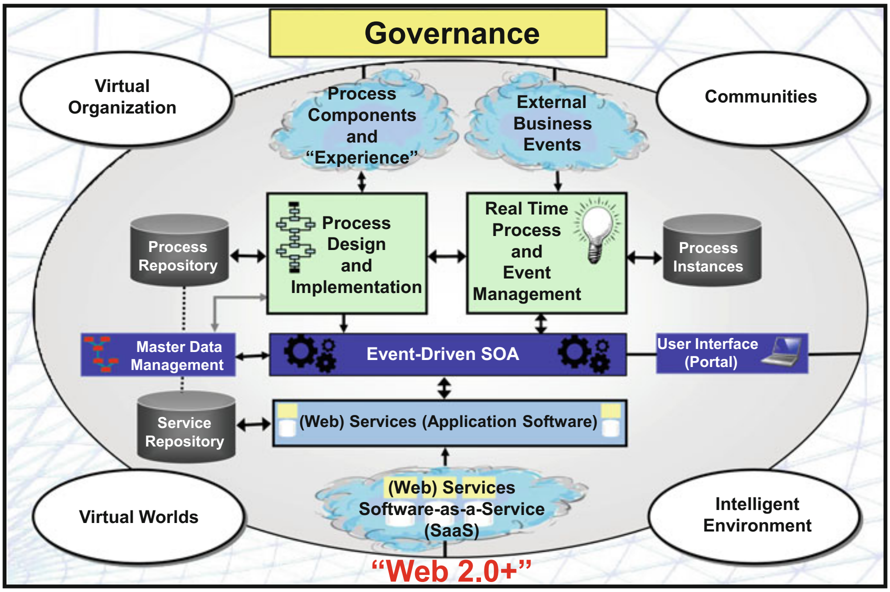


Fig. 4 Enterprise 2.0 + – Integrated with business environment

the exchange of business experiences within and across specific industries – which would become an important factor to support MPE's design of innovative processes. Many organizations already use Facebook or Twitter to support their marketing and customer care activities. An airline, for example, provides special services to their frequent flyers who are identified when they are active in Twitter at the airport.

The Web 2.0 environment could be utilized to make the Enterprise 2.0+ part of a powerful virtual organization. For example, one could create an innovation network around the company, including customers, partners, research institutes, universities, etc. The exchange of ideas could be organized through blogs.

Until now, most information systems received necessary data through human interaction. For example, a person enters the shipping data of orders. This is often very costly and leads to delays. New technologies, such as radio frequency identification (RFID), enable the automated creation of that data. For example, once containers are loaded into a ship, this information is automatically transferred through RFID into a software system and from there becomes available through the Web. The result is an "intelligent environment" or the "internet of things" (Fleisch et al. 2005; Mattern 2005), which ultimately leads to business processes that enable innovation and high performance.

This intelligent environment closes the gap between the real and the virtual world step by step. Once you have more and more information about the real world digitized, you can start using this information as building blocks for a virtual world, allowing the realistic test of new business process as described above. And, the boundaries between the real and virtual worlds then begin the blur.

The Enterprise 2.0+ is clearly a perfect environment for MPE. It permanently delivers the information necessary for timely decisions and supports the almost real-time execution of the resulting actions. Strategy and its execution are closely integrated. Agility and innovation are strongly encouraged. Therefore, MPE requires an early adaptation of the Enterprise 2.0 approach.

A key challenge of Enterprise 2.0+ is finding the appropriate governance model. Web 2.0 empowers people and encourages creativity. But how do you ensure that they still work toward the company's goals? A traditional governance model, consisting of many inflexible rules and policies, does not work in such an environment. The Enterprise 2.0+ could utilize a governance model similar to that of the online encyclopedia Wikipedia. Users are guided through common goals and control themselves. However, it is clear that an enterprise is more complex, so the governance has to be more refined. But the direction is demonstrated by Web 2.0 communities like Wikipedia.

4 Business Process Governance for MPE

Business process governance (BPG) is a set of guidelines focused on organizing all BPM activities and initiatives of an organization in order to manage all of its business processes (Kirchmer 2005; Kirchmer and Spanyi 2007; Markus and Jacobson 2014). The core of BPG is the "process of process management" (Franz and Kirchmer 2012a). The resulting governance framework provides the frame of reference to guide organizational units of an enterprise and enable responsibility and accountability for adhering to the BPM approach, thus to follow the MPE philosophy. Therefore, the definition of appropriate governance and governance bodies is a key element of MPE and a differentiator to other approaches. Scheer and Brabander (2014) suggest an alternative view on business process governance by proposing an "accountability framework". This view is included in our approach of BPG for MPE.

BPG involves the following components:

- A high-level model of an organization's key processes
- Clarification of high-level goals to frame the definition of KPIs that will be used to monitor the performance of these business processes; this includes innovation-related goals
- Accountability for the innovation, improvement, and management of business processes
- A clear formal structure for the description of business processes and the related aspects (enterprise or business architecture) to transform processes into assets
- An outline of the infrastructure necessary for MPE and the related process of process management

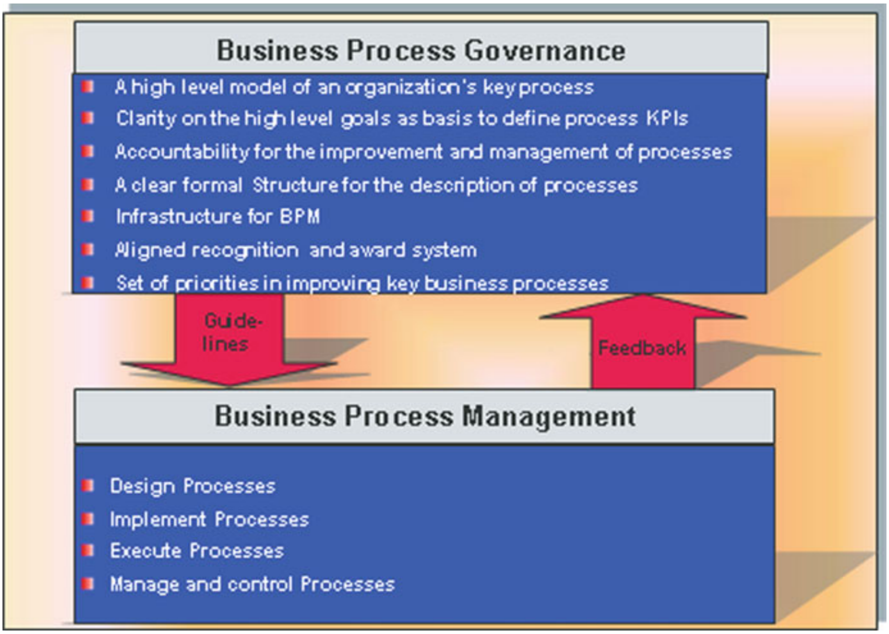


Fig. 5 Relation of BPG and business process management

- Aligned recognition and reward systems
- The set of priorities in innovating and improving key business processes

The primary objective of BPG is to set the stage for the effective deployment of BPM to create value for customers, shareholders, and other stakeholders. BPG ensures that BPM delivers consistent business results to satisfy and exceed the expectations of an organization. BPG is responsible for the management of the BPM process. This means you implement MPE through BPG (Kirchmer 2008; Franz and Kirchmer 2012a). MPE again drives the success of all other business processes, specifically high impact processes relevant for a company's competitive positioning. The relation between BPG and BPM is explained in Fig. 5.

BPG is relevant for all phases of MPE: design, implementation, execution, as well as monitoring and controlling of processes. Hence, it includes the entire "BPM delivery". Each phase of MPE is guided by BPG, leading to its overall orchestration. These guidelines may target the content of process models (e.g., identifying and mitigating risks) or purely formal aspects of BPM (e.g., each function of a process model must be assigned to the responsible and accountable organizational unit) or they define how decisions around the process are taken.

An example of a BPG guideline for process design is "graphically identify operational risk in process models" "or use Lean and Six Sigma as analysis and design principles." A process implementation example is "deploying the related business application software (ERP, SCM, CRM, etc.) to support the business processes" (Kirchmer and Scheer 2004) (resulting in a "process-oriented implementation"). "Any change of the process workflow must be approved by the process owners" is an example of a guideline for process execution. "Benchmarks for process KPIs have to be checked and, if necessary, updated every 6 months" guides the CPI in the controlling phase of MPE.

What is the broader background of BPG? BPG is the required foundation to assure the sustainability of process innovation and improvements and the continuous focus on creating value for all stakeholders, such as customers, business partners, employees, and shareholders. The importance of governance has already been recognized in one-time improvements to individual business processes, such as order to cash, source to pay or new product development. Its importance increases significantly when an organization decides to deploy MPE on an enterprise level for competitive advantage, hence when MPE becomes a real management discipline.

BPG enables and guides the enterprise-specific execution of MPE. It is an essential component of leadership; therefore, general principles for execution of strategies and management tasks must be considered when defining BPG for an organization (Bossidy and Charan 2002):

- Know your people and your business
- Insist on realism
- Set clear goals and priorities
- Follow through
- Reward the doers
- Expand the capabilities of your employees

To develop BPG for an organization, it is crucial that the leadership team knows the people and the business of an enterprise within the context of key business processes. A focus on realism and achieving a shared understanding of the organization's business processes are required when developing BPG guidelines; otherwise, the guidelines are worthless. At a minimum, the leadership team must have a common understanding of the high-level business processes, including clarity on organizational responsibilities, deliverables, inputs, outputs, key functional steps, dependencies, and KPIs. Within BPG, clear goals and priorities must be set so that people's efforts in executing MPE activities are as effective as possible and that appropriate attention is set on innovation and agility. BPG ensures that business performance management activities create value, and the "doers" or people, who get them done, are rewarded. This really makes BPM a part of the how the organization completes work. BPG should include guidelines for training and education to expand the capabilities of employees, and call attention to the importance of cross-functional collaboration to properly equip people involved in BPM.

The leaders of organizations that chose to deploy MPE as a management discipline appreciate that value is created and work is accomplished via the organization's business processes. They recognize the importance of MPE to topics, such as execution of strategy, growth, and the integration of mergers and acquisitions. These topics typically preoccupy the thoughts of leadership teams –

the people of an organization responsible for making MPE happen – in high-performance businesses.

Thoughtful leaders recognize that MPE enables the clearer formulation and especially execution of strategy. As far back as 1985, Michael Porter emphasized the concept of the value chain and noted, “Activities, then, are the basics of competitive advantage. Overall advantage or disadvantage results from all of a company’s activities, not only a few” and then went on to say, “The essence of strategy is choosing to perform activities differently than rivals do” (Porter 1996). Organizational strategy drives the design of BPG and MPE enables the execution of strategy. This aspect supports MPE’s key role as the link between strategy and operations, which will drive high performance for the organization.

When it comes to sustainable organic growth and innovation, leaders also recognize that MPE is equally important. Rapid, sustainable growth requires a systemic view of the business and broad collaboration, which requires immense effort from many firms. The design of BPG must recognize that focusing on goals, such as flawless delivery responsiveness, is essential in providing existing products or services to existing or new markets.

When growth is planned through mergers or acquisitions, the integration phase is essential to success. Perceptive leaders appreciate that an important reason for the success of mergers or acquisitions is the ability of the merged firm to perform for and meet the needs of their customers. It is in the “integration phase” that MPE can play an enabling role. This is related to the fact that merged firms often have an opportunity to gather specific information on comparative core business processes and their relative health, and address customer facing issues in the premerger due diligence period. MPE makes M&A initiatives innovation projects, creating a new organization that uses systematically synergies between the merging companies by providing the transparency, for example, though the process repositories used in the process factory.

BPG plays a key role in MPE and enabling high performance for an enterprise. Organizations elect to invest energy in establishing BPG because it is the management infrastructure that enables them to address critical topics, such as strategy, growth, and the integration of mergers and acquisitions through the improvement and management of the corporation’s core business processes. BPG sets the stage to achieve competitive advantage through MPE. It moves MPE to a consequent support of innovation and agility.

In the previously described concept of the Enterprise 2.0+, BPG must be adapted by focusing on goals and general directions regarding the MPE activities, while still addressing the aforementioned topics. BPG has to offer sufficient freedom – and also sufficient direction – to people to truly use the benefits of Web 2.0 capabilities. Creativity and collaboration need to be applied to achieve the organization’s goals and provide value to the relevant stakeholders.

BPG is, in organizations, often organized through a specialized Center of Excellence (CoE) who “owns” the process of process management. The CoE delivers process management services to the organizations, provides the necessary standards, and enforces BPG rules and guidelines. The CoE organizes the process

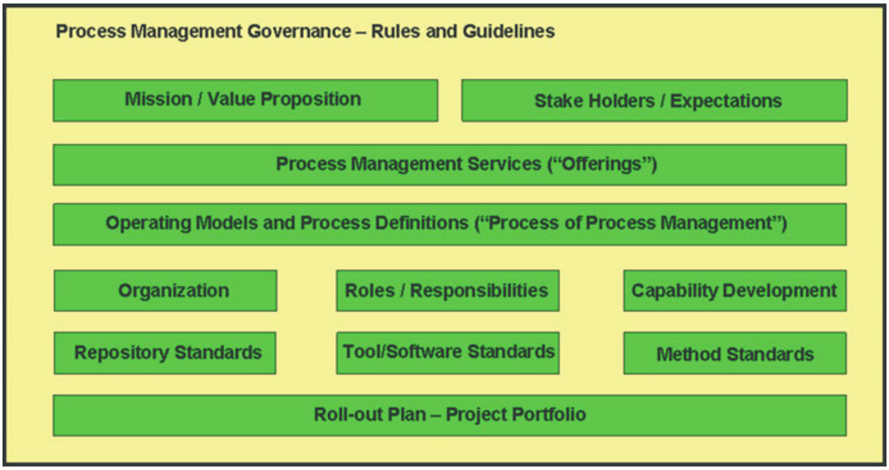


Fig. 6 Main aspects of a governance and process management center of excellence

of process management and its roll out. The main aspects to be considered while setting up a CoE are shown in Fig. 6. Rosemann provides a detailed discussion on the service portfolio of BPM centers of excellence (Rosemann 2014), and Jesus et al. show how a center of excellence has been implemented at a Brazilian company (Jesus et al. 2014). The head of the CoE is emerging as a new top management position, a Chief Process Officer (Franz and Kirchmer 2012b).

CoE in an MPE environment enforces the consequent realization of agility and innovation. For example, it selects and enforces standards around the process life cycle, supporting the "process factory", such as an enterprise wide repository, or provides flexible process execution and controlling solutions to the entire organization.

BPG provides to an MPE environment enough freedom to achieve innovation and agility and combines it with sufficient structure to enable the alignment with the overall strategy. It makes MPE the key link between strategy and operations enabling sustainable high performance.

5 MPE in Practice

During the last years more and more companies have started to move towards an outcome-focused and value-driven approach to BPM. They typically see BPM as an overarching management discipline. MPE has a role in this new thinking happening. Here a couple examples of companies going that way (Franz and Kirchmer 2012a).

A major technology company won a significant new contract that allowed them to sell in 5 years ten times more of a specific product line. While this was good news for the division head the new situation also created lots of questions and concerns. Are the supply chain and engineering processes able to handle that volume? How do we scale up our processes? Where do we have to invest? What do we have to do in detail?

The company used MPE to answer those questions. In a first step MPE provided visibility into the supply chain and engineering processes. This was achieved through a repository based modeling approach – a first step towards a process factory. The process models allowed to identify areas for improvement and launch first transformation initiatives.

In a second step the company simulated key sub-processes using the existing process models enriched through relevant process attributes, like time and cost values or probabilities. This simulation helped discovering systematically bottlenecks by showing what happens if the company has to handle twice, three times, five times or ten times more orders. It turned out that some of the already started investment initiatives could be stopped or reduced since the areas had already been improved sufficiently in the past. Other processes that were always considered simple and straight forward were identified as clear issue areas that had to be fixed. MPE helped to revise the investment plan to enable the organization to deliver on their commitments.

The approach was so successful that the organization decided to roll it out across other business units. Starting point for this initiative was a BPM maturity assessment. Then they prepared for a MPE CoE to achieve synergies and avoid that every unit re-invents the wheel. This included for example the definition of the appropriate governance and identification of company-wide standards for methods and tools. At the end they put a MPE organization in place that helped to take well informed investment decisions and execute quickly and efficiently on them. The related transparency helps identifying the right processes and sub-processes for innovation and optimization activities.

A global oil and gas company started their MPE journey to support a major post-merger integration. It was initially the goal just to standardize processes in the new combined organization to make them manageable and avoid compliance issues. Specific improvement or innovation activities were not planned.

MPE was used to define the new common processes. Starting point was a comprehensive industry reference model. In joint integration workshops this reference model was adjusted to the specific needs of the organization. The modeling activities were carried out in a process repository so that the new standards could be published easily across the organization.

This was a very successful start of the MPE initiative. The company was now ready to get even more value out of their process assets. They started to use the process models to drive their safety and compliance management. They added standard operating procedures to their process models and used a simple workflow system to move necessary information to the right people. Step by step MPE became a powerful management discipline that helped to manage safety and compliance.

Consequently the company founded a solid CoE to take care of their process of process management and continue to increase the benefits, for example by optimizing processes and identifying innovation opportunities. MPE helped to move from strategy to execution, take the right decisions and react in an agile way to business situations like changing legal compliance requirements.

MPE expands a BPM approach through a consistent focus on innovation and agility. It enables smart decisions and a fast execution of the resulting actions. It provides the appropriate insights and move quickly from insight to action. MPE is based on an industrialized management of all phases of a process life cycle in an integrated way that links business strategy with execution through a systematic use of process related assets. The focus of MPE on innovation is paramount since process innovation is of the highest importance for most organizations. Key enablers are flexible IT systems architectures like SOA including more and more SaaS and Could components. The appropriate governance for MPE delivers enough structure to focus the approach and leaves the necessary freedom for creative knowledge workers.

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Value-Orientation in Business Process Management

Jan vom Brocke and Christian Sonnenberg

Abstract The purpose of business processes is to create value, and the purpose of business process management is to support this value creation. However, the concept of value is little understood in BPM, and a number of BPM initiatives have missed the opportunity to demonstrate value creation in practice. In fact, there is little understanding in the BPM discipline concerning how business processes become valuable and what kinds of value may arise from specific BPM initiatives. This chapter structures the value discussion in BPM by elaborating on the general notion of (economic) value and providing a frame of reference. Against this background we review extant contributions on value considerations in BPM and characterize the emerging field of value-oriented BPM. As an example, we present the Return on Process Transformation (ROPT) as a measure for evaluating the monetary effects of decisions on process (re-)design.

1 Introduction

Decision-making in BPM is eminently driven by value considerations, even though many of these considerations are not explicated and some may even be processed subconsciously. Such decisions include choosing the right processes with which to support the corporate strategy, which of the alternative process designs to favor, how to improve a given process, and what process solutions are feasible from a technical point of view.

Although value-orientation is an important element for BPM decision-making, a considerable stream of research on value-orientation in BPM emerged only recently

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*,
International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_4,

(e.g., vom Brocke 2007; vom Brocke et al. 2010; Buhl et al. 2011). Several notions of value have been adopted in this research stream. Some BPM studies elaborate on value-based BPM (e.g., Gulledge et al. 1997; Bolsinger et al. 2011), while others address value-oriented BPM (e.g., vom Brocke et al. 2010); cultural values (e.g., Schmiedel et al. 2014); value in the quality, time, and cost dimension (e.g., Reijers and Liman Mansar 2005); or value in the ecological, social, and economic dimensions (Hailemariam and vom Brocke 2010), and still others relate formally specified value systems to business processes (Neiger et al. 2009).

Bringing structure to the value discussion in BPM is a central aim of this chapter, since having a clear understanding of the types of value that can arise from business processes is essential in planning, encouraging, and enforcing appropriate organizational behavior. Against this background, we provide a general discussion of several notions of value, we position current evaluation methods in BPM within this discussion, and we exemplify how to assess the economic value of process reorganizations by means of the Return on Process Transformation (ROPT) measure.

The chapter proceeds as follows: Sect. 2 presents the foundations of the notion of (economic) value by synthesizing selected studies from philosophy and economics. Section 3 reviews current business process evaluation methods based on the value notions adopted by these methods. Section 4 exemplifies a value assessment by means of a generic calculation scheme to calculate the ROPT as a financial measure of business process reorganizations' performance. The chapter concludes with a summary of key findings.

2 Foundations on the Notion of Value

2.1 Value as a Metaphysical Idea

Value is central to human life, as "all deliberate, all planned human conduct, personal and collective, seems to be influenced, if not controlled, by *estimates of value* or worth of ends to be obtained" (Dewey 1939, p. 2; emphasis added). To systematically determine the (estimates of) value inherent in a thing through the process of *evaluation*, it is beneficial to be clear about what value is and when it is achieved. Common definitions of value suggest two meanings of the term (cf. Merriam-Webster 2003): (1) value as a "relative worth, utility, or importance" of something as perceived by individuals or groups, and (2) value as a "fair return or equivalent in goods, services, or money for something exchanged" meaning "the monetary worth of something." But do these definitions really clarify what value is and when it exists? For example, what is a "fair return," and when does fairness emerge? Who determines when a return can be considered fair? How does monetary worth emerge, and to what does monetary worth relate?

What can be inferred from these representative definitions is that *value means different things to different people*. What is perceived as fair by one individual might not be so perceived by another. What has monetary worth in one situation might be worthless in another. The meaning and existence of value is bound to an individual's or group's mental states and beliefs. As a consequence, value is elusive and difficult to recognize using the human senses, so value is often referred to as a *metaphysical idea* (cf. Ramsay 2005). Given the elusive characteristic of value, one wonders whether it is even possible to find an answer to the question concerning what value is and when value exists.

A linguistic approach alone–that is, defining the meaning of value and providing a phenomenological description of the range of its referents–would establish features of awareness of value but could not disclose the conditions of the possibilities of value (cf. Compton 1958). Another way to approach the question of what value is, is through an ontological analysis. Such an ontological approach would inquire about the being-structure, the being-conditions, that make it possible for value to appear (cf. Compton 1958). The question "What is value?" is then reframed to "What is it *to be* value?"

What follows is a summary of inquiries that have been conducted in an effort to define an *ontology of value*, drawing on philosophical and economic thought. The philosophical perspective serves as our main point of departure for identifying essential ontological categories and relationships. We then transfer the philosophical thoughts on the being-conditions of value to the domain of economics in order to answer the question, "What is *economic* value?" (or "What is economic value to be?"). The section concludes by outlining how the ontology of (economic) value that is outlined in our summary provides insight into the use of the term "value" in a BPM context. In particular, we argue that the language used to describe value in the context of BPM is misleading (cf. Ramsay 2005). For example, we discuss why it is not possible for a business process or business activity to add value (instead of creating value) and why it is not possible for value to flow through a process.

2.2 Being-Conditions of Value

Our ontological argument is a summary of Compton (1958), who synthesizes and contrasts theoretical proposals about the being-conditions of value. Compton (1958) makes use of two expressions, *value statement expression* and *evaluation statement expression*. Both types of expressions play a vital role in explaining what value is and when value can be said to exist. Moreover, these expressions allow the various notions of value-orientation in BPM to be defined and characterized. (See Sect. 3.)

Compton's (1958) ontological analysis begins with a linguistic position of the meaning of value, which characterizes value as follows:

1. There is a *value dimension* of things, which is unique and cognitively apprehensible.

2. The value dimension is unique in its reference to existence, that is, it is generic to its very meaning as an *ought-to-be*[1] (Compton 1958, p. 158).
3. The value dimension of things is diverse, as *plural claims-to-be* can be distinguished with each claim competing for allegiance and appreciation.

Based on this characterization of value, Compton (1958) formulates value statement expressions and evaluation statement expressions. Let *x* stand for any center of value—any entity, single or collective—for which value may be said to arise. Let *y* represent certain relationships, states, and activities that are of some value for *x*. Assuming that there are *y*'s and *x*'s that qualify, we may say "y is of value for x" or "*x ought to be y*" (Compton 1958, p. 158). We term a value assertion of the form "x ought to be y" a value statement. According to Compton (1958), a value statement is thus comprised of three elements: a center of value (i.e., a thing denoted as *x*), a value claim (the "ought to be" claim), and a characterization of the value claim (i.e., some valued quality of *x*, denoted as *y*). For instance, the business process "goods received" (center of value *x*) ought to meet a throughput time of 10 min (valued quality *y*).

For the purpose of this paper, we expand the set of possible value claims in a value statement beyond the "ought to be" type in order to account for different intensities and levels of a value statement's normative forces. In particular, we distinguish between "could be," "should be," and "ought to be" value claims (Table 1).

We consider a "could be" value claim as the weakest of all value claims, one that exhibits no normative force. A "could be" denotes a mere possibility, the potential of some *x* to transition to a state *y* that is of value for *x*. A potential state *y* is of value for *x* simply because it signifies a technically feasible state of *x* at some point in the future. For example, when one is planning or implementing a new business process *x*, a value statement that only values the technical feasibility of *x* can be expressed as "process ABC *could be* as defined by our process model." Such a value statement is then satisfied by all technically feasible process solutions that are implemented according to an existing process definition.

The next-strongest value claim is a "should be" value claim. A "should be" denotes an objective, such as an objective in the form of advice or a suggestion. Unlike a "could be" value claim, a "should be" has a normative force, so a "should be" claim provides direction and gives meaning to "could be" states in *x*. "Should be" value claims can be formalized by means of objective functions. An exemplary "should be" value statement can be expressed as "the potentially feasible business process ABC (i.e., a process that could be) *should be* designed and implemented so as to maximize profit"; an alternative value statement is that it "*should be* designed to maximize revenue or to minimize environmental harm," which would result in significantly different directions for respective BPM initiatives.

[1] When formulating a value assertion, the uniquely valuational element in what is asserted is that something ought to exist (Compton 1958).

Table 1 Normative intensities of value claims

Value claim	Relative normative force	Description
Could be	0	Denotes the possibility of some value center x to acquire a state y at some point in the future, so the value of y for x lies in the feasibility of x to transition to some y. The normative force of "could be" reduces to make y possible for x
Should be	+	Denotes advice or a suggestion. The advice can be formalized through objective functions. "Should be" value claims give meaning to "could be" value claims. For example, a process that could be in a particular way should or should not necessarily be so. From all "could be" states $y \in Y$, a process should transition only to "should be" states $y' \in Y', Y' \subseteq Y$ because these states fulfill a particular objective, so they are more desirable in a given situation than the "could be" states $y \notin Y'$
Ought to be	++	Denotes a consensus achieved for balancing a set of "should be" value claims. This consensus implies that some state y is collectively asserted to be the right state for x to be

From our set of proposed value claims, we conceive an "ought to be" as the strongest value claim. The normative force of an "ought to be" is greater than that of a "should be" claim, as an "ought to be" expresses that something is the right thing to do. An "ought to be" claim has an ethical stance to it and can be best interpreted as a value claim that represents a consensus among a group of individuals about a collectively desired state y for a value center x. Therefore, as opposed to the singular advice or suggestion implied by a "should be" we hold that an "ought to be" denotes some consensus achieved over multiple "should be" value claims. For example, a process manager could state that "a business process ABC *ought to be* implemented so as to maximize profits," which presumes a consensus that balances a set of competing "should be" value claims, such as that a business process should be altogether profitable, environmentally sustainable, and strongly supported by the members of an organization.

Definition 1 provides a generic structure of a value statement expression:

Def. 1 A *value statement expression* specifies the being-structures in the world that must hold for value to arise. The elements of a value statement are comprised of a thing x in the world (center of value), a value claim, and a desired state y that is of value for x. The structure of a value statement expression is given by Eq. (1).

$$\{x\}\{could|should|ought\ \ to\}\ \ be\ \ \{y\} \tag{1}$$

According to Compton (1958), the being-condition of value (i.e., the fact that y is of value for x) is expressed in a value statement's value claim that denotes a tension between the being of a center of value x as it actually is, and y, what x could/should/ought to be (cf. Compton 1958, p. 160).

Value claims can be used to express in linguistic terms a value order related to things in the world. However, value claims, and thus value orders, exist independently of linguistic expressions. But due to their relation to things in the world, value claims and value orders can become an "ingredient" to things in the world (Compton 1958). If a value claim becomes an ingredient to a thing x, that is, if a value claim is satisfied, then value arises and is actualized by a thing such that "x is as it could/should/ought to be" (cf. Compton 1958).

The statement "x is as it could be/should be/ought to be" is an *evaluation statement*, which signifies a situation in which value emerges from a thing x, since x satisfies a value claim. In BPM such statements typically relate to gap analysis, in which an as-is process (or value) is compared to a to-be process (or value).

Def. 2 An *evaluation statement expression* is used to assert meaningfully and validly that some x is actually of value, that is, it is here and now as it could be/should be/ought to be, wholly or in some respect (cf. Compton 1958). The assertion is valid if its three sub-assertions hold true: first, x is in fact, that is, y is now achieved and actual; second, y is still what x ought to be, that is, the value claim upon x still subsists (e.g., x still ought to be y); and this claim upon x is somehow satisfied, rendering x of positive value (Compton 1958). The structure of an evaluation statement expression is given by Eq. (2).

$$\{x\}\ is\ as\ it\ \{could|should|ought\ to\}\ be \tag{2}$$

Value statements and evaluation statements together define the being-conditions in the world in order for value to arise. A value statement explicates the value claim against some center of value x. An evaluation statement is used to assess the degree to which value is actualized by a thing x.

At this point, the distinction between different types of (strong and weak) value claims and between value statements and evaluation statements might appear to be artificial—something of a theoretical exercise. However, this distinction is instrumental to the ability to identify different notions of value-orientation in BPM (Sect. 3). For example, "could be" value claims and associated evaluations are typically employed in structural process analysis, where a process is valued based on some soundness criteria. "Should be" value claims are predominantly used in BPM to assert that a process is valuable according to some economically relevant evaluation criterion. (E.g., a process is operated at a cost minimum, a process creates products of a certain quality, a process does not exceed a particular cycle time.) "Ought to be" value claims are prevalent in the context of value-oriented BPM approaches (Sect. 3), and the process of achieving "ought to be" value claims is an important people- and culture-related aspect of BPM (Schmiedel et al. 2014; vom Brocke et al. 2014).

The preceding discussion sketched the general being-conditions of value of any kind to arise. Next, we turn to the being-conditions for *economic value* to appear.

2.3 Being-Conditions of Economic Value

The basic assumption to be made about the being-conditions for economic value is the existence of an *economic reality*. Whenever individuals engage in making economic decisions, they perceive things in the world as "constituents of a reality divided by and articulated through economic considerations" (Zúñiga 1998, p. 300). These constituents are *economic objects*, and the world comprised of these economic objects is economic reality. Economic objects are social phenomena that are the product of beliefs and objective properties of things, "some of which are physical and some of which are social facts" (Zúñiga 1998, p. 302).

Menger (1871) defines six categories of economic objects that can exist and relate to each other in an economic reality: economic good, commodity, money, price, exchange, and *economic value*. Building on the work of Menger (1871), Zúñiga (1998) proposes a list of conditions that apply to each category such that "the truth or falsity of a belief about an economic object can be objectively settled" (Zúñiga 1998, p. 302). For the purpose of this chapter, we focus on the economic value category. Def. 3. explicates the being-conditions for economic value to appear.

Def. 3 Economic value is the perceived significance attached to a good[2] (its putative features) based on a subjective judgment that considers personal gain (cf. Zúñiga 1998). Zúñiga (1998, p. 306) provides the specific being-conditions for economic value to appear:

1. *significance attached to a good* resulting from a conceptualization of the good in terms of desired ends,
2. *recognition of a perceived utility* stemming from concrete quantities of a good in relation to an end,
3. *instantiation of the feature of scarcity* in a good,
4. a *dependence relation* between the *assigned importance* to any one need or want and the *relative importance* of other needs or wants,
5. a *dependence relation* between the relative importance of *any need or want* and the agent's *overall degree of fullest satisfaction* expected,
6. a *dependence relation* between the importance of *higher-order goods* (stand in mediate stages toward the satisfaction of a need or want) and the importance of *first-order goods* (provide an immediate satisfaction of a need or want),
7. a *dependence relation* between the *future value* of things and the *present value* of things,
8. the nature of the significance attached to a good varies according to the *relation between wants and things* (i.e. significance of a good arises and disappears as wants arise and disappear), and
9. the *value of the services* of particular goods are subject to the same laws of value, outlined above, as for any other *economic good*." Zúñiga (1998, p. 306).

[2] An economic good "exists as such by virtue of putative features that an individual attaches to a thing in relation to an end the individual has in mind. [. . .] [T]he thing is either the mediate or immediate means" (Zúñiga 1998, p. 302).

The value statement and evaluation statement expressions specified in Eqs. 1 and 2 can be readily applied to make assertions about economic value creation. The fulfillment of a value statement of the form "*an economic good x could be/should be/ought to be in a particular state y*" can be validated through an evaluation statement of "*an economic good x is as it could be/should be/ought to be*." The difference between the generic value assertion and an economic value assertion is that the normative force in economic value claims relates to the satisfaction of an economic agent's needs.

Reference to economic value is usually made through the agency of two sub-categories of economic value: the *use value* and the *exchange value* of a thing (e.g., cf. Smith 1776; Ricardo 1821; or Marx 1867). The *use value* (or value in use) of a thing relates to subjective needs of individuals or groups and the satisfaction of these needs. Following Ricardo (1821) and Smith (1776), the value in use of a good is identical to its utility, with utility being the cause or determinant of value (a "being-condition" in the sense of Def. 3). For example, a machine in a production process has a use value as it is used to produce goods. Likewise, inputs to a production process have use value. In BPM, the use value expresses the utility provided by a process in a given design, considering the degree to which it meets operational requirements. Similarly, use value is considered in design-oriented research when methods, models, and tools designed for BPM are evaluated (Sonnenberg and vom Brocke 2012).

The *exchange value* (or value in exchange) of a thing refers to economic value in terms of monetary[3] measures. For example, the exchange value of a good lies in its ability to buy other goods, particularly its ability to acquire use value. Because of this transformation potential, exchange value itself becomes a universal value in use, motivating economic actors to increase the value in exchange under their control (cf. Bartsch and Schlagwein 2010, p. 236). A thing can be of value in terms of both categories at the same time; that is, it can be useful and it might have a price. In BPM, for instance, exchange value is apparent in business process redesign (vom Brocke et al. 2009), as investments at a certain exchange value must be made in order to conduct the redesign (and allocated resources compete with alternative investments), and the redesign aims to increase the exchange value of the process. Therefore, profitability analysis investigates the relationship between the exchange value created by a process redesign to be achieved and the exchange value sacrificed by investing in the process redesign.

Value-based management approaches, also known as shareholder value approaches (Rappaport 1986), focus on values in exchange, so a thing has economic value if it increases the exchange value (or market value) for an institution that

[3] The exchange value of goods or commodities is expressed in terms of a price that denotes a quantity of money asked for a good or commodity in an exchange. More precisely, money is defined as "a universal medium of exchange as well as a commodity for storing exchangeable wealth" (Zúñiga 1998, p. 304). The price of an economic good "is merely an objective magnitude of numerical value" (Zúñiga 1998, p. 308). The price attached to a commodity is not equivalent to its putative value as an economic good (cf. Zúñiga 1998).

owns that thing. An abstract value statement representative of a value-based management approach could read: "*{a thing x}* ***should be*** *{(transformed; used; consumed; designed; controlled; planned; operated;...) so as to (maximize the shareholder value or the market value of an institution owning the thing x)}*."

In contrast to value-based management approaches, *value-oriented management approaches* take into account multiple "should be" value claims, so no single objective function can be specified to formulate a being-condition of economic value. Value claims made under a value-oriented paradigm can be satisfied only if sub-ordinate "should be" value claims are satisfied and these sub-ordinate value claims are asserted based on a consensus among individuals or groups. In a value-oriented management approach, also known as the stakeholder approach (Freeman 1984), the notion of an "ought to be" is prevalent, and it stipulates that the interests and value statements of multiple stakeholders must be balanced in order to achieve a sustainable *incentive contribution equilibrium* (cf. Barnard 1938; Cyert and March 1963; Freeman 1984). A value statement in a value-oriented approach could read: "*{a thing x}* ***ought to be*** *{(so as to achieve an overall objective) and (the fulfillment of the overall objective allows for the fulfillment of all sub-ordinate objectives of relevant stakeholders)}*." Value-oriented approaches consider both use value and exchange values.

2.4 Some Intermediary Conclusions for BPM

From our discussion on the notion of value, we learned that the being-conditions of value are determined by value statements and that the satisfaction of a value statement is validated through evaluation statements. We also learned that value statements' intensity levels regarding their normative force can differ. While a "could be" value claim has no normative force, an "ought to be" value claim has the strongest normative force as it has an ethical stance. Finally, we distinguished multiple categories of value, a generic value category and the category of economic value, and further categorized economic value as "use value" and "exchange value." A thing can inhere both categories of economic value at the same time, as processes usually do. No matter how value is categorized, the conception and apprehension of value is bound to the mental states and beliefs of individuals and groups, so the existence of value is subjective. Since value is seldom perceptible through human senses, it is often referred to as a metaphysical idea. However, anything in the world can actualize value as long as the thing satisfies a value claim related to it.

How, then, can value arise from business processes? The language commonly used in the context of BPM suggests that value is a concrete thing that can be passed from activity to activity, thereby giving the impression that value can "flow" through a value chain or a value stream. In a similar vein, it is often asserted that value can be "provided by an organization" or "delivered to a customer" and that it is an inherent characteristic of a product or service (cf. Ramsay 2005) and that value can be "added" by a process or process step. From our discussion on the notion of value, however, we can conclude that such a language may not properly describe how value arises from a process. In fact, this use of language may be misleading and may encourage inappropriate organizational behavior (cf. Ramsay 2005). We discuss some prominent examples in what follows.

First, value is not an inherent characteristic of a product or service (Ramsay 2005), that is, products and services are not valuable per se. The existence of things is a necessary but by no means sufficient being-condition that value arises in the value dimension of a thing. Instead, the existence of value is contingent on the satisfaction of value statements related to a thing. However, these value statements are made based on beliefs and mental states of individuals or groups. A thing can only inhere value if an individual or group believes that a value statement related to a thing is satisfied and that the value claim (that a thing could/should/ought to be) still exists (cf. Compton 1958). Therefore, when people refer to the value of a product, service, or process as such, they may have certain value statements of individuals or groups in mind. Still, for the purpose of deriving management decisions in BPM, it appears necessary to explicate such assumptions so that other people (who likely have other value statements in mind) can understand what is meant by the value of a process in a certain context.

Second, as a metaphysical idea, value has no substance, so it cannot be transferred (passed, provided, delivered). Value cannot flow through a process or an organization, that is, there is no such thing as a "value stream." Ramsay (2005, pp. 549–550) points out that "it is impossible for a metaphysical idea to move along a chain within a company, far less between firms and their customers." In fact, in BPM it is the work that flows according to a chain of activities, each of them contributing to the value of a process (regarding certain value statements). It may look like a value flow, but in order to manage value creation, we must understand that it is not value that is flowing but each activity contributing to the satisfaction of a specific value statement.

Third, since value is not an intrinsic characteristic of a thing but bound to subjective beliefs and value statements, it cannot be added to a product or service. From an ontological perspective it is not possible that a value chain can exist. Rather, it is a chain of activities that has been planned in order to satisfy value statements that are relevant to a business area. This difference is important because only then does a BPM initiative begin to question the value statements that are implied by a process design.

These considerations have serious consequences for reference modeling (vom Brocke 2007), for instance, since reference models intend to describe (best) practices to be applied in classes of applications (such as sectors or functions). As to the normative power of reference models, it is important to explicate the value statements for which these reference models are designed. To date, reference models that have been suggested for BPM do not make such clarifications but implicitly assume certain value statements. (See Houy et al. 2014.)

Although it is not possible for a process or activity to add value to a thing, it may be possible in a process to improve the customer's perceptions of products and services. Therefore, value is not added to something but is a value perception (of something) *increased* by a certain *driver* that is worth specifying. In particular, while value itself cannot flow through a process, value can be *stimulated*, *prompted*, *influenced*, and *created* by a process (cf. Ramsay 2005).

A process can create value as resources are used, so processes can be perceived as sequences of resource utilizations (or resource flows). Resource flows may satisfy value statements that relate to a value in use (e.g., the use value of a raw material is instantiated once the material can be used to assemble a product), to value in exchange (e.g., the exchange value of a product is instantiated once it has been exchanged for another economic resource), or to other kinds of value outside the economic value category (e.g., the value of a process executed by an employee is instantiated when the process stimulates job satisfaction).

Coming back to the initial question, value arises from a process when economic resource and business process states (potential or actualized) satisfy one or more value statements that are subject to a particular value claim.

3 A Review of Value Considerations in BPM

Based on the conceptualization of value introduced in Section 2, we now review extant contributions in BPM that include value considerations. We focus on three steam of research: evaluations of formal and structural process characteristics, economic evaluations of processes, and value-oriented BPM. Then we summarize the intermediate findings from our review.

3.1 Evaluations of Formal and Structural Process Characteristics

In Sect. 2 we discussed how the intensity of value statements' normative force can differ. Of the three types of value claims (could be/should be/ought to be), only the "could be" type is seen as having no normative force. The value asserted by a "could be" value claim lies in its bearing on a thing x that some state y can be actualized in x.

"Could be" value claims in BPM relate to structural characteristics of a process. For example, in a process design phase it is useful to know whether a process design is feasible, that is, whether a process *could be* according to some formal correctness criteria. It is also useful to know about the possible "could be" states of a process in order to determine, for example, whether a process is free of deadlocks. An important influence on the "could be" value derives from the technological frame of the process, since these frames largely determine what "could be done" in a process design. The business process reengineering literature has presented a number of examples on the enabling role of information technology in process design (Hammer 2014).

In light of “could be” value claims, value arises for a process if the process fulfills a minimum set of correctness criteria.[4] Evaluation statements concerning the correctness of a process or process model are typically of the form “*a process model for a process ABC is {syntactically correct; free of deadlocks; otherwise sound; complex; coherent; modular;...} such that the process ABC* ***could be***.”

Many studies in the BPM field are concerned with various notions of process correctness and evaluations of structural process characteristics. For example, van Dongen et al. (2006) proposes structural patterns for process soundness, van der Aalst (1993) discusses algorithms for sate space analysis and reachability graphs based on a formal process description, and Vanderfeesten et al. (2007) propose metrics for describing process models in terms of size, complexity, coupling, cohesion, and modularity.

It can be argued that correctness criteria for processes do have a normative force, so value statements have to be in the form of “a process ***should be*** correct.” While this normative force can be assumed to be present outside an economic reality, within an economic reality there is no reason that a process *should be* correct since no economic value would arise from the correctness of a process alone. For example, it is not valid to asserted that a sound process has significance in satisfying the needs of economic actors. Fulfillments of correctness criteria, that is, fulfillments of “could be” claims, are not sufficient for economic value to arise. Therefore, even if a process designer arrives at a sound process design, the designer may not be able to argue from the correctness criteria alone why a process *should be* the way it has been designed; a process designer may only assert that the process *could be* as designed. There may be sound processes that satisfy no economic value statements at all; such processes would be very sound in doing the wrong thing.

Figure 1 exemplifies the meaning of “could be” value claims by showing three process variants that have been specified as petri nets (Petri 1962). Out of these variants, only processes b) and c) *could* possibly be, since process a) would run into a deadlock (after the transition sequence $<T1, T2, T4, T3>$). While processes b) and c) are free from deadlocks, a structural process analysis could not disclose or suggest which one of the feasible process variants *should be* considered for implementation or execution. However, both processes b) and c) have already actualized value (by fulfilling a correctness criterion) since they both qualify for implementation or execution. In choosing a process variant that can potentially instantiate economic value, one must subject the processes to “should be” value claims. The example is extended in subsequent sections to demonstrate that decisions about a process design particularly include accounts of statements pertinent to the economic value attributed to a process variant.

[4] That a process fulfills a minimum correctness criterion is the *soundness* of the process (cf. van Dongen et al. 2006).

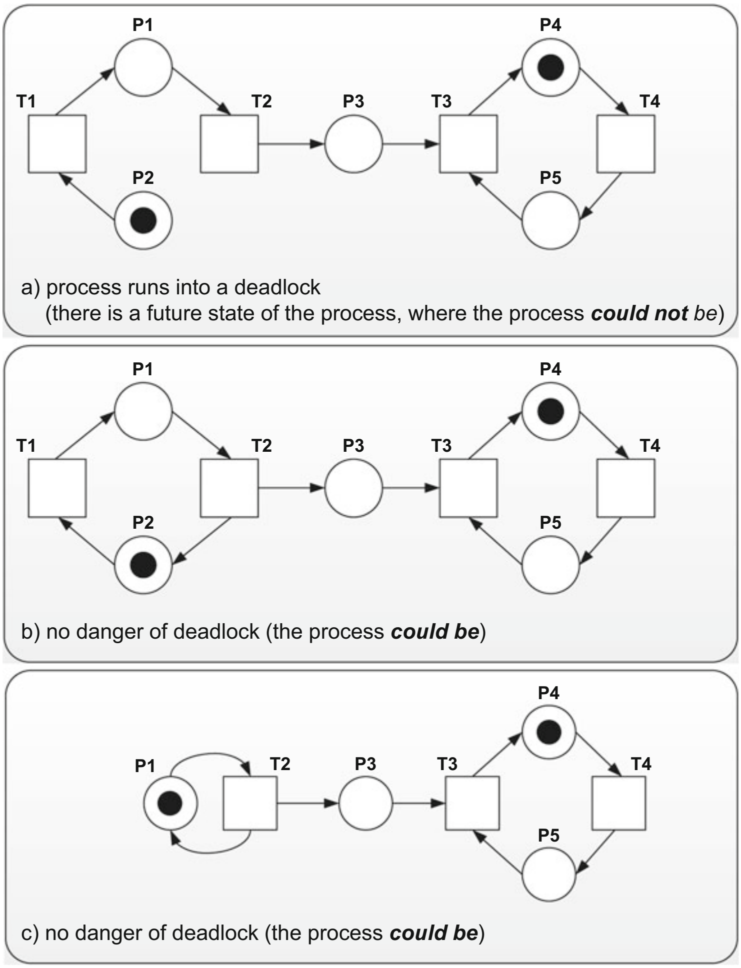

Fig. 1 "Could be" value claims and processes

3.2 Economic Evaluation of Processes

Whenever a business process is to be redesigned or improved, the resulting to-be process is not primarily valued because of its correctness but because of its ability to actualize economic value or to actualize a higher economic value than a current as-is process can. Not surprisingly, the prevalent and most commonly applied type of value claim within BPM decisions is of the "should be" type. "Should be" value claims imply a normative force that directs BPM decisions toward creating economic value. Therefore, a typical value statement in BPM may read: "a business processes ABC *should be* planned, designed, and controlled so as to create economic value."

In BPM value claims about economic value refer to both economic value in use and value in exchange, while value statements in BPM predominantly focus on a process's use value on an operational level along the dimensions of time, quality, flexibility (Reijers and Liman Mansar 2005), and costs, with costs belonging to the exchange value category. Key measures of process evaluations on an operational level are flow times, flow rates, and inventories (cf. Anupindi et al. 2011). Quality control approaches like total quality management (TQM) (Sinclair and Zairi 1995) and Six Sigma (Conger 2014) evaluate processes with regard to their variability and disposition of risk, that is, their tendency to deviate from "normal" process flows or their tendency to deviate from desired performance levels, respectively. Processes actualize value in a quality dimension if, for example, they are subject to a minimum number of errors or if the number of errors falls within a defined range.

There is no single value statement that determines when economic value arises from a business process. The actualization of a process's economic value depends on what an economic actor considers important and significant regarding the satisfaction of an economic actor's needs in a particular situation. (See the discussion on the being-conditions of economic value explicated in Def. 3) Figure 2 provides an example, by means of the "could be" processes b) and c) from Fig. 1, of how "should be" value claims compete against each other. The decision about which process *should be* implemented depends on what state or characteristic is considered to be of value in the situation shown. In Fig. 2, value statements relate to process flow times and process quality. If fast process flow times are valued, then process b) should be chosen over c). However, process c) is assumed to have a quality control mechanism in place, so this process should be chosen if quality is valued over short process flow times.

This example shows that there is no single, optimal way a process should be designed because value means different things to different individuals, groups, and organizations, and depending on the being-structure in an economic reality, different kinds of value may arise in different situations for the same process. Therefore, from an ontological perspective, *there is no such thing as an optimal business process*, and business process optimization is simply not possible.[5]

Typically, the actualization of a process's economic value requires *tradeoffs* to be accepted between or among value claims. (See Reijers and Liman Mansar 2005, who discussed several tradeoffs along the value claims related to time, cost, quality, and flexibility that are pertinent to particular business process design patterns.) For example, a process that produces quality products might have long cycle times and relatively high costs, whereas a process with low cycle times might have moderate costs and a low quality level.

Anticipating and explicating acceptable tradeoffs between or among multiple (competing) value statements relating to a business process is supported by *goal-oriented business process modeling* approaches (e.g., Kueng and Kawalek 1997;

[5] In our terminology it *could not be* that a process is optimal regarding its ability to instantiate economic value.

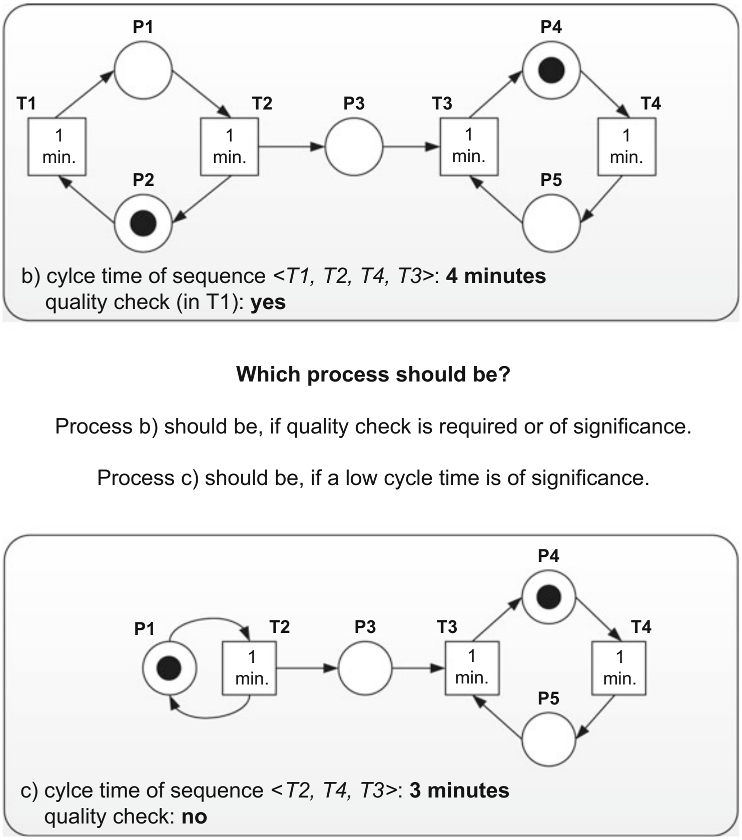

Fig. 2 “Should be” value claims and processes

Neiger et al. 2009; Nurcan et al. 2005; Soffer and Wand 2005). The idea behind goal-oriented process modeling is to associate value statements (expressed as goals) with elements of a process (model). Like process elements, the value statements (goals) can be connected with each other in order to denote hierarchical, cause and effect, or means-end relationships. With goals mapped onto processes and process elements, the process variant can be analyzed regarding its consistency and the tradeoffs that have to be accepted if particular goals are valued over other goals of the goal system.

Figure 3 exemplifies how value statements can be mapped onto process elements in order to assert how a business process *should be* in light of multiple (potentially competing) value statements. The process structure is described by means of an event-driven process chain (EPC) (Keller et al. 1992).

Figure 3 shows that value statements, expressed as objectives, are not an intrinsic part of a business process but are used to describe the being-conditions necessary for economic value to arise from a process. In the example, a “payroll

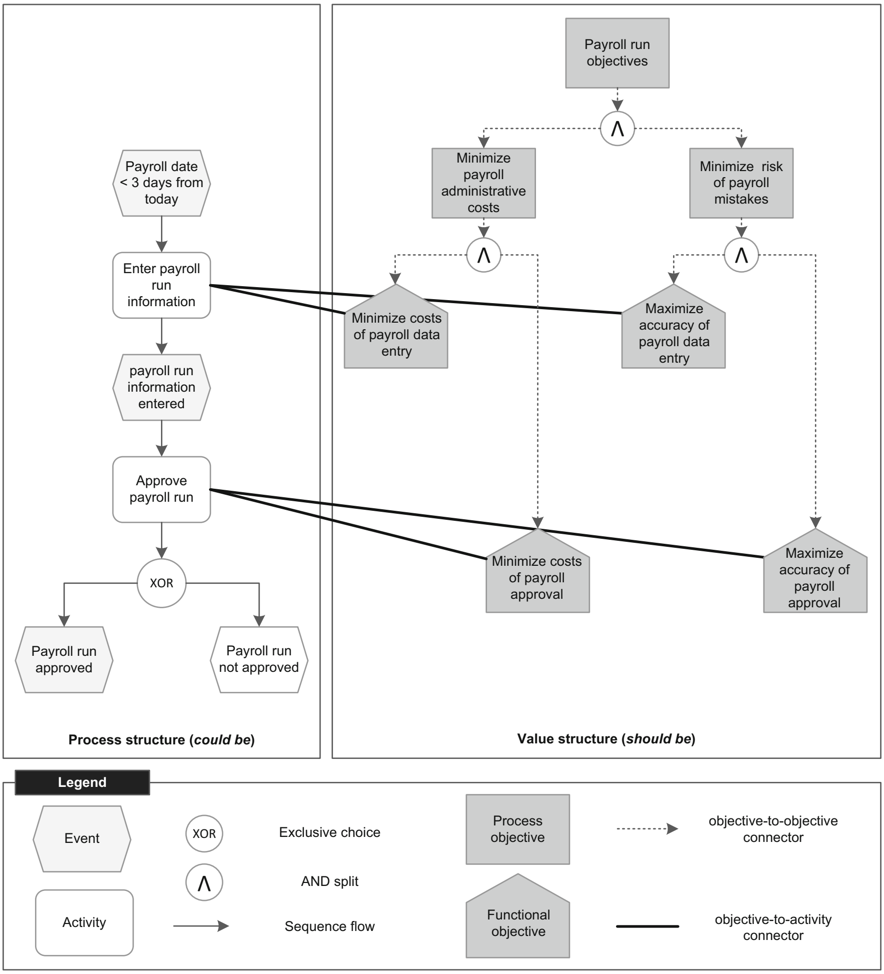

Fig. 3 Mapping "should be" value statements onto process elements (Adapted from Churliov et al. 2006, p. 8)

process" is considered valuable if it minimizes administrative costs and the risk of payroll processing errors. In order for the process to satisfy these value statements, it should be designed so its elements (process functions) contribute to maximizing the accuracy of data entries and minimizing the costs its functions incur.[6]

Being able to map value statements onto business processes and business process elements allows the potential loci of economic value creation to be

[6] Figure 6 (Sect. 5) illustrates how costs can be calculated on the function/activity level of a business process.

identified systematically. However, such a mapping does not fully reveal how the objectives assigned to a "should be" process translate into a value in exchange.

The value in exchange is usually articulated as an amount of money (a price) to be paid for a thing. A price, as opposed to measures of use value, is a measure that allows the economic value of things to be compared, particularly if the things are different in nature and satisfy different needs. For example, let a bicycle have the same price as some piece of furniture (e.g., a couch). Although these things serve different needs and although their use value may be assessed differently by different individuals, it is fair to assume that both things have the same economic value in exchange; that is, if someone owns a bicycle, he or she could sell it on a market, obtain an amount of money in exchange, and then buy the piece of furniture. Due to the fact that things can be exchanged for other things with possiby different use values, the exchange value of a thing can be regarded as a universal value in use (Bartsch and Schlagwein 2010).

In this sense, a BPM decision-maker may well be convinced that some process has a use value but would also want to know what a business process would be worth in terms of economic value in exchange, that is, the return (in monetary units) from a business process if that process could be sold on a (fictitious) "process market." Having the information about the exchange value of a business process may allow the ownership of a particular process to be justified. For example, if a process generates profits (i.e., it has a high value in exchange), then it would be a good advice to take care of that process and maybe to allocate financial resources to further improve it. However, if the process is losing money, that is, it has a negative economic value in exchange, then a decision maker might contemplate whether the process should be abandoned in order to acquire other kinds of use value with the financial resources that the process would otherwise consume. Also, the decision maker might consider investing resources in order to improve the process (if possible) so that its economic value in exchange increases.

The general approach to managing organizations with the objective of increasing their value in exchange (the market value) is known as *value-based management*, often referred to as the shareholder value approach (Rappaport 1986). In the context of BPM, this management approach is referred to *as value-based business process management*, signifying that BPM decisions should contribute to increasing an organization's market value. Value-based BPM (to which the literature also refers as value-oriented BPM) requires that the economic consequences of business processes be expressed in terms of long-term financial measures that are calculated based on cash flows (cf. vom Brocke 2007; vom Brocke et al. 2009). Despite the significance of value-based performance measures for decision support in organizations, and despite the increased adoption of process-oriented management approaches, the literature has proposed only a handful of value-based BPM approaches. We consider Gulledge et al. (1997), vom Brocke (2007); vom Brocke et al. (2009, 2010), Braunwarth et al. (2010), Buhl et al. (2011), vom Brocke and Grob (2011), and Bolsinger et al. (2011) as representative of the state of the art in value-based BPM approaches. We return to the evaluation of processes in terms of their value in exchange in Sect. 4, where we present an evaluation approach to calculating the *return on process transformation* (ROPT).

A main barrier to the adoption of value-based BPM approaches in practice is that relevant *process-oriented accounting information* is not readily available in many organizations (Sonnenberg and vom Brocke 2014). To facilitate the provision of process-oriented accounting information in organizations, Sonnenberg and vom Brocke (2014) propose a *process accounting model* (PAM) that is capable of tracing the flow of economic resources along an organization's business processes. By applying the PAM, process managers can determine where exchange value is created or destroyed in an organization, which processes contribute to increasing the market value of an organization, and which resources are exchanged for other resources (cf. Sonnenberg and vom Brocke 2014). Used in combination with recent developments in process technologies, such as in-memory technology (see Plattner and Krueger 2014), the PAM can provide real-time information on the value creation of business processes (vom Brocke et al. 2013).

3.3 Value-Oriented BPM – Balancing of "Should Be" Value Claims

We have discussed value statements that are concerned with appreciating feasible process alternatives ("could be" value claims) and with the conditions that determine when economic value can arise from a business process ("should be" value claims). We also learned that there can be multiple competing "should be" value claims pertinent to a process, so decision-makers have to accept tradeoffs when deciding how a business process should eventually be.

However, accepting tradeoffs does not imply that all value claims about a process are balanced, as a particular tradeoff may be acceptable to only one stakeholder of a process, while value statements that are significant to other process stakeholders might not be fulfilled by such a tradeoff. Thus, a business processes may not be equally supported by all parties involved.

Value-oriented BPM accounts for the fact that organizations—and processes in particular—are cooperative social systems and that people are willing to contribute to such a cooperative system only if they perceive their participation to be personally beneficial (cf. Cyert and March 1963). Therefore, organizations should offer incentives to stakeholders in order to "secure efforts necessary to its existence" (Barnard 1938, p. 142). In the sense of our value discussion, incentives and contributions represent (prospective) fulfillments of stakeholder-specific value statements. For example, an employee might be induced to contribute by attractive work conditions (i.e., a process's value for an employee arises if the process contributes to establishing attractive work conditions), as the employee's contribution (e.g., a process output) is valued by the process owner and contributes to the fulfillment of the owner's value statement related to the process output. In order to sustain such a cooperative system in the long-term, stakeholder incentives and contributions must be delicately balanced in a way that the exchange of all stakeholders' contributions offers all stakeholders the necessary incentives. Such *balancing of value statements requires negotiation among stakeholders*, which can be conducted through contracting or persuasion. Therefore, we propose distinguishing between *value-based* and *value-oriented* BPM.

It is the distinctive feature of a value-oriented BPM approach that value statements are balanced and traded off based on negotiations between process stakeholders. The resulting *balance of values* can be said to be socially acceptable—which is not necessarily the case in, for example, a value-based BPM approach that focuses solely on the financial perspective—so high-level value claims under a value-oriented BPM paradigm are conceived as having the strongest normative force (Table 1). Instead of asserting that a process should be, a business process's value is asserted by stating that "*a process* ***ought to be***." In BPM this notion has been put forth in the area of Green BPM, where sustainability as a management paradigm has been characterized by (a) balancing the views of all relevant stakeholders (b) over a long-termed planning horizon (Alemayehu and vom Brocke 2010).

In order to achieve a balance between value statements, both cause-and-effect and means-end relationships between individual value statements must be identified and weighted in a business process context. Techniques from goal-oriented process modeling (Fig. 3) can be employed for this purpose. Two goal-modeling techniques appear to be particularly useful in the context of value oriented BPM approaches: the *value-focused business process engineering approach* (Neiger et al. 2009) and the *i** goal modeling approach (Yu et al. 2011). There are also less process-oriented approaches that can be adapted for the purpose of balancing value statements in BPM, such as the balanced scorecard proposed by Kaplan and Norton (1992).

Whatever approach is chosen for defining value statement relationships, each resulting value system must account for the organization-specific context. Different organizations may arrive at different value systems since value means different things to different stakeholders and in different cooperative systems.

Despite the particularities of individual value systems, some basic patterns can be identified that can be considered in the formulation and adaptation of organization-specific value systems. Figure 4 provides an abstract example of such a value system.

The value perspective that is most frequently referred to in BPM is the operational perspective, which focuses on the key performance measures of time, quality, and costs (Reijers and Liman Mansar 2005). From the operational perspective, a process should be designed to fulfill quality, time, and cost objectives.

Under a value-oriented BPM paradigm, however, other perspectives must be considered as well if the needs of all relevant process stakeholders are to be satisfied. In addition to satisfying operative results, a business process should satisfy the conditions that secure processes' ability to operate in the long term. In particular, the interests of employees as members of a cooperative system must be addressed. Processes in this sustaining perspective are valued, for example, if they

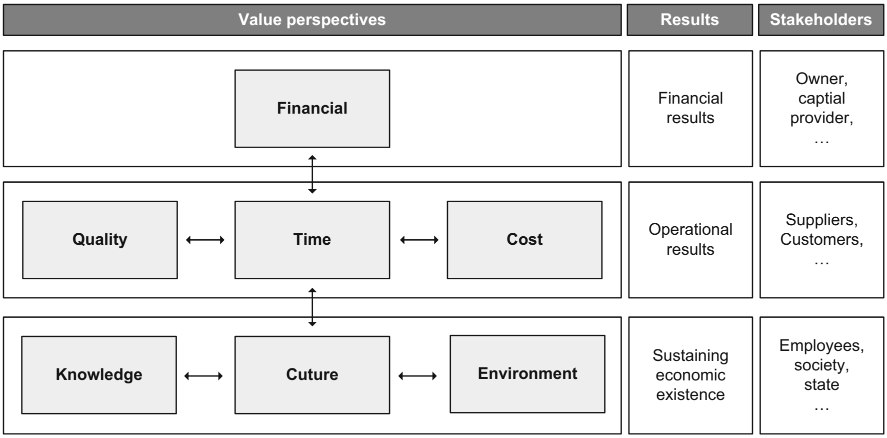

Fig. 4 Value-oriented BPM – exemplary perspectives on a multi-dimensional value system

positively affect the process culture (Schmiedel et al. 2014). Other kinds of value related to process sustainability can also be considered; for example, the state and society may demand that a process be designed so it leaves a minimal carbon footprint or produces minimal waste of natural resources (cf. vom Brocke and Seidel 2012; Seidel et al. 2012).

The process alternatives that satisfy the "should be" value claims pertinent to the operational and sustaining perspectives have different effects on an organization's financial results. From the financial value perspective, relevant stakeholders are interested in the exchange value that arises from particular process alternatives. (See the discussion on value-based BPM in Sect. 3.2.) For example, owners and capital providers expect financial returns on their investments, the government expects taxes to be paid, and shareholders expect the organization's market value to increase. As opposed to the operational perspective, the financial perspective requires process evaluations that account for long-term economic effects. The value of a process is assessed not only on short-term operational performance but also on the financial effort required to implement and migrate the process, on the effort required to maintain its technical infrastructure, and on its prospective returns.

Eventually, an organization can exist in the long-term only if it is successful in achieving positive financial results. Therefore, the balancing of stakeholder value statements should ensure long-term financial success (cf. Kaplan and Norton 1992; vom Brocke 2007; vom Brocke and Grob 2011).

3.4 Further Intermediary Conclusions for BPM

The framework in Fig. 5 illustrates the differentiation of the three types of value statements in BPM.

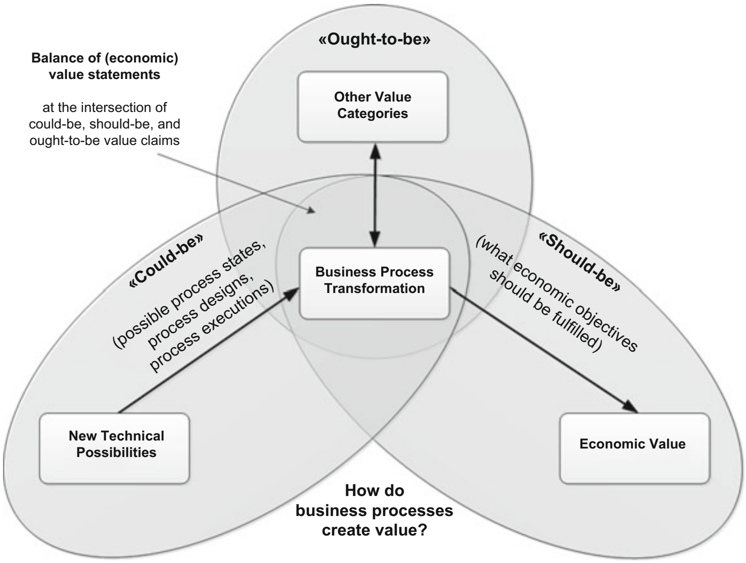

Fig. 5 Three types of value statements in value-oriented BPM

A "could be" value claim pertains to evaluations of structural process characteristics and asserts that the value of a process lies in its ability to be possible, to be feasible, and to actualize several process states. However, "could be" value exerts no normative force, so structural process analysis and evaluations would not disclose whether a possible process alternative is of economic value.

The existence of economic value can be asserted by means of "should be" value claims, which are prevalent in process evaluation approaches that focus on the satisfaction of a superordinate objective (e.g., a process should be designed so as to incur minimal processing cost). However, a number of "should be" value claims fail to be realized in practice because of lack of support from a wider range of stakeholders.

"Ought to be" value claims consider the need to balance multiple viewpoints on business processes and process transformations. These value claims take into account that there can be different objectives for a process that are significant to multiple stakeholders. Therefore, to assert that a "process ought to be" implies that the multiple process objectives are balanced in order to create an incentive-contribution equilibrium (cf. Barnard 1938). These value claims are pertinent to what we term a "value-oriented BPM approach."

In practice, an "ought to be" value claim might not be fully satisfied, and the resulting tensions and frictions among process stakeholders have to be resolved. BPM capabilities (Rosemann and vom Brocke 2014), such as a process-friendly culture (Schmiedel et al. 2014), might mitigate the risk of frictions among stakeholders. In light of the difficulties inherent in achieving an appropriate balance of value statements, we see an "ought to be" process as an ideal process that instantiates value for all of its stakeholders. We refer to such a process as one that has the maximum "support" of all stakeholders.

"Ought to be" value statements may come with the price of limiting the satisfaction level of some "should be" value statements, but the balance of value statements is essential to realizing long-term economic value. In this regard, we perceive the negotiation and achievement of "should be" value claims in an organization important predecessors of economic value creation through BPM.

Because of the significance of the financial perspective in the context of a value-oriented BPM paradigm, we present a method for measuring the *return on process transformation* (ROPT) in the next section. While the ROPT evaluation method is used to calculate a financial-process performance measure, it interfaces with the other value perspectives. For example, the application of the ROPT allows the effort required to establish a desirable degree of process-friendly culture or for inducing employees to participate in process transformations to be explicated in financial terms. Moreover, detailed information about the operational process behavior is required in order to calculate the ROPT. Finally, relevant types of stakeholder value can be accounted for in the ROPT method by specifying cash flow categories that represent (virtual) financial rewards or financial penalties that are incurred if stakeholder value statements are satisfied or violated to a given degree. For example, if environmental goals are not met, a financial penalty can be specified and considered in the calculations.

4 The Example of the Return on Process Transformation

4.1 Introducing the Return on Process Transformation

In many practical cases, the question arises concerning whether it is worth re-organizing or transforming a certain process. In terms of an evaluation statement expression introduced in Sect. 2, the question is whether a transformed process is as it "should be" in financial terms or as it "ought to be" in terms of a balanced set of multiple stakeholder value.

We propose a method for evaluating the exchange value of a process in terms of a *return on process transformation* (ROPT). Although focusing on the financial perspective, for two reasons the ROPT represents a value-oriented measure of a process's value: its calculations require consideration of other value perspectives, and its use is meant to complement further value considerations. In practice often the strategic and qualitative effects of alternative process redesigns are considered first, and then the ROPT is calculated in order to put a "price tag" on each alternative so decision-makers can balance both the quantitative and qualitative effects of process redesign.

The basic idea behind the ROPT measure is that a business process transformation is considered beneficial if the investment into the process transformation "pays

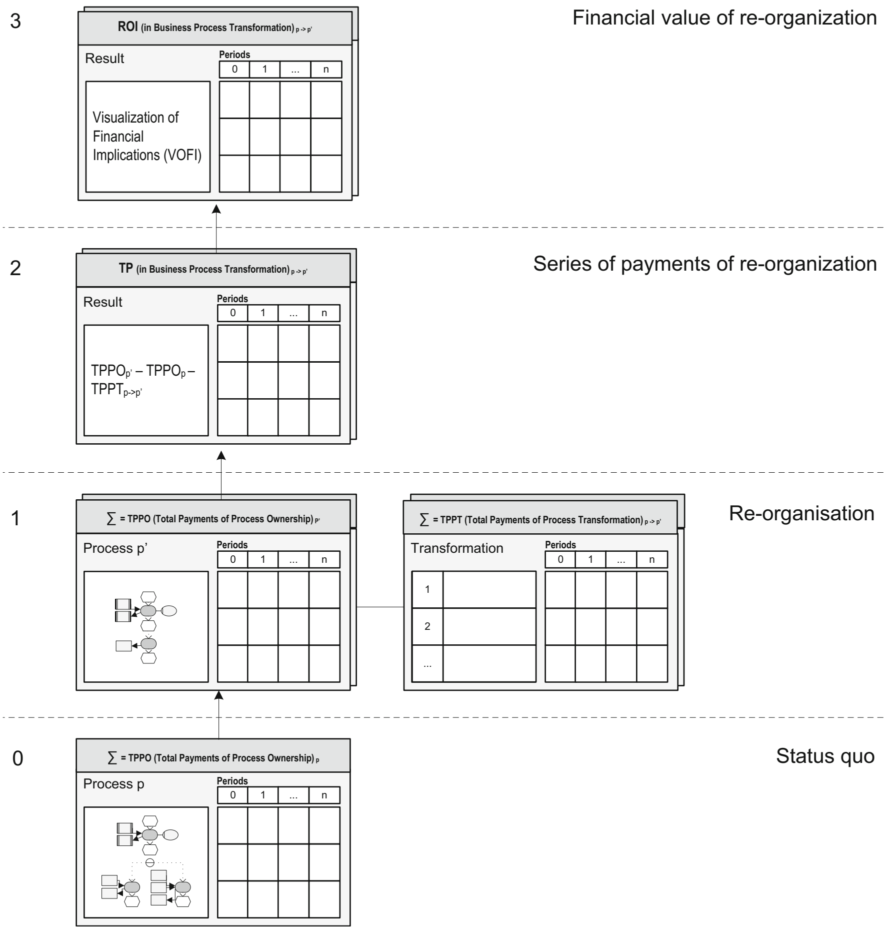

Fig. 6 Return on Process Transformation (ROPT) – calculation scheme

off".[7] The benefits of a transformation can be calculated by simply subtracting the cash flows of the as-is process from those of the to-be process, which should yield a cash flow surplus large enough to compensate for the financial investment in the process transformation. Figure 6 shows the calculation scheme for determining the ROPT.

[7] The ROPT does not report a payoff period but a net present value measure. In fact, payoff periods are not a useful criterion for evaluating financial investments, since an investment can be unprofitable even if it has a payoff period. Consider, for example, the case of a long-term (20–30 years) investment. In the first 10 years the investment could generate excess cash flows, so that the investment initially pays off after 10 years. However, then the investment could create only negative cash flows, leading to a negative terminal value. Although it has a payoff period, the investment would still be unprofitable.

The *benefit* of a process re-organization or a process (re-)design is calculated by comparing the *Total Payments of Process Ownership (TPPO)* of the reorganized to-be process (process p′) with the TPPO of the as-is process in status quo (process p) (level 1 and level 0 in Fig. 6). The benefit resulting from the transformed process is expressed as a positive difference between the $TPPO_{P'}$ of the new process p′ and the $TPPO_P$ of the process in the status quo (process p).

The investment into the process transformation, which represents its *price*, is the sum of all the payments that are required for the transformation, referred to as *Total Payments of Process Transformation (TPPT)*. TPPT is typically comprised of payments for investments into the technical process infrastructure (like new information technology), for the development of process knowledge, or for training employees affected by the new process design.

Long-term economic consequences of the process re-organization should be taken into account in calculating the TPPO and the TPPT, which is why the planning horizon for the payments should span multiple time periods (e.g., 5 years). By netting the TPPO ($TPPO_{P'} - TPPO_P$) and the investment in the process transformation (TPPT), one can calculate the total expected payments resulting from the process re-organization.

The sequence of direct payments provides the basis for taking into account additional financial consequences, including indirect (derived) payments, such as interest and tax payments. Various standard methods for investment controlling can be used to calculate the derived payments. Instead of using classical methods for capital budgeting, such as the net present value (NPV) or the internal rate of return (IRR), we use Visualization of Financial Implications (VOFI) (Grob 1993) to aggregate and calculate the financial consequences of a process transformation.

VOFI is suitable for making the financial consequences of a particular investment transparent (Grob 1993) since it discloses how the funding and taxation conditions affect the financial performance of an investment. vom Brocke and Grob (2011) show how the transparency feature of VOFI is used to analyze the interdependencies between business process design decisions and financial consequences.

Identifying the TPPO (on level 0 and level 1) can be done on a different levels of detail. On a high level, payments can be roughly estimated by asking decision-makers to specify the top 3–5 cash flow positions that they consider relevant to the as-is and the to-be processes. On a detailed level, however, the TPPO can be identified based on information on process structures, which can be obtained from process models (vom Brocke and Grob 2011), and operational process behavior, which, in turn, can be obtained by process-oriented accounting information systems (cf. Sonnenberg and vom Brocke 2014).

Identifying the TPPO based on process models necessitates that the process models be annotated with financial information, as illustrated in Fig. 7.

Figure 7 shows an exemplary calculation scheme for identifying and calculating payments related to a process design alternative on an activity level. The notation used in Fig. 7 is the BPMN (OMG 2010). Out-payments are calculated based on the use or consumption of input objects and resources objects, respectively. All

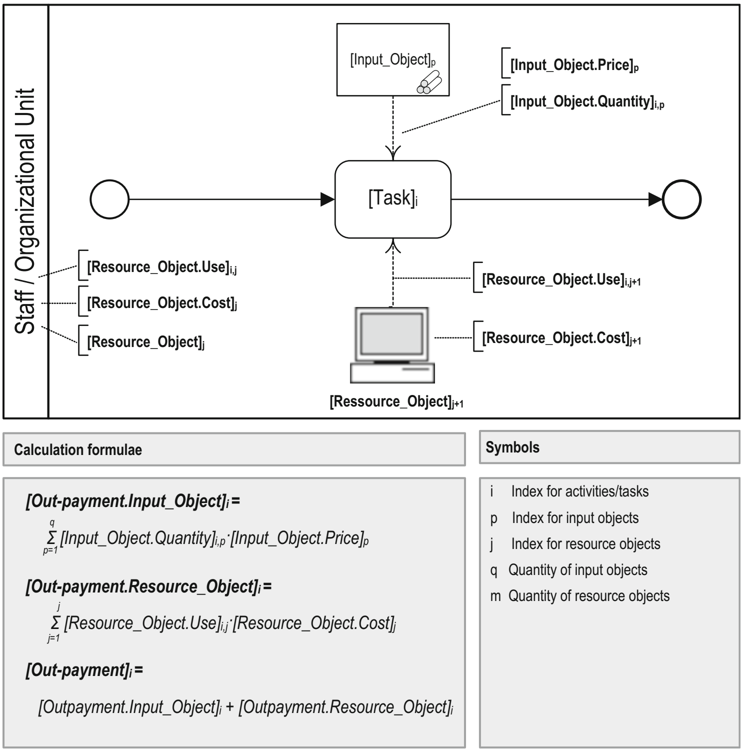

Fig. 7 Exemplary scheme for calculating out-payments on an activity level

payments calculated for each activity (or task) are then aggregated according to the process structure. This payment aggregation is then conducted for each period of the planning horizon, which can be facilitated by defining trend rates (e.g., out-payments for a particular resource or activity increase by x% each period).

The payments related to the investment in the transformation (the TPPT) can be specified based on calculation templates that contain pre-defined payment positions for typical transformation tasks. An exemplary calculation template is shown in Fig. 8.

– Integration infrastructure	0	1	2	…	5
– Development of a wrapper service	-20.000 €	-700 €	-700 €		-700 €
– Development phase	-20.000 €	0 €	0 €		0 €
- Requirements analysis	-8.000 €	0 €	0 €		0 €
- Implementation	-7.500 €	0 €	0 €		0 €
- Testing	-5.500 €	0 €	0 €		0 €
+ Operating phase	0 €	200 €	200 €		200 €
+ Adaptation phase	0 €	500 €	500 €		500 €
+ Human resource development	-1.500 €	-1.200 €	-600 €		-200 €
Payments (total)	-21.500 €	-1.900 €	-1.300 €		-900 €

Fig. 8 Exemplary calculation template for determining the TPPT

The approach to calculating the return on process transformation is subsequently illustrated by means of a real-world application example.

4.2 Calculating the ROPT in a SOA & BPM Case

A medium-sized logistics company uses a web-based enterprise portal to support its business processes.[8] In the case at hand, management is considering integrating a route-planning process into this portal. Two route-planning types are distinguished: detailed planning and ad-hoc planning. Prioritization policies have been defined in order to determine the planning type for each delivery order. High-priority delivery orders are subject to detailed planning, but if there is not enough time for detailed planning, ad-hoc planning is applied instead. The drawback of ad-hoc planning, however, is that routes may turn out to be inefficient, and the delivery may not be made in time, leading to contractual penalties, so the truck fleet may not be deployed efficiently.

As route-planning has been conducted manually in the past, which is time-consuming, a drastic increase of ad-hoc route plans has been noted, even for high-priority deliveries. By integrating the route-planning process into the enterprise portal, the company hopes to reduce errors, meet delivery schedules, and increase the efficient allocation of resources. The technical implementation of the solution is to be done on the basis of a Service Oriented Architecture (SOA) (e.g., Cummins 2014). Prior to the implementation, several design alternatives must be assessed:

1. *GlobalRoutePlanning* – an IT solution by means of which route plans can be created over an online interface and saved to the company's database. Using the service requires specific information, such as delivery orders, truck fleet capacity, order prioritization, delivery addresses, and delivery dates. With this solution, the process of route-planning is fully "out-tasked."
2. *GeoDataForLogistics* – an in-house solution by which internal routing rules and customer data are enriched by external route information provided by a special geographic map service that is particularly suited to the needs of logistics companies. While this service can substantially reduce the planning effort, it also requires the development of a number of data services (wrappers) in-house.
3. *IntelligentRouting* – a web service by which fully fledged route plans can be created. This design alternative is similar to *GlobalRoutePlanning* but is used only for a particular geographic region. As the geographic data of this service is up to date (e.g., providing information on construction sites or blocked roads), the planning quality is likely to be significantly improved by this solution.

[8] The example is taken from vom Brocke et al. (2009).

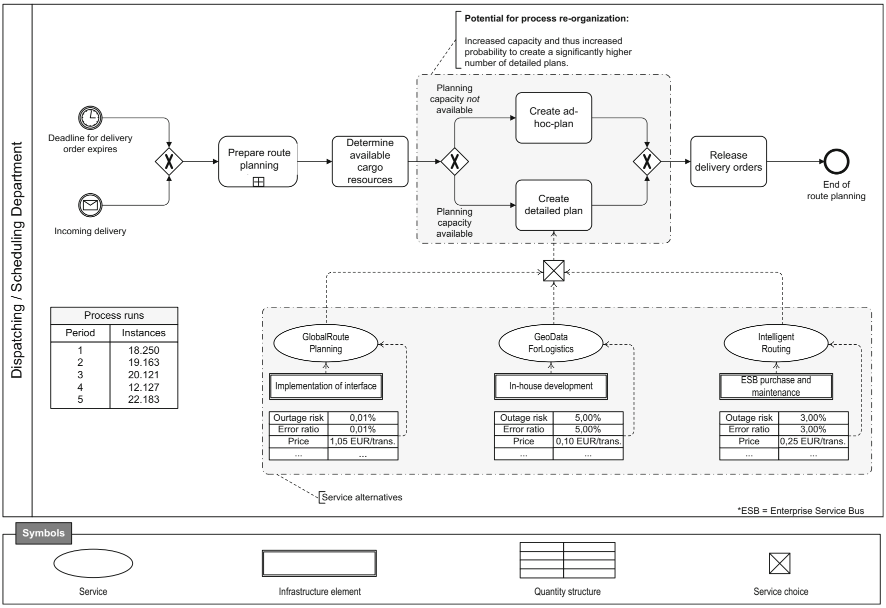

Fig. 9 Business process diagram for the process "Route planning" (vom Brocke et al. 2009)

The internal route-planning process is modeled by a BPMN process model (see Figure 9). In order to indicate process alternatives and specify the quantity structure of the process, company-specific notational elements (BPMN artifacts) are integrated. (See the explanation of symbols in Fig. 9.) Calculation of payments is done according to the calculation scheme illustrated in Fig. 8. Two resource object types are relevant: organizational unit ("dispatching / scheduling") and the services to be integrated. The quantity structure that is relevant to the calculation of the use of resources is specified in the process diagram by means of custom table artifacts.

The design alternatives of the process are considered based on a partial calculation (see vom Brocke et al. 2009) in Fig. 9. Various infrastructure requirements (e.g., purchase and maintenance of an Enterprise Service Bus (ESB), implementation of interfaces, in-house developments) are needed in order to integrate the services into the process. Deciding in favor of or against a certain service in this example is expected to have a local impact only, as there are no structural or institutional interdependencies with other process elements.

The process diagram illustrates the design alternatives as they are given in a particular case. Selection of a *to-be* model here is made on the basis of a comparison of the financial value of alternative process configurations. The calculation is shown in Fig. 10 and is explained in more detail for the *IntelligentRouting* alternative process configuration.

As the impact of the design decisions is only local, the calculation of the differences between alternative process configurations and the status quo can be conducted by means of a partial analysis for determining the direct payments.

Direct Payments

Period	0	1	2	...	5
— ***IntelligentRouting***	**–25.000 €**	**11.431 €**	**12.422 €**	**...**	**16.463 €**
— **Activity level**		**22.356 €**	**24.569 €**	**...**	**29.614 €**
— **Savings**		**22.356 €**	**24.569 €**	**...**	**29.614 €**
(1) CA		1.825	1.825		1.825
(2) PE		18.250	19.163		22.183
(3) $PT_{as\text{-}is}$		10	10		10
(4) $PT_{to\text{-}be}$		5	5		5
(5) $ER_{as\text{-}is}$		0,2	0,2		0,2
(6) $ER_{to\text{-}be}$		0,03	0,03		0,03
(7) $OR_{to\text{-}be}$		0,03	0,03		0,03
(8) $pDP_{as\text{-}is} = (1) / (3)$		10.950	10.950	...	10.950
(9) $pDP_{to\text{-}be} = [(1) / (4)] \cdot [1 - (7)]$		21.243	21.243		21.243
(10) $rDP_{as\text{-}is} = MIN\ [(2)\ ;\ (8)] \cdot [1 - (5)]$		8.670	8.670		8.670
(11) $rDP_{to\text{-}be} = MIN\ [(2)\ ;\ (9)] \cdot [1 - (6)]$		17.703	18.588		20.606
(12) $\Delta rDP = (10) - (11)$		8.943	9.828		11.846
· Savings per detailed plan (€)		2,50	2,50		2,50
= Total savings (€)		22.356	24.569		29.614
— **Infrastructure level**	**–25.000 €**	**–6.500 €**	**–7.500 €**	**...**	**–8.000 €**
— **Template [Payments ESB]**	**–25.000 €**	**–6.500 €**	**–7.500 €**	**...**	**–8.000 €**
Initial expenditure	–25.000 €				
– Maintenance		4.000 €	4.000 €	...	4.000 €
– Adaptation		2.500 €	3.500 €		4.000 €
Depreciations		5.000 €	5.000 €		5.000 €
— **Service level**	**0 €**	**–4.426 €**	**–4.647 €**	**...**	**–5.151 €**
— **Service payments**	**0 €**	**–4.426 €**	**–4.647 €**	**...**	**–5.151 €**
Service charge rate (price per transaction)		**0,25 €**	**0,25 €**	...	**0,25 €**
· $rDP_{to\text{-}be}$		17.702	18.588		20.606
= Service payments		**–4.426 €**	**–4.647 €**		**–5.151 €**
— ***GlobalRoutePlanning***	**–1.000 €**	**3.060 €**	**5.183 €**	**...**	**9.349 €**
+ **Activity level**		**23.720 €**	**26.001 €**	**...**	**32.839 €**
+ **Infrastructure level**	**–1.000 €**	**–1.500 €**	**–700 €**	**...**	**–500 €**
+ **Service level**		**–19.161 €**	**–20.119 €**	**...**	**–22.990 €**
+ ***GeoDataForLogistics***	**–32.500 €**	**11.770 €**	**13.229 €**	**...**	**16.814 €**

Formulae for evaluating the economic potentials

- $pDP_{as\text{-}is} = \dfrac{CA}{PT_{as\text{-}is}}$
- $mDP_{to\text{-}be} = \dfrac{CA}{PT_{to\text{-}be}} \cdot (1 - OR)$
- $rDP_{as\text{-}is} = MIN\ (PE\ ;\ pDP_{as\text{-}is}) \cdot (1 - ER_{as\text{-}is})$
- $rDP_{to\text{-}be} = MIN\ (PE\ ;\ pDP_{tp\text{-}be}) \cdot (1 - ER_{to\text{-}be})$
- $\Delta rDP = rDP_{to\text{-}be} - rDP_{as\text{-}is}$

Symbols

CA	Capacity (hours/period)
PE	Process executions (#)
PT	Processing time (min.)
ER	Error ratio (%)
OR	Outage risk (%)
pDP	Possible detail plans (#)
rDP	Realized detail plans (#)

Fig. 10 Calculation of TPPO and TPPT for the process re-organization (vom Brocke et al. 2009)

Therefore, in order to calculate this difference, the expected *additional payments* compared to the status quo level (*as-is*) of each design alternative (*to-be*) must be determined.

Using the *IntelligentRouting* service for the route-planning process promises both a higher number of detailed plans that are possible (*pDP*) and a better quality of realized detailed plans (*rDP*). It is expected that the processing time (*PT*) of the activity "Create detailed plan" will be reduced from 10 min to 5 min and that the error ratio (*ER*) will be reduced (from 20 to 3 % in case of the *IntelligentRouting* web service). Taking into account an available capacity (*CA*) of 1,825 working hours per period, a process execution frequency (*PE*) of 18,250, and a 3 % outage risk (*OR*) of the web service, direct cost savings of 22,356 € can be expected in period 1. The calculation is based on the assumption of an average advantage of 2.50 € for creating a detailed plan compared to creating an ad-hoc plan.

For the *IntelligentRouting* web service a transaction-based pricing model is assumed, with an average calculation rate of 0.25 € per transaction. The payments per period are calculated on the basis of the expected execution frequencies for the task "Create detailed plan" ($\approx rDP_{to\text{-}be}$). In period 1, for example, 17,702 detailed plans are expected to be created, so the service payments amount to −4,426 €. If the route-planning process is out-tasked, the calculation rate, with a lower risk of outage risk, is 1.05 € per transaction, so the expected payments increase accordingly (−19,161 €).

In addition to the activity-based payments ($TPPO_p$ and $TPPO_{p'}$), the payments for the process transformation (TPPT) must be taken into consideration. In this case, most of these payments result from investments in the technical infrastructure. Using the *IntelligentRouting* web service requires the implementation of an enterprise service bus (ESB) solution. The case example assumes that the company pursues an incremental implementation strategy, so a decision in favor of the *IntelligentRouting* web service brings about all payments for purchase of technical infrastructure (25,000 €), as well as all follow-up payments for maintenance and adaptation that occur periodically. If the *GlobalRoutePlanning* service is used, with activities for detailed planning being out-tasked, payments for the technical infrastructure are substantially lower. If *GeoDataForLogistics* is used, higher payments for the technical infrastructure are expected because of the comparatively high implementation and development effort required.

With direct payments being consolidated by means of the VOFI capital budgeting method (Grob 1993; vom Brocke and Grob 2011), the future value of investing into the re-organization of the process is: 30,379 € (*IntelligentRouting*), 25,424 € (*GlobalRoutePlanning*), and 26,235 € (*GeoDataForLogistics*). Compared to the future value of the opportunity of an alternative financial investment on the capital market, which amounts to 11,425 € (own equity compounded with an interest rate of 6 %), implementing any service can be considered beneficial to the company. The *IntelligentRouting* web service is the design alternative that generates the highest additional future value, so the route-planning process should be transformed based on the *IntelligentRouting* web service.

5 Summary and Outlook

This chapter provides fundamentals on the notion of "value" and its role in BPM. Despite the important role that value considerations play in BPM, the extant literature reveals a limited understanding of the concept of (economic) value in BPM. We fill this gap by discussing the concept of value in general and in relation to BPM. The chapter highlights three types of value claims in BPM—"could be" value claims, "should be" value claims, and "ought to be" value claims—and distinguishes between the two notions of "value in use" and "value in exchange." Against this background we synthesize prior research on value in BPM and characterize the concept of value-oriented BPM, illustrating it by means of the ROPT, a measure for evaluating the economic consequences of any business process design activity. This measure can be used to complement further value considerations by putting a price tag on design activities that considers the specific contextual factors of the related design decisions. The measure expresses the exchange value of a process design, thus helping to balance different value dimensions in order to define "ought to be" processes that are meaningful and supported in an organization. The differentiated understanding of value creation in BPM can support practitioners in decision-making, and researchers in developing complementary knowledge on value-oriented BPM.

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Process Capital as Strategic Success Factor

Markus Brenner, André Coners, and Benjamin Matthies

Abstract The high importance of processes regarding a company's success has been known for a long time. However, the level of importance of processes, especially in comparison with other success factors, has not been in focus in a consequent matter yet. The research regarding "intangible assets" now provides a new perspective. According to recent research findings, "process capital" is one of the most important assets of a company. In consequence, process capital has to be built up and managed and has to be a major focus of corporate strategy. On the one hand, the process capital can be the basis for strategy development. On the other hand, process capital is essential for strategy implementation. Process capital management (PCM) is the concept that, in addition to a "classical" process management, also focuses on developing and preserving intangible assets. This chapter gives an introduction to process capital. Then, the correlation between process capital and strategy is analyzed. Furthermore, a suggestion is made regarding the further development of process management toward PCM. Finally, the importance of process capital is illustrated by means of a real-life example from Lufthansa.

1 Process Capital as driver of corporate success

It is almost general knowledge that processes are important to a company's success. However, it is rare to focus attention on the level of importance of processes. Therefore, a systematic approach to processes, in part regarding their impact upon corporate success, is necessary in order to manage process potential to its full extent. In order to analyze the role of processes regarding corporate success, research regarding resources as well as regarding success have to be considered. Besides Porter's market-based approach (cf. Porter 1998), the resource-based approach of Prahalad and Hamel

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_5,

(cf. Prahalad and Hamel 1990) became one of the two main perspectives of corporate strategy and success. “Establishing competitive advantage involves formulating and implementing a strategy that exploits the uniqueness of a firm’s portfolio of resources and capabilities” (Grant 2005, p. 136f). It became mainstream that resources are a source of creating competitive advantage and success. Analyzing the determinants of corporate success – known as success factors – is part of success research (e.g. Rockart 1979). We distinguish between two types of success factor, internal factors such as resources and external factors such as market share. When looking at company resources, we distinguish between three categories: financial resources, material resources and immaterial resources (known as intangible assets). Empirical testing has shown that intangible assets induce significant reactions on the capital market (cf. Lev and Sougiannis 1999). Intangible assets can be defined as “the non-material and non-financial resources a company can exploit for longer than the current reporting year” (Günther et al. 2004, p. 162). In the following definition from the Schmalenbach Gesellschaft, which is derived from the basis of Edvinsson’s and Malone’s system (cf. Edvinsson and Malone 1997, p. 65), intangibles are broken down into seven categories (cf. WGARIA 2005, p. 68). Within this definition, process capital is exemplified as a category of intangible assets (see Fig. 1). Accordingly, process capital is understood as “Intangible values that relate to an entity’s organization, primarily in terms of structure and process” (WGARIA 2005, p. 69). “Examples include a well-functioning distribution and/or communication network, as well as effective quality management processes” (WGARIA 2005, p. 69).

In another definition, processes are seen as a main component of ‘organizational infrastructure’. This organizational infrastructure embodies “business processes and systems that transform ‘lifeless things’, tangible and intangible, to bundles of assets generating cash flows and conferring competitive positions” (Lev and Daum 2003, p. 7). These authors attach great importance to organizational infrastructure: “[. . .] organizational infrastructure, when operating effectively, is the major intangible of the firm” (Lev and Daum 2003, p. 7).

In consequence, process capital is created by the existence or development of processes which represent economic advantages. As a result the company’s intangible assets are increased.

A detailed definition of process capital distinguishes between the two components of *process structure* (cf. Becker and Kahn 2003) in the sense of an operational structure and *process performance* (cf. Leyer et al. 2014). From the perspective of a company, the existence of defined processes which conform with corporate business targets represents a “value”. Based upon the business model a company chooses, the aim is to have and to develop the ‘right’ processes in terms of strategic and operative efficiency and effectiveness targets. Thus, for example, HAMMER stresses the effectiveness target: “Processes are what create the results that a company delivers to its customers” (Hammer 2001, p. 53). The existence of the ‘right’ processes enables the company (cf. Mayer 2005, p. 2)

- to recognize the relevant market trends and to translate these into products faster than the competition,

Fig. 1 Process capital as a category of intangible assets based on: WGARIA 2005, p. 68

- to recognize its target markets and target customer groups and to address and coordinate them appropriately,
- to establish support processes which provide effective support for the business model and demonstrate benchmarkable efficiency,
- to manage the value-adding processes in such a way as to ensure an optimal division between which activities are carried out internally and which are outsourced, and
- to organize the collaboration with value-adding partners along commercial aspects.

The existence of a defined and (ideally) well-documented process structure alone does not suffice to ensure corporate success and 'sustainability' or whether process capital retains its value over time. Rather, the important aim here lies in shaping the processes to conform with the targets they must achieve in terms of costs, time and quality. This is known as Process Performance Management. Process performance has a direct impact upon the central key performance indicators of turnover and costs (cf. Mayer 2005, p. 5). Defined processes which satisfy their performance targets are the embodiment of sustainable process capital. If we understand process capital in these terms, it becomes "[. . .] a sustainable strategic competitive advantage, a dynamic core competency of a company" (Osterloh and Frost 2006, p. 7).

As such, process capital is seen as an extremely important success factor – based on its contribution to company success – compared with the other categories of intangible assets, as shown in empirical studies (cf. Günther et al. 2005, p. 101ff). Against this background, value-based corporate management should go beyond material assets (e.g. management and controlling of fixed asset investments) and focus on managing and controlling intangible assets, especially process capital. One key aspect should not be ignored: according to OSTERLOH/FROST, process capital only exists when process structure and performance can be deployed to create value, or at least to preserve it. This is the case when processes are aligned with corporate strategy in terms of structure and performance. This then gives rise to the question of how to design and shape processes so they help the company to reach its strategic financial and customer targets. Consequently, these targets should form the starting point for designing all processes – from the innovation process, through the processes for supply chain, operations, market and customer relationship, to the processes for internal services. With Business Process Management (BPM), a management concept already exists to this end. However, BPM lacks the goal of preserving and further developing process capital as an intangible asset.

The main focus of this essay is to describe the correlation between process capital and strategy. This correlation will be illustrated by means of a real-life example from Deutsche Lufthansa AG (hereafter Lufthansa). Furthermore, a suggestion regarding the further development of BPM towards Process Capital Management is made.

2 The Correlation Between Strategy and Process Capital

2.1 Overview

If we look at the plethora of publications on strategic management (cf. Mintzberg et al. 1998 for an overview of the different schools of thought), we can identify two main questions: How do we substantiate strategy content and how do we implement the defined strategy in the company's daily business? A company's existing process capital, or that which needs to be built up, plays an important role in answering these questions. As Chandler said, "Structure follows strategy" (Chandler 1962, p. 14), and this is often used to exemplify how interdependent strategy and organization, and hence processes, are. If we see strategy as the means of implementing corporate goals, then it becomes clear that we need processes with which we can plan, execute and monitor measures towards strategy implementation (Burlton 2014). Consequently, processes and process targets must be derived from strategy. An empirical study gave a fitting summary: "Get your strategic objectives aligned with business processes" (Hung 2006, p. 37).

However, processes should also be seen as strategic success factors when substantiating the content of strategies. Indeed, it is often the case that the key success factor for business models is the company's ability to master core competencies. Amongst other things, running a successful 'no-frills' airline depends on efficiently mastering aircraft turnaround and thus reducing ground time. Numerous other examples in industry could be given here to prove the hypothesis of a positive correlation between corporate success and process capital, where processes are seen as core competencies (one prime example would be Google's internet-based search process). Thus, existing and future process capital must be taken into consideration when formulating strategy. Figure 2 summarizes the interrelationship between strategy and process capital.

On the one hand, the process capital, which consists of processes that are part of a company's core competencies can be the basis for strategy development. On the

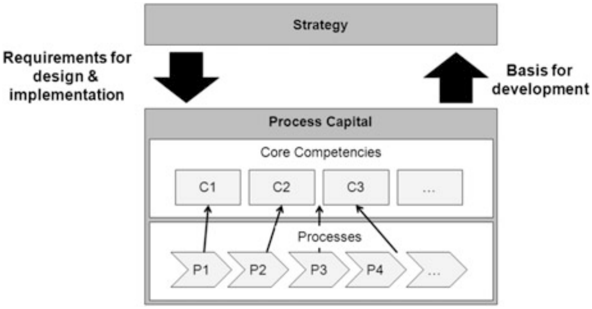

Fig. 2 The interrelationship between strategy and process capital

other hand, the defined strategy gives rise to parameters for process structure and performance. We can talk about an interdependence.

Based on the literature cited here, we can assume that both the ability to regard processes as an organization's core competency when formulating strategy, especially the processes which are 'visible' for the recipient, and the ability to accurately design and shape process structures and process performance based upon the strategy a company chooses, represent success factors. We explain these success factors in more detail in the following chapters.

2.2 *Core Competencies in Process Capital*

The underlying idea of aligning strategy with the strengths of a company in the sense of *core competencies*, for example certain processes, results from the resource-based approach to strategy. Core competencies can be processes which will play a central role in the future due to the company's strategic orientation and are already well-established in the company – or can be developed to be so. As a rule, it is difficult for other companies to create or acquire these processes in terms of their structure and/or performance. These limited resources are difficult to imitate and cannot be substituted (cf. Barney 1991, p. 105f.) and as such are particularly valuable. Consequently, they are also called strategic resources or strategic success factors. Generally, not all of a company's processes fall into this category. Hence, support processes are regularly well-documented and described by standard IT applications. These outsourceable processes have little impact upon strategy development and implementation.

What do impact upon the development of core competencies, however, are the so-called *core processes*. "Core processes are processes that cross functional boundaries, produce an output that is strategically important to the organization's success, and have a high impact on customer satisfaction" (Hung 2000, p. 4). Insofar as the process capital which exists in an organization is unique, cannot be imitated and comprises processes which generate value (core processes), we can consider the idea of aligning strategy with this process capital.

In the following section, we take a look at how process capital can be used to implement strategies.

2.3 Strategy Implementation Using Process Capital

The strategic level represents the "initiating and shaping factor in corporate management" (Ahlrichs and Knuppertz 2006, p. 23). Successful strategy implementation requires its prior operationalization. This, in turn, raises the question of which processes contribute to reaching targets and realizing the strategic plan, and to what extent. This can be seen in the fact that processes are one of the four perspectives of the Balanced Scorecard, which is used as an instrument of strategy implementation (cf. Kaplan and Norton 1996).

However, there is a major deficit in traditional corporate management: Strategic and operative planning are usually separated and lack rigorous and consistent linkage. As such, the strategic plan is developed as a requirement for annual operative planning (budgeting) and for mid-term planning in the form of planning premises and target values. While the operative planning budgets and financial performance indicators focus on *individual organizational units,* in terms of strategic targeting we often focus on quantitative and qualitative indicators variables at *overall company level*. This schism in organizational bearing within the planning system can lead to operative plans being developed whose contribution to strategy implementation cannot be measured. In contrast, however, we can use a process orientation to combine the strategic and operative planning levels by focusing on *processes which cross functional and organizational boundaries* from strategic targeting all the way through to operative realization (cf. Ahlrichs and Knuppertz 2006, p. 21). The processes are aligned with both strategic and operative targets.

When it comes to implementing strategies, the strategies themselves should be used to derive process-related target values. Hence, if a company decides to pursue the strategy of quality leadership, all its processes must focus on securing the desired level of quality. The operational processes work towards creating a top-quality product. For marketing and customer relationship processes, this desire for quality must be reflected in customer dealings. Within the innovation process, all efforts should be focused on developing top-class products which are difficult for competitors to imitate in terms of the degree of novelty. Since the mid-nineties the *Balanced Scorecard* has become an established instrument for deriving requirements from strategy. By using the Balanced Scorecard in combination with a further tool known as the *Strategy Map*, it becomes possible to substantiate strategies and to document the specific target values which act as yardsticks for the implementation phase. From the aspect of processes, the process perspective defined in the Balanced Scorecard, together with the targets it stipulates, is of particular importance for the strategic fields of action. Companies which use the Balanced Scorecard already have a first focus on processes for the KPI-based implementation of their strategies.

This, however, does not appear to suffice as only the main targets with strategic relevance are considered in a Balanced Scorecard. It is precisely that focus on few targets which KAPLAN/NORTON see as a success factor of the Balanced Scorecard. Yet, when we derive the strategic demands upon processes, we actually want to define comprehensive targets for all strategically relevant processes and be able to measure the extent to which those targets are reached. To do this we need to use KPIs to determine the contribution of process capital to strategy implementation, or the extent to which strategic goals are reached, and to compare this with target values.

It is for this reason that we wish to introduce an instrument known as the *Strategic Process Alignment matrix* (SPA matrix) as a method of aligning processes with corporate strategy. The SPA matrix establishes formal, KPI-based relations between strategy and those processes with strategic relevance. Thus, strategic requirements upon process performance should be portrayed and made measurable. To do this, we use a matrix to systematically compare the strategic goals, which for example can be taken from a Strategy Map, with the core processes. In this way, we can assess the contribution of process capital to strategy based on the criteria of 'process relevance' and 'degree of target achievement'. Process relevance represents a weighting in percent of how relevant a process is for reaching the strategic goal. As several processes are relevant for achieving a specific strategic goal, we have to weight the impact of the different processes upon the goal as whole when estimating the percentage values. Hence, we analyze and estimate the extent to which a process should contribute to reaching a specific strategic target.

Subsequently, the demand upon the process is specified in the form of a performance indicator, which measures target achievement, and a target value. This is done for each strategic target and 'relevant' process. By comparing actual and target values and carrying out deviation analyses, we can monitor and manage the conformity of process performance with strategic targets. Thus, the SPA matrix provides management with a strategy-based process cockpit. In the example SPA matrix portrayed in Fig. 3, the strategic goals were developed in Balanced Scorecard workshops. After finalization of the company's Strategy Map, another accompanying workshop was initiated: Within 'SPA' workshops, executed with the management team, the implications for each process regarding each strategic goal were discussed. As an example, the advisory process of a bank which has a relatively high relevance for the strategic goal 'Free up front office' fails to meet strategic requirements. This might be due to the fact that this process still has too many high-maintenance communication interfaces to the back office, which in turn might be measured using the performance indicator 'Number of interfaces in process'.

By using the SPA matrix companies are able to track process performance from a strategic point of view. Nevertheless, the following question still remains: how can companies design their management system so it systematically creates process-based values?

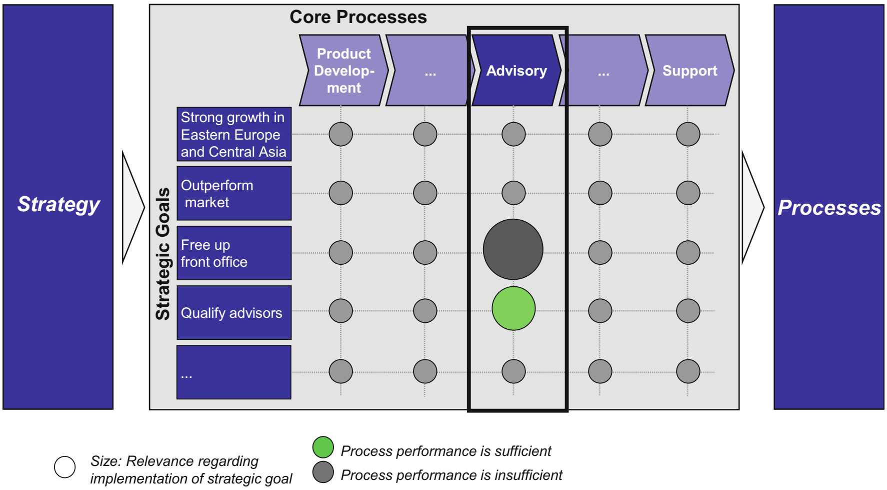

Fig. 3 Example depiction of the SPA matrix

3 Process Capital Management

3.1 Overview

After the previous chapters focused on the importance of process capital, we shall now show how process capital can be built up and managed systematically. Before presenting and detailing the necessary tasks and activities, we first need to analyze the term *Process Capital Management* (PCM) in terms of what is commonly called *Business Process Management* (BPM). 'Traditional' process management (BPM) represents a management approach which describes how to manage processes using strategic and operative targets. The same applies to PCM. In addition to the classical 'management' of processes, however, PCM goes one step further by also focusing on developing and preserving intangible assets. This means that also and especially the relationships of process capital to the other intangible asset categories, for example human capital, are considered and controlled using an integrative management approach (Fig. 4).

Once the concept of process capital has been firmly anchored in strategy, one of the major tasks consists of actually building up that process capital. Subsequently, we need to implement an appropriate management control system to secure the long-term existence of the process capital stock. These tasks have to be substantiated and shaped in the form of a PCM control loop. This control loop should ensure process capital is involved in planning, developing and managing the process capital stock, and ensure that those developments are fed back retrospectively into the planning process. On a sideline note, the tasks of PCM should be

Fig. 4 Tasks of PCM

institutionalized in the company's organization (e.g. by a process management unit in collaboration with the controlling department) in order to secure the sustainability of PCM.

In the following subsections we describe the tasks mentioned here in more detail.

3.2 Anchoring Process Capitals in the Strategy

One of the first tasks we need to carry out is to integrate a 'perspective' focusing on process capital into the strategy development and planning process. To do this, we must first know and formally describe the company's processes. Explicit steps aimed at checking the process-based core competencies and their impact upon related financial and market performance indicators must be included in the strategic planning process. On the one hand, the *strategy development* phase involves testing the extent to which core competencies arising from the process model might support the strategic options being evaluated. The objectives underlying this step are first to prioritize potential strategic actions based upon an analysis of the existing process capital in connection with the strategic options on hand. Second, we need to find out which elements of process capital can be developed using specific measures so as to provide process-based support for the prioritized strategic options.

One further aspect of integrating process capital into the company's strategy can be found in the phase aimed at *operationalizing strategy*. By using the SPA matrix described above, we can substantiate the strategy by capturing the requirements for each strategically important process. This then results in performance indicators and target values which are used in the next phase of strategy implementation to track progress at process level. Should deviations from target values occur, these can be recognized at an early stage and we can take the appropriate decisions to modify *strategy implementation*. Special attention needs to be paid to the company's core processes. If there is not enough de facto mastery of these processes in terms of target values, we need to build up the appropriate process capital needed for strategy implementation.

3.3 Assessing Process Capital

Intangible assets that cannot be identified, transferred, sold or measured independently are accounted as a part of the goodwill (cf. WGARIA 2005, p. 75). Generally speaking, goodwill can be defined as the excess of a company's actual market value over the carrying value (book value) according to the balance sheet. As such, the goodwill could be seen as "[. . .] a catch-all residual category, a label given to the going concern value of assets in the target company over and above those that can be kicked, or counted, or weighted, or valued with some precision" (Blair and Wallmann 2003, p. 455). This raises the question of how these intangible assets, such as process capital, can be assessed individually, and to what extent.

Generally, individual intangible assets and their values are inherently difficult to measure and to quantify. Due to the fact that intangibles cannot be seen, touched, or weighted, they need to be assessed by using appropriate proxies and measurable variables that can be compared (cf. Blair and Wallmann 2003, p. 454). Besides that, intangible assets can often not be identified separately. For example, the success of a customer goods company can be derived from good customer relations and well established brands (*customer capital*), from high-developed and efficient processes (*process capital*) as well as from permanent product innovations (*innovation capital*) (cf. Gladen 2011, p. 136). Therefore, a unique identification and allocation to a specific category of intangible assets is both difficult and very often impractical (cf. WGARIA 2005, p. 89). In addition, traditional accounting standards cannot be very helpful in providing information about intangible assets. In most cases, accounting rules do not allow a capitalization of internally generated intangibles in a company's balance sheet and "generally require that internal expenditures on intangible assets [. . .], treated as expenses in the period in which they are incurred and charged against current earnings" (Blair and Wallmann 2003, p. 455).

Nevertheless, in order to manage a company's intangible assets and their development, it is of high importance to find solutions for assessing intangibles with appropriate methods and measurable figures. Accordingly, for example, KAPLAN/NORTEN point out the importance of considering the contribution of intangible assets to performance targets as the "holy grail of management accounting" (Kaplan and Norton 2004, p. 52). Indeed, appropriate information could help a company's management "to make resource allocation decisions and to engage employees, business partners, and other participants in value-creating activities" (Blair and Wallmann 2003, p. 458). This can be illustrated by taking the example of banks again. In banks, especially in their back-offices, most core competencies can be characterized as intangibles, such as save and efficient processes. In recent years, there has been a trend of industrialization in banking (cf. Loos and Coners 2006, p. 204). This means, briefly worded, that bank's revise their operation models by simplifying and standardizing products, processes and technologies. This initiates many optimization projects with high cost impact and strategic relevance. Against this background, decision making attaches a vital importance to reliable information about intangible assets in order to evaluate these optimization projects.

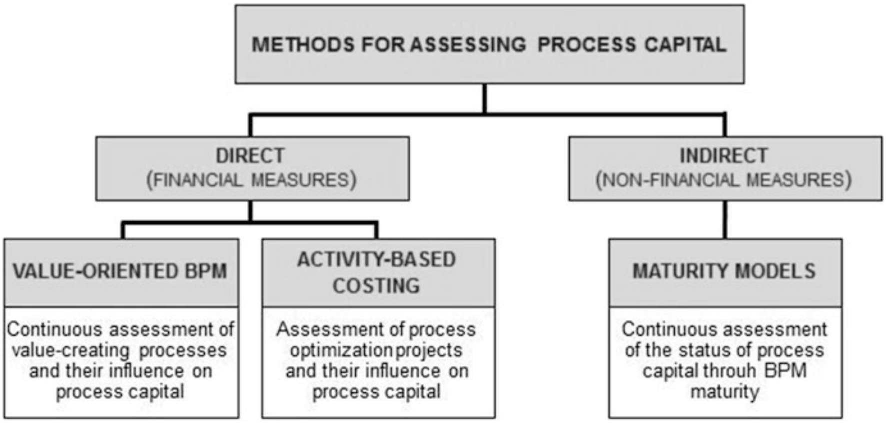

Fig. 5 Indirect und direct methods for assessing process capital

This leads to the initial question: how can process capital be assessed? In general, we distinguish between direct and indirect methods here (as portrayed in Fig. 5 “Indirect und direct methods for assessing process capital”). Direct methods reveal efficiency changes directly at process level and quantitatively assess their influences on the existing process capital. While indirect methods qualitatively assess the general state of process capital through comparable indicators.

The direct methods described here are based on LEV, who proposed an assessment of process capital by quantitatively measuring efficiency before and after optimization efforts (cf. Lev and Daum 2003). In this way, value-creating improvements could be revealed and their impact on process capital could be assessed quantitatively. One corresponding approach for measuring changes in process capital could be a value-oriented BPM, which reveals the value contribution of processes by determining changes in their payment surpluses (cf. vom Brocke and Grob 2011; vom Brocke et al. 2010; Buhl et al. 2011, p. 169). This could be used for valuing process efficiency and optimizations with financial measures. This means processes could be assessed quantitatively with their impact on a company’s value, and, in addition, on the process capital. Another direct quantitative approach could be Activity-based Costing (ABC), which assigns related costs to each activity in a process. In this way, process optimization projects could be valued by determining their cost saving potentials, which represent economic advantages and therefore the creation of process capital. But, however, these results only cover the cost saving potentials for single optimization projects and can only be used for assessing the changes in process capital. Neither a value-oriented BPM nor activity-based costing could make an assessment of process capital in total.

This raises the question of how process capital can be assessed as a consistent unit. In this context, maturity models provide an applicable approach for the assessment of a company’s capability in Business Process Management (BPM). Thus, considering that process capital is correlated with a company’s BPM capability, maturity models can be a method for assessing process capital indirectly from a qualitative point of view.

The main purposes of maturity models are to answer the question of how advanced a company is in their BPM development, to guide process improvement initiatives, and to control progress (cf. Iversen et al. 1999). For this reason the general concept of maturity models contains a sequence of maturity levels, which represents the typical evolution path of BPM improvement. The lowest level stands for an initial state that indicates little BPM capabilities. In contrast, the highest level represents a stage of total maturity. Each level provides essential criteria and elements of effective and efficient processes, which need to be fulfilled to reach the next maturity level on the evolution path. Hence, an improved maturity results "in an increase in the process capability of the organisation" (Paulk et al. 1993, p. 5). As an example of BPM maturity models, the Capability Maturity Model Integration (CMMI) (SEI 2011) could be considered. CMMI "is an internationally recognized model for process improvement and is used worldwide by thousands of organizations" (O'Regan 2011, p. 44). The CMMI consists of five maturity levels (see Fig. 6). The lowest level of maturity is level 1 and the highest level is maturity level 5. Each maturity level contains several process areas, which describe specific and generic goals for improvement. For example, the maturity level 2 contains the process area "Measurement and Analysis", which determines specific management information needs and measurement objectives that need to be fulfilled to reach the

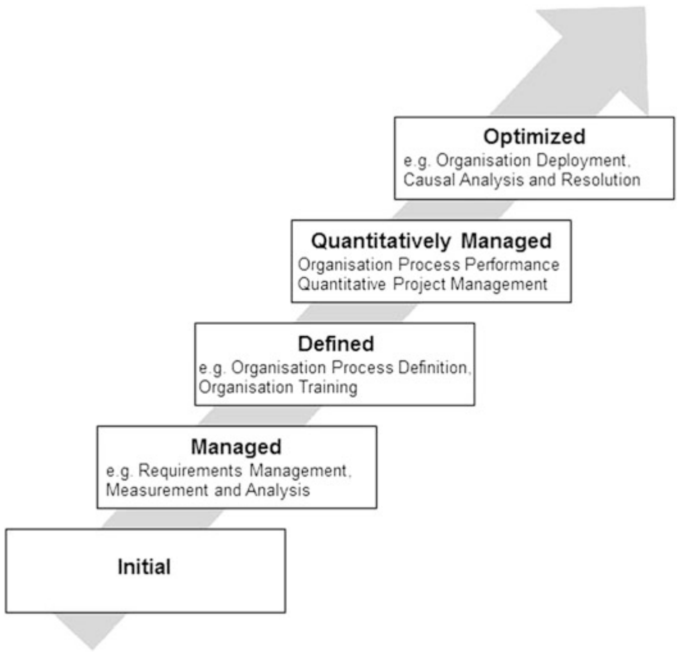

Fig. 6 BPM maturity levels (CMMI) (Based on O'Regan (2011), p. 50)

next level of maturity. In this way, CMMI provides an instrument for the assessment of BPM capabilities as well as for the improvement of process performance. In addition, CMMI allows organizations to benchmark themselves against similar organizations (cf. O'Regan 2011, p. 46ff.).

Taking into consideration that process capital is correlated with a company's BPM capability, maturity models such as CMMI, provide a practical approach for an indirect assessment of process capital. This means, for example, that an improved maturity level indicates a growing process capital. Thus, maturity models allow assessing the state of process capital, evaluating its general contribution to strategic goals as well as identifying possibilities for its further improvement. However, with regard to a sufficient determination and interpretation, two key aspects should be noted. First, as outlined before, process capital is created by the existence or development of processes which represent economic advantages. Consequently, only value-creating processes (core processes) which represent these advantages, should be taken into account when assessing a company's BPM maturity in terms of process capital. The second aspect is that the different intangible asset categories are closely connected to each other and difficult to separate. Therefore, comparable measures are required, which allow a more comprehensive analysis of all intangible asset categories and their relationships regarding an integrative performance measurement (cf. Gladen 2011, p. 136). In order to create comparable measures of process capital, maturity states could be the basis for further enhancements with financial and non-financial measures.

It should not be ignored, that the existing approaches cannot measure the value of process capital to its full extent. Taking into account that other intangible assets can be measured with some precision (e.g. customer capital by using the customer lifetime value), particular needs for research into the assessment of process capital can be demonstrated.

3.4 Building Up Process Capital

We can build up the process capital needed to secure strategy implementation by carrying out process design and optimization measures (*business process optimization*). In this way, the process structure and performance required (usually at short notice) for strategy implementation can be created. However, this is not enough to secure sustainable process capital, since carrying out process transformations is not only extremely resource-intensive, it also represents a considerable burden upon the company's employees. For this reason it is advisable to create an environment which is conducive to systematically developing process capital as a permanent core competency for the company. Several factors play an important role here: process culture, change management and human capital. *Process culture* should be seen as taking overriding priority and should be closely connected with the company's organizational structures, in the sense of being the "complete and self-evident classification and execution of all business activities in the form of

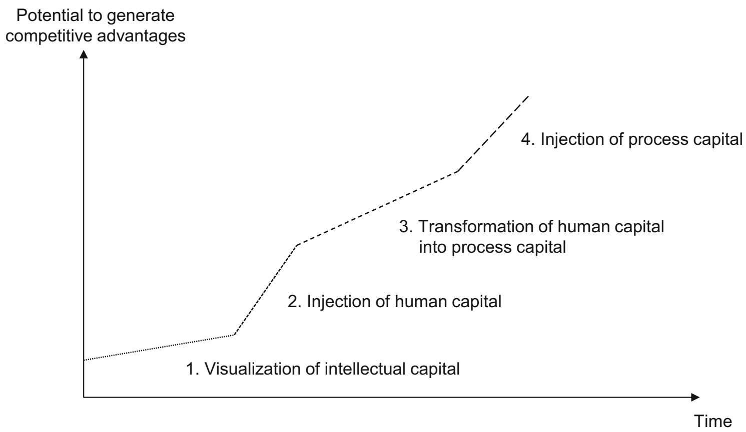

Fig. 7 Generating process capital (Based on Edvinsson (2000), p. 15)

processes" (Ahlrichs and Knuppertz 2006, p. 43). In this way, employees are not connected with one another primarily through the company's hierarchy, but rather through the processes. The resultant reduction in the number of organizational interfaces can lead to more efficient communication and a more flexible corporate structure. Alongside process culture, *change management* represents a significant contribution to establishing process capital. On the one hand, building up process capital involves changing 'hard facts', such as the structure of processes and the organizational structure. On the other hand, 'soft factors' also change, for example the behavior of employees as process owners. Special importance is attached here to processes of learning and change which focus on ensuring an organization is capable of adapting (for example by employee multi-skilling) to dynamic changes in the conditions affecting process execution (for example change in strategy, collapse in demand etc.). This also makes another category of intangible assets particularly important for sustainable process capital: *human capital*, insofar as this shapes, executes and controls the processes. A reduction in the number of hierarchy levels, accompanied by a focus on end-to-end processes, can for example strengthen the employees' personal sense of responsibility, which ought to result in the creation of creativity potentials due to the existence of a common mindset. Against this background, raising innovation capital can in turn lead to the development of new, innovative processes (cf. Becker and Kahn 2011, p. 8). Human capital is a major platform for building up process capital, as can be seen in Fig. 7.

Initially, we need to establish an awareness of the existence of intellectual capital in the organization ('Visualization of intellectual capital'). We must create an in-depth understanding among staff about actual and target processes using employee programs and change management methods. This will enable process capital to develop into practical and applicable knowledge which can be used to create value in the company. By combining this with human capital ('Injection of human capital'), the organization's processes can be enhanced and improved. These newly (documented and) acquired skills and knowledge result in actual process capital as a core competency firmly anchored in the organization ('Transformation of human capital into process capital'). As these competencies can be traced back to methods and techniques, they are no longer tied to individual employees and are hence firmly and permanently anchored in the company (portrayed as the 'Injection of process capital' in Fig. 7).

3.5 Managing Process Capital

Companies wishing to build up process capital must permanently analyze their processes in terms of performance: process flows need to be questioned and, if necessary, modified to fit new situations. We can use PCM here to comprise planning, organizational and control measures for managing the value chain in terms of costs, time, quality, and – as a consequence – customer satisfaction.

Here, process controlling plays a central role, which can be seen as aligning planning, control and management to those processes being examined (cf. Leyer et al. 2014). The main task of process controlling is to make processes measurable and hence to provide the institutionalized information necessary for process control. To do this, process controlling instruments can be used. Depending on their specific data and analysis focus, these can be classified based on whether they serve to measure strategic or operative performance. Examples of strategically oriented instruments include the SPA matrix mentioned earlier and activity-based costing (ABC), a tool for strategic cost management (cf. Kaplan and Anderson 2004). To measure and analyze operative process performance, we could, for example, carry out business activity monitoring (cf. Wang 1999) and data mining using process-related databases (cf. van der Aalst et al. 2003). The aim here is to facilitate early recognition of problems in process flows in order to be able to initiate suitable and timely counter-measures.

The information provided should contain statements about the efficiency and effectiveness of the processes. To this end, it is necessary to define and measure performance indicators which influence the success of the processes (cf. Leyer et al. 2014). Alongside financial indicators such as process cost rates, these are mainly non-financial variables which focus on time (e.g. run time) and quality (e.g. error rate for process output). Process controlling does not only comprise measuring and reporting performance indicators, however. In fact, it actually reflects the 'classical' understanding of controlling in that it deals with planning and monitoring targets, as well as initiating countermeasures. In terms of process controlling, this means we need to define process targets, to regularly measure the extent to which those targets are reached, and, if necessary, to set appropriate reactions to deviations from plan in motion. In this way, we can firmly anchor the development of processes into the company (cf. Neumann et al. 2011, p. 234).

4 Case Study: Lufthansa AG

4.1 Example of Lufthansa's Process Capital

Case study research can be regarded as a common approach to verifying or negating scientific statements (cf. Yin 2008). In the following we try to illustrate the PCM concept by means of Lufthansa. All information regarding the Lufthansa case study is based on publicly available documents. The authors have interpreted core competencies and processes as process capital. Many of its core competencies, which are mandatory for Lufthansa's strategy, can be contributed to process capital. As the airline industry in Europe has been characterized by a movement towards concentration in recent years, one of Lufthansa's important strategic goals is to grow, either organically, or through cooperations and takeovers. Consequently, through its complete acquisition of the Swiss airline Swiss and Austrian Airlines, Lufthansa has been able to gain considerable ground in important markets. However, integrating another airline into its own network is not an easy task. Lufthansa has proven to have the right processes for such integration work. In particular, the takeover of Swiss and its subsequent integration into Lufthansa's route network can be seen as a prime example of the importance of process capital. Integrating other airlines into one's own route network is a substantial undertaking as each and every airline has its own very individual characteristics. Alongside such factors as having different aircraft types, integrating the systems (route network, IT systems etc.) represents an especially challenging hurdle. The availability of a process which can incorporate other airlines into Lufthansa's network represents a key core process for Lufthansa. Lufthansa is able to tap into prior experience. Back in 1997, the company was the initiator and founding member of the airline network Star Alliance. The skills and abilities Lufthansa developed here in a multitude of operations processes and in particular the process of integration manifest themselves as process capital. The company can now rely upon this resource for takeovers and other integration activities, using it to create value.

Besides this process capital necessary for integration work, there is another prime example for process capital in the company's daily business. Lufthansa's aircraft maintenance processes, which are core processes, are best practice in the aviation world. As one result, Lufthansa has one of the highest reputations regarding safety in the market and is considered to be quality leader. As another result, Lufthansa's strategy is influenced by these maintenance processes. These processes are not only used to maintain its own fleet. Instead, Lufthansa formed a separate unit, Lufthansa Technik, which offers maintenance services to the market.

4.2 Strategy Implementation at Lufthansa Based on Process Capital

Let us now use the example of Lufthansa to demonstrate how process capital can be used to implement strategy. One of the most important strategic goals for Lufthansa is quality and innovation leadership. First we must check to see which processes are relevant to achieve these goals and to determine the requirements towards these processes. As an example, the processes ‘Passenger handling’, ‘In-flight service’ and ‘Operations’ are used. These processes all contribute significantly to the strategic goals of quality and innovation leadership. In a second step, the goals have to be specified for each process and changes or improvements defined. Regarding the processes used as example, based on the SPA-Matrix the following process changes were defined by Lufthansa (Fig. 8).

4.2.1 Passenger Handling

Handling passengers consists of all land and airside processes until the passenger has boarded the aircraft. Lufthansa has derived measures from strategy to significantly improve this process. Regarding quality, the company has designed a top-class product. Specific services for top customers, such as special lounges and limousine transfer to the aircraft (for first class passengers and members of the HON level in the frequent flier program) mean Lufthansa now leads the industry in this field. Regarding innovation, homeprint boarding passes and check-in by mobile phone offer convenient ways to check in. It is obvious that in order to be able to offer the same high-end travel experience for all customers worldwide, or at least for customers to feel this is what they are receiving (service quality), the

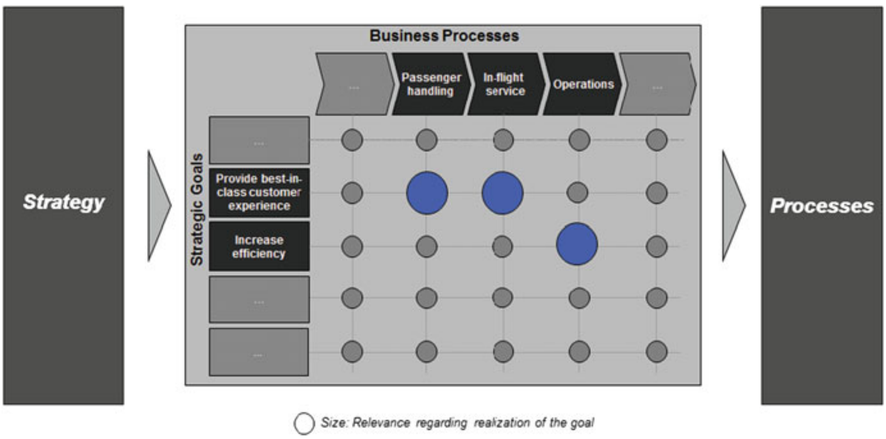

Fig. 8 SPA-Matrix of Lufthansa (exemplary)

appropriate processes must be defined at every individual stage (process structure) and carried out in the same way (process performance). This means the current strategy is implemented by setting up a suitable process structure and by monitoring process performance. After successful implementation, these processes form key factors which distinguish Lufthansa from its competitors and the process capital represents a corresponding value for the company.

4.2.2 In-flight Service

Another example is the in-flight service process. Lufthansa invested huge amounts of time and money on improving seating. The airline recently introduced a new first class as well as a new business class product for international services. The seats allow travelers to sleep more comfortably and better. Another innovation regarding customer experience was the introduction of in-flight internet access.

4.2.3 Operations

Not only in passenger-related processes is innovation a goal which Lufthansa implements in its processes. Several process innovations have been introduced: By the use of the "Aircraft Addressing Communication and Reporting System", data of aircrafts operating worldwide is sent to the Traffic Control Center in Frankfurt and analyzed. Potential faults can immediately be detected. Lufthansa also introduced what is known as the 'electronic flight bag'. This system, developed by the subsidiary Lufthansa Systems, replaces lots of paper-based documentation which has to be available in the cockpit (e.g. maps). Each year, up to 16 million pieces of paper can be replaced with up-to-date information.

All these examples improve Lufthansa's processes significantly with goals out of strategy. Lufthansa can increase quality and customer satisfaction. Innovative processes also result in higher efficiency.

Finally, in order to secure the process performance and the sustainability of process capital, a Process Capital Management has to be established. As described in Sect. 2.3, a set of performance indicators is used in order to specify the goals to be achieved. The "increase" in process capital can be measured by the change of these indicators.

5 Summary and Outlook

Countless publications from both academia and industry deal with the importance of *processe*s for corporate success. In most cases, selected examples of process optimizations and process management success stories are described without really proving which share of corporate success can actually be attributed to processes.

This essay looks at this topic from a different perspective: using intangible assets – which have come to the fore in recent years – as a starting point, the intangible category of process capital is subjected to close scrutiny.

Based upon a definition of the term process capital and a description of the correlation between process capital and strategy, this essay shows how process capital can be built up as a strategic success factor and managed permanently and consistently. Here it is important to remember that while extensive literature can be found on other areas of research into intangibles, such as human capital, to date there have been very few investigations into process capital. As such, this article should demonstrate the need for further research and provide impulses for a more detailed analysis of the topic. There is particular need for research into the positive correlation between process capital and PCM and corporate success postulated in this article. The use of empirical research methods (e.g. interviews with experts) would lend itself to this end.

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Business Process Frameworks

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Abstract In Business Process Management (BPM) research as well as in practice, a whole host of different Business Process Frameworks supporting various tasks connected with BPM in organizations have been introduced and further developed. However, the term Business Process Framework is ambiguous and has been used for different BPM-related systemization approaches concerning BPM methods and techniques. Against the background that so far no attempt to systemize the different meanings and understandings of the term Business Process Framework is known, this article aims at clarifying this term by analyzing and systemizing its different facets giving an overview of available understandings and usages of the term. The identified facets are investigated and several different classes of Business Process Frameworks are described and explained in more detail. In this context, one predominant class of Business Process Frameworks summarizing business process reference models is presented in more detail.

1 Introduction

Business Process Management (BPM) gains more and more importance for practice and an increasing number of organizations use BPM methods and techniques in order to support their operations (Fettke 2009). This makes BPM a highly relevant object of study and development for researchers and practitioners who strive for designing new and innovative BPM approaches and, furthermore, investigate their effects in real world application. In this context, BPM research and practice has created a whole host of so called Business Process Frameworks supporting different tasks connected with BPM in organizations. However, the term Business Process

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_6,

Framework is ambiguous and has been used to denominate different BPM-related systemization approaches, BPM methods and techniques etc. The term has not been consistently defined and various understandings can be identified in literature until now. This word sense ambiguity has already been mentioned before, e.g. by Harmon (2014) and process frameworks have been identified an important element of strategic alignment in BPM (Rosemann and vom Brocke 2014). However, so far no attempt to systemize the different meanings and understandings of the term Business Process Framework is currently known and so the term has remained ambiguous.

Against this background, this article aims at further clarifying the term Business Process Framework by means of an investigation and systemization of its different facets and an overview of a selection of different understandings and usages of this term in literature shall be given. Another goal of this article is to clarify the various facets of the term Business Process Framework and the different classes of Business Process Frameworks by means of a more detailed description and explanation of several Business Process Framework instances.

In order to reach the goal of further clarifying the term Business Process Framework, a review and investigation of selected articles referring to Business Process Frameworks is our research approach. We report on different usages and understandings of the term Business Process Framework in literature and systemize different identifiable instances into consistent classes of Business Process Frameworks.

This article is structured as follows: after this introduction, the second section analyses the ambiguity of the term Business Process Framework in more detail based on an investigation of frameworks in the context of BPM research and the clarification of different possible facets of the term *business process* as well as the term *framework*. A classification of identified understandings of the term Business Process Framework is given. In Sect. 3, each of the different Business Process Framework classes are described in more detail and explained by means of according framework instances. In this context, we especially focus on some Business Process Framework instances *in the sense of business process reference models* and also report on empirical insights concerning real world effects of using reference models in practice. Section 4, discusses the findings of our investigation before the article is summarized and concluded in Sect. 5.

2 Business Process Frameworks: An Ambiguous Term

2.1 Frameworks in Business Process Management Research

Frameworks in general are highly relevant in the context of Information Systems (IS) research as they commonly provide a systemization or overview of relevant objects or phenomena in a certain domain of interest. The general term *framework* has, furthermore, quite often been used in the context of BPM research addressing a whole host of different aspects of BPM, e.g. Rosemann and vom Brocke (2014) develop a framework for the description of Six Core Elements of BPM which supports structuring BPM as a holistic approach; Tregear (2014) introduces a *Global BPM framework* for process standardization supporting BPM in globalized organizations; Bhat et al. (2014) differentiate several classes of *Business Process Management Frameworks*, e.g. maturity models with according assessment tools as well as BPM lifecycle methodologies (pp. 333f.) and use a specific *Business Process Management Adoption Framework* in order to investigate Business Process Outsourcing effects. In summary, frameworks play an important role in BPM research and the term *Business Process* Management *Framework* has been used for the description of many different aspects of BPM.

This plurality of meaning can also be observed for the term *Business Process Framework*. In literature, the term Business Process Framework is used very differently, e.g. Harmon (2014) mentions this ambiguity but predominantly understands Business Process Frameworks as reference process models or organizational best practices like the *IT Infrastructure Library* (ITIL) or the *Enhanced Telecom Operations Map* (eTOM), while Scheer (1998) uses the term Business Process Frameworks in the sense of methodical engineering approaches for business processes and process-oriented IS addressing technical infrastructure, organizational aspects as well as existing business objects. Table 1 gives an exemplary overview of different usages and understandings of the term Business Process Framework in literature.

This exemplary enumeration of different usages of the term Business Process Framework illustrates the mentioned term ambiguity in literature. We assume that this ambiguity is related to two different aspects: the ambiguity of the term *business process* as well as the ambiguity of the term *framework*.

2.2 Term Clarification "Business Process"

According to the Cambridge Dictionary[1] a *process* in general is "a series of actions that you take in order to achieve a result". The term *business process* can accordingly be understood as a sequence of actions carried out in a business context for the creation of goods and services. In common speaking as well as in literature the term business process can occur in different contexts. For the clarification of its meaning it is important to ask, whether (a) a business process in the *real world* or in the *model world* is addressed and, furthermore, (b) if we are talking about a business process *instance* or a business process *schema*. The influence of these two dimensions will be explained in more detail in the following.

As already mentioned, the term business process can address both sequences of executions which can be observed in the *real world* and sequences of intended

[1] http://dictionary.cambridge.org

Table 1 Different usages of the term *Business Process Framework*

Source	Underlying understanding of the term *Business Process Framework*	Given examples
Scheer (1998, pp. 109ff.)	Engineering approaches for process-oriented IS adressing technical infrastructure (e.g. workflow systems), organizational aspects (systemization of relevant domains) as well as existing business objects	Architecture of Integrated Information Systems (ARIS), Zachman Framework, CIMOSA
Otto and Wäsch (2003, pp. 427ff.)	Standardized technical interchange infrastructures for inter-organizational business process models supporting reduction of complexity and costs of process modeling	ebXML, RosettaNet, WSCI, BizTalk, WSFL, BPEL4WS
Pickering and Wynn (2004, pp. 377ff.)	Reference business processes and relevant views and functions for the support of team collaboration and project management in organizations. The term describes a systemization of processes in a domain	Business Process Framework for Global Team Collaboration
Barros (2007, pp. 47ff.)	The term *Business Process Frameworks* appears in this article's title. However, in the text, the author mostly uses the term *business process pattern* or *structure*. Nevertheless, Business Process Frameworks in the sense of best practice process models or reference models are mentioned	Supply Chain Operations Reference (SCOR) Model, enhanced Telecom Operations Map (eTOM)
Hrastnik et al. (2007)	The term *Business Process Framework* is used as a synonym for a *Business Process Knowledge Framework*. This framework represents a systemization of relevant knowledge for different central roles and perspectives in a business process	A new Business Process Knowledge Framework
Yuan and Shen (2007, p. 676)	The term *Business Process Frameworks* appears in this article's title. It is not clearly defined in the text but can be interpreted based on the context. It is used in the sense of a technical infrastructure for the management of workflows	SwinDeW, SwinDeW-B as decentralized workflow management systems
Boukhebouze et al. (2009, pp. 502ff.)	Technical infrastructure for business integration and the support of flexible and reliable workflows	Business Process Framework for Agility of Modelling and Analysis (BP-FAMA)
Harmon (2014, pp. 60ff.)	"Business Process Frameworks (also called Operation Reference Frameworks) [. . .] provide a quick way for a company to establish a high-level process architecture"; best practice process models or reference models	SCOR Model, Information Technology Infrastructure Library (ITIL)

(continued)

Table 1 (continued)

Source	Underlying understanding of the term *Business Process Framework*	Given examples
Karagiannis and Woitsch (2014, pp. 466ff.)	"A set of assumptions, concepts, values, and practices that constitute a way of viewing BPM" referring to four concepts: (1) business models, (2) regulations, (3) domain and (4) model processing	Detailed explanations and many examples for the four concepts are given
Vo et al. (2011, p. 990)	Technical and organizational reference structure (technical infrastructure and business processes) for a certain domain in organizations (asset management)	RFID-based business process framework for asset management

executions documented in the form of a process model (*model world*). A clear differentiation between the term *business process* related to the real world on the one hand and related to the model world on the other hand seems highly important as this term indeed has different meanings depending on the context. As far as the *model world* is concerned, a business process can be represented in different ways and using different types of methods and techniques (Desel and Juhás 2001). In literature, a common classification differentiates (I.) *informal*, (II.) *semi-formal* and (III.) *formal* representations of business processes. However, there are also different opinions in literature concerning how these classes of representations can be distinguished in detail and what the exact criteria for this differentiation are.

The mentioned (I.) *informal* representations are typically considered to comprise business process description in free prose (Markovic 2010), e.g. a transcript of an interview with an employee concerning the sequences of executions commonly performed at her workplace for the documentation of as-is processes.

As natural language can be ambiguous and is likely to be interpreted differently, there have been several initiatives towards the development of formalized business process representations. A first step towards a more formal and standardized representation of business processes has been the introduction and usage of graphical elements and symbols with a standardized meaning in graphical business process models. This resulted in methods and techniques which support – besides several other tasks – the development of technical drawings of processes, e.g. *Event-driven Process Chains* (EPCs), the *Business Process Model and Notation* (BPMN) or *UML Activity diagrams*. In literature, such representations are often considered to be (II.) *semi-formal*. One important purpose of these modeling techniques is the graphical representation of business processes.

However, in the meanwhile several of these business process representation techniques have been further developed and stronger formalizations have been proposed in order to have a (III.) *formal* representation of business process models, e.g. for EPCs by van der Aalst (1999) or Nüttgens and Rump (2002). In this context, two different types of formalizations can be distinguished: (*a*) formal representations by means of mathematical expressions and structures based on set theory or first-order logic, and (*b*) formal representations by means of a formal language in the sense of the field of theoretical computer science. A formal language in the sense of theoretical computer science is a finite set of strings of symbols (Davis et al. 1994). In this context, formal languages can support several different purposes: (1) the provision of a machine-readable representation of a process model in order to make them interchangeable, e.g. the *Event-driven Process Chain Markup Language* (EPML) or the *ARIS markup language* (AML) for EPC models, and (2) the provision of a machine-readable representation of a process model in order to make them executable by means of a process engine (*execution semantics*).

Furthermore, as already mentioned above the exact meaning of the term business process also depends on the differentiation between process *instances* (tokens) or process *schemata* (types). This results in the following classes of business processes (represented in Fig. 1):

1. According to the above definition of a business process, a *business process instance* in the *real world* describes a unique and singularly happening sequence of executions in a business context, e.g. production process #1111 concerning article #2222 performed on the 1th of July 2013 in the Example Company's plant #15. Its existence is actually independent of the existence of a process model or an information system.
2. A *business process schema* in the *real world* is the common schema of execution steps which all the production processes in an organization typically follow, e.g. concerning the article #2222 produced by the Example Company. This schema does not necessarily have to be documented by means of a process model and is actually also independent of an IS.
3. A *business process instance* in the *model world* is the unique graphical or informal representation (e.g. EPC diagram or a textual description printed on one particular sheet of paper), or a formal representation (EPML code running on one particular computer) of a sequence of executions in a business context. The latter example typically represents a process instance in the real world, e.g. a currently running workflow instance. However, as already mentioned above, a process model can exist independently of a business process in the real world and vice versa.
4. A *business process schema* in the *model world* is a graphical (e.g. EPC diagram), a formal (e.g. EPML code) or an informal (e.g. prose) representation of a documented, intended or suggested sequence of executions, e.g. a business process model which is contained in the SAP reference model.

In conclusion, it can be stated that the term business process can have several different meanings. Thus, the underlying understanding of business process is likely to influence intended meanings of the term Business Process Framework, which will also be indicated in the following sections in more detail.

	Model world	Real world
Type	graphical, formal or informal representation of an intended sequence of executions, e. g. business process reference model	common execution steps which all the production processes in an organi-zation follow
Token	unique graphical, formal or informal representation of a sequence of executions, e. g. an EPC diagram printed on one particular sheet of paper	unique and singularly happening sequence of executions in a business context

Fig. 1 Different meanings of the term *business process*

2.3 Term Clarification "Framework"

As already mentioned, the development of frameworks plays an important role in IS research. However, the term *framework* is generally used in many different senses in IS research and, as has been shown, especially in the context of BPM research. This is probably also related to the fact that the general English term *framework* has several different meanings. Besides other meanings which are probably less important for IS research, e.g. *the parts of a building or an object that support its weight and give it shape*, framework – according to the Cambridge Dictionary[2] as well as the Oxford Advanced Learner's Dictionary[3] – can have the following meanings:

1. *a set of beliefs, ideas or rules that is used as the basis for making judgements, decisions, etc*. and
2. *the structure of a particular system*.

Both interpretations are valid for BPM research compared to the different usages and understandings of the term Business Process Framework which we have seen in Table 1. This will also be shown in more detail after the introduction of our classification of the usages and understandings of the term Business Process Framework in literature by means of a mapping of these two meanings of the term *framework* onto our Business Process Framework classes in the following section.

[2] http://dictionary.cambridge.org

[3] http://oxfordlearnersdictionaries.com

2.4 A Classification of Business Process Frameworks

As we have already seen, several different classes of Business Process Frameworks can be identified in literature. During our investigation, we discovered that in some of the contributions the term Business Process Framework has been used as a shorter form for unique and specific frameworks in the context of BPM like the Business Process Knowledge Framework by Hrastnik et al. (2007) or the Business Process Framework in the sense of a set of assumptions, concepts, values, and practices for BPM by Karagiannis and Woitsch (2014). Moreover, we found characteristic usages and understandings of the term Business Process Framework which can be identified significantly more often than others in literature. In the following, these serve as our Business Process Framework classes. Figure 2 summarizes these characteristic classes.

The first major class of Business Process Frameworks in our classification subsumes methodical business process engineering approaches, e.g. the *Architecture of Integrated Information Systems* (ARIS) (Scheer 1998), the *Zachman Framework* (Zachman 1987), the *Computer Integrated Manufacturing Open System Architecture* (CIMOSA) (AMICE 1993) etc. Such engineering approaches support the development of process-oriented IS, the definition of process models and not only propose the structure of such IS but sometimes also provide according procedure models and according software implementations supporting BPM in practice. For such Business Process Frameworks the second meaning of the general term *framework* given above (*structure of a system*) is relevant in the first place as these business process engineering approaches basically provide systemizations of underlying structures of process-oriented IS. However, they also provide certain beliefs, ideas and rules for taking decisions for the design of such systems. Thus, also the second given meaning of frameworks applies for this Business Process Frameworks class.

The second Business Process Frameworks class summarizes technical infrastructures for process integration and for the interchange of business process models, e.g. XML-based approaches like the *XML Process Definition Language* (XPDL) or the *ebXML Business Process* (ebBP) OASIS standard. These technical infrastructures provide the basis for formal representations of business process models (*model world*) and the execution of singular process instances in the real world by means of workflow systems. Concerning this Business Process Frameworks class, the second meaning of *framework* which is related to structural aspects of a system is relevant.

The third major class which also represents the most common understanding of the term Business Process Framework summarizes so called business process reference models which are often representations of best practice processes, e.g. the *Supply Chain Operations Reference Model* (SCOR), the *Information Technology Infrastructure Library* (ITIL) or the *Control Objectives for Information and Related Technology* (COBIT). Reference models are process descriptions (*model world*) which can provide the basis for real world process instances.

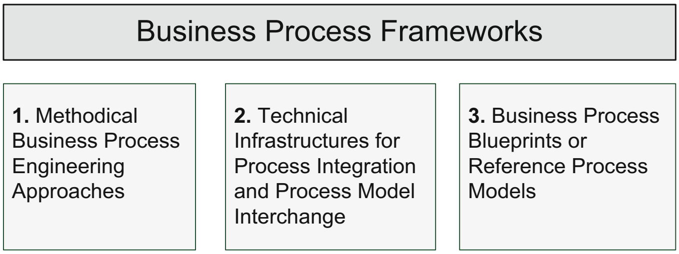

Fig. 2 An overview of different types of Business Process Frameworks

Looking at the interpretation of Business Process Frameworks in the sense of reference models, both of the above meanings of the term *framework* are relevant. Reference models are often interpreted as prescriptions of *how* a real world business processes could or should be conducted. They contain certain *believes* and *ideas* aiming at the improvement of a process-oriented organization. Furthermore, the structural aspects of reference process models are especially important as business process models represent a structure of work in an organizational system or sub-system.

In the following section, these different classes of Business Process Frameworks and selected instances of Business Process Frameworks are presented in more detail. We first introduce exemplary Business Process Frameworks in the sense of business process engineering approaches, then some exemplary technical infrastructures for process integration and process model interchange before we put a stronger focus on established business process reference models.

3 Description of Exemplary Business Process Frameworks

3.1 Methodical Business Process Engineering Approaches

A whole host of methodical engineering approaches for process-oriented IS have been presented in literature. Furthermore, several according software prototypes exist. Therefore, we can only introduce a selection of Business Process Frameworks in this sense in the following. However, these frameworks have in common that they typically provide a systemization of domain-independent approaches, methods and techniques for the development of process-oriented IS considering different views and perspectives on involved systems and business processes.

The *Architecture of Integrated Information Systems* (ARIS) is a comprehensive methodical framework for the design of process-oriented IS. It provides a holistic view on business processes comprising the *organizational view*, the *data view*, the *function view*, the *output view* and the *control view* (Scheer 1998). In addition, the ARIS phase model defines several consecutive development phases (*requirements* *definition*, *IS concept* and *implementation description*) which are relevant for each view and, furthermore, necessary for a structured development of integrated IS. Besides offering an architecture for process-oriented IS, the ARIS concept provides the basis for several concrete modeling methods and techniques as well as software implementations for business process modeling. The ARIS platform offers comprehensive functionality in the context of BPM in general, e.g. the development of the business process strategy, business process implementation, business process monitoring or business process controlling.[4]

The *Zachman Framework* was initially developed in the late 1980s as a domain-independent approach providing guidelines and a systemization of roles and perspectives as well as and their specific requirements which should be considered during the development of IS (Zachman 1987). Based on the insight that the size and complexity of IS implementations as well as enterprises in general keep increasing and, furthermore, that individual perspectives on a complex system matter ("Architecture is relative. What you think architecture is depends on what you are doing", Zachman 1987, p. 291) this systemization of relevant roles (*planer*, *owner*, *designer*, *builder*, *programmer* and *user*, p. 284ff.) and perspectives (*data*, *function*, *network*, *people*, *time* and *motivation*) for individual IS development has been proposed as a two-dimensional framework and further developed into a comprehensive multi-dimensional Enterprise Architecture Framework.[5]

The *Computer Integrated Manufacturing Open System Architecture* (CIMOSA) has been developed in the early 1990s (AMICE 1993). Although the underlying research projects of this initiative focussed on the development of an open system architecture for CIM, the CIMOSA can support enterprise modeling in general and has some similarities compared with ARIS (Scheer 1998). The CIMOSA architecture (*the CIMOSA cube*) is represented by three dimensions: the "stepwise generation" dimension (*function view*, *information view*, *resource view* and *organization view*) which is comparable to the views in ARIS, "stepwise derivation" (*requirements definition*, *design specification*, *implementation description*) which is comparable to the ARIS phase concept and "stepwise instantiation" which describes the necessary individualization of concepts during the development from basic requirements (*generic*), to industry specific requirements (*partial*) to enterprise specific requirements (*particular*) (Scheer 1998). Former and current research on CIMOSA as well as software implementations supporting enterprise modeling according to the CIMOSA approach can be accessed via the website of the CIMOSA Association.[6]

Additionally, we would like to mention further examples of Business Process Frameworks in the sense of methodical business process engineering approaches which are of relevance for Enterprise Modeling and BPM such as *Multi-Perspective Enterprise Modelling* (MEMo) by Frank (1994), the *Semantic Object Model* (SOM)

[4] http://www.softwareag.com/de/products/aris/default.asp

[5] Zachman (2008): http://www.zachman.com/about-the-zachman-framework

[6] http://www.cimosa.de/

by Ferstl and Sinz (1995), *ProMet* by Österle (1995) or *The Open Group Architecture Framework* (TOGAF).[7] In the following section Business Process Frameworks in the sense of technical infrastructures for process integration and process model interchange will be treated.

3.2 Technical Infrastructures for Process Integration and Process Model Interchange

The second major class of Business Process Frameworks summarizes technical infrastructures for process integration and process model interchange. In this area, several different specifications have been developed based on the specific tasks which are supposed to be supported, e.g. process model interchange between different modeling or workflow tools, inter-organizational process integration or web service orchestration. In the following, some examples of such technical infrastructures will be presented in order to further clarify this specific interpretation of the term Business Process Framework.

The *XML Process Definition Language* (XPDL) is an XML-based standard for the exchange of business process models and has been developed and advanced by the *Workflow Management Coalition* (WfMC) since 1993. The current version 2.2 has been released in 2012 and supports a graphical representation of XPDL specifications by means of the *Business Process Model and Notation* (BPMN) 2.0 standard.[8] Furthermore, XPDL facilitates the interchange of BPMN diagrams in general, also for earlier versions of the BPMN up to version 1.2.[9] This distinguishes XPDL from similar XML-based standards like the *Web Services Business Process Execution Language* (WS-BPEL) which mainly focusses on business process execution and not so much on graphical representation aspects. WS-BPEL is a description language for business processes comprising functions and activities which are implemented as web services.[10] The WS-BPEL has been extended by the so called *WS-BPEL Extension for People* (BPEL4People) specification which additionally considers process activities conducted by humans in BPEL processes.[11]

The *ebXML Business Process* (ebBP) OASIS standard is another XML-based standard for the technical specification of business processes.[12] It especially aims at supporting inter-organizational business process integration and is based on the former process integration standard *eBusiness Extensible Markup Language*

[7] http://www.togaf.org/

[8] http://www.wfmc.org/xpdl.html

[9] http://www.xpdl.org/

[10] http://docs.oasis-open.org/wsbpel/2.0/OS/wsbpel-v2.0-OS.html

[11] http://docs.oasis-open.org/bpel4people/bpel4people-1.1-spec-cd-06.pdf

[12] http://ebxml.xml.org/bp

(ebXML) which has also been developed by the *Organization for the Advancement of Structured Information Standards* (OASIS).[13]

Besides these quite current business process integration approaches, many other technical infrastructures and approaches exist – some of them meanwhile obsolete – like *Workflow-XML* (Wf-XML) by the WfMC[14] or the *Business Process Modeling Language* (BPML) by the *Business Process Management Initiative* (BPMI).[15] In the following section, we present several Business Process Frameworks in the sense of business process reference models in more detail.

3.3 Business Process Reference Models

3.3.1 What Is a Business Process Reference Model?

The term business process reference model has not been consistently defined and there is still a lively discussion which aspects this term comprises. This discussion shall not be comprehensively recapitulated in this contribution. In general, business process reference models can be understood as business process models which should fulfil certain criteria and offer certain features. These criteria are still under discussion, e.g. in (vom Brocke 2003; Thomas 2006; Fettke and Loos 2007). Referring to Fettke and Loos (2007) and Ardalani et al. (2013), we consider the following features as important:

1. **Reusability**: Business process reference models represent business process blueprints for the development of process-oriented IS which can be reused in different IS development projects (vom Brocke 2007).
2. **Exemplary practices**: Business process reference models can provide common, good or even best practices describing how business processes are actually designed in practice or how they could or should be designed and executed in order to reach certain goals. In this context, a descriptive as well as a prescriptive or even normative connotation of business process reference models becomes apparent depending on their interpretation.
3. **Universal applicability**: Business process reference models do not only represent business processes of one particular organization but aim at providing universally applicable business process representations which are valuable for different organizations in a certain domain.

Reference models can provide benefits for both theory and practice. Besides the provision of general descriptions of enterprises, which is especially interesting from a theoretical point of view, practice profits, e.g. from decreases in modeling costs,

[13] https://www.oasis-open.org/

[14] http://www.wfmc.org/wfmc-wf-xml.html

[15] http://www.bpmi.org/

modeling time and modeling risk as reference models can represent proven solutions (Becker and Meise 2011). Moreover, increases in model quality based on the reuse and adaption of already validated process models can be expected.

Prominent examples for reference models which have been extensively used in practice in order to profit from these advantages are, e.g. the *Y-CIM Model* by Scheer for industrial enterprises (Scheer 1994) or the *SAP reference model* as a basis for the SAP R/3 system which has been partly published in (Keller and Teufel 1998). An overview of a collection of reference models is provided by the Reference Modeling Catalogue hosted by the Institute for Information Systems (IWi) at the DFKI and Saarland University, Saarbrücken.[16] In the following, we present a selection of relevant Business Process Frameworks in the sense of business process reference models: the SCOR Model, ITIL, eTOM and the APQC Process Classification Framework[SM] (PCF).

3.3.2 Supply Chain Operations Reference (SCOR) Model

The *Supply Chain Operations Reference* (SCOR) *Model* is a process-oriented reference model for supply chain management which has been introduced in 1996 and further developed by the Supply Chain Council.[17] After several revisions, the SCOR model has been available in version 10 since August 2011. While at first only the 69 founding members were part of the Supply Chain Council, the Council now comprises almost 1,000 companies and research institutions.[18]

The SCOR model defines five different types of processes in organizations. Their relationship is visualized by means of a multi-stage supply chain in Fig. 3:

1. **Plan**: includes the planning and management of supply and demand for goods.
2. **Source**: comprises the purchase of goods, the goods receipt, pre-delivery check, storage and method of payment for any goods.
3. **Make**: covers all stages of production processing.
4. **Deliver**: comprises all the steps of the ordering and delivery of goods to the customers.
5. **Return**: includes all the steps for handling returned goods, both repairs and maintenance are taken into account.

In the study of Fettke (2008) the real world effects of using the SCOR model have been investigated based on different theoretical perspectives, such as the market-based view, the resource-based view and network theory. Moreover, the hypothesis saying that the application of the SCOR model comes with positive effects on typical supply chain management goals is supported by an empirical

[16] http://rmk.iwi.uni-sb.de/

[17] http://supply-chain.org/scor

[18] http://supply-chain.org/about/history

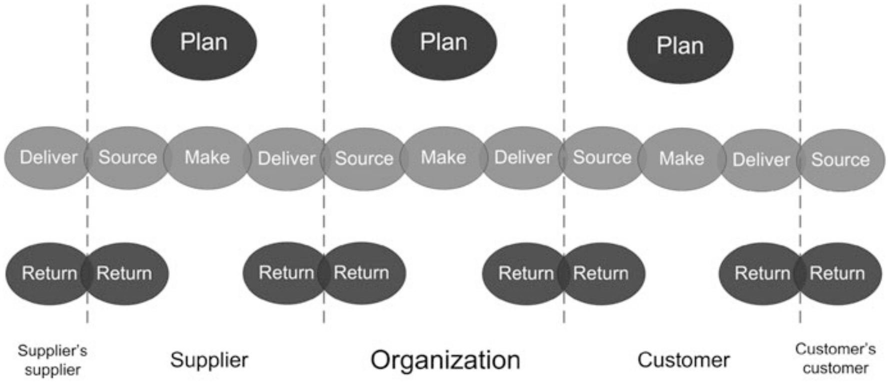

Fig. 3 SCOR model process types in a supply chain (According to: http://supply-chain.org/)

study which has addressed all members of the Supply Chain Council. Furthermore, Bolstorff et al. (2007, p. 27) report on additional experiences with the SCOR model:

1. Increase of total income by three per cent after a SCOR project through the reduction of costs and the improvement of customer services;
2. Two to six fold return on capital within 12 months after completion of the SCOR project;
3. Lower operating costs for information technology;
4. One to three per cent increase in annual operating profit.

Besides these findings, a recent survey identified positive impacts of using the SCOR model on *customer-facing supply chain quality performance* and *internal-facing business performance* (Li et al. 2011). Another survey could also confirm several positive influences of using the SCOR model on supply chain management performance (Zhou et al. 2011).

3.3.3 Information Technology Infrastructure Library (ITIL)

The *Information Technology Infrastructure Library* (ITIL) represents a business process framework for IT service management (ITSM) which is widely accepted and applied in professional IT service organizations.[19] The current version ITILv3 has been published in 2007 and updated in 2011. ITIL is considered a de-facto standard for ITSM and describes standardized *key processes*, *key concepts and principles, key roles and responsibilities* as well as according KPIs and checklists in five different areas of ITSM. Concerning ITILv3, for each of these areas one separate volume with detailed process descriptions in the following areas has been published: (1) *ITIL Service Strategy* which supports the definition of an

[19] http://www.itil-officialsite.com/

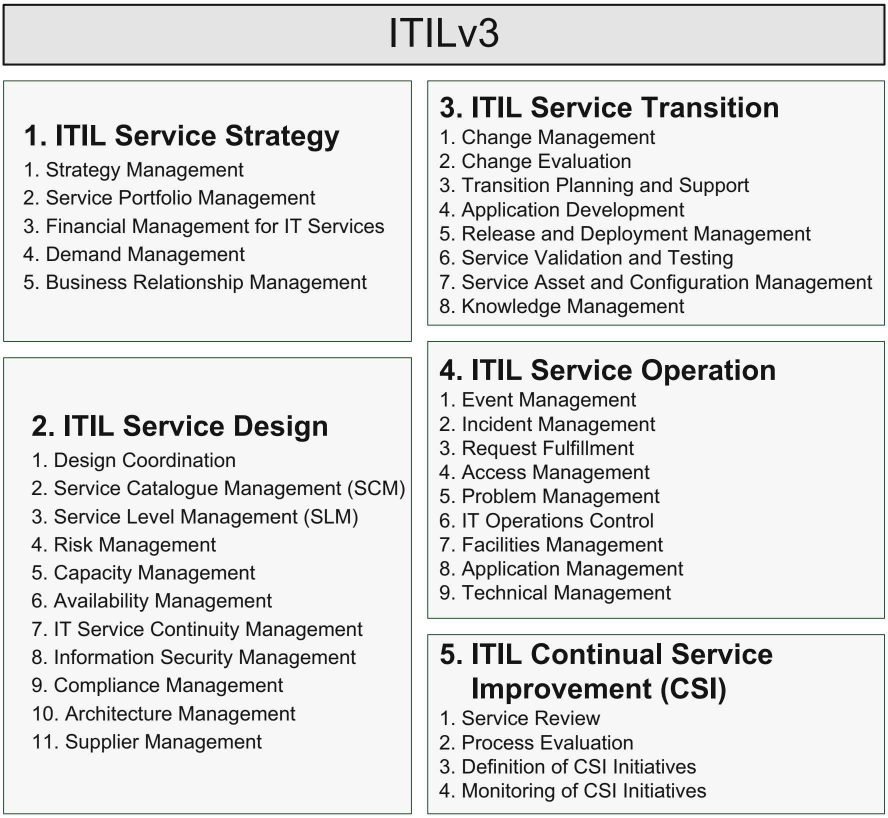

Fig. 4 ITILv3 core processes

adequate IT service strategy in the sense of a longer term development of IT service skills under special consideration of the customer requirements, (2) *ITIL Service Design* which supports the development of new IT services and solutions as well as the further development of existing services based on the service strategy, (3) *ITIL Service Transition* which supports the coordination of the IT services' development and deployment, (4) *ITIL Service Operation* which supports an effective and efficient IT service fulfillment and (5) *ITIL Continual Service Improvement (CSI)* which uses methods of quality management in order to continuously learn from success and failure to improve IT services. Figure 4 visualizes these five areas of the ITILv3 and the according core processes within these areas.

As ITIL represents the de-facto standard for ITSM, a large amount of experience with the usage of ITIL in practice exists. Furthermore, there is quite an amount of empirical studies conducted by scholars reporting on the positive effects of ITIL usage on IT service organizations' performance, e.g. Henson and Geray (2010) or Meziani and Saleh (2010) in the context of service management in public administration settings or Lapão et al. (2009) in the context healthcare environments.

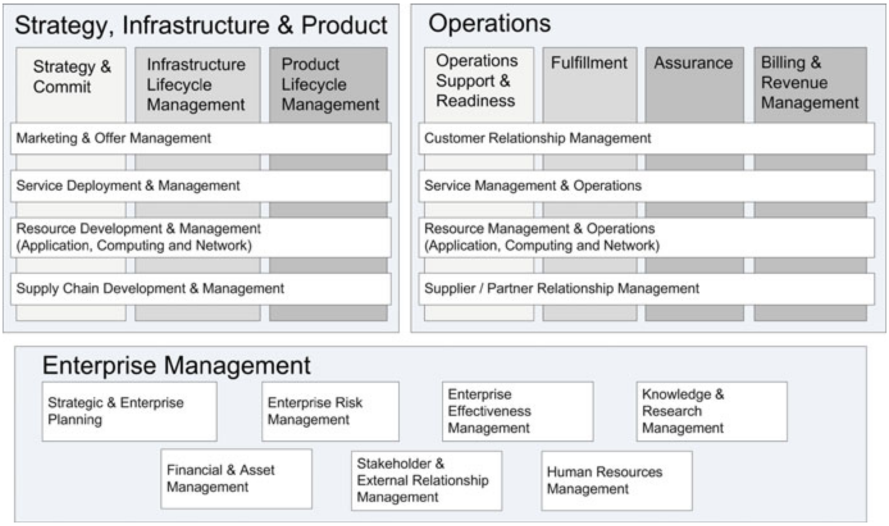

Fig. 5 eTOM architecture (Level 0 and 1) (According to: http://www.tmforum.org/Overview/13763/home.html)

Furthermore, there are some recent studies on factors influencing ITIL adoption, e.g. the contribution of Cater-Steel et al. (2009) or the comprehensive international survey by Marrone and Kolbe (2011) which reports on the ever-increasing ITIL adoption and the increasing realized operational benefits caused by the usage of ITIL.

3.3.4 Enhanced Telecom Operations Map (eTOM)

The *enhanced Telecom Operations Map* (eTOM) represents a business process reference model for the telecommunications industry which has been introduced by the TM forum as their Business Process Framework.[20] It provides a detailed description of relevant business processes for service providers based on a four-level-hierarchy. Figure 5 shows Level 0 and Level 1 within the eTOM process hierarchy.

Level 0 represents the overall enterprise level and defines the three major sections: a. *Strategy, Infrastructure & Product,* b. *Operations* and c. *Enterprise Management*. Level 1 "contains seven end-to-end vertical Level 1 process groupings in the areas of Strategy, Infrastructure and Product and Operations. These vertical groupings of processes focus on end-to-end activities [. . .] and each grouping includes processes involving customers, supporting services, resources and suppliers/partners. [. . .] The horizontal groupings represent major programs or

[20] http://www.tmforum.org/

functions that cut horizontally across an enterprise's internal business activities."[21] More detailed process definitions exist on level 2 and level 3 of the eTOM specification.

In practice, a certain amount of experience with the application of eTOM exists as it is one of the most popular standards for managing business processes in the telecommunications industry (Tanovic and Androulidakis 2011). However, so far there are only few empirical studies driven by scholars concerning the real world effects of eTOM; e.g. Chou et al. (2008) report on a successful application of eTOM especially in the context of trouble management operations in the largest Taiwan telecommunications corporation resulting in an improved performance and improved user satisfaction.

3.3.5 APQC Process Classification Framework^{SM}

The *APQC Process Classification Framework*^{SM} (PCF) provides a comprehensive taxonomy of operating processes as well as management and support processes. The PCF supports benchmarking of organizational performance within one or among organizations "regardless of industry, size or location" of the compared organizations by means of a common terminology to describe and compare business processes.[22] It has been developed by the *American Productivity & Quality Center* (APQC) since the early 1990s and the current version 6 comprises more than 1,000 relevant business processes. Besides the cross-industry version, several industry-specific versions of the PCF exist, e.g. for retail, automotive, telecommunications, education. The content of the PCF is organized into the following five levels[23]:

- **Level 1**: *Category,* represents the highest level of processes in enterprises such as financial organization, human resources etc. One example of a category in PCF version 6 is "*1.0 Develop Vision and Strategy (10002)*".
- **Level 2**: *Process Group,* represents connected groups of business processes within one category. One example of a process group in PCF version 6 is "*1.1 Define the business concept and long-term vision (10014)*".
- **Level 3**: *Process,* represents a sequence of interrelated activities converting input into output. One example of a process in PCF version 6 is "*1.1.1 Assess the external environment (10017)*".
- **Level 4**: *Activity,* comprises key events performed during the execution of a process. One example of an activity in PCF version 6 is "*1.1.1.1 Analyze and evaluate competition (10021)*".

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[21] http://www.tmforum.org/Overview/13763/home.html

[22] http://www.apqc.org/process-classification-framework

[23] According to the framework description on: http://www.apqc.org/knowledge-base/documents/apqc-process-classification-framework-pcf-cross-industry-pdf-version-600

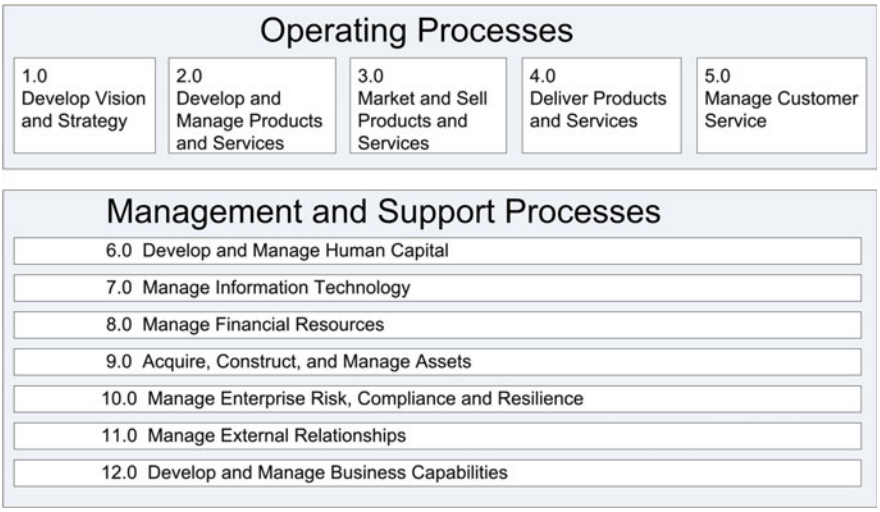

Fig. 6 Overview of categories in the APQC Process Classification Framework^{SM}

- **Level 5**: *Task,* next level of decomposition after activities, more fine-grained. One example of a task in PCF version 6 is "*12.2.3.1.1 Identify project requirements and objectives (11117)*".

Figure 6 gives an overview of the process categories contained in the PCF.

According to the APQC reporting, the PCF has been used for business process management and benchmarking in many different businesses in the last two decades worldwide and several practical case studies providing detailed experiences with the PCF in renowned companies from different industries exist.[24] Furthermore, the PCF has been used as a systemization approach for business processes as a fundament for scientific empirical studies and surveys, e.g. concerning IT and business process alignment (Cragg et al. 2007; Cragg and Mills 2011) and in the context of comparing service offerings in business transformation projects (Srivastava and Mazzoleni 2010).

4 Discussion

Our investigation showed that the term Business Process Framework is ambiguous and that quite a number of different understandings and usages of this term exist. However, on the basis of our underlying definitions of *business process* and *framework* and the commonly identified understandings an expedient systemization of Business Process Frameworks could be developed. Presenting several instances

[24] http://www.apqc.org/apqcs-process-classification-framework-case-studies

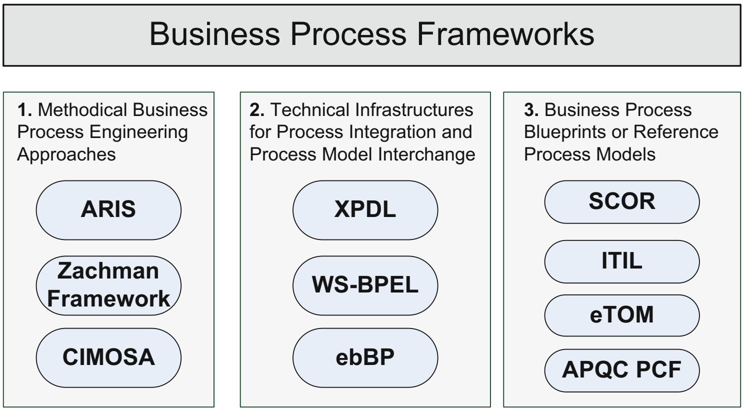

Fig. 7 Business Process Framework classes and instances

of each understanding of the term Business Process Framework could further clarify the specific subtleties of each framework class.

During our investigation, several quite similar Business Process Frameworks within the different classes have been identified, e.g. ARIS and CIMOSA as methodical business process engineering approaches, XML-based process model interchange and process integration infrastructures like XPDL and ebBP or ITIL and eTOM as reference models. Figure 7 gives an overview of Business Process Frameworks within the according classes which have been presented in this contribution.

The similarity of these Business Process Frameworks makes the topic of mapping frameworks which belong to the same class an interesting subject-matter. In the above mentioned cases there are several intersections and considerable overlapping of addressed content of Business Process Frameworks e.g. comparing ITIL and the COBIT framework, another valuable IT governance framework. In this comparison also several differences in content between such Business Process Frameworks are observable. In practice, this can lead to severe problems when both frameworks could provide important functionality for an organization. In such a context, the mapping of the Business Process Frameworks in terms of terminology, procedure models etc. is highly desirable in order to be able to profit from a combination of functionalities. Such mapping initiatives exist for several Business Process Frameworks, e.g. ITIL and COBIT[25] or ITIL and eTOM.[26] Furthermore, the mapping of Business Process Frameworks in order to combine functionality and to profit from the strengths of every single approach also seems promising for the other classes of frameworks.

[25] https://www.isaca.org/

[26] http://www.tmforum.org/RelationshiptoITIL/11744/home.html

Investigating Business Process Frameworks in the sense of reference models, we found that empirical research concerning the real world effects and relevant characteristics like factors influencing the adoption of a Business Process Framework has so far only been conducted to a moderate extent. In order to assess these empirically observable effects in more detail, more empirical research into this seems to be desirable besides the design of new and innovative Business Process Frameworks.

5 Conclusion

Business Process Frameworks are of considerable importance in Business Process Management practice and research. In this contribution, we investigated the research community's underlying understanding and usage of the term Business Process Framework which showed to be an ambiguous term with different meanings. We introduced a systemization of common understandings and presented several Business Process Frameworks which have been relevant for BPM research and practice in recent years. Thereafter, we discussed our results.

Our assumption that the two central terms *business process* and *framework* seem to influence the Business Process Frameworks term ambiguity seems plausible to a certain extent. In our investigation we found that important aspects and meanings of these underlying terms can be found in the different interpretations of the term Business Process Framework and in the content dimensions of the presented frameworks.

Future work concerning Business Process Frameworks should – besides the design and further development of innovative frameworks – concentrate on the empirical assessment of the effects of existing Business Process Frameworks in the real world. A further-going investigation of the possibilities of mapping similar Business Process Frameworks could support a better understanding of how valuable functionalities could be combined and, thus, made accessible for practice. However, in this context it has to be further investigated how engineering challenges concerning the maintenance of framework mappings could be faced in order to have consistent and at the same times flexible Business Process Frameworks.

Acknowledgements The research described in this paper was partly supported by a grant from the German Research Foundation (DFG), project name: "Pluralistische Beurteilung der Qualität von Unternehmensmodellen – Qualitätsdiskurse und Diskursqualität innerhalb der Wirtschaftsinformatik (PluralistiQue)", support code LO 752/4-1, and partly supported by a grant from the German Research Foundation (DFG), project name: "Konzeptionelle, methodische und technische Grundlagen zur induktiven Erstellung von Referenzmodellen (Reference Model Mining)", support code GZ LO 752/5-1.

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A Framework for Classifying and Modeling Organizational Behavior

Chris Aitken, Christine Stephenson, and Ryan Brinkworth

Abstract The consistent structuring and modeling of behavioral descriptions is a prerequisite to any successful Business Process Management (BPM) initiative. This chapter presents a simple practical framework for aligning various concepts and representations of organizational behavior, which assists identifying appropriate model types. The framework is presented as a means to improve process modeling within BPM initiatives and as a guide to the development and documentation of process architectures. A set of BPMN 2.0 based templates are described which enable the modeling of the concepts in the framework. Both health sector and investment management industry cases studies are described in which the framework is used to align descriptions of organizational behavior to produce useful integrated behavioral reference models and unified process model sets. The framework is also used to analyze model and process architecture completeness and structure.

1 Introduction

The ability to readily compare models is fundamental to any BPM initiative concerned with process re-use, improvement, or integration. Business process modeling is often limited in its effectiveness by the inability to produce unified sets of process models especially where the models have been developed within different organizations or within different contexts. Although there have been approaches to attempt to address this issue (e.g. Becker et al. 2014; Houy et al. 2014), the fundamental problem is that human behavior is expressed as a

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_7,

continuum and not as discrete components of activity, consequently any partitioning or structuring is necessarily ‘imposed’ and to some extent arbitrary. Furthermore, there is a tendency for the term “process” to be applied to behaviors that vary significantly in complexity and scope. This lack of specificity can result in models of the same behavior that bear little resemblance to one another. Clearly, factors other than the behavior or activity itself need to be taken into account when attempting to determine appropriate representation, and when aligning these representations across levels of abstraction, organizational boundaries or project environments.

It is common for a hierarchy of business process models to be developed with a BPM initiative. Typically a “high level conceptual” model is developed to provide a context and frame of reference for “lower level” more detailed ‘as implemented’ process models (Indulska et al. 2006; Bandara et al. 2005; vom Brocke et al. 2012). The development of process architecture is commonly touted as the means to achieve alignment between such models, although there are few if any standardized approaches (Davis and Brabänder 2007; Stephenson and Brabänder 2007). However, without clear agreed definitions of concepts, levels of abstraction and decomposition, it is difficult to establish whether lower level models within process architecture are aligned with those at higher a level of abstraction. It is commonly assumed that core concepts such as business process, function, or service are defined and commonly agreed within the BPM community at large. However, it can be argued that this is often not evidenced in practice (van der Aalst et al. 2003). Although there are process ‘meta-models’ such as the ARIS business process meta-model (Scheer et al. 2005), and the Business Process Definition Metamodel (Object Management Group 2008) and while these models may enjoy some popularity in some quarters they are by no means universally agreed and adopted within the global BPM practitioner community. Furthermore neither of these approaches provides a sufficient framework to clearly delineate between the behavioral concepts of service, process, activity, task or related concepts such as capability and function, and the relationships between them. For example, within the ARIS business process meta-model all behavior is represented by the concept ‘function’. While it is possible to have sub-functions the meta-model does not specifically differentiate as different classes of activity, an end-to-end service provided to a customer, and a single constituent activity or task within a single business unit.

A common problem is that of establishing an appropriate level of abstraction or decomposition for any description of organizational behavior. Although two models may have been developed to describe the same process, they may be different in scope and the level of detail they include. Combining or comparing such models often means that one of the models has to be revised in order to establish whether the scope of the individual models is compatible, and whether the same behavior is being represented. The notions of abstraction, generalization, and aggregation were identified from within the data base and data modeling perspective by John and Diane Smith in their landmark article ‘Database

Abstractions: Aggregation and Generalization" (1977). The authors were amongst the first to identify the dimensions of abstraction by aggregation (i.e., composed of), and abstraction by generalization (i.e., type of). The issue of abstraction as it applies to process modeling has been dealt with extensively from an academic perspective (Polyvyanyy et al. 2014). The approach described by Polyvyanyy et al. (2014) obviously has merit as a means to reduce potentially irrelevant or extraneous details from within a complex process model. However, the concept of abstraction is to a degree arbitrary in that the target audience and viewpoint 'owner' (i.e., Becker et al. 2003) at least in part drive the determination of what constitutes 'significant detail'. Furthermore, measures such as 'frequency of use' and 'execution effort' are not necessarily measures of process or task criticality. What is required is a simple set of practical, readily applied rules to allow the practitioner to structure and develop unified models of comparable abstraction or decomposition.

Although organizational behavior can be viewed at the macro level of the services provided, it can equally be viewed from the perspective of constituent tasks and single executable steps within these. Moreover, organizational behavior can be understood in terms of the behaviors of groups of individual actors (i.e., organizational units), as well as at the level of the individual. This multifaceted and fluid nature of organizational behavior means that there are few absolute points of reference upon which to structure and compare behavioral models. Indeed, it can be argued that useful abstraction cannot be directly derived from analysis of the process model structure alone (Smirnov 2011) and that the wider contextual meaning of the model needs to be a consideration.

This problem is further compounded where process models include elements from differing levels of abstraction within the one model. Typical examples of this occur where for reasons of modeling expediency, implementation level details are mixed with logical or conceptual level descriptions. This limits the capacity for model re-use, and will inevitably mean that the model will need to be revised when there are changes made at the level of physical implementation.

The aim of this chapter is to present a framework that has been developed, refined and extended over several years, that provides a simple set of rules to guide practitioners in the structuring, partitioning and development of unified sets of process models. The framework contains a set of criteria that can be readily and applied to representations (i.e. models) of behavior or activity to more reliably identify the level of abstraction being used, the behavioral concept being represented, and to promote the development of unified process and behavioral models across modeling initiatives. The framework presented in this chapter has been applied in both the health and financial investment industries. The framework is essentially a meta-model of behavioral concepts. The framework includes some modeling constraints and rules which are particularly suited to the use of Business Process Modeling Notation (BPMN) and its use of the constructs 'Collapsed Sub-process' and 'Swimlanes'. The following section describes the circumstances that gave rise to the framework, and the process of its development.

2 Framework Development

2.1 Background and Genesis

The need for a framework arose from a requirement to develop both function and service reference models within a large health sector agency in which an ehealth initiative was to be implemented. The ehealth initiative involved providing health services using information systems and technologies which enabled improved communication and collaboration between clinicians, as well as greater participation by patients in their own care. The reference models were required to allow consistent mapping of current and future state business processes and their supporting applications and technologies to better understand the scope of required changes. In the absence of any recognized industry reference models, the models had to be derived by combining a number of existing models and standards. Some of these models were specific to the health industry while others were more general descriptions of organizational behavior. The contributing models and their respective scopes are listed in Table 1 and are briefly described in the following paragraphs.

The American Society for Testing and Materials (ASTM) has published a number of technical standards for the health care industry. Of particular interest to our modeling efforts was the Standard Specification for a Healthcare Conceptual Process Model (ASTM WK5068[1]). This was described as a conceptual level model. The model is structured using the IDEF0 format (ANSI Publications 1320.1 1998) and describes four levels of process decomposition, although not all levels are specified for all processes within the model.

The Health Level Seven (HL7) Electronic Health Records (EHR) System Model (ANSI 2007) was also described as a conceptual level view of health functions. However, the EHR system model departs from the ASTM model by focusing on those functions necessary to support an EHR system. While the scope focuses on application functionality, the model was developed to be independent of any technology solution or implementation strategy. The model had four levels of decomposition; however, not all levels are specified for all functions specified in the model.

The Australian Council on Health Standards (ACHS) is an organization responsible for assessing, accrediting, and reviewing the performance of Australian health organizations in respect to their quality and safety. The Evaluation and Quality Improvement Program (EQuIP) was developed to support the ACHS. The EQuIP requirements were used by the authors to identify a number of key process patterns. These patterns were then compiled into an overarching process model for health care treatment (Stephenson 2005).

[1] At the time of writing, this document was still in draft form and unpublished.

Table 1 Contributing models and scope

Model	Scope
ASTM standard specification for a health care conceptual process model	Health provider (enterprise wide)
HL7 EHR system model	EHR application functions
ACHS functional requirements	Australian health service provider
APQC – Process Classification Framework	Generic enterprise

The American Productivity and Quality Commission (APQC) has developed a comprehensive taxonomy of generic processes applicable in many industries. The APCQ model was the most comprehensive of the models referenced, with more than 1,000 processes and activities included. It provided a useful framework to describe and understand the nonclinical operations within the health agency. This model contains four levels of decomposition and is broadly structured according to the Porter Value Chain model (Porter 1996).

On inspection, it was apparent that the level of description and abstraction varied markedly across the selected models. In order to successfully combine the various process and function descriptions contained within the models, it was necessary to develop a core set of definitions and relationships between these (i.e. a meta-model).

2.2 A Framework for Behavior Classification and Modeling

This section describes a framework developed to categorize descriptions of organizational behavior. Figure 1 illustrates the core concepts within the framework and highlights the two distinct perspectives (i.e. functional and service oriented) for a single set of common processes. The Service perspective describes how the organization operates, the Functional perspective describes how the organization or the activities in the organization are structured and controlled.

The framework is based on the not uncommon proposition that services can be defined as sequences of processes that are in turn located within functions or capabilities within an organization. The functional view provides a means to logically group and control processes within an organization, whereas a services oriented view describes the way in which processes are actually used. The wavy colored arrow lines in Fig. 1 could be considered to represent "compositions" or "arrangements" of processes which implement a given service. Figure 1 also highlights that some processes may be used by many services, whereas a process typically only appears within a single function. The same process appearing in more than one function is an indication of possible inefficiency.

In order to develop a framework that would define these concepts, their relationships, and to provide a way to abstract (i.e., aggregate and generalize) them

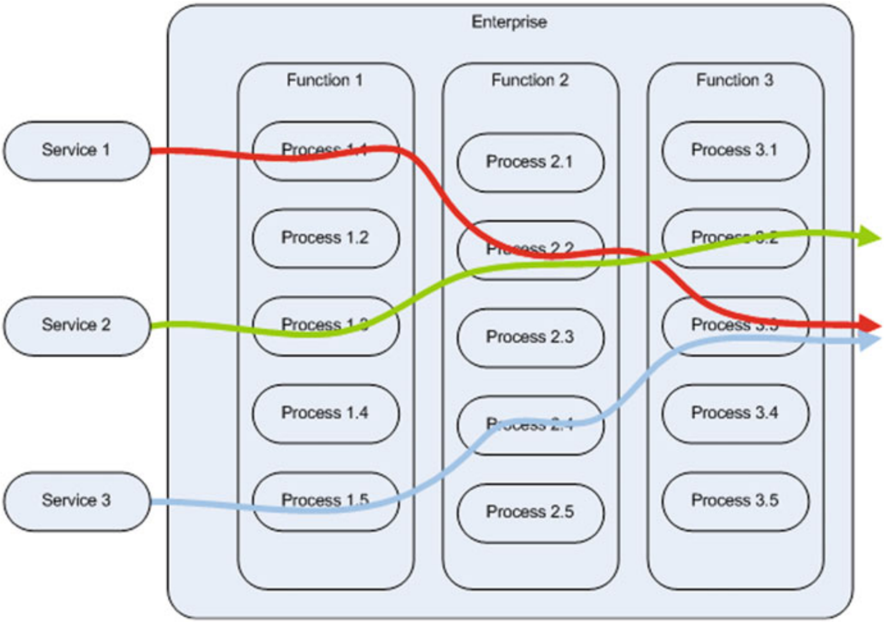

Fig. 1 Service and functional perspectives

consistently the following reference models were considered; Process Architecture Framework (Davis 2006), Supply-Chain Operations Reference-model (Supply-Chain Council 2008) (SCOR), Business Process Definition MetaModel Object Management Group (OMG) (2008), APQC – Process Classification Framework, the ARIS business process meta-model (Scheer et al. 2005), and the Reference Model for Open Distributed Processing (RM-ODP) Enterprise Language (ISO/IEC 15414:2002). Each of these frameworks and their contribution is briefly discussed in the following paragraphs.

The Process Architecture Framework (Davis 2006) consists of a descending hierarchy organizational behavior types; Business Activities, Process Groupings, Core Processes, Business Process Flows, Operational Process Flows, and Detailed Process Flows. The level of detail increases down the hierarchy. The patterns identified at each level represent the process architecture of the organization. This framework has been used extensively within British Telecom. However, the concept of 'process' seems overloaded in this framework. Furthermore framework does not appear to readily support the concept of a service that is composed of a sequence of processes. Nonetheless, the Process Architecture Framework (Davis 2006) does provide a means to identify varying levels of process abstraction (i.e., aggregation).

The Supply-Chain Operations Reference-model SCOR (Supply-Chain Council 2008) is an industry reference model for the management and planning of supply chains. SCOR includes definitions of performance metrics, processes, practices and skills and training required for the effective management of supply chains. SCOR defines the following four levels of processes. Level 1 Processes – describe the scope and high level configuration of a supply chain (i.e., the main phases). Level 2 Processes – represent the supply chain strategy or implementation. Level 3 Processes – describe the steps to execute the Level 2 Processes, Level 4 Processes describe industry specific activities required to perform Level 3 Processes and are not formally part of SCOR. Although SCOR does promote a hierarchical structuring of organizational behavior it does not readily support the concepts necessary for a functional or capability view of processes within the hierarchy. However, SCOR does reinforce the notion of end-to-end process composition, and provides a means for decomposing these compositions into more detailed descriptions.

The Business Process Definition MetaModel (Object Management Group 2008) provides a UML based "framework for understanding and specifying the processes of an organization or community", and provides a meta-model and precisely defined semantics for BPMN concepts and process modeling in general. An important concept is that of Performer Role that has responsibility for the execution of a Process. Swimlanes in BPMN represent this concept.

It is the concept of Swmlanes that provides a mechanism to define the boundaries of a Process, and compartmentalize business activity according to the entity controlling the activity (i.e. the Performer Role). The swimlane is also likely to represent the 'viewpoint' of the entity fulfilling the Performer Role. The entity may be an organization, a business unit within the organization, or individual employees or systems. These entities can be represented abstractly as 'enterprise', 'functional area' or 'function', and 'actor'.

The American Productivity and Quality Commission (APQC) Process Classification Framework (PCF) has been described in the previous section. It provides a process reference model for a generic enterprise in much the same way that SCOR does for supply chains. The PCF consists of four levels of process decomposition across all functional capabilities.[2]

The ARIS business process meta-model and the 'ARIS House' were also considered in the formulation of the framework. Although the ARIS meta-model is popular framework and complies with the OMG MOF formalism, all behavioral concepts are encompassed in the single concept of Function. Consequently, the meta-model provides limited capacity to differentiate between behavioral concepts in our framework such as Service, Process and Task (i.e., they are all types of ARIS Functions or sub-Functions).

The Reference Model for Open Distributed Processing (RM-ODP) Enterprise Language (ISO/IEC 15414:2002) and the ISO/IEC 19793: Information technology – Open distributed processing – Use of Unified Modeling Language (UML) for ODP system specifications (2004) both contain a series of definitions of behavioral

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[2] Since the time of writing the APQC PCF has improved the formalism of the four levels in the latest revision describing them as; Process Category, Process Group, Process, and Activity. This has also improved alignment between the APQC definitions and the concepts of Functional Domain and Function in the framework presented in this chapter.

Table 2 Core concepts and levels of abstraction

Core concept	Level of abstraction
Environment: the context in which an enterprise operates, which includes external parties, their relationships to the enterprise, and the requirements of these relationships	Contextual – aggregation
Community: a group of *enterprise objects* which exhibit *behaviors* and fulfill *roles* to achieve a common purpose or aim	Contextual – aggregation
Enterprise: a type of *community*, as are the organizational units of which it is comprised, as to the other organizations the enterprise interacts with	Contextual – generalization
Service: a sequence of *processes* initiated and terminated by a *client role*, delivered via an *interface role*, and controlled or constrained by a *contract*	Conceptual – generalization
Functional domain: the highest level at which Functions are grouped within an Enterprise. Usually corresponds to an implemented Division within the organization at the physical level of abstraction	Conceptual – aggregation
Function: an enterprise capability represented by a normalized grouping of *processes* which share a common objective, aim, or goal	Logical – generalization
Process composition: a sequence of *processes* which may implement all or part of a *service* and be undertaken by *actors* within one or more f*unctions* within a *functional domain*	Logical – aggregation
Process: a sequence of *tasks* undertaken by *actors* within a single *community*	Logical – generalization
Task: a sequence of *steps* undertaken by an individual *actor* that results in the change in *state* of the *object* being acted upon	Physical – aggregation
Step: a*ctivity* which results in a change to an attribute of an *object*	Physical – generalization
Organizational unit: a group of human resources, systems and business resources that implements one or more f*unctions* is responsible to execute one or more *processes*	Physical – generalization
Actor: a business resource (human or system) that performs a *task*	Physical – generalization

Italicization indicates terms with specific meaning within the framework. Further definition of some terms used can be found in ITU-T Rec. X.906|ISO/IEC 19793: Information technology – Open distributed processing – Use of UML for ODP system specification (2004), and the Business Process Modelling Notation, V1.1 OMG Available Specification (2008)

concepts that include organizational behavior (i.e. process), as well as the environment that the organization operates in. A core concept within the RM-ODP Enterprise Language is that of community.

In developing the framework it was clear that some concepts described different levels of generalization (e.g., capability vs. resource) while others addressed abstraction via aggregation (e.g., business function vs. organizational unit). This analysis resulted in the following table (Table 2) of core concepts and levels of abstraction.

The four levels of abstraction and their definitions are described in detail elsewhere (Aitken 2008; Stephenson and Bandara 2007). The framework presented in this chapter is an application of the Aitken (2008) general modeling framework

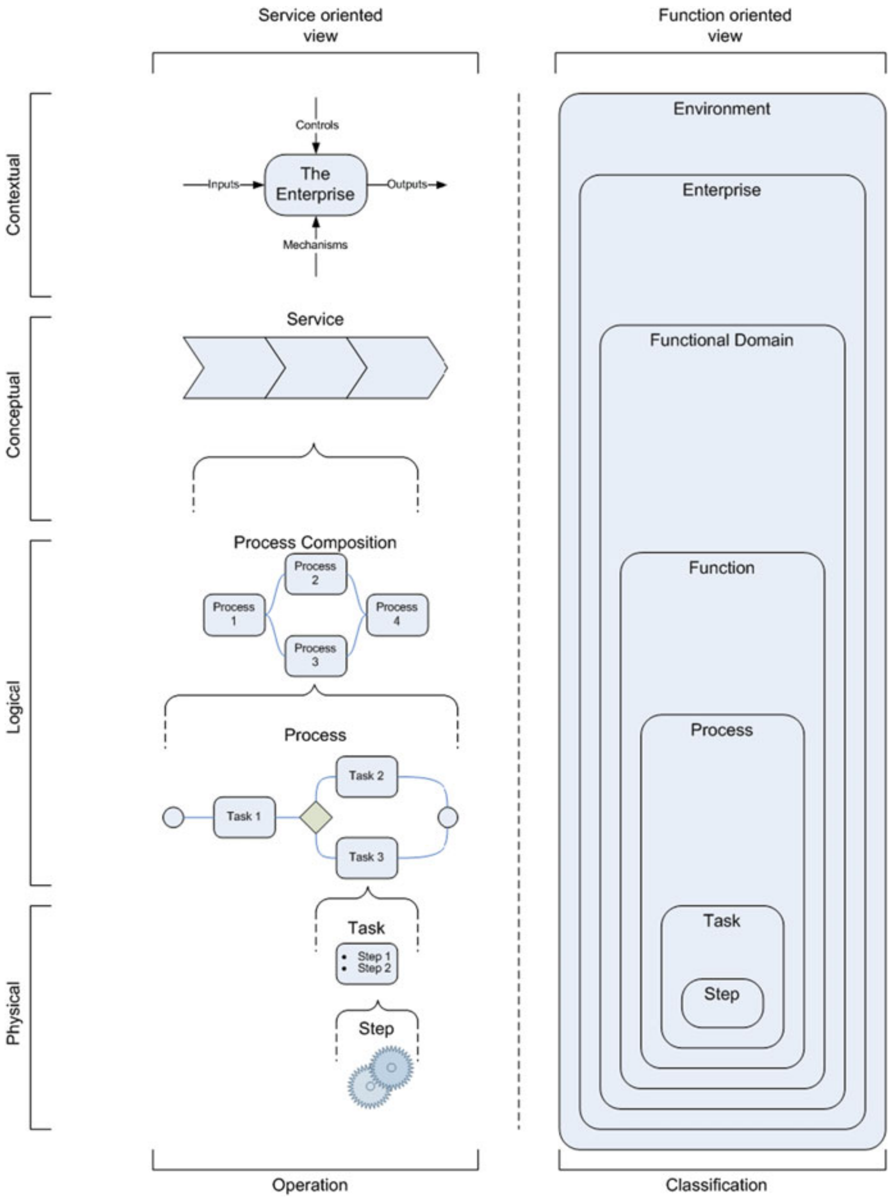

Fig. 2 An organizational behavior classification and modeling framework

within the specific context of business process modeling. Therefore, each level within the current framework is associated with a set of characteristics or criteria that apply to all representations within that level. Figure 2 provides a summary of the elements of the framework.

These concepts form a hierarchy of behavioral decomposition in which subordinate concepts elaborate a parent concept. Importantly, Fig. 2 also illustrates the two alternative views of organizational behavior supported by the framework. The service oriented view is concerned with sequencing of behavior whereas the function oriented view provides a means for behavioral classification.

Although the levels of abstraction within the framework bear a superficial resemblance to those within other frameworks (e.g., The Zachman Framework, Zachman 2005), the terms "contextual," "conceptual," "logical," and "physical" have specific meanings that have been detailed elsewhere (Aitken 2008). The application of these levels to the behavioral concepts within the framework is now discussed.

The contextual level represents the highest level of abstraction both in terms of generalization and aggregation within the framework. The concepts relevant to this level are the communities within the external environment of the enterprise or organization. The internal behavior of the organization is not described or represented by models at this level. However, the environment, external parties and customers, their relationships to the enterprise in question, and the requirements of these relationships are all legitimate behavioral components that might be represented within a contextual level behavioral model.

The criteria for models at the contextual level are that they treat the enterprise of concern as a "black box," they model the roles and relationships between the enterprise and other entities in its environment, describe the requirements of these relationships, and identify the outcomes that are the result of enterprise activity. The IDEF0 Level 0 model might be used to represent some of these components, although other models such as the RM ODP Enterprise Specification model might equally be suitable candidates (see ITU-T Rec. X.906|ISO/IEC 19793: Information technology – Open distributed processing – Use of UML for ODP system specifications 2004). Such models are used within the framework to provide a frame of reference for, and identify the overall requirements that must be satisfied by the process compositions, and processes described in subsequent levels.

The second level of abstraction within the framework is the conceptual level. This level is concerned with describing the internal behavioral constructs of the enterprise that are typically true of both current and future states. The behavioral constructs at this level within the framework are represented by the concepts "service" and "functional domain." These terms are considered conceptual level concepts in that they do not provide a description of the internal workings of the organization, but they do capture its defining behavioral characteristics and structure. Both constructs can be considered concepts that describe "what" is done or needed to be achieved without specifying "how" this is done. Descriptions concerning "how" things are done (i.e., design) are covered at the logical level. In this sense, both the functional and service views provide two separate perspectives on the same set of internal processes within an organization. The criteria for behavioral models at this level are as follows:

- The model only contains behavioral constructs and the relationships between these.
- A service might be modeled as being comprised of several "phases" or partitions of activity. For example, within the health sector, most services would conform to the following three broad phases; "receive the patient," "provide the required treatment," and "post-treatment follow-up." These logical segments of activity within a service will constitute separate process compositions to be modeled at the next level within the framework.
- The model does not contain processes, tasks, swim lanes, or logical gateways.

In accordance with these criteria, the Porter (1996) Value Chain would be an example of a conceptual behavioral model, as would be SCOR level 1 and 2 models.

A further consideration at this level of the framework is illustrated in Fig. 3. The concepts of Service and Functional Domain are related in that the concept of Service can be meaningfully applied both internally and external to the enterprise. Internal Services are provided between Functional Domains. This means that individual internal Services can be considered to be the responsibility of a specific Functional Domain. External Services by contrast are likely to be provided by combining several internal Services and therefore involving multiple Functional Domains.

The third level of the framework provides a logical view of the activities or behavior within an organization. A logical view depicts a particular design state (i.e., current or future state) and is composed of logical (i.e., implementation agnostic) components complied according to a set of identified design principles (Aitken 2008). Therefore, this level of the framework includes representations concerned with the composition of processes within an organization.

The concepts "function", "process composition" and "process" are positioned most appropriately at the logical level within the framework. Given the requirements of logical level models (Aitken 2008) and the hierarchical structure of the framework, the following are the recommended criteria for modeling process compositions using BPMN:

- The model may include a pool where this represents the Community (i.e. Enterprise) or the Functional Domain in which the processes included in the process composition are performed.
- The model includes lanes that may only represent Functions (i.e., organizational units or teams) and not individual actor roles as processes within a composition are likely to involve more than one actor. Actor level detail is provided within the associated subordinate process models.
- Process compositions include the initiating and terminating client role identified in the parent service model.

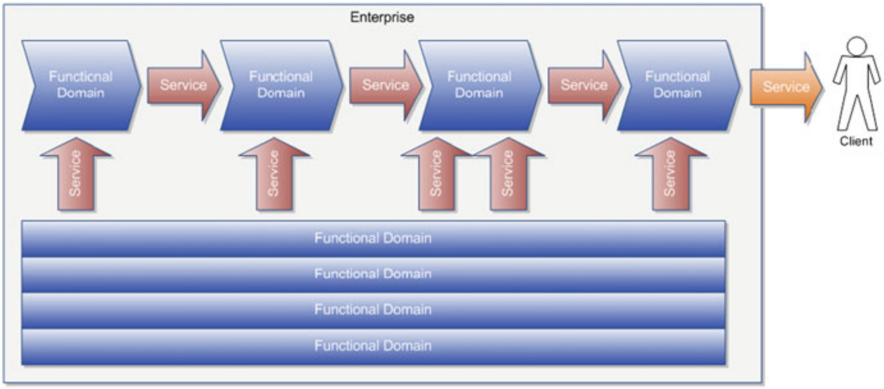

Fig. 3 Internal and external services

- May include alternative process flow pathways but do not include information about the logic gateways implicit in these. Gateways are described in the associated subordinate process models, as any gateway represented explicitly in a process composition would not be able to map to any element in any child process as it would lie outside the boundaries of any child process. This would mean that the gateway could not be described at the physical implementation level within the current framework.
- Processes do not bridge Lanes.

The recommended criteria for process models are as follows:

- The model will include a pool that will correspond to one of the Functional Domain within the parent process composition.
- The model includes logical actor roles as lanes.
- Tasks within the process do not bridge lanes (i.e., tasks are only performed by individual actors and therefore must remain within the lane of the actor role).
- The model will inherit initiating and terminating roles from the parent process composition.[3]

The fourth and final layer of the framework is the physical level. This level of description is concerned with actual implementation. The key terms in this level are task and step. SCOR level 4 process models would be examples of models appropriate to this level. The various behavioral concepts within the framework, their definitions, and suggested model types are summarized in Table 3.

[3] Note: the roles may not necessarily be the Service initiating and terminating roles as this will depend on the scope of process composition in which the process is located.

Table 3 Process classification framework definitions

Level	Term	Definition	Modeling criteria	Example
Contextual	Environment	The context in which the enterprise operates. This includes external parties, their relationships to the enterprise, and the requirements of these relationships	The enterprise is represented as a "black box". External parties, their relationships, and requirements are depicted or documented	IDEF0 – Level 0 diagram
	Enterprise	A grouping of business objects with an identified objective	No depiction of the inner working of the organization	IDEF0 – Level 0 diagram BPMN collapsed Pool
Conceptual	Functional domain	The first level decomposition of business functions (i.e., business capabilities)	The conceptual organizational structure at its highest level (e.g., typically the 'Divisions' within an organization)	Value Chain Chevrons and supporting capabilities BPMN Pool
	Service	A sequence of processes initiated and terminated by a client role, delivered via an interface role, and controlled or constrained by a contract. Maybe internal or externally facing	A 'black box' representing a sequence of activity with an identified initiating and terminating role, and a controlling or constraining contract or policy. Does not depict individual processes, alternative flows, gateways, or swim lanes	Value Chain Process composition model
Logical	Function	An enterprise capability represented by a normalized grouping of processes which share a common objective, aim, or goal	Represents a grouping or category of processes. Identifies a common objective. Does not depict a sequence of processes	BPMN Pools and Lanes
	Process composition	A sequence of processes which may implement all or part of a service and be undertaken by actors within a functional domain	Depicts a flow of processes. May depict alternative flows but does not depict decision logic. May depict swimlanes where these are Functions (i.e., not a single role)	BPMN process model comprised of Collapsed Sub-processes only

(continued)

Table 3 (continued)

Level	Term	Definition	Modeling criteria	Example
	Process	A sequence of tasks undertaken by actors within a function	Depicts initiating and terminating events, decision gateways and tasks. The swim lanes represent the logical role that undertakes a given Task. Does not include implementation detail	BPMN process model comprised of Tasks only UML activity diagram
Physical	Task	A sequence of steps undertaken by an individual actor that results in the change in state of the object being acted upon	Includes implementation level detail (i.e., the actual role within the organization that performs the task). Depicts the steps necessary to complete the task, and the states of the object being acted upon	UML sequence diagram UML State Machine
	Step	Activity which results in a change to an attribute of an object	An actual instruction	

Note that some definitions draw on concepts defined in ITU-T Rec. X.906|ISO/IEC 19793: Information technology – Open distributed processing – Use of UML for ODP system specification (2004), and the Business Process Modeling Notation, V1.1 OMG Available Specification (2008)

3 Application of the Framework

This section describes how the framework established in the previous section has been applied within both the health and investment management industries. The framework has been used as a means to integrate disparate behavioral models, to analyze and structure process architecture models, and to deliver a unified set of current and future state process models within a major outsourcing initiative. Although the examples provided are set within the health and investment management industries, the framework is likely to have equal applicability in other industries.

3.1 Integration of Health Industry Behavioral Descriptions

As described previously, several existing models of organizational behavior were selected as sources from which to compile two health industry reference models; a functional reference model, and a service reference model. The framework was used to map the behavioral descriptions in each source model to the relevant behavior concept within the framework (i.e., service, function, process composition, process, etc.). Descriptions that met the framework criteria for the concepts "function" and "service" were selected for inclusion in the reference models. Descriptions that were similar and assessed to be of the same concept type and level of abstraction were combined. All function descriptions were then grouped according to their scope, such that functions with the widest scope were positioned as parent functions to those related child functions with narrower scope. The model contained 11 first level functional categories (i.e., Functional Domains). Figure 4 depicts one of these, the Information and Communication Technology (ICT) and information management functional category including subcategories identifying the original models from which the descriptions were sourced (i.e., APQC and HL7). The point here is that the framework enabled the combination of behavioral descriptions from disparate sources to provide a coherent artifact.

A similar approach was used with service descriptions except that the scope of the client role associated with the service was used as the dimension for structuring service types. The services with the more generalized client role were positioned as parent services to those whose client role was more specialized.

The resultant functional reference model was then used as a taxonomy tool to uniquely classify and position the "as-is" processes within the organization. The function reference model was also used to classify and map the "to-be" processes within the newly proposed ehealth initiative to better understand the scope of impact of the proposed changes.

The service reference model was used to map both the "as-is" and "to-be" services, and then to identify those "to-be" processes which were common across services to be provided within the ehealth initiative. The model differed from the functional model in that processes could appear in more than one service type. These common processes were then candidates for further investigation, refinement and optimization.

3.2 Health Process Architecture Analysis

The ehealth initiative within the health agency included a number of priority areas in which to automate processes across the continuum of care for patients. The six priority areas were the following:

- Discharge Summary
- Clinical Notes
- Medications Management
- Orders Entry
- Results Reporting
- Scheduling

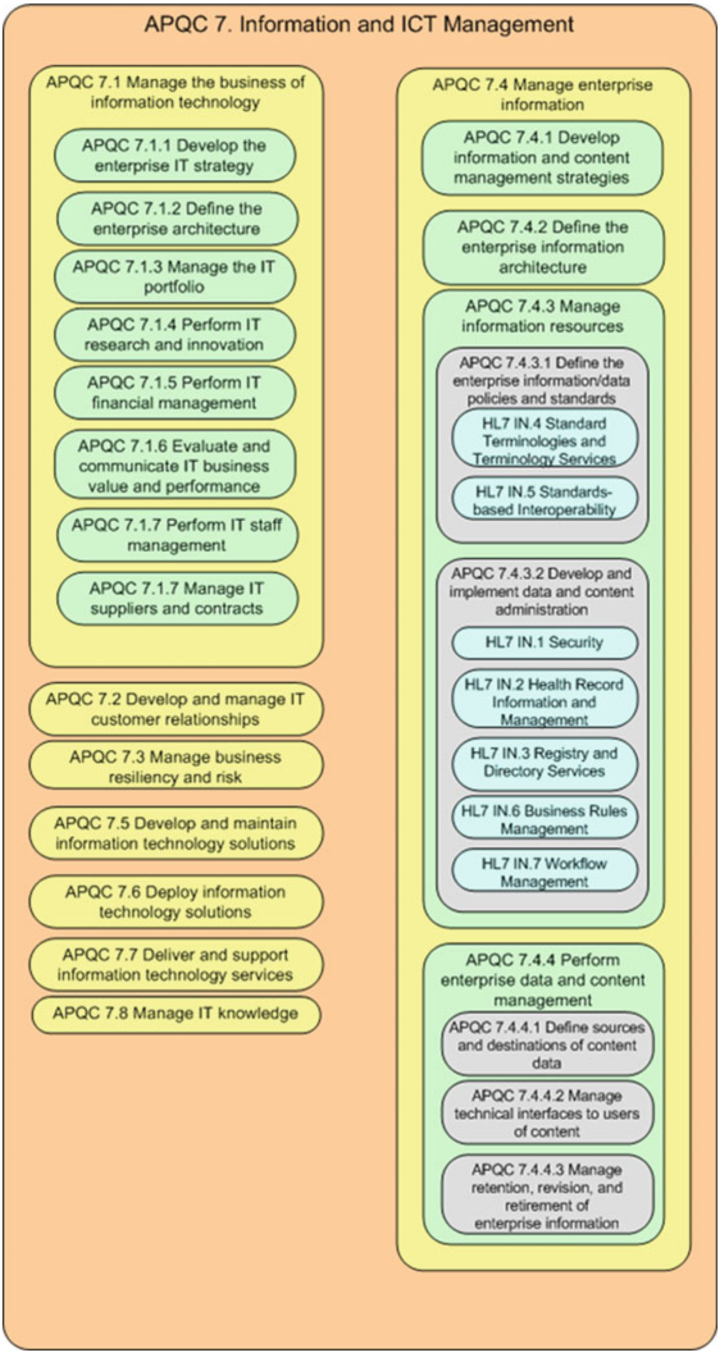

Fig. 4 Example functional categories

Table 4 Mapping between framework levels of abstraction and ehealth priority areas

	ehealth	priority	areas			
Framework level	Discharge summary	Clinical notes	Medication management	Order entry	Results reporting	Scheduling
Contextual						
Conceptual		X	X			
Logical	X	X	X	X	X	
Physical				X	X	X

Challenges within this program included a lack of consistent terminology and limited understanding of the process boundaries between each of the six priority areas. The framework was used successfully to structure the six priority areas and to identify overlaps and gaps between them. The health initiative used a series of workshops with specialist staff from within the agency to develop an "as-is" and "to-be" process model for each priority area. However, due to the lack of a consistently applied framework across the workshops, the resulting process models were of varying levels of detail, scope, and abstraction. As a result, it was difficult to compare models, and to determine whether they overlapped in scope.

The framework was applied to each workshop-based process description by analyzing each in terms of the framework criteria for each behavioral concept and level of abstraction. This process revealed that while some models were concerned with services and process compositions, others contained descriptions of processes and tasks. Moreover, some models contained descriptions at more than one level of abstraction (e.g., order entry). This suggested that the workshop based models did not represent a unified set of process descriptions, and consequently collectively could not provide satisfactory process architecture. The results of the classification process are listed in Table 4. The application of the framework and inspection of the results (Table 4) suggested the following recommendations:

- That the clinical notes and medications management priority areas conceptual level descriptions provide a conceptual level framework which could be used to accommodate the lower level descriptions within the scheduling, discharge summary, orders entry, and results reporting priority areas.
- Secondly, the lack of contextual level modeling potentially meant that the priority areas had been established without due consideration to the agency operating environment and the requirements of its key business partners and health consumers.

3.3 *Process Architecture Templates*

A series of BPMN based templates have been developed by applying the concepts within the framework in this chapter to the definitions within the BPMN specification. The templates can be used to document all levels of process architecture. The

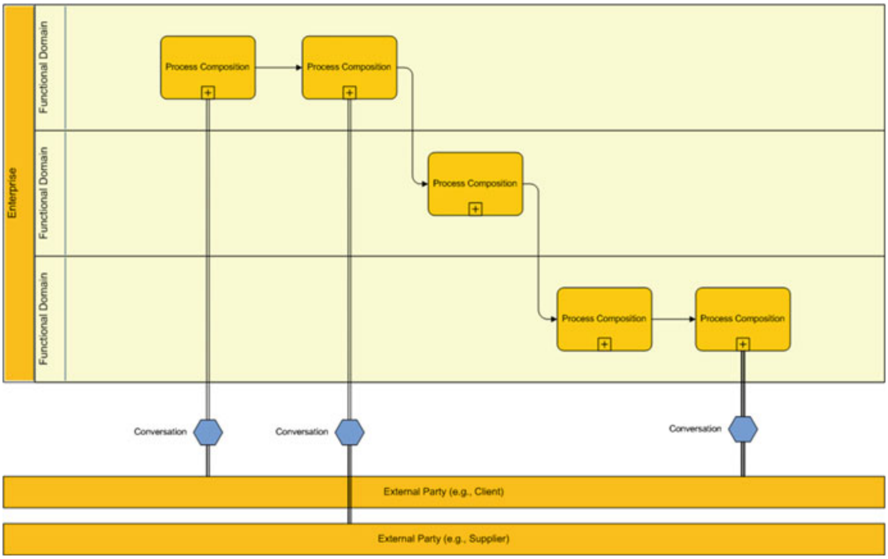

Fig. 5 Service template

templates have been developed for the framework concepts: service, process composition, and process. Each template is presented and described below.

The service model template is illustrated in Fig. 5. The template identifies the enterprise, the functional domains, process compositions that make up the service, and the external parties such as clients or suppliers. Note that the messaging interactions are abstracted using the BPMN 2.0 conversation construct. Each process composition identified in the service model may be modeled using the process composition template (Fig. 6).

Figure 6 depicts the process composition model template. This template is comprised of BPMN elements with the constraints that only collapsed sub-process elements can be used within the model, that lanes must represent Functions and not individual actor roles, and that no decision logic elements (i.e. BPMN Gateways) appear. Conditional flows are used to imply a conditional exit from a Process. The specification of the decision logical responsible for the conditional flow is considered to be internal to the Process. Similarly, the only intermediate events included are exception events as these too can be responsible for alternative pathways. All other intermediate events are considered to be internal to individual processes within the composition. Each process identified in the process composition may be modeled using the process template (Fig. 7). The process composition template also includes the client role specified in the parent service model.

The final template in the series is the process template (Fig. 7). This template uses all BPMN elements with the constraints that no Collapsed Sub-Processes can

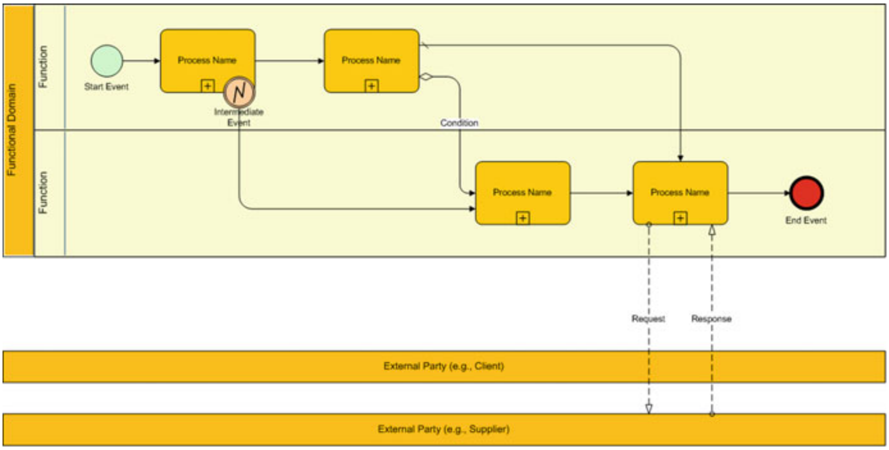

Fig. 6 Process composition template

be appear within the model, and that the lanes represent individual actor roles. The start and end events are commonly Business Process Modeling Notation link events unless they represent actual points at which the composition or service commences or terminates (Fig. 7).

Note the convention of optionally using squared brackets to denote how an element within the process model is implemented. If implementation details are provided then the model is considered to be at the Physical or 'As Implemented' level of abstraction, otherwise the model is a logical level model. The 'As

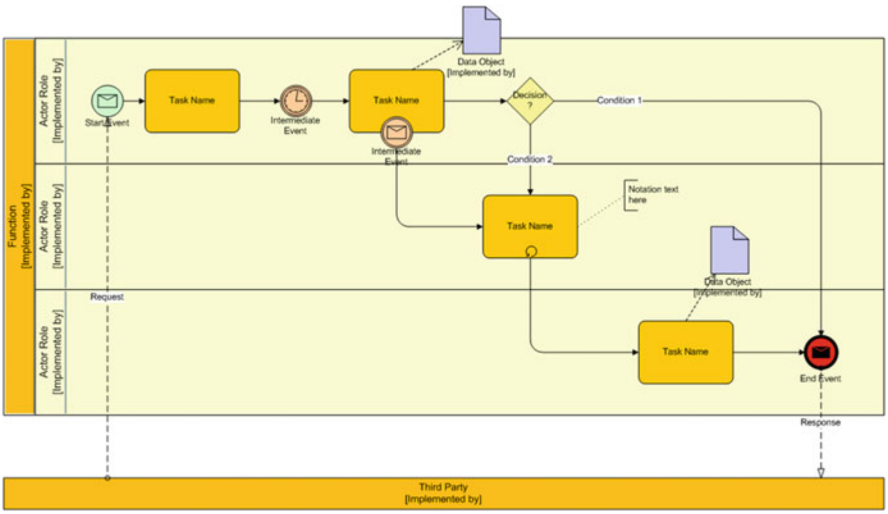

Fig. 7 Process model template

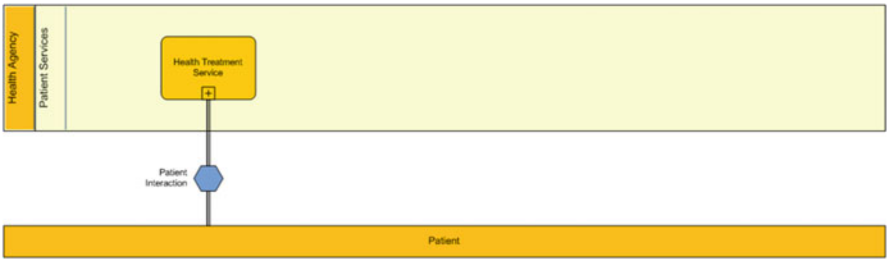

Fig. 8 Health treatment service model

Implemented' model is used as a parent to lower level implementation specific models such as UML Sequence Diagrams for individual Tasks within the Process.

3.4 Health Sector example

The following health sector models were developed using the templates just described. The models were developed as an alternative to those developed within the ehealth workshops. The models demonstrate the way in which the templates help structure and align the behavioral descriptions across three levels of decomposition.

The health treatment service model is illustrated in Fig. 8. In this instance, it was decided to model the service as a single process composition and not to partition it into separate phases. The implementation of the service is shown in Fig. 9. The process composition references both the client (i.e., patient) and interface roles (i.e., patient administration) identified in the parent service model.

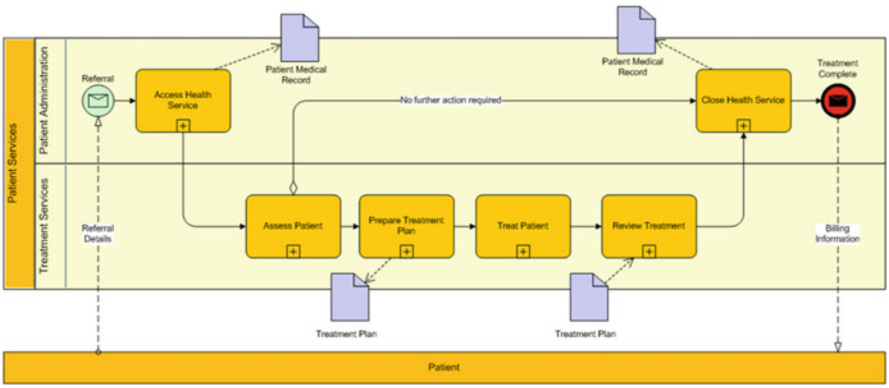

Fig. 9 Health treatment process composition model

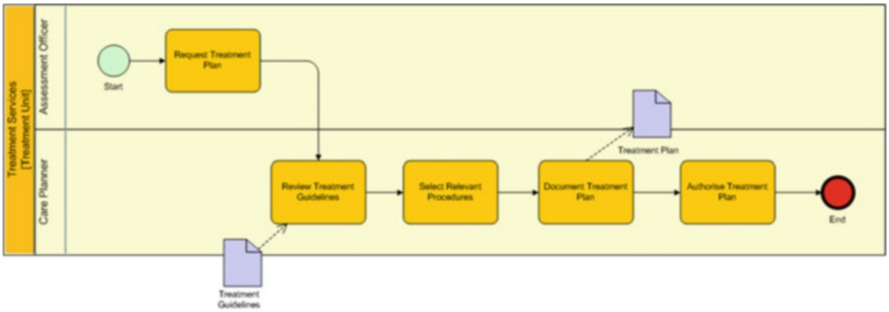

Fig. 10 Prepare treatment plan process model

The “Prepare Treatment Plan” process is one of the processes identified in the process composition model (see Fig. 9) and is modeled in Fig. 10. The model inherits the Function ‘Treatment Services’ and identifies the individual actor roles with the organizational unit “Treatment Unit” which perform the tasks within the process.

3.5 Investment Management Reference Model

More recently, the framework was used in the planning phase of a major middle office outsourcing initiative within a medium sized investment industry company. The framework was initially used to develop an investment industry functional reference model. In the absence of a commonly recognized reference model the American Productivity and Quality Commission (APQC) Process Classification Framework (PCF) was again used as the basis for structuring a functional model. However, the APQC PCF levels of ‘Process Category’ and ‘Process Group’ were re-classified as ‘Functional Domain’ and ‘Function’ and the PCF process definitions modified where necessary to reflect a business capability rather than an activity. Investment specific Functions were then identified and added to the model, with care taken to ensure that the definitions reflected typical business capabilities (i.e., functions) rather than activities or processes. These function definitions were then tested with business stakeholders and refined. As a guiding principle the functions identified needed to be able to be implemented as a business unit or team typically found within an investment industry organization.

This reference model was then used to highlight the retained and outsourced functions in the future state, readily identifying those areas in the company that would be impacted, and ensuring common agreement between the company and outsourced service provider regarding the functions to be outsourced.

3.6 Investment Management Process Architecture

The Functional Domains and Functions defined in the investment industry reference model above were then used as the Pools and Lanes for a set of BPMN process models. The required models were identified by first determining which Services the middle office platform provided to clients and the organization as a whole. These Service definitions were tested and refined with business stakeholders. A Process Composition was then developed for each Service using the Process Composition template above (see Fig. 6). The Process Compositions used the relevant Functional Domains as Pools and the Functions as Lanes to describe the areas within the company that were involved in delivery of the Service. Each Process Composition model was then tested with business stakeholders to ensure that all relevant business activities (i.e., Processes) were identified and correctly sequenced in the Composition. At this point risk management controls were also identified and added to the models as BPMN notations.

Some Processes were deemed to be particularly critical by business stakeholders for the outsourcing initiative to succeed and these were then modeled as Process models using the Process model template (see Fig. 7). However, in these models in accordance with the framework, the Pools were the relevant Function from the parent Process Composition (i.e., the Lane that the Process was positioned within), and the Lanes represented the individual Actors (human and system) that performed Tasks within the Process in question. Again the Process models were tested with business stakeholders to ensure that all Actors and Tasks were identified, and that the sequencing and decision logical was correct.

The resulting models provided a set of Process Compositions which described the Functions and Process required to deliver the Service. By identifying the Functions to be outsourced, it was possible to develop a set of future state Process Compositions where the outsourced service provider was represented as a BPMN collapsed Pool, and the outsourced Functions and the Processes they contained were removed from the model. Some additional ‘monitoring’ Processes were added to ensure the service provider met SLA requirements.

In summary the application of the framework in this setting resulted in a unified set of Functions and definitions, and agreed set of Services, current and future state Process Compositions, and detailed Process models for s subset of critical Processes.

A final step was to assign business units to the Functions in the reference model. The organizational structure of the company was modified as a result of the outsourcing initiative. The business units from the new organizational structure were then assigned to Functions in the Process Compositions. By analyzing which Processes and associated risk controls were positioned within the relevant Lanes in the Process Composition models it was possible to generate a listing of Processes and risk controls that each business unit was then responsible for in the future state outsourced environment.

3.7 Investment Management Service Architecture

As mentioned in the introduction to this chapter, organizational behavior is expressed phenomenologically as a continuum, and not as discrete 'packets' of process. The framework outlined in this chapter compartmentalizes the continuum by imposing boundaries on the behavior based on functional control of business activity. While this approach has some prima facie validity it nonetheless has the effect of constraining how the behavior is described. The effective of this was apparent during the process to arrive at the Services identified in the investment industry outsourcing initiative described above.

Using the framework a Process Composition was developed for each Service initially identified by relevant business stakeholders. However, it was apparent that when some of these Services were modeled, that they potentially appeared to be several Services, particularly where they conformed to the pattern in Fig. 11 (i.e. independent sequences of Processes). In these 'anomalous' cases the initial Service definition was reviewed with business stakeholders and in all cases was revised to identify additional services.

If the Services had been modeled without reference to the relevant Functional Domains and Functions, and the constraint that a Process must be positioned within a Function, then potentially the initial Service descriptions would not have been altered, as the scope for individual processes may have been larger and the independence between the process flows not captured. The validity of partitioning

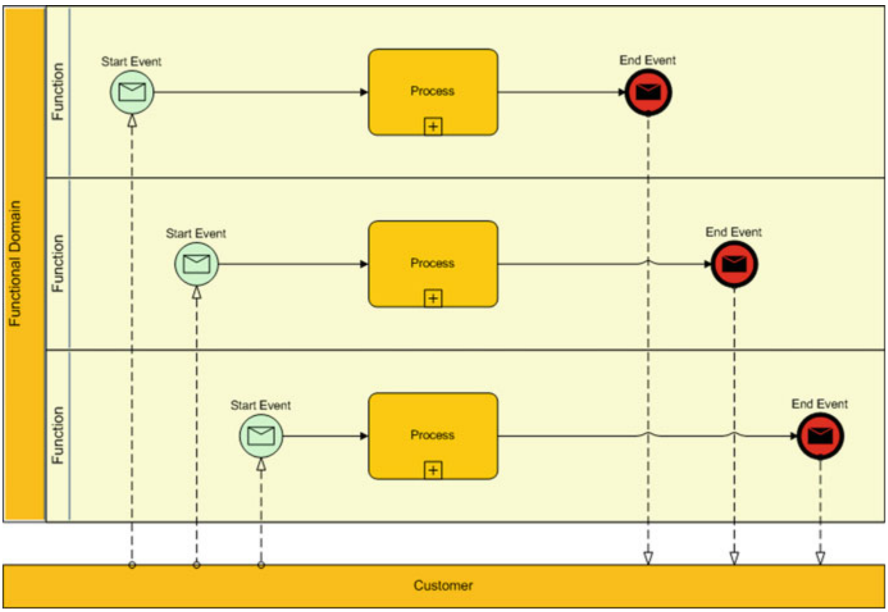

Fig. 11 An 'anomalous' service pattern

the organizational behavior in the way that the framework requires clearly needs further investigation. However, in this instance the framework appears to have provided a stimulus for the business re-considering how it described itself and the services it provided.

4 Conclusion and Future Work

This chapter has outlined a framework designed to promote greater consistency in the description and modeling of organizational behavior. The framework provides a means to position various behavioral descriptions and concepts in relation to one another, and to determine the model types best used to document them. The framework described provides BPM practitioners with a simple set of rules and model types to enable them to develop process models with a consistent level of abstraction.

The chapter has also described application of the framework within both a large health agency and within a major outsourcing initiative within an investment management company. Both these situations have demonstrated the framework's ability to provide a means to structure process models of differing levels and types of abstraction (i.e., generalization and aggregation), and as a tool to assist in the analysis of behavioral models, architectural completeness, and the development of process architectures. Furthermore, the framework has also been used as the basis for developing a process pattern based approach to the development of process architectures (Stephenson and Bandara 2007). The ideas and concepts within the framework presented in this chapter are described in a meta-model available on request from the authors.

The framework has been refined over several years with greater specificity and definition being provided for the concepts, levels, and associated model types. Although Table 3 provides an initial list of model types, further work is required to position additional model types such as Petri nets, and UML diagram types within the framework. A key model type for which a suitable candidate has yet to be identified is the contextual level model. The model also lacks any concept related to client outcome. However, the Enterprise Specification model within the UML Profile for ODP (see ITU-T Rec. X.906|ISO/IEC 19793, 2004) may provide the basis for the development of a model template for contextual models and provide the additional definitions for this level.

An additional shortcoming is that the scope of the framework is currently limited to process related descriptions. Other behavioral perspectives such as strategy and business rules or policy also suffer from a lack of modeling specificity and consistency. It is intended to extend the current framework to include these additional behavioral perspectives using concepts and definitions within the Business Motivation Model (BMM) (OMG 2006), Semantics of Business Vocabulary and Business Rules (SBVR) (OMG 2006), and ITU-T Rec. X.906|ISO/IEC 19793:

Information technology – Open distributed processing – Use of UML for ODP system specification (2004).

As noted earlier the framework presented naturally constrains the way in which organizational behavior is represented and modeled. Although the framework and the concepts within it may have some face validity, there is a need for the concepts to be further refined, and the approach to be trialed more widely and in particular in organizational settings that are less structured than the case studies presented in this chapter.

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A Taxonomy of Business Process Management Approaches

Tobias Bucher, David Raber, and Robert Winter

Abstract Both the design and the implementation of the Business Process Management (BPM) concept vary significantly from one organization to another. Organization-specific approaches to BPM are, among other things, influenced by organizational culture as well as by the maturity of the concept's adoption in the respective organization. This chapter reports on findings from an empirical study and is aimed at answering the question of precisely how organizations deal with the process-oriented management concept – today and in the near future. To address this issue, 38 medium-sized and large organizations from various industries were surveyed. Out of 18 variables used to characterize individual BPM approaches, four distinct design factors of BPM are identified: the degree of process performance measurement, the overall professionalism of process management, the impact of process managers, and the utilization of established methodology and standards. Based on these design factors, four generic approaches to BPM can be differentiated. Furthermore, these results are complemented by an interpolation of this classification into the near future, leading to the differentiation of five BPM project types. This part of the analysis shows that all surveyed organizations strive to increase BPM maturity. There are however significant differences with respect to the particular design of the aspired approaches to mature BPM. The presented results are particularly useful for the engineering and/or adaptation of situational methods in the field of BPM. The chapter therefore concludes with the exemplary adaptation of the 'process innovation' method proposed by Davenport with respect to the identified five BPM project types. This adaptation also demonstrates the practical applicability of the presented findings.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*,
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1 Introduction and Motivation

Business process management (BPM) resembles one of the major topics in modern information systems (IS) research as well as in current corporate practice (Rosemann et al. 2006; vom Brocke et al. 2011). In fact, BPM has consistently been identified as a top priority on the agenda of CIO's during the last 6 years (McDonald and Aron 2010). Research in the field of BPM covers a broad range of different topics, including conceptual research (Melão and Pidd 2000), research on managerial aspects of BPM (Spanyi 2014), as well as research on business process automation (ter Hofstede et al. 2009). In the past, BPM was often perceived as a IT-driven topic, concerned with technical aspects of business processes and their design (Harmon 2014; van der Aalst et al. 2003). Nowadays a more dominant perception is to understand BPM as a holistic, multifaceted approach (Armistead and Machin 1997; Harmon 2014; Rosemann et al. 2006; Zairi 1997; Rosemann and vom Brocke 2014). In this perception, BPM retains its IT aspects as one under several success factors. In order to create a sound understanding and to decompose the complexity of such a holistic approach (Rosemann and vom Brocke 2014), proposed a framework that comprises the essential building blocks of BPM: strategic alignment, governance, methods, IT, people, and culture.

However, despite its widespread adoption and popularity in research and practice, BPM is still in its infancy according to Hammer (2014). Besides the issues that still need to be addressed adequately, identified by Hammer, a further important fact about BPM is that there is no "one-size-fits-all" approach. Many academic authors argue that the progress towards organizational excellence through process-oriented management takes place in different stages, that different approaches or aspects thereof are predominant at different levels of organizational development, and that almost each and every organization has developed its own approach to BPM (Armistead et al. 1999; Balzarova et al. 2004; Ho and Fung 1994). Moreover, there is also evidence from corporate practice that real-world organizations adopt BPM in many different ways. However, research is scarce which is explicitly directed at gaining insight into and understanding the nature of these situational aspects of BPM, or which aims at identifying, categorizing, and describing different BPM approaches.

During the last two decades, a huge amount of methods to support BPM or particular stages thereof have been proposed. Two popular examples are methods for business process modeling (cf. e.g., List and Korherr 2006; Scholz-Reiter et al. 1999) and methods to support business process reengineering (cf. e.g., Davenport 1993; Davenport and Short 1990; Hammer 1990; Hammer and Champy 1993; Hammer and Stanton 1995; Harrington 1991, 1995; Imai and Heymans 1999; Kaplan and Murdock 1991). These proposals, however, are more or less generic, i. e. they are aimed at supporting BPM or particular aspects thereof without taking into account situational aspects. Implicitly or even explicitly, almost universal validity is claimed.

In order to close this gap and to support the engineering of situation-specific methods, this chapter proposes a taxonomy of BPM approaches. This taxonomy represents an essential basis for the situation-specific adaptation of generic methods and/or for the construction of new situational methods to support BPM within real-world organizations. Furthermore, the chapter is aimed at contributing to the current discussion about BPM maturity models (cf. e.g., de Bruin 2007; DeToro and McCabe 1997; Hammer 2007; Harmon 2006; Maull et al. 2003; Pritchard and Armistead 1999; Rosemann and De Bruin 2005).

The remainder of this chapter is structured as follows: The subsequent Sect. 2 provides a detailed introduction to the principles of method construction and situational adaptation. The Sect. 3 reports on empirical results of research targeted at the identification and systematization of BPM approaches as a basis for the engineering of situation-specific methods. These findings are largely based on our previous work (Bucher and Winter 2006, 2008). In this section we also apply our empirical results to three different case studies. The Sect. 4 demonstrates the applicability of those results by sketching situation-specific embodiments of Davenport's method for process redesign (Davenport 1993; Davenport and Short 1990). The final Sect. 5 summarizes the main findings and provides an outlook on further research.

2 Situational Method Engineering

This section is intended to familiarize the reader with the basic principles of method construction and situational adaptation. To this end, we first introduce design research for information systems as the fundamental research paradigm and outline the basics of method engineering. Two aspects of particular interest, namely the representation of situational characteristics as well as the definition of fragments as the essential building blocks of situational methods, are then discussed in detail.

2.1 Design Research for Information Systems

The design research (DR) paradigm for information systems (IS) development has been discussed intensively in recent years. As opposed to behavioral research, DR for IS is not primarily aimed at discovering and justifying theories but rather at creating solutions to specific problems of practical relevance (Hevner et al. 2004; March and Smith 1995). Both design processes and design products play an important role in DR: "As a product, a design is 'a plan of something to be done or produced'; as a process, to design is 'to so plan and proportion the parts of a machine or structure that all requirements will be satisfied'" (Walls et al. 1992).

As for the process aspect, the current body of DR literature proposes a variety of IS research processes that are closely related to each other (cf. e.g., Hevner et al. 2004; March and Smith 1995). Niehaves (2006) summarizes these proposals and suggests the IS research cycle depicted in Fig. 1.

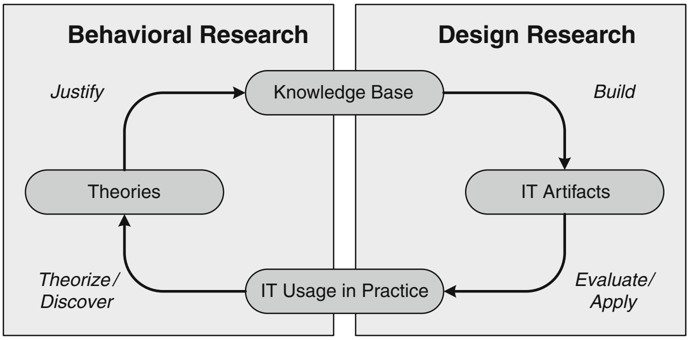

Fig. 1 IS research cycle (Adapted from Niehaves (2006))

The outcome of the design process – the design product – is commonly referred to as "artifact", i.e. as human-made object of any kind (Simon 1996). In the context of DR for IS, artifacts are typically of four types, namely constructs, models, methods, and instantiations (Hevner et al. 2004; March and Smith 1995; Nunamaker et al. 1990). In the following, we will concentrate on methods as one particular type of DR artifacts. A method is "an approach to perform a systems development project, based on a specific way of thinking, consisting of directions and rules, structured in a systematic way in development activities with corresponding development products" (Brinkkemper 1996).

The discipline concerned with the design, construction, adaptation, and evaluation of methods is referred to as "method engineering" (ME). The primary design object of the business domain are so-called "IT-reliant work systems" (Alter 2003, 2006). A work system (WS) is defined as "system in which human participants and/or machines perform work using information, technology, and other resources to produce products and/or services for internal or external customers" (Alter 2003). In order to be applicable for IS development, methods need to be adapted to the specific characteristics of the so-called development situation or application situation. This approach is commonly referred to as "situational method engineering" (SME) (Harmsen 1997; Harmsen et al. 1994; Kumar and Welke 1992; van Slooten and Hodes 1996) and may be ascribed to the so-called "contingency model" proposed by Fiedler (1964). According to this scientific theory, there is no "best way" of organizing or leading an organization. On the contrary, there are various internal and external factors that influence organizational effectiveness, and therefore the organizational style must be contingent upon those factors.

2.2 Representation of Situational Aspects in SME

Methods are aimed at the engineering and/or change of WS. In the following, we will refer to engineering/change of a WS as "transformation". Consequentially, a method

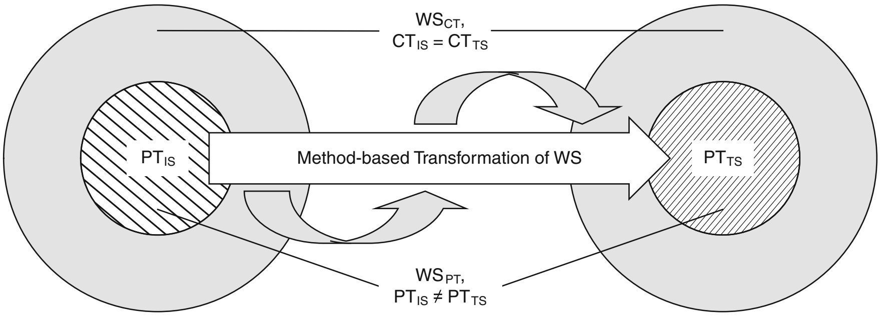

Fig. 2 Method-based transformation of work systems (Bucher and Klesse 2006; Bucher et al. 2007)

represents a systematic means for the transformation of a WS from an initial state (IS) to a target state (TS) (cf. Fig. 2). The part (i.e. the set of system elements) of a WS that is transformed by the application of the method is denoted as WS_{PT}. The tuple of initial state of WS_{PT}, denoted as PT_{IS}, and target state of WS_{PT}, denoted as PT_{TS}, is referred to as "project type" (Bucher et al. 2007). However, as a matter of fact, each WS_{PT} is part of a larger WS. All system elements that are not transformed by the application of the method (i.e. that are not part of WS_{PT}) but that are part of the WS under consideration are referred to as environmental work system WS_{CT}. The initial state CT_{IS} of WS_{CT} does not differ from its target state CT_{TS}. Although WS_{CT} is outside of the method's transformation scope, the state of its system elements ($CT_{IS} = CT_{TS}$, in the following denoted as "context type" (Bucher et al. 2007)) may influence the applicability, effectiveness, and efficiency of the method.

Context type (CT) therefore comprises all factors that do influence the IS development process but that themselves are not changed by the application of the method. In contrast to that, project type comprises all aspects of an IS development project that both influence the IS development process and that are at the same time changed/transformed through the method application.

Both CT and PT are relevant parameters that have to be considered in SME. They jointly constitute the so-called development situation. The development situation results from the combination of CT and PT. Both CT and PT are hierarchical constructs that can be refined/broken down into constituent CT factors and PT factors, respectively. The development situation also influences the applicability of so-called method fragments.

We understand a method fragment as a combination of (one or multiple) design activities and (one or multiple) techniques which guide the creation of one particular design result (cf. Fig. 3). A method fragment therefore consists of a product description (i.e. the design result element) and a process description (i.e. the design activity and technique elements) (Ågerfalk et al. 2007; Cossentino et al. 2006).

Each method fragment can be identified unambiguously by its design result. As a consequence, the design result of a particular method fragment must be invariant. Viewed from the outside, a method fragment is characterized by three attributes

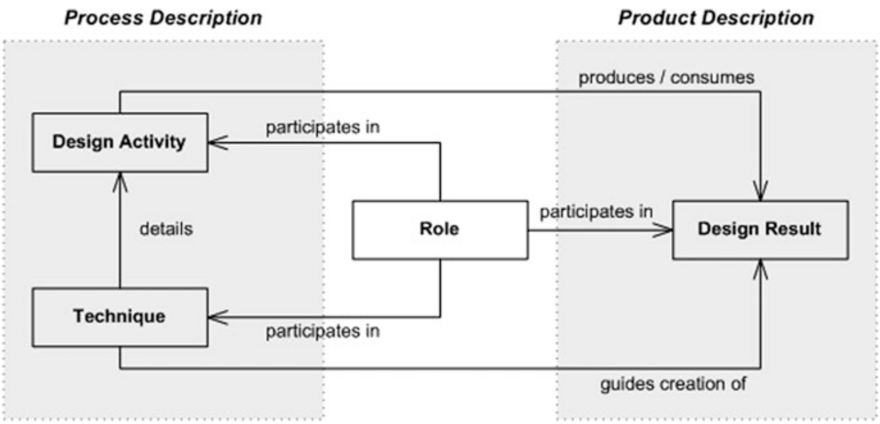

Fig. 3 Elements of a Method Fragment (Adapted from Bucher 2009)

(Bucher 2009): (1) the design result that is created, (2) the preconditions that have to be met for a method fragment to be applicable (i.e. other design results that have to be created beforehand), and (3) the specification of (one or multiple) development situations in which the design result (and therefore the method fragment) generally matters.

By the use of well-defined adaptation mechanisms, method fragments can be adapted and combined into a situational method (Becker et al. 2007a, b; Bucher et al. 2007). The application of a situational method is effected by the selection and aggregation of method fragments based on the development situation at hand as well as on the preconditions specified for each fragment.

3 Empirical Study on Business Process Management Approaches

This section presents results and implications of an empirical study on BPM approaches. First, the data set is characterized and the course of analysis is described. In the two subsections that follow, the results of the exploratory analysis are presented. We distinguish four BPM realization approaches, allowing for the differentiation of five project types that characterize BPM development situations. In the remainder of this chapter, we will focus explicitly on the identification and discussion of project types while abstaining from contemplating context types. This restriction is due to the nature of the underlying data set. In order to complete the proposed taxonomy of BPM approaches, complementary context types need to be specified, too. However, this will be subject to further research.

3.1 Data Set and Course of Analysis

Data for the exploratory analysis was collected by means of a written questionnaire distributed at two BPM forums held in Germany and Switzerland in 2005. The forum participants were specialists and executive staff, primarily working in IT or operating departments concerned with organizational issues and process management.

The questionnaire was designed to assess both the current and the target state of BPM within the interviewed organizations. For this purpose, appropriate statements were formulated, and the respondents were asked to indicate both the current realization degree ("as-is value") as well as target values ("to-be values") of each variable in their organization on a five-tiered Likert scale. Before being used at the forum, experts revised the questionnaire in reference to its comprehensibility.

A total of 47 questionnaires were returned. After the elimination of questionnaires with missing values or other quality problems, 38 observations remained and were included in the analysis. Although the sample size is rather small, the data set is considered to constitute an adequate basis for an exploratory analysis.

The interviewed organizations are primarily large and medium-sized companies (71 % have more than 1,000 employees, and another 20 % have more than 200 employees) from the German-speaking countries. The sectors mainly represented were banking, finance, and insurance (32 %), manufacturing and consumer goods (15 %), public administration and healthcare (11 %), information technology (9 %), and utilities (9 % as well).

In addition to demographic characteristics and information on the stage of maturity of BPM, the data set comprises 31 variables describing the design of BPM. These variables can be grouped into the five categories (1) communication of process management, (2) role of process managers, (3) process design, (4) process performance measurement, and (5) other initiatives pertaining to BPM. The variables summarized in these categories allow for a detailed characterization of actual BPM realization approaches and, consequently, for a well-founded derivation of BPM project types (Bucher and Winter 2006, 2008): The accurate communication of the BPM initiative itself, the design and the documentation of processes and of underlying process activities are equally important as the implementation of adequate organizational structures to foster and support BPM as a whole. Furthermore, process monitoring and control as well as quality management are critical to the success of any BPM initiative.

Data analysis was conducted as follows:

- ***Factor analysis***: To develop a deeper understanding of the current design factors of BPM, principal component analysis was conducted on the basis of the as-is values. Factor analysis can be applied to identify a small number of important and mutually independent factors from a multiplicity of contingent variables. As a result, four design factors of BPM were identified. BPM design factors summarize multiple variables (that have been included in the survey instrument) and can be used to characterize BPM realization approaches regarding specific thematic aspects of BPM.

- ***Cluster analysis***: Consecutively, the 38 observations (each one representing a different organization) were clustered on the basis of as-is factor values calculated in the first step. The hierarchical Ward algorithm and the squared Euclidean distance were used as fusion algorithm and distance measure, respectively. As a result, four generic BPM realization approaches can be distinguished.
- ***Regression analysis***: Finally, regression analysis was applied to calculate to-be factor values for each observation and each factor. Based on this information, target realization approaches could be determined for each organization surveyed. The comparison of the as-is and the to-be realization approaches yields five BPM project types. Each project type represents a particular transformation path between two generic BPM approaches: One of the two BPM realization approaches that characterize a BPM project type serves as starting point, whereas the other realization approach represents the desired target state.

Comprehensive information and details of the statistical analysis can be found in our previous work (Bucher and Winter 2006, 2008).

3.2 BPM Design Factors

The factor analysis was conducted to gain insight into the dominant design factors of BPM. Principal component analysis (PCA) was chosen as extraction method. PCA is a technique for extracting a small number of mutually independent factors from a multiplicity of variables. It is aimed at answering the question of how to summarize the variables that load on a particular factor by the use of a collective term (Härdle and Simar 2003).

According to Dziuban and Shirkey (1974), a data set is appropriate for PCA if and only if the variables' anti-image covariance, i.e. the share of a variable's variance that is independent of the other variables, turns out as small as possible. Consequently, a set of variables qualifies for PCA if the proportion of non-diagonal elements in the anti-image covariance matrix that are different from zero accounts for 25 % at the most. In the case at hand, this parameter value is about 17.6 %. The measure of sampling adequacy (MSA, "Kaiser-Meyer-Olkin criterion") is about 0.753. The MSA indicates whether or not a factor analysis can reasonably be performed on a given data set. Kaiser and Rice (1974) appraise a value of 0.7 and more as "middling". Therefore, the data set is considered to be appropriate for applying PCA.

Four factors that jointly explain about 69.1 % of the total variance were extracted by means of PCA (Eigenvalue > 1.0; the scree plot heuristic points to this four factor solution as well). The component matrix was rotated using the Varimax method with Kaiser normalization to improve the interpretability of the variables' assignment to factors

According to our analysis, there are four design factors of BPM. These can be interpreted as follows:

- ***Design factor 1***: ***Degree of performance measurement***. A total of six variables were found to have significant impact on the first factor. Our analysis results indicate that a high degree of performance measurement is characterized by (1.1) the usage of simulations for process design, (1.2) the usage of surveys to assess the process customers' satisfaction with the processes, (1.3) the measurement of process cycle times, (1.4) the measurement of process outputs and performances, (1.5) the fact that performance measures are available without undesirable time lags, and (1.6) the fact that performance measurement is supported by a workflow management system.
- ***Design factor 2***: ***Professionalism of process management***. Four variables exhibit high loadings on the second factor. According to our analysis results, professional BPM is characterized by (2.1) the fact that the documentation of process performances and goals is common knowledge, (2.2) the fact that the documentation of non-financial measures is available to all employees without any restrictions, (2.3) the existence of an organizational unit for strategic process management, and (2.4) the existence of a dedicated education for process managers.
- ***Design factor 3***: ***Impact of process managers***. Likewise, four variables were found to have significant impact on the third factor. Our analysis results show that the impact of process managers is positively influenced by (3.1) the fact that process management is located at a sufficiently high level in organizational hierarchy, (3.2) the fact that process managers enjoy high prestige in the organization, (3.3) the fact that process managers have sufficient decision-making power in order to influence process design and execution, and (3.4) the fact that process managers are actively engaged in change projects.
- ***Design factor 4***: ***Usage of methodology and standards***. Finally, the fourth factor is made up by four variables as well. Corresponding to our analysis results, usage of methodology and standards is characterized by (4.1) the usage of procedure models for the design of performance management systems, (4.2) the usage of reference process models for process analysis and design, (4.3) the fact that the organization is ISO-certified, and (4.4) the fact that the organization uses the European Foundation for Quality Management (EFQM) approach to quality management.

3.3 BPM Realization Approaches

Based on these design factors, four clusters can be distinguished that represent four distinct realization approaches of BPM. Figure 4 exhibits the standardized arithmetic means of each of the 18 variables' as-is values for each of the four clusters, grouped according to the four design factors.

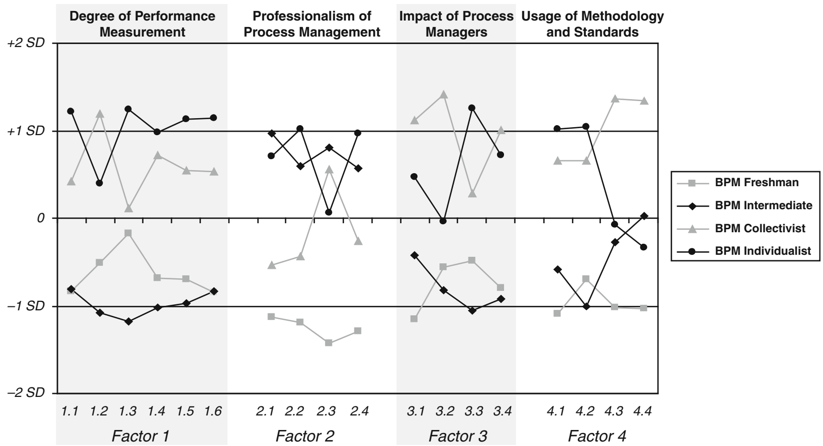

Fig. 4 Profile lines of the four current realization approaches of business process management (Bucher and Winter 2006)

These profile lines illustrate an obvious partitioning between two BPM approaches on the one hand side, in the following referred to as "BPM freshman" (11 observations, i.e. 11 organizations) and "BPM intermediate" (seven observations), and the remaining two clusters on the other hand, subsequently labeled as "BPM collectivist" (nine observations) and "BPM individualist" (11 observations).

The first group (BPM freshman and BPM intermediate) is characterized by rather low realization degrees with respect to performance measurement, arrangements supporting the work of process managers, and usage of methodology and standards (design factors 1, 3, and 4). Organizations clustered into the second group (BPM collectivist and BPM individualist), however, show significantly higher implementation degrees in terms of these factors. Thus, both the BPM collectivist and the BPM individualist approach can be characterized as mature approaches to process management. Accordingly, our findings suggest that the maturity level of BPM is determined by the variables summarized in design factors 1, 3, and 4.

The BPM freshman approach is branded by exceptionally low professionalism of process management (design factor 2). For that reason, the BPM freshman approach contrasts with the BPM intermediate stage. Although rather immature as well, organizations in the BPM intermediate stage have at least started to pay a certain amount of attention to the implementation of BPM, e.g. by establishing an organizational unit for strategic process management and a dedicated education for process managers.

In contrast to this classification which relies on the degree of attention paid towards process management, the differentiation between the BPM collectivist and the BPM individualist approach is residing at the design level (cf. Fig. 5). The former approach is characterized by reliance on established standards as well as on procedure and reference models whereas organizations having adopted the last-mentioned approach to process management strive to implement a more tailor-made type of BPM. Thus, the main differences between these two highly

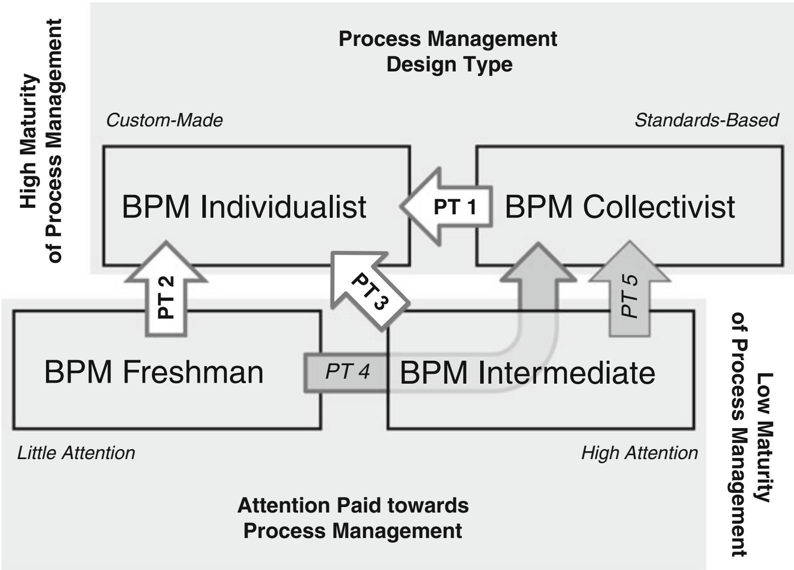

Fig. 5 BPM typology matrix with project types (Adapted from Bucher and Winter (2006), (2008))

mature realization approaches of BPM do exist with respect to the professionalism of process management and the usage of methodology and standards (design factors 2 and 4).

3.4 BPM Project Types

Based on the results of the regression analysis and a comparison of as-is and the to-be realization approaches, a total of five project types for the engineering of situation-specific methods to support BPM can be identified. These project types can be further subdivided into three of major importance (project types 1–3, numerous cases in the data set) and two of minor importance (project types 4 and 5, some isolated appearances):

- ***Project type 1***: ***BPM collectivist turning into BPM individualist***. Seven organizations that have currently adopted the BPM collectivist approach were found to pursue the BPM individualist approach. Both approaches are characterized by high maturity but differ with respect to the design type of process management.
- ***Project type 2***: ***BPM freshman turning into BPM individualist***. A total of ten organizations that have not yet begun or are at most about to deal with BPM were found to pursue the BPM individualist approach in the long run. This implies that those organizations need to improve the maturity of their BPM approach significantly and develop individual practices.

- ***Project type 3*: *BPM intermediate turning into BPM individualist***. Five organizations that currently reside on the BPM intermediate stage, i.e. that have started to pay a certain amount of attention to the implementation of BPM, were found to pursue the BPM individualist approach. Similar to project type 2, these organizations need to both improve the maturity of their BPM approach and develop independent procedures for BPM at the same time.
- ***Project type 4*: *BPM freshman turning into BPM collectivist***. Just one organization that is branded with exceptionally poor professionalism of BPM was found to pursue the BPM collectivist approach in the long run. Due to the marginal number of relevant observations, this project type is considered to be of minor importance. We will therefore refrain from discussing this project type in the remainder of this chapter.
- ***Project type 5*: *BPM intermediate turning into BPM collectivist***. Similarly, a mere two organizations that have currently adopted the BPM intermediate approach were found to purse the BPM collectivist approach. For the same reason as with project type 4, we will refrain from discussing project type 5 in the following.

The four BPM realization approaches can be arranged in matrix format. This so-called BPM typology matrix is depicted in Fig. 5. We have added three arrows in light grey color, representing the three major project types of BPM, and two arrows in dark grey color, in place of the two minor BPM project types. The matrix illustrates a classification according to three dimensions:

- ***Maturity level of process management***: The classification of the four approaches depends on the BPM maturity level within the organization. This differentiation is in accordance with the obvious partitioning between the two bottom clusters (BPM freshman and BPM intermediate) on the one hand and the two top clusters (BPM collectivist and BPM individualist) on the other hand.
- ***Attention paid towards process management***: If the maturity level is rather low, it is assumed that BPM has not played any significant role within the organization in the past. However, the BPM freshman and the BPM intermediate approach can be differentiated with respect to the amount of attention that is currently paid towards process management.
- ***Process management design type***: On the contrary, if the maturity level of BPM is rather high (i.e. if the organization has dealt with the BPM concept for quite a long time), one can distinguish between two design types of process management. The BPM collectivist relies on established standards as well as on procedure models and reference models whereas the BPM individualist focuses on the adoption of a more tailor-made approach to BPM. For this purpose, the BPM individualist provides process managers with excellent education and far-reaching authority for decision-making with respect to process design and execution.

In our early work, we have argued that the BPM intermediate approach might be characterized as transitional stage in an organization's shift towards process-oriented thinking (Bucher and Winter 2006). According to the results of subsequent research, this assumption does not hold completely true (Bucher and Winter 2008): project type 2 is made up of ten observations that develop directly from the BPM freshman approach to the BPM individualist approach.

The common ground of the three major project types of BPM is that the target state in all cases is the BPM individualist approach. When compared to the other realization approaches, this particular approach is characterized by the highest implementation level with respect to ten out of 18 variables that have been sampled and included into the analysis (cf. Fig. 4). This fact indicates areas that need to be explicitly addressed in BPM transformation projects. The assessment of relative distances of the BPM collectivist, BPM freshman, and BPM intermediate implementation levels from the BPM individualist implementation level with respect to the 18 variables covered in our analysis points towards the topics that are of particular importance in each one of the three project types, e.g. the collection of process customers' input regarding process design or the documentation of process performances and goals.

The section to follow will illustrate the exemplary adaptation of a well-known BPM method to account for the characteristics of the three major BPM project types that have been identified and discussed in the previous section.

3.5 Exemplary Case Studies

To demonstrate the applicability of the developed BPM project typology, we present three case studies published in the first edition of the BPM Handbook as exemplars of the three important project types described above.

The first case study describes a BPM tool selection project conducted by the Queensland Court of Justice (Davies and Reeves 2014). The case description clearly points out that the government organization had neither performance measurement nor professional process management in place. Also BPM in general was not recognized as a strategic topic. Process management was supported by an outdated tool, which severely limited the application for process analysis and design. Therefore, the BPM realization approach before tool implementation of Queensland Court of Justice can obviously characterized as BPM freshman. The tool selection is part of a program to review, standardize and streamline court processes. Goals are to design the business process architecture and the information architecture for court case management across all courts. This requires documentation of current processes, analyses to identify improvement opportunities and definition of a future state. Customization of the tool played an important role in the selection process. Hence, Queensland Court of Justice strives to implement a BPM individualist approach in the future so that the respective project type is an exemplar of PT2.

In the second case study, the presented company, an Australian transport provider, uses BPM approaches to support their move from government operations to commercialization (de Bruin and Doebeli 2014). During early stages of improvement activities, the company employed several methods to improve its operations. Since these activities were not coordinated and lacked professionalism, they failed. In summary, the transport company was aware of process related issues but isolated BPM approaches lacked professionalism with respect to all four design factors. Hence the company can be attributed to the BPM intermediate category. After these initial failures, the Australian transport provider launched a major change program that used an enterprise-wide BPM approach to establish a platform to achieve service excellence and allow for further grow of the business. This approach implemented, refined, and developed capabilities in all four BPM design factors. The presented company did not rely on common methods, but rather created a specific BPM approach by blending existing methods/techniques. Therefore this case study describes how a BPM intermediate turns into a BPM individualist and thus is an exemplar of PT3.

The third case study presents the transformation of a Brazilian oil and gas company (Jesus et al. 2014). Regarding the situation before implementation of a BPM center of excellence, the company had already achieved a significant professionalism of its BPM approach. All the organization's processes were modeled, documented, and redesigned, defined KPI's were used for performance measurement, and trainings in BPM best practices and solutions were conducted. To professionalize its BPM approach even further, the company decided to implement a BPM center of excellence. The goal was to transform isolated BPM initiatives to systematic BPM services and to move from punctual improvements to continuous improvements. Thereby, the organization implemented several customized tools to support the BPM center of excellence. Obviously, after introduction of the BPM center of excellence the Brazilian company reached BPM individualist level. The transformation from being a BPM collectivist to a BPM individualist is an exemplar of PT1.

4 Exemplary Adaptation of the 'Process Innovation' Method

The following section demonstrates the applicability of the empirical results. We report on the exemplary adaptation of Davenport's 'process innovation' method (Davenport 1993). After giving a brief overview of the (generic) method for process redesign, we will sketch situation-specific embodiments of the method that are based on the project types identified in the previous section.

4.1 Overview of the Method

In the early 1990's, during the pioneer era of business process reengineering (BPR), many authors have proposed concepts and methods for process innovation and redesign. Recommendations were made by both academia (e.g. Davenport 1993; Davenport and Short 1990; Hammer 1990; Hammer and Champy 1993; Harrington 1991, 1995) and practitioners. For a compilation and comparison of different approaches, see (Hess and Brecht 1996).

The ‘process innovation’ method proposed by Davenport (1993) is a well-known example of such an early BPR method. It aims at the fundamental and radical examination, analysis, and redesign of existing business processes with the objective of improving performance with respect to quality, flexibility, time, and money.

Figure 6 depicts the method’s procedure model as outlined by Davenport (1993). This method description is rather generic, i.e. it is intended to be applicable to a variety of development situations. The procedure model of the generic method features 25 design activities grouped into five phases. To simplify matters, we will assume that one or multiple design activities described by Davenport (1993) yield one particular, common design result. We will furthermore abstain from discussing both roles and techniques in support of the design results’ creation.

Figure 7 depicts the documentation model that has been deduced from the description of the ‘process innovation’ method. The documentation model shows all design results that arise from the method’s application as well as their mutual dependencies. In accordance with the terminology established in this chapter (cf. Sect. 2), we refer to the combination of design activities and associated design results as method fragments. Each method fragment is characterized by (1) the design result that is created and (2) the preconditions that have to be met for the fragment to be applicable. The third attribute necessary for the complete description of a method fragment – the specification of development situations in which the design result matters – will be introduced in the subsequent section.

4.2 Situation-specific Embodiments of the Method

For the engineering of situation-specific embodiments of Davenport’s BPR method, we focus on the major project types 1–3, i.e. BPM collectivist, BPM freshman, and BPM intermediate turning into BPM individualist. Moreover, we concentrate on selected variables of the empirical analysis: variable 1.2 (“surveys are used to assess the process customers’ satisfaction with the processes”), variable 1.4 (“process outputs and performances are measured”), variable 2.1 (“the documentation of process performances and goals is available without restriction to all employees”), variable 3.4 (“process managers are actively engaged in change projects”), variable 4.1 (“procedure models are used for the design of performance management systems”), variable 4.2 (“processes of competitors and/or reference processes are used for process analysis and design”), and variable 4.4 (“the organization uses the EFQM approach to quality management”).

From the information depicted in the profile lines of the current BPM realization approaches (cf. Fig. 4), we can observe the following differences between these approaches (and consequently between the project types):

- As for variable 1.2, the BPM individualist approach exhibits an implementation level slightly below the BPM collectivist approach. However, BPM freshman and BPM intermediate fall considerably short of this standard. The same holds

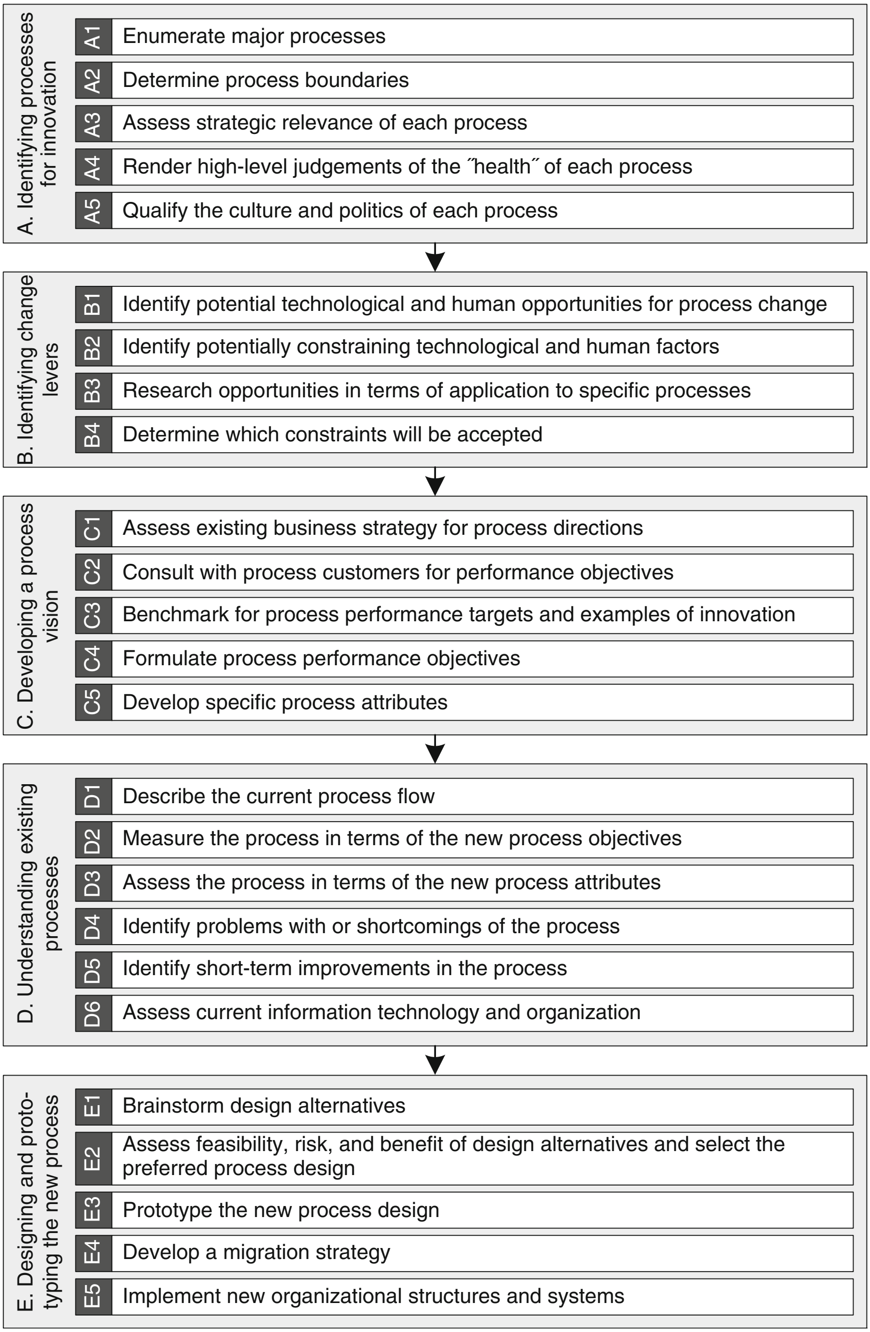

Fig. 6 Procedure model of the ‘process innovation’ method (On the basis of Davenport (1993))

Fragment	Activity	Design Result	Preconditions
Fragm. 01	A1, A2	Map of all business processes	No preconditions
Fragm. 02	A3, A5	Detailed characterization of all business processes	Fragment 01 completed
Fragm. 03	A4	List of advantages/disadvantages of current processes	Fragment 02 completed
Fragm. 04	B1, B3	Evaluated list of opportunities for process change	Fragment 03 completed
Fragm. 05	B2, B4	Evaluated list of constraints to process change	Fragment 03 completed
Fragm. 06	C1, C2	Process vision based on strategy and customers' input	Fragments 04, 05 completed
Fragm. 07	C3	˝Best practice˝ examples and external benchmarks	Fragment 06 completed
Fragm. 08	C4, C5	List of quantitative and qualitative process objectives	Fragment 07 completed
Fragm. 09	D1	Detailed model of current business process	Fragment 03 completed
Fragm. 10	D2, D3, D4	Assessment of current process as to new objectives	Fragments 08, 09 completed
Fragm. 11	D5	Short-term process improvements	Fragment 10 completed
Fragm. 12	D6	Assessment of infrastructure in support of the process	Fragment 09 completed
Fragm. 13	E1	List of design alternatives	Fragments 11, 12 completed
Fragm. 14	E2	Assessment and ranking list of design alternatives	Fragment 13 completed
Fragm. 15	E3	Prototype of new process design	Fragment 14 completed
Fragm. 16	E4	Migration strategy for the implementation	Fragment 14 completed
Fragm. 17	E5	New organizational structures and systems in place	Fragments 15, 16 completed

Fig. 7 Documentation model and method fragments deduced from the description of the 'process innovation' method

true for variable 3.4. Variables 1.2 and 3.4 are particularly dealt with in conjunction with method fragment 6.

- As for variables 1.4, 4.1, and 4.2, the BPM individualist and the BPM collectivist approach exhibit implementation levels that are approximately equal to each other (with the BPM individualist approach scoring slightly higher). By contrast, the respective implementation levels of the BPM freshman and the BPM intermediate approach are significantly lower. Variable 1.4 is addressed by method fragment 10. Variables 4.1 and 4.2 relate to method fragment 07.
- As for variable 2.1, the BPM intermediate approach exhibits an implementation level that is approximately equal to the BPM individualist approach. The respective implementation levels of the BPM collectivist and the BPM freshman approach are considerably below this level. Variable 2.1 is not addressed by any of the fragments proposed by Davenport (1993). A new fragment therefore needs to be introduced to deal with this variable.
- As for variable 4.4, the BPM intermediate and the BPM individualist approach exhibit similar implementation levels that are significantly lower when compared to the BPM collectivist approach. When compared to the other three

approaches, the BPM freshman approach scores lowest. The ‘process innovation’ method does not explicitly address this variable. However, fragments 04 and 05 may be supported through the adoption of the EFQM approach.

Consequently, project type 1 (BPM collectivist turning into BPM individualist) needs to focus on the improvement of the implementation level with respect to variable 2.1 and might, at the same time, reduce the respective level of variable 4.4. Project type 2 (BPM freshman turning into BPM individualist) needs to account for all of the aforementioned variables. Project type 3 (BPM intermediate turning into BPM individualist) must focus on the improvement of variables 1.2, 1.4, 3.4, 4.1 and 4.2. From the fragment perspective, the new fragment introduced to deal with variable 2.1 (fragment 18; “documentation of process performances and goals) is of particular importance for project types 1 and 2 but might be neglected in conjunction with project type 3. Project type 1, by contrast, does not have to deal too much with fragments 6, 7, and 10. Those fragments are especially important to project types 2 and 3. Project type 3 might skip fragments 4 and 5.

Both Figs. 8 and 9 summarize these thoughts and propose a set of situation-specific embodiments of the ‘process innovation’ method. The fragment list

Fragment	Design Result	Preconditions *(if fragment is applicable)*	Project Types
Fragm. 01	Map of all business processes	No preconditions	PT1, PT2, PT3
Fragm. 02	Detailed characterization of all business processes	Fragment 01 completed	PT1, PT2, PT3
Fragm. 03	List of advantages/disadvantages of current processes	Fragment 02 completed	PT1, PT2, PT3
Fragm. 04	Evaluated list of opportunities for process change	Fragment 03 completed	PT1, PT2
Fragm. 05	Evaluated list of constraints to process change	Fragment 03 completed	PT1, PT2
Fragm. 06	Process vision based on strategy and customers’input	Fragments 03, 04, 05 completed	PT2, PT3
Fragm. 07	˝Best practice˝ examples and external benchmarks	Fragment 06 completed	PT2, PT3
Fragm. 08	List of quantitative and qualitative process objectives	Fragments 04, 05, 07 completed	PT1, PT2, PT3
Fragm. 09	Detailed model of current business process	Fragment 03 completed	PT1, PT2, PT3
Fragm. 10	Assessment of current process as to new objectives	Fragments 08, 09 completed	PT2, PT3
Fragm. 11	Short-term process improvements	Fragments 08, 09, 10 completed	PT1, PT2, PT3
Fragm. 12	Assessment of infrastructure in support of the process	Fragment 09 completed	PT1, PT2, PT3
Fragm. 13	List of design alternatives	Fragments 11, 12 completed	PT1, PT2, PT3
Fragm. 14	Assessment and ranking list of design alternatives	Fragment 13 completed	PT1, PT2, PT3
Fragm. 15	Prototype of new process design	Fragment 14 completed	PT1, PT2, PT3
Fragm. 16	Migration strategy for the implementation	Fragment 14 completed	PT1, PT2, PT3
Fragm. 17	New organizational structures and systems in place	Fragments 15, 16 completed	PT1, PT2, PT3
Fragm. 18	Documentation of process performances and goals	Fragment 17 completed	PT1, PT2

Fig. 8 Situation-specific embodiments of the ‘process innovation’ method (Fragment list)

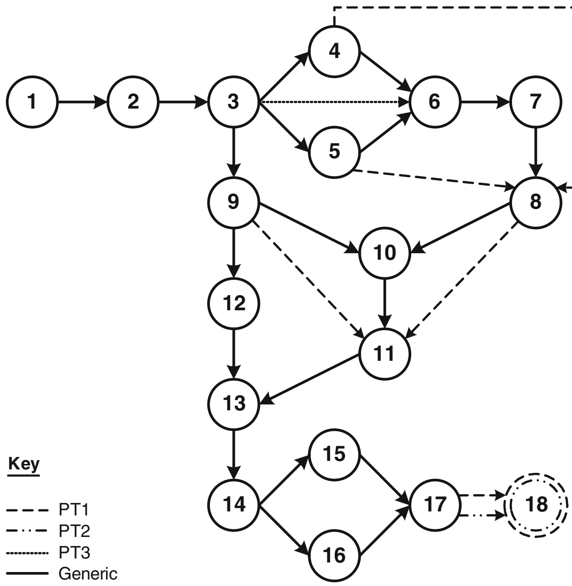

Fig. 9 Situation-specific embodiments of the 'process innovation' method (Network diagram)

(cf. Fig. 8) depicts the fragments of the situational method. Changes with respect to Fig. 7 are marked with a diagonal shade. The network diagram (CF. Fig. 9) shows the generic method in continuous bold lines. Particular variations of this standard procedure that are valid for individual project types only are displayed in dashed lines (see figure key). To engineer a situational method that might be applied in real-world organizations, the required method fragments need to be selected and aggregated subject to the project type at hand.

5 Conclusion and Outlook

Our work is motivated by the conviction that no artifact (e. g., reference model or method) fits all development/application situations. One the one hand, a large range of development/application situations may be covered by an extremely generic artifact – but its generality makes it hard to concretely solve a specific problem. One the other hand, concrete problem situations may be addressed by a very specific artifact – but then reuse potentials are very limited and artifact development is hard to justify. Situational methods try to combine the best of both worlds: Although they are designed as generic as possible, such methods can be adapted to fit a certain range of specific problem situations.

In order to engineer the generic method and appropriate adaptation mechanisms, a deep understanding of problem situations is needed. As our goal is to develop a situational approach to BPM, we therefore conducted a survey which, in a first step, identified four distinct design factors of BPM: (1) the degree of process performance measurement, (2) the overall professionalism of process management, (3) the impact of process managers, and (4) the utilization of established methodology and standards. Based on these design factors, four generic approaches to BPM were differentiated in a second step which we designated as (1) "BPM freshman", (2) "BPM intermediate", (3) "BPM collectivist" and (4) "BPM individualist". When interpolating the actual BPM approach with BPM plans in the near future, five BPM project types were differentiated in a third step: (1) BPM collectivist turning into BPM individualist, (2) BPM freshman turning into BPM individualist, (3) BPM intermediate turning into BPM individualist, (4) BPM freshmen turning into BPM collectivist (rare), and (5) BPM intermediate turning into BPM collectivist (rare). All surveyed organizations strive to achieve high BPM maturity. There are however significant differences with respect to the particular design of the aspired approaches to mature BPM. For three important project types, exemplary case studies from the first edition of the BPM Handbook have been referenced.

The presented knowledge about design factors, generic approaches, and in particular PTs allows for strategic alignment, i.e. developing a "customized" BPM method: The analysis of the relation of method fragments and fragment dependencies to PTs leads to a "core method" which can be systematically adapted by additional fragments and/or alternative fragment dependencies in order to fit a certain PT. By adapting the "core method" using the taxonomy presented here, it is ensured that the situation-specific approach is aligned to the organization's BPM realization approach. The applicability of this approach to real-world BPM methods has been shown by using Davenport's "process innovation" method as a test case.

Future research is needed to further validate the empirical findings regarding BPM design factors, generic approaches to BPM, and BPM project types. Based on a growing common understanding of BPM situations, more case studies have to justify the usefulness of the proposed situational method engineering approach.

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Process Performance Measurement

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Abstract Measuring performance is a precondition for analyzing and subsequently improving business processes. However, selecting the "right" criteria for measurements remains a difficult and highly debated topic, both in theory and practice. The objective of this chapter is to provide an overview how adequate measures can be identified and implemented. For this purpose, the main terms will be defined and the procedure of process measurement will be presented. This includes a number of approaches for measuring process performance. In more detail, two methodologies, Data Envelopment Analysis and Process Mining, to measure and calculate indicators for process performance are discussed. As an example, Process Mining is applied to real case data to demonstrate its possibilities.

1 Measurement as Part of Process Management

Managers become more and more aware of the necessity to design and to control companies from a process-oriented perspective. As a consequence, the entire company should be strictly aligned to the requirements of its customers. The management of the necessary processes should follow the typical business process management cycle (van der Aalst et al. 2003). Thus, each business process (in the following the term 'processes' is used) should be designed, implemented, executed, and controlled. Process control includes the measurement, analysis, and improvement of processes. In this chapter we focus on the first step of process control, that is to conduct accurate measurements (Ljunberg 2002).

Process measurement is the continuous observation of predetermined performance indicators for the purpose of attaining process targets (Kueng and Kawalek 1997). Although measuring a company's process performance is a topic that has

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_9,

been broadly discussed in publications, precise definitions of performance measurement have been rarely provided.[1] According to Neely et al. (2005, p. 1229) "... the level of performance a business attains [is] a function of the efficiency and effectiveness of the actions it undertakes." In their view, measurements are defined and established in order to define performance. A coordinated and aligned set of measurements (metrics) represents a measurement system that is suited to quantifying efficiency and effectiveness (performance).

In order to measure processes four generic steps have to be considered (Ljunberg 2002; Neely et al. 2005; Yen 2009). Firstly, it has to be determined how the measurement in general should be performed. For this purpose, several frameworks are available describing the set-up of a process measurement system. Secondly, the indicators for measuring process performance have to be identified. Thirdly, the data sources to gather the necessary data have to be selected. Fourthly, the measurements should consider implications from the context of the respective business process.

The objective of this book chapter is to provide an overview how the performance of processes can be measured. Therefore, in Sect. 2 the term performance of business processes is clarified. Section 3 presents the procedure of process measurement which covers the steps from identifying performance indicators to the consideration of the context. Within Sect. 4 two prominent methodologies for the measurement of process performance, Data Envelopment Analysis and Process Mining, are presented. In Sect. 5, the latter methodology is illustrated in detail by means of an application on real case data. Section 6 concludes the chapter by summing up the discussed topics.

2 Defining Process Performance

Performance of business processes is about how well the executed processes work with regard to the chosen indicators. Performance can be seen from two perspectives (Coelli et al. 2005):

- Descriptive measures, i.e., how the performance of the process is actually observed. The chosen indicators of a process are measured as the relation of output to input. An aggregation is required if more than one input or output is considered. This perspective is termed as **productivity**.
- Normative measures, i.e., how the performance of the process should be. Either the actual output is compared with the maximum producible quantity of output from its observed input (output-oriented) or the actual input with the minimum required input for its observed output (input-oriented). This perspective is termed as **efficiency**. Another normative indicator is **effectiveness** which is focusing on the question if a process is focusing on the adequate output at all. "It is fundamentally

[1] Also see vom Brocke and Sonnenberg (2014) in this handbook, who provide a discussion and conceptualization for performance evaluations in BPM.

the confusion between effectiveness and efficiency that stands between doing the right things and doing things right. There is surely nothing quite so useless as doing with great efficiency what should not be done at all" (Drucker 2006, p. 145).

The consequence of the two perspectives is that the measurement of productivity is a precondition for the identification of process efficiency and process effectiveness. Every indicator of a process is the result of transforming an input into an output. For the definition of inputs and outputs, there are various possibilities, such as costs per employee, working time for an activity or number of sales orders processed (Johnston and Jones 2004).

A stand-alone productivity indicator has no reference to the determined value. Only by a comparison with other productivities or other reference values, meaningfulness is created. Various productivity indicators can be compared or be placed in a sequence to each other. If the productivity ratios are comparable in their design, it is also possible to calculate the relative distance from the reference values. As a constant ratio of input to output over time should be used, possible economies of scale in a comparison of productivity cannot be identified (McLaughlin and Coffey 1990).

Process performance measurement entails capturing quantitative and qualitative information about the process. Subsequently, the measurements can be transformed into performance figures which translate unfiltered data into information about process performance, enabling the process manager to deal with process control.

3 Procedure of Measuring

3.1 Design of a Process Measurement System

Process performance is multi-dimensional, i.e., process performance cannot be determined on the basis of a single indicator, such as productivity, but results from many different indicators, measures, and performance figures. In addition, process performance indicators are not independent from each other. Most process performance indicators exhibit a relationship with other indicators, i.e., they complement one another or they conflict with each other (Gillies 1995).

As a result, a multitude of frameworks for determining a performance measurement system exists of which important ones will be discussed in the following. The framework developed by Fitzgerald et al. (1991) represents the insights gained from research in service industries. The authors divide performance indicators into two basic types of *Performance Indicators*:

- indicators that are related to and reflect process results (measurements assessing the competitive environment, such as market share or market growth, as well as financial measurements, such as costs and profits) and
- indicators that reflect the determinants of process success (measurements to determine quality, flexibility, resource utilization, and innovation).

Another well-known framework for designing a measurement system is the *Performance Pyramid* (Lynch and Cross 1991). This framework follows a hierarchical view of performance. It considers the relationship between strategic performance (e.g., fulfilling the vision, market share, financial performance) and process performance (e.g., quality, cycle time, waste, or spoilage rate). The layer connecting the two hierarchical levels depicts those performance indicators that impact both levels (e.g., customer satisfaction, flexibility, and productivity).

A stronger process perspective is emphasized by Brown (1996). His framework highlights the distinction between input, throughput, and output as he recommends determining performance indicators according to this classification. Process input factors include, for example, employees, plant and equipment, as well as capital. The quality and quantity of these input factors can be a decisive factor in meeting customer requirements which themselves represent an additional input factor. During the throughput phase, input factors are utilized and combined. The output consists of a product, a service, and financial results. The process performance is therefore determined through a measurement system that encompasses performance measures for input, throughput, and output. In addition, performance measures related to meeting customer requirements and customer satisfaction are included.

Kaplan and Norton (1992) suggest eight steps, which they believe managers should follow in order to develop a measurement system in alignment with the Balanced Scorecard (Kaplan and Norton 1993): (1) prepare measurement system development, (2) conduct one-on-one interviews with senior managers (to elicit different vision and strategy approaches), (3) hold a first workshop with senior management (to agree on vision and strategy), (4) conduct extended interviews with senior management (to identify different indicators), (5) hold a second workshop with senior management (to determine performance indicators and target measures for each indicator), (6) conduct a third workshop with senior management (to define the Balanced Scorecard), (7) implement the measurement system, and (8) periodically review the measurement system. This procedure highlights how the measurement system should be aligned with vision, strategy, and strategic objectives.

Setting up a measurement system is a sensible undertaking. The outlined frameworks provide managers with guidance with respect to the development of an individualized measurement system. In doing so, emphasis should be placed on championing a methodology suited to developing a measurement system rather than prescribing a general "one-size-fits-all" system. To develop an individualized process performance measurement system, implementation steps have to be taken. These can be based on the recommendations by Brignall and Ballantine (1996), Fitzgerald et al. (1991), and/or Kaplan and Norton (1993). Subsequently, the external environment, the strategy, and the process model of the company have to be taken into account. An example of such a dynamic methodology is the framework delivered by Neely et al. (2000).

3.2 Identification of Performance Indicators

Measuring process performance starts with the identification of performance indicators that allow for a detailed specification of process performance. Therefore numerous authors have suggested categories of indicators in order to facilitate a structured approach. The majority of authors, such as Sarin et al. (2011) as well as Wu and Liu (2008), have adopted a process-oriented view, resulting in the indicator groups quality, time, costs, and flexibility. These four indicator groups will be examined in the following.

In general, *quality* describes the degree to which the actual product attributes and properties conform to the underlying product specifications. In the past, indicators often included costs, for example, defect prevention, quality measurement costs, and costs related to failure rates (Campanella and Corcoran 1983). However, the emergence of quality improvement initiatives such as Total Quality Management has resulted in a new definition of the term quality. Nowadays, customer satisfaction serves as the yardstick for measuring the quality of a product or service.

From a production point of view, *time* is considered to be an indicator for competitiveness and process performance. Yet, the time aspect can be looked at from different angles: Within a just-in-time production paradigm, for example, production and/or delivery of production outputs at a premature or belated point of time is considered to be a waste of time. Thus, the exact point of time is relevant, and an appropriate performance indicator would be the deviation from the targeted point of time. Within the field of research in Optimized Production Technology (OPT), the main objective is seen in minimizing process time (McLaughlin and Coffey 1990). Performance indicators and subsequent performance measures therefore include, for example, throughput time, actual processing time, waiting time, transportation time, and delivery time.

Research in the area of cost accounting provides the basis for the determination of *cost* indicators (e.g. Ravichandram 2007). A large number of academic contributions, for example Johnson (1983), deal with the various cost aspects. Different cost factors provide the basis for cost indicators: labor costs, IT costs, production costs, product costs, service costs, failure costs, and so forth. A distinction can be made between fixed and variable costs. Since the emergence of activity-based costing, indicators such as activity-based costs, sub-process-, or process-related costs are also feasible.

Indicators to determine *flexibility* include, according to Slack (1987), the degree to which a production or service process can be modified, including the timeline and costs associated with the restructuring of a production or service process. A further indicator for flexibility relates to the number of product or service components that can be exchanged within a given time. Moreover, process flexibility may also be viewed as dealing with output volumes or resource utilization.

In summary, there are many indicators available that can be applied for the measurement of company-specific process performance. Companies have to select indicators that are directly linked to their strategy, and they have to link the indicators to their business objectives and resources. This will then result in strategic performance figures that support senior management in navigating toward the desired strategic direction. In order to be successful, each company has to determine performance indicators and, subsequently, performance measures and performance figures that are strategically relevant to its respective situation.

3.3 Determination of Data Sources for Measurement

Several techniques can be used to obtain the relevant information using different data sources. Sometimes the techniques are used independently from each other, but mostly they are used in combination during the entire survey period. Each collection technique allows obtaining a certain amount of information. Therefore, it is particularly challenging to determine the right mix of techniques to gather relevant data.

Studying documents is often the first step of data collection. The relevant information can be found in customer and order documents, job descriptions, organizational manuals, work instructions, databases, and current literature. A major goal of the document study is to obtain an overview of the quality and quantity of the existing documentation of processes. Furthermore, a basic understanding of the technical and organizational contexts can be achieved. Thus, studying documents is a helpful data source for identifying further needed data sources (Ungan 2006).

In most cases *interviews* with employees of the respective organizational unit are conducted. The interview is the most open and flexible format to gather data, as the questioner is able to control the conversation and thereby the flow of information by using appropriate questioning techniques. It is usually distinguished between a free and a structured interview. During the conversation, it is possible to clarify traditional practices during process execution, reservations to changes and informal communication structures (Johnson 2002).

Observation is an optical recording and interpretation of the activities of the monitored person. Observations can be taken officially or unknown to employees. A significant advantage of observation with respect to interviews is the independence from the ability and willingness to provide information of the observed person. A special type of observation is the *multi moment study*. Here, a sample of individual observations is made in regular intervals. This sample is generalized to the whole working area using statistical methods (Castle and Harvey 2009).

Within *questionnaires*, a list of questions will be presented to employees. The advantage is that at the same time a large number of people can be addressed. It must however be noted that manipulation through conscious or unconscious false statements is easy to be made, but difficult to detect. Due to the missing interaction between interviewer and interviewee, there is no possibility to intervene directly in the response process. This complicates the collection of clear and focused information (Yen 2009).

Especially for the determination of a job or position profile and the determination of processing times *self-recording* can be used. In this case, the collection of data is transferred to the employees involved in each study area. The employee notes all activities and times in a special document or collection system during his/her daily work.

Order worksheets are attached to each object (e.g., document or parcel) which is processed. For each step performed information is added on the worksheet typically including description, originator, and time. This technique is particularly suitable for determination of working, idle and transportation time. Order worksheets can also be created automatically by information systems in form of event logs which are described in Sect. 4.2.

Estimations are used for approximate determination of data. The estimations are often based on past values which are updated based on statistical methods (e.g., trend extrapolation). Usually estimations are conducted by experts in the related work area.

The choice of the data source depends on the purpose but also on availability. In practice, often data sources are not available because of missing information systems or obtaining the needed data is too complex.

3.4 Contextual Implications of Measurement

Identifying the root causes for process performance deficiencies and eliminating them is an important task of every company. In doing so, it should be considered that the context in which a business process is executed plays an important role for variances in process performance (Banker and Natarajan 2008).

The influence of the context can be operationalised by contextual factors. These are indicators of the environment surrounding a business process. Contextual factors can be found outside of the external corporate environment or within internal company characteristics (Papadakis et al. 1998). In any case, they are not inherent in the business process under analysis. Examples of contextual factors are weather conditions or holiday seasons (Rosemann et al. 2008).

Within process operations, the consideration of contextual factors could lead to a diversified view of measuring process performance. Instead of analyzing the performance of a business process as a whole, it might be favorable to derive different performances based on the major independent contextual factors. Processes should be improved having a multi-performance in mind. One specific characteristic of a contextual factor might be the reason for a poor overall performance. Using a call center as an example, the root cause of low performance could be the time of the day, e.g., the evening. The reason for this might be a peak of calls caused by customers calling after work while the number of employees working is the same for all times of the day.

To enable a context-aware measurement, the relevant contextual factors and their characteristics have to be identified. Contextual factors which are relevant for processes can be grouped into two categories: Environmental factors include e.g., industrial conditions such as high/low regulation, customer characteristics such as standard/special clients, general conditions like hot/cold weather, and characteristics of process instances such as light/heavy weight of parcels to be transported. Internal factors comprise e.g., organizational conditions such as the health situation of employees and the workload within the process like low/high degree of capacity utilization.

The identification of contextual factors is highly dependent on the specific business process. There has to be an assumption which factors might have an impact. However, the analysis should use the above mentioned categories as guidance to evaluate if either existing data fits in these types or additional data is needed (Leyer 2011).

To conduct such an analysis, the characteristics of each contextual factor have to be assigned to every process instance within the process under analysis. The influence of the context can then be determined by using statistical tools like one-way analysis of variance (ANOVA), Mann–Whitney U test or Kruskal-Wallis test (Ruxton and Beauchamp 2008). If statistically significant results are detected, descriptive statistics should be applied to measure the percentile and the average processing time for each characteristic of a contextual factor in order to determine its impact.

4 Methodologies for Measurement

As pointed out the development of systems and metrics for process performance analysis is a key issue. However, the use of simple metrics of process analysis is considered critical, as simple approaches fail to take into account the overall performance (Neely et al. 1995). Consequently, it seems more appropriate to use methodologies based on input–output models for performance measurement. Over the years, a number of methodologies for measuring the performance of input–output relations have evolved, at which Frontier Analysis approaches count to be the most popular and precise measurement techniques (Paradi et al. 2004). Within this area several methodologies exist, such as parametric approaches (Stochastic Frontier Approach [SFA], Distribution Free Approach [DFA], Thick Frontier Approach [TFA]) and non-parametric approaches (e.g., Data Envelopment Analysis [DEA], Free Disposable Hull [FDH]). Overall, DEA came up as the most popular methodology for measuring efficiency (Cinca et al. 2002).

DEA is purely based on an input–output model for efficiency measurement. The throughput is considered to be a “blackbox” (Frei and Harker 1999). However,

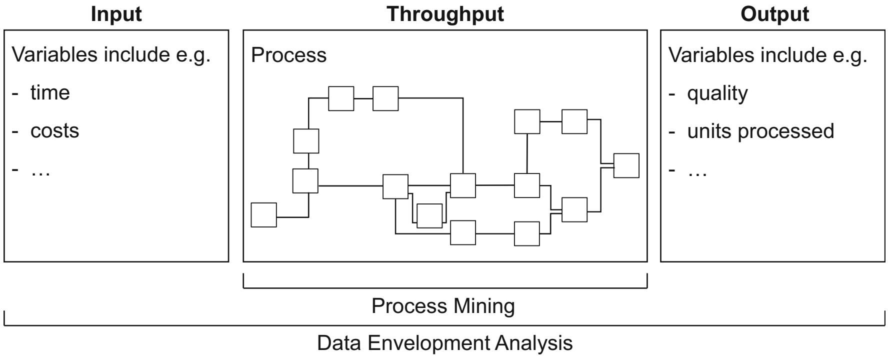

Fig. 1 Measurement foci of DEA and Process Mining on a process level

focusing on measurements of the input–output relation is not sufficient because throughput measurements are also needed for root cause analysis of a low performance. Here, Process Mining provides the opportunity to analyze this blackbox in terms of identifying the process model and subsequently the performance of the process (Fig. 1). Process Mining is a methodology which allows evaluating the execution of processes with the help of automatically generated timestamps (van der Aalst 2011). Due to the advantages of the possibility of analyzing large data sets, Process Mining becomes more and more popular.

4.1 Data Envelopment Analysis

DEA is a non-parametric, non-stochastic efficiency measurement methodology developed by Charnes et al. (1978). For each object to be measured, termed as Decision Making Unit (DMU), an efficiency score is assessed. This rests upon the derivation of a production frontier determined by the empirically best practice DMU. The distance to the peer object on the best practice frontier determines the efficiency score (Epstein and Henderson 1989). DEA is based on few assumptions only and is especially applicable in cases where input–output relations are analyzed and the production function is unknown (Cooper et al. 2004).

Generally, DEA has been used to detect efficiency on an organizational level (e.g., branches, companies). Since there are always parts of a company, which are more or less efficient than others, measuring on an organizational level might miss opportunities to detect inefficient parts. To overcome this shortcoming, efficiency measurement should be conducted on a process level. Burger and Moormann (2010) present a method to measure efficiency on a process level with Data Envelopment Analysis. In this context, DEA is applied on process instances' level, indicating that each process instance is considered to be a DMU. An instance might be a parcel to be delivered, a loan application to be proceeded etc. Applying

DEA on a process instances' level yields an empirical production function of the process resulting from the best practice process instances. The efficiency score is calculated by the distance to its peer best practice process instance located on the efficient frontier. Aggregating the efficiency scores (e.g. by calculating the mean) delivers an indication of the process efficiency.

4.2 Process Mining

As described in Sect. 3.3 several techniques are available to record process execution data. These techniques are usually used manually, i.e., either gathered manually by employees or partly pulled out from an IT system. Unfortunately, these techniques are either imprecise or time-consuming and thus expensive. To avoid these disadvantages, process data should be recorded automatically. Precondition is the implementation of the process within a process-aware information system such as workflow management systems (van der Aalst and Weijters 2004). These systems can generate event logs. Event logs are automatic timestamps documenting order processing. Event logs gathered using techniques of Process Mining enable a relatively fast analysis of processes over a large time span.

Process Mining is a methodology which allows evaluating the execution of processes with the help of automatically generated timestamps. Starting point are customer orders of a process for which the conducted activities at their respective point in time are documented. Beyond these minimum requirements for an analysis it can also be recorded by whom an activity was performed. Every customer order has an unique identification code so that each activity can be assigned properly (van der Aalst 2011). A customer order can thus be described as a sequence of time stamps.

Using the timestamps, the process model can be identified which is a precondition to conduct meaningful measurements. A chosen set of timestamps is analyzed with algorithms to detect the order of performed activities for customer orders (de Medeiros et al. 2007). Using the detected process model, Process Mining techniques can cover three measurement perspectives (van der Aalst et al. 2007):

- *Process perspective:* From this perspective the question is how well customer orders were handled in a process. Thus, the average cycle time, working time, and idle time can be identified. Furthermore, costs can be assigned to evaluate the time needed. The measurement points are determined by the granularity of the process steps implemented in the workflow management system.
- *Organizational perspective:* Within this perspective the performance of the employees working in the process can measured. Thus, the connection between the resources can be analyzed as well as their degree of capacity utilization.
- *Order specific perspective:* Here, the focus lies on individual customer orders. This perspective is of interest if there is an outlier determining the overall process performance. It can be analyzed for a single order, which route through

the process has been chosen, how the performance has been, and which resources have been working on the respective order.

Despite the benefits it has to be noted that event logs are limited to documented activities monitored by a workflow management system. Activities of employees, like informal phone calls, are not documented.

5 Exemplary Application of Process Mining

The example chosen in this section is a loan application process of a medium-sized bank in Germany. In this process corporate loans for small and medium enterprises (SME) without collaterals are handled. Customers of the loan processing are 34 branches of the bank which provide the loans to SMEs. If information or documents are required for handling a SME loan application, the contact takes place through the branches.

When a customer applies for a SME loan at a branch, the loan application is prepared there and forwarded to the loan application process in the bank's back-office. Then, the application is examined by loan clerks. Exceptionally, in the case of high credit amounts, the applications will be first approved by the management board. In a following step it is checked whether the required documents and all needed information have been provided. If documents or information are missing the application is returned to the customer either for supplemental or major revision. If documents and information are complete, there are two possibilities:

- If the loan application has not been approved, it will be done now.
- In the case of special condition agreements, additional processing by a loan officer takes place.

Afterwards, administrative work for all applications will be finished, including possible further inquiries to customers. The latter includes requesting missing signatures of SMEs. If necessary, a post-processing happens as well as a final inspection of the documents leading to archiving the final application.

Data of the loan application process was gathered for a period of 10 months. Within this period 391 loan applications were processed completely, i.e. they were either approved or rejected. The underlying workflow management system documented 7,066 events (timestamps) for all 391 loan applications.

To build the process model, we used the Heuristic Miner of ProM software. This software package makes it possible to analyze event logs via an algorithm, and provides the best results for real-life data (van der Aalst et al. 2004). For the purpose of model building, the data was separated into two halves to ensure an independent and valid procedure. Data from the first half was used to create the model; then the model was tested against the second half. The conformance of the model is 95.0 %, indicating a high representativeness (Rozinat and van der Aalst 2005). Additionally, the model was validated by the process owner of the bank.

Table 1 Occurrence and working time of activities in the process

Activities	Number of occurrences	Average working time (min)
Pre-checking	619	16
Processing of incomplete orders	71	8
Preparation of draft for executive board	4	5
Approval by executive board	3	6
Approval	26	18
Processing approval	8	28
Preparation of special processing	43	12
Processing of special applications	28	17
Checking of applications	373	11
Processing of applications	173	80
Processing of reply	1	2
Re-working	59	24
Checking of documents	16	55
Checking of approvals	1	36
Archiving	377	43

The relevant performance measures of the process are defined as time, costs, and quality. The specific indicators for time are cycle time, working time, waiting time during office hours, and waiting time outside office hours. Based on the timestamps of starting activity and end activity, the respective the cycle time was calculated. The average cycle time of processed loan applications is 22.54 days (MD = 15.25 days, SD = 21.03 days). This average cycle time can be divided into internal idle time outside of business hours (Ø 6.2 days) and internal idle time during business hours (Ø 8.6 days). Therefore, timestamps of customer orders were sorted into the business hours. Additionally, idle time was caused by customers and suppliers but these are not relevant for the performance from an inside perspective. The working time for each loan application itself (Ø 189 min) was identified by calculating the mean time of every activity within the process weighted by the relative occurrence of each activity. Table 1 gives an overview for each activity.

Regarding the costs of processing, the specific indicator was the costs per minute of employees. Further fixed costs did not occur within the process. The work within the process is performed by five groups of employees: Pre-check (1 person, *1.02* €/*min*), Loan processing (12 persons, *1.02* €/*min*), Approval (2 persons, *1.13* €/*min*), Assistant to the Executive Board (1 person, *0.72* €/*min*) and Executive Board (1 person, *2.04* €/*min*). These costs can be directly assigned to the individual activities and multiplied with the working time. The average working costs per loan application are 198.45 €.

Quality was measured in terms of back loops of loan applications. If an application is reverted within the process some information has been wrong, unclear, or missing. In such a case, the quality of the loan application is assumed to be insufficient. Back loops can be identified by checking the timestamps for a repeated usage of the same activity. It has to be ensured that an interruption in the same activity, which leads to two timestamps for the same activity in a row, is not counted. 141 out of the 391 loan applications were affected by back loops leading to a quote of 36.1 % of loan applications with quality issues. For these 141 applications, 178 back loops were detected leading to a back loop rate of 1.26 (SD = 0.34).

Using timestamps it is not only possible to analyze the results for the described performance indicators but also to examine these indicators individually for loan applications. Thus, outliers can be identified and reasons for extreme values can be investigated. Also a correlation between time, costs, and quality can be calculated.

6 Conclusion

If a process manager wants to assess opportunities for improving a given business process, he/she should not only rely on a formal depiction and description of the process. He/she also has to analyze the process performance in-depth. Hence, criteria to determine process performance (i.e., indicators, measures, and figures) have to be defined beforehand. Selecting the "right" criteria, however, is a challenge, as there is no agreement in theory or practice on how to do this best.

This chapter has delivered the procedure of process performance measurement as part of the business process management cycle. Within the steps of this procedure relevant approaches have been presented as well as the possibilities to execute the respective steps. The finding is that companies require a process performance measurement system that is tailored specifically to their vision, strategy, and strategic objectives. Additionally, several opportunities to conduct a systematic measurement of indicators have been highlighted. Moreover, two methodologies to measure process performance have been described. Such methodologies allow gathering and identifying the individually relevant measures to conduct a successful management of business processes. Finally, the example of applying Process Mining to a real case indicates the vast opportunities advanced methodologies offer to measure performance of processes.

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Business Process Analytics

Michael zur Muehlen and Robert Shapiro

Abstract Business Process Management systems (BPMS) are a rich source of events that document the execution of processes and activities within these systems. Business Process Management analytics is the family of methods and tools that can be applied to these event streams in order to support decision making in organizations. The analysis of process events can focus on the behavior of completed processes, evaluate currently running process instances, or focus on predicting the behavior of process instances in the future. This chapter provides an overview of the different methods and technologies that can be employed in each of these three areas of process analytics. We discuss the underlying format and types of process events as the common source of analytics information, present techniques for the aggregation and composition of these events, and outline methods that support backward- and forward-looking process analytics.

1 Introduction

Business process analytics provides process participants, decision makers, and related stakeholders with insight about the efficiency and effectiveness of organizational processes. This insight can be motivated by performance or compliance considerations. From a *performance perspective*, the intent of process analytics is to shorten the reaction time of decision makers to events that may affect changes in process performance, and to allow a more immediate evaluation of the impact of process management decisions on process metrics. From a *compliance perspective*, the intent of process analytics is to establish the adherence of process execution with governing rules and regulations, and to ensure that contractual obligations and quality of service agreements are met.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_10, © Springer-Verlag Berlin Heidelberg 2015

There are three reasons why we might want to measure different aspects of business processes: To evaluate what has happened in the past, to understand what is happening at the moment, or to develop an understanding of what might happen in the future. The first area focuses on the *ex post* analysis of completed business processes, that is on *process controlling* (Schiefer et al. 2003; zur Muehlen 2004). This type of analysis may or may not be based on a pre-existing formal representation of the business process in question. If no documented process model exists or if the scope of the process under examination extends across multiple systems and process domains, such a model may be inductively generated through *process mining* approaches (van der Aalst et al. 2007). The second area focuses on the real-time monitoring of currently active business processes, that is, *business activity monitoring* (Grigori et al. 2004; Sayal et al. 2002). The third area uses business process data to forecast the future behavior of the organization through techniques such as scenario planning and simulation and is known as *process intelligence* (for example, Golfarelli et al. 2004).

Business Process Management systems (BPMS) usually include an analytics component for collecting and analyzing the events that occurred over the life of a process instance, either in real time or after the completion of process instances. While in the early days of workflow automation this facility was intended as a mechanism to debug the automated processes, it became clear early on that the resulting information could be used for more than just technical analysis. As a result, the demand for process dashboards (McLellan 1996) and process information cockpits (Sayal et al. 2002) has led BPMS vendors to offer this technology as an integral part of their products. Often, this is realized through the integration of open source platforms (such as Eclipse BIRT) or through the acquisition of specific technologies (e.g., Global 360s acquisition of CapeVisions, or TIBCO's acquisition of Spotfire). In addition to these reporting and analytics capabilities, an increasing number of BPMS includes a simulation component that allows the exploration of alternative process execution scenarios. In these scenarios, the resourcing, the processes themselves, and/or the workload are altered in order to discover ways to improve the overall performance of a business process.

In Sect. 2, we outline the concept of process analytics by first discussing the data from which analytics information, its sources, and raw formats can be generated. We also outline the basic metrics that can be gathered from raw BPMS events, and how an analyst can interpret these metrics. Furthermore, we discuss the three kinds of process analytics in detail: first historical analytics, then real-time analytics, and finally forward-looking analytics with a particular emphasis on using analytics information for process simulation purposes.

2 Sources for Process Analytics Data

Most process analyses are based on the aggregation, correlation, and evaluation of *events* that occur during the execution of a process. These events represent state changes of objects within the context of a business process. These objects may be activities, actors, data elements, information systems, or entire processes, among others. For example, activities can begin and end, actors can log on and off, the value of data elements may change, and many other events can occur over the typical lifespan of a process instance. The scope of events considered for analysis determines the context envelope of the analysis. In other words, a narrowly scoped process analysis might focus on a single activity by examining just those events that originated from this activity, its performers, and the resources that are input and output of the activity. In contrast, a more widely scoped process analysis might include events from multiple processes, involve data sources outside the organization and involve events from nonprocess-centric information systems.

Figure 1 shows the different stages of process analytics in context. The bottom of the picture depicts a typical heterogeneous IT infrastructure, comprising a BPMS, an electronic content management system, an enterprise resource planning (ERP) platform, and several other systems that are integrated using an enterprise application integration (EAI) solution. Each of these systems contains some capability to represent and execute processes, even if not all of these processes may be represented graphically. For instance, the process scripting language BPEL is a popular description format for system-to-system workflows within EAI platforms such as Oracle's BPEL Process Manager or ActiveEndpoints' ActiveVOS. Each component of the IT infrastructure can be a source of events. From a process management perspective, the events generated by dedicated workflow or BPMS constitute the most natural source of information for analysis. But systems such as an Electronic Content Management system may record events that can be used to detect business events prior to the initiation of a BPMS-supported process (e.g., the arrival of a fax), and transactional systems such as ERP platforms or legacy applications may record

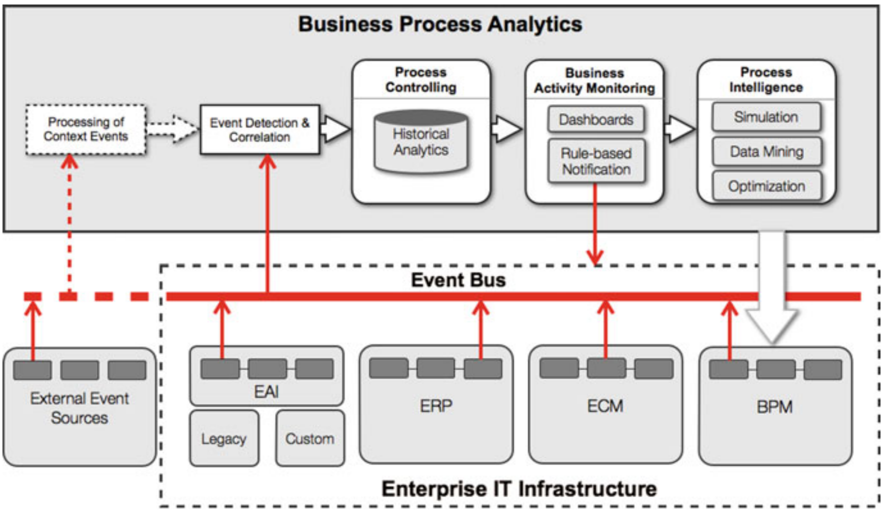

Fig. 1 Business process analytics in context

the manipulation of business data that – taken together with the related process transactions – provides an in-depth picture of the operational state of an organization. EAI platforms may produce events related to the movement of data between legacy systems, and some vendors offer dedicated listening components that are designed to publish events if they detect changes in systems that are not designed to communicate these changes by default. For example, a popular application for these listeners is the surveillance of spreadsheets. If a cell in a spreadsheet changes, the listener sends out an event notification that can cause other systems to react to this event. Certain external systems can also be sources of events that are of interest in a process analytics application. For instance, the performance of an order fulfillment process may be affected by a traffic condition, which is not necessarily reflected in the internally generated events. The design of these open systems is sometimes summarized under the term *event-driven architecture* (EDA).

In order to make sense of process events, they are typically processed in an *event detection and correlation* stage. Event detection is used to uncover changes in operational systems that may not be published by default, for example, changes to a cell in a spreadsheet, as discussed above. Event correlation is used to link events that were generated by separate sources to a common process, for example, by tracing a common identifier such as an order number or a customer ID across multiple systems (zur Muehlen and Klein 2000). The resulting information can be used for historical analysis, real-time control, or predictive intelligence.

3 A Source Format for Process Events

In order to allow for the generic design of a process analytics system, an event format is required that is not specific to the semantics of the underlying process model. Since most BPMS are general-purpose applications in the sense that they are agnostic of the business semantics they support, an event format can be based on the general states a process activity and/or business process traverses through. While each process execution environment may implement a slightly different state machine, a consensus for a standardized state model for audit event purposes has emerged in the BPM software vendor community, as depicted in Fig. 2. The state machine described here is aligned with the state machines described in the related standard specifications Wf-XML (WfMC 2004) and BPEL4People/WS-HumanTask (OASIS 2008a, b).

A business process or a process activity will traverse through this state model over the lifetime of the respective process or activity instance. The two superstates of the model are *open* and *closed*. An activity or process instance in the state open can change state, whereas an activity or process instance in the state closed has arrived in its terminal state and can no longer be manipulated. The states open and closed are divided into a number of substates. In the state *Open.NotRunning*, no work is being performed on an activity or process instance, but the instance may be assigned to a multi-member role, or reserved by an individual process performer. In the state *Open.Running* a process or activity instance is actively being processed.

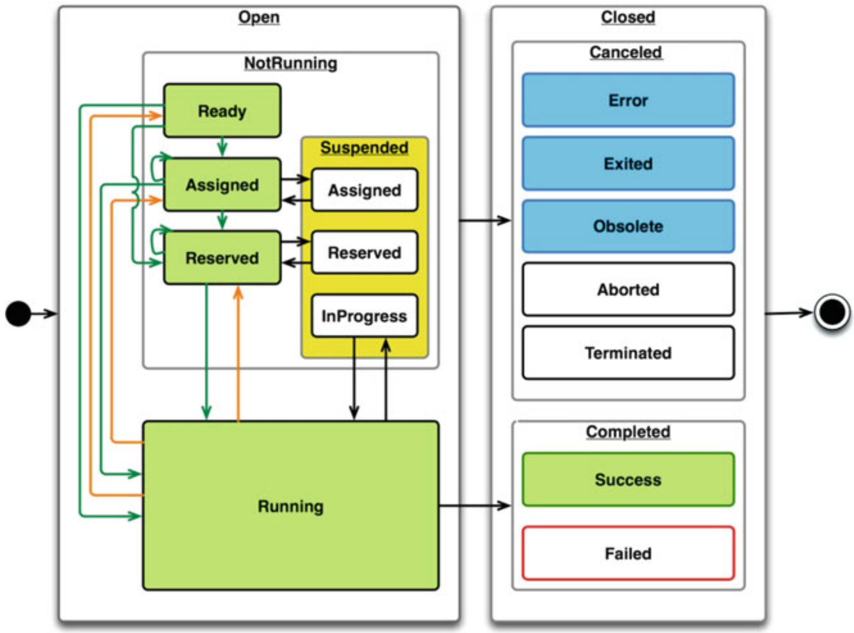

Fig. 2 Process execution state model
Source: (WfMC 2009)

If a process or activity instance is forcefully terminated, it moves to the state *Closed.Canceled*. Some possible reasons for such termination may be a system error, the obsolescence of an activity (e.g., if a timeout or compensation activity occurs), or a manual cancelation. Processes and activities in this state have not achieved their objective. If a process or activity instance has been fully executed, it moves to the state *Closed.Completed*. Processes and activities in this state may or may not have achieved their objective, which a system can indicate through the states *Closed.Completed.Success* and *Closed.Completed.Failure*.

Individual process management products may support additional states beyond those represented in Fig. 2, and thus may produce additional runtime events. For example, a system could record that an activity was completed because a deadline expired. In this case, the system would record a final state of *Closed.Completed.TimeOut*. Alternatively, a process management system might only implement a subset of the states described in Fig. 2, thus reducing the different kinds of runtime events it can produce. For instance, a system might not allow for the suspension of activities, and thus it would not be able to produce audit events such as *Open.NotRunning.Suspended.InProgress*.

Events generated by a BPMS typically have a proprietary format, although there have been attempts at standardizing event formats (e.g., WfMC 1999; van Dongen and van der Aalst 2005). Figure 3 shows the structure of a process analytics event following the XML business process analytics format (BPAF) standard published

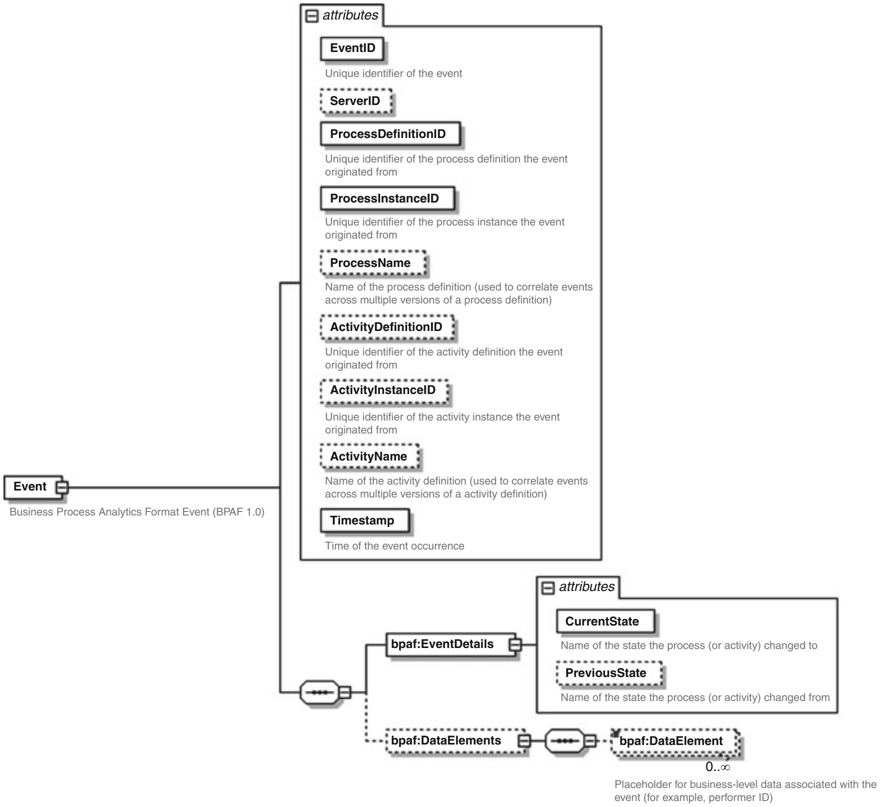

Fig. 3 BPAF event format (WfMC 2009)

by the Workflow Management Coalition (WfMC 2009). An event contains at the minimum a unique identifier, the identifiers of the process definition and instance that it originated from, a time stamp, and information about the state of the process at the time of the event.

With this information, and the state model discussed above, a process analytics system will be able to deliver basic frequency and timing information to decision makers, such as the cycle times of processes, wait times, and counts of completed versus pending process instances. In order to deliver more detailed information, a number of optional data items can be included in the event format. An event may contain information about the server that generated the event, which is helpful in a distributed execution environment if an analyst is trying to isolate a location-specific problem. Furthermore, an event may contain the identifier of the activity it relates to, both for the activity definition and the activity instance, to allow for more fine-grained analysis. It may also contain the names of processes or activities to facilitate the aggregation of events across multiple versions of the same process or activity (since different versions of the same process will typically have different identifiers).

Arbitrary data elements may be enclosed in an event in order to preserve specific business-relevant data that was present at the time of event occurrence. A common use of this field would be the inclusion of the performer ID, in order to relate events to individual organization units, performers, or machines. Finally, an event may contain a description of the process/activity state prior to its occurrence in order to identify the specific state transition that is described by the event. This is useful in situations where a state can be reached from multiple other states, but through the use of timestamps this information can typically be recreated by stepping backward in time through the recorded events.

4 Process Metrics

The analytic figures that can be used to understand process performance range from absolute measurements, such as cycle times and wait times, to variance measurements, such as service-level variability, and qualitative measures, such as customer comments on a particular process. While the design of process performance measurements is discussed extensively in another chapter of this book (Leyer, Heckl, Moormann 2014), this section focuses on the construction of elementary process metrics and their enhancement with line-of-business information.

The most elementary process metrics are obtained by analyzing the time stamps of several process-related events that belong to the same process or activity instance. The difference between these time stamps can provide an analyst with some basic insights into the behavior of a process instance.

At the most basic level, a process management system delivers frequency and temporal information to decision makers. Figure 4 shows the traversal of the state model described in Fig. 2 over the life cycle of a regular activity instance that involves a human performer. The Business Process Management system schedules the activity instance for execution when all of its preconditions are met. In the example, the system automatically places the activity instances on the work list of a role that may be shared by multiple performers (state *Open.Assigned*). One of these performers selects the work item (state change to *Open.Reserved*) and starts working on the activity instance (state change to *Open.Running.InProgress*). Some BPMS will move the activity instance into this state automatically upon selection of the work item, and thus will not record the *Open.Reserved* state. Later on, the user decides to take a break, and thus suspends and later resumes work on this activity instance (state changes to and from *Open.Running.Suspended*). When the user finally completes the activity instance, the BPMS changes the state of the instance to *Closed.Completed.Success*. Each state change in this life cycle will be recorded by the BPMS with the current time, the identifier of the related process instance, and – depending on the system configuration – additional data elements, such as the identifier of the user performing the activity instance, or workflow-relevant data that was available at the start of the activity instance.

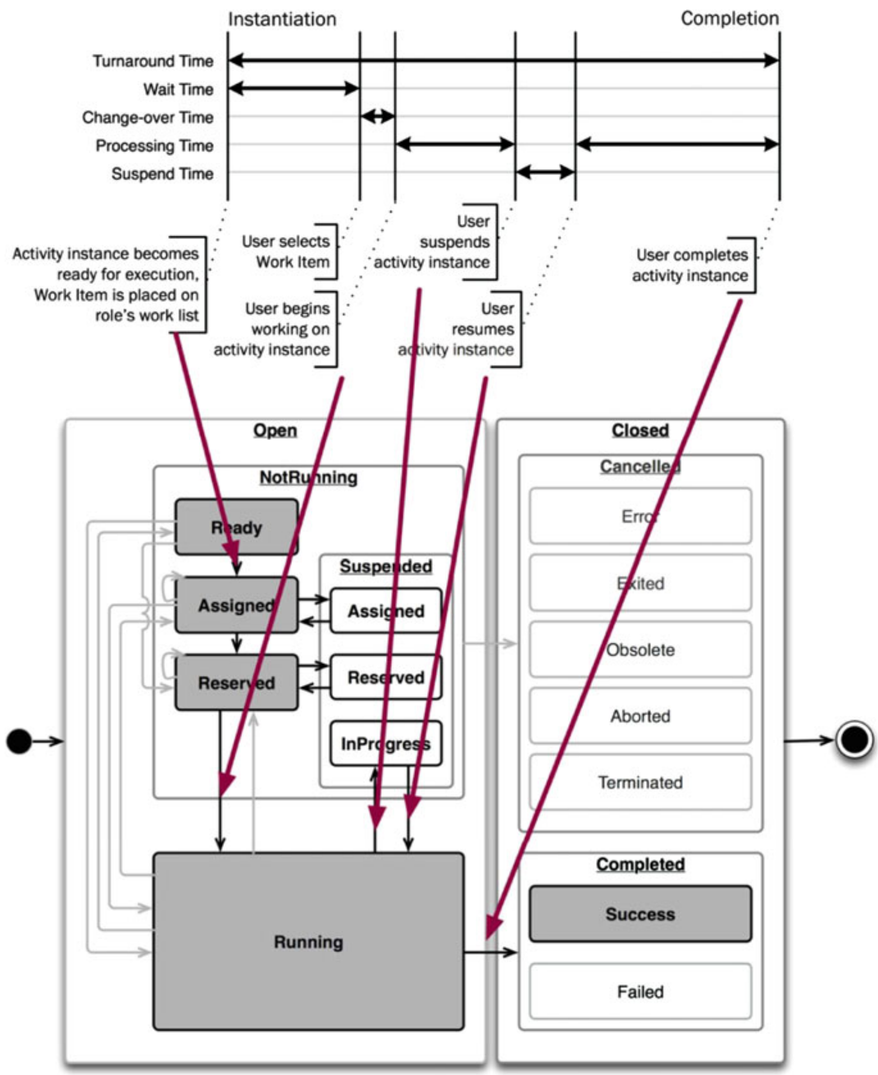

Fig. 4 Activity instance metrics

Based on these events, an analyst can determine the wait time for each activity instance and type (i.e., the time elapsed before a user chose to select a particular work item). This may provide insight into user preferences or aversion toward certain types of tasks. The difference between work selection and the actual start of the activity instance represents the changeover time required to prepare for the activity instance. In industrial processes, this would be the time required to retool a workstation, and in office processes, this might be the time required to mentally adjust to a different task type. In multitasking environments, this mental adjustment can have a significant impact on overall performance (Burmistrov and Leonova 1996). If the previous task of the performing user is known, an analyst might be able to determine how compatible or conflicting two different task types are, and use this information to fine-tune the work assignment policies embedded in the process model or the BPMS. The time spent in the *Open.Running.InProgress* state provides the net processing time of the activity instance, while time spent in the *Open.Running.Suspended* state represents the suspend time of the activity. The difference between the first instantiation of the activity (arrival in the state *Open.NotRunning.Assigned*) and the final completion (arrival in the state *Closed.Completed.Success*) provides an analyst with the gross processing time of the activity. If permitted, an aggregation of these metrics across multiple activities of the same performer may give an analyst insight into learning effects and training effectiveness (Rosemann et al. 1996; zur Muehlen and Rosemann 2000).

Each of these fundamental metrics can be computed at the instance level and can be aggregated to an average model level metric. In addition, the execution frequency of activities and the traversal frequencies of certain control flow connections provide an analyst with the frequency distribution of alternative process pathways. Time stamps of process instantiation and activity instantiation can be used to determine the arrival distributions of individual process types, and the distribution of activity start times may provide insight into the work allocation on a daily basis. All of these metrics can be obtained from a BPMS automatically and at very little cost. However, they provide only limited insight into the underlying causes of process performance. To examine such causes, business-level information has to be integrated with the temporal and frequency information.

To this end, extended metrics add line of business attributes to key audit events. If, for instance, the customer ID or the order numbers are recorded in the process audit events, an analyst can correlate a process instance with the relevant business object that was being handled by this process instance. If this business information is available for retrieval in a data warehouse, an analyst may be able to analyze the behavior of process instances that share certain lines of business attributes (such as customer region or order amount). By using this technique in combination with OnLine Analytical Processing, an analyst may be able to determine those line-of-business attributes that affect the process performance or the choice of certain control flow paths.

5 Quality Criteria for Process Metrics

There are five key criteria for process metrics. They need to be accurate, cost effective to obtain, easy to understand, timely, and actionable.

The need for *accuracy* is self-evident: if the metrics do not correctly reflect reality, or if the inferred relationship between a metric and its underlying causes is incorrect, it is difficult for a decision maker to recommend changes that will have an impact on this metric. The distinction between cause and effect is important to note in this context. BPMS measure the effects of decisions, actions, and technical operations. They typically do not document the underlying causes for these effects.

Thus, just by looking at the automatically collected metrics a decision maker might want to infer causality when in fact there is no connection between two events. Only the combination of technical metrics with line-of-business attributes will provide a decision maker with the necessary context to draw such inferences.

The need for *cost-effective* measurement relates the expenses for a measurement infrastructure with the value derived from the availability of a particular metric. Internal metrics are generally cheaper to obtain than metrics that rely on external information sources such as markets, competitors, or customers. But the business value derived from decisions based on internal metrics often is lower than that of decisions based on an accurate understanding of the organization's ecosystem. Organizations that have a technical process management infrastructure in place will have an easier time gathering process metrics. However, these metrics mainly relate to internal operations such as resource scheduling, processing, and wait times for internal activities. Again, the integration of line-of-business attributes will increase the value of these process metrics, but at the same time this integration will increase the cost of measurement.

The need for an *easy-to-understand* presentation of process metrics relates to the cognitive effort required by decision makers to comprehend and act on analytics and intelligence information. If the cognitive effort to parse the presented information is high, more time will elapse before a decision maker will decide on an appropriate action. If the cognitive effort is too high, the information may be ignored and thus have no value at all to the decision maker. The presentation of metrics thus has a direct impact on decision latency.

The *timeliness* of analytics information is related to both the cost effectiveness, as faster information availability is typically more expensive than slower reporting of information, and to how actionable the information is, since delayed information availability may mean that a decision maker has no time to act anymore. Figure 5 shows the potential loss of business value that is caused by a delayed reaction to a business-relevant event. If a decision maker can react to a process disruption or disturbance in a timely fashion, it may be possible to mitigate the effects of the disturbance before it impacts the process customer. For instance, if it is apparent that a customer's luggage was not transferred to a connecting flight, an airline representative could greet the arriving customer at the gate and explain the situation, thus avoiding wait time and potential aggravation for the customer in the baggage claim area. If information about the misrouted luggage is reported too late, the customer will have waited in vain for his luggage and the resulting impression of the airline's service may result in a permanent loss of customer loyalty.

In most situations, there will be a delay between the occurrence of a business-relevant event and the initiation of remedial action. This delay can be decomposed into data, analysis, decision, and implementation latency.

- *Data latency* is the delay between the occurrence of a real-world event and the capturing of this event in an information system for further analysis. Contemporary information systems rely on publish/subscribe mechanisms that send events to a messaging bus from where they can be read by registered subscribers. The technical

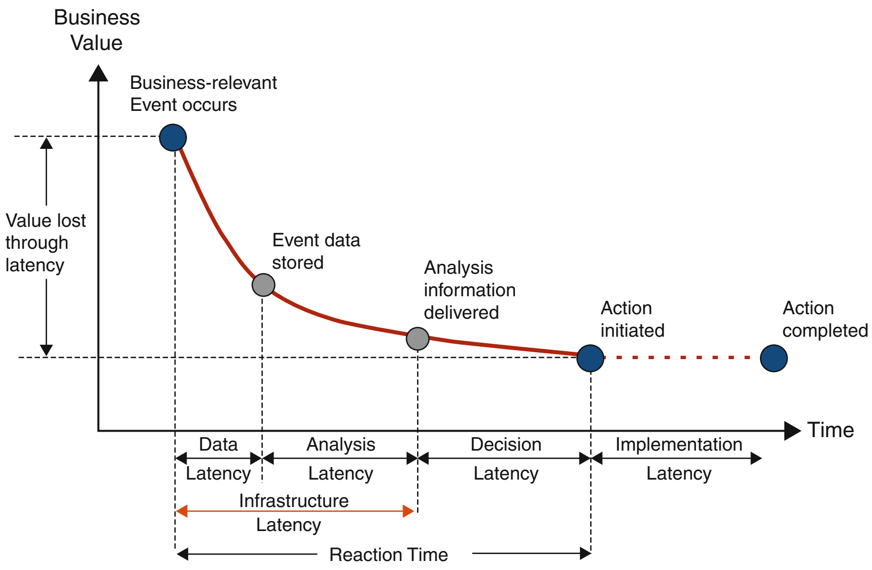

Fig. 5 Latency types in process monitoring (cf. Hackathorn 2002)

delay is relatively low, but there may be a delay between the occurrence of an event in the real world (e.g., baggage is misplaced) and the creation of an electronic representation (e.g., a recognized mismatch of passenger and baggage on a flight).

- *Analysis latency* is the delay between the storage of event information in a repository and the subsequent transformation of this event information into an analyzable format, such as a notification, report, or indicator value. Traditional management accounting systems that rely on fixed cycles for the generation of reports create latency at this stage because report generation is not synchronized with event occurrence. The goal of real-time business intelligence systems is therefore the delivery of information whenever relevant events occur, not just in fixed cycles.
- *Decision latency* is the delay between the availability of a reported event and the initiation of remedial action. This latency results from the time it takes decision makers to read and comprehend the event report, to evaluate possible decision alternatives, to assess the consequences of their actions, and to ultimately initiate an activity.

Data and analysis latency directly correlate with the technical infrastructure used for the collection and representation of business-relevant events. Their sum can be treated as the infrastructure latency underlying the system. The use of BAM technology can reduce this latency through the shortening of the cycle time for capturing, storing, and visualizing business-relevant events. To a lesser extent, an adequate representation of business events based on the job requirements and decision privileges of decision makers can shorten the decision latency as well. Implementation latency is dependent on the responsiveness of the organization as well as the technical infrastructure available, and is outside of the scope of BAM systems.

Implementation latency is the delay between the decision of a stakeholder and the actual implementation of the action the stakeholder decided upon. In the context of a BPMS, this delay may be caused by the effort necessary to modify a given process. Some decisions, such as changes to staffing levels, can typically be deployed without modifying the process model, while other changes may require a redesign of a process model. While some systems (e.g., Fujitsu Interstage BPM) allow for the dynamic modification of running process instances, most BPMS do not allow for structural modifications (e.g., the introduction of new activities or gateways) once a process instance has been initiated. Any structural modifications in these systems require a fresh deployment of the modified process model, and consequently, the changes take effect only for new process instances.

Finally, process metrics need to be actionable in order to have value to decision makers. This means that there should be a clear relationship between actions of the decision maker and the observed metrics. If, for instance, a process analysis uncovers large variances in the processing time of a particular activity but the underlying causes are unknown, a decision maker will not be able to effectively decide on a course of action that will positively change this metric. In these cases, the use of simulation technology might help a decision maker understand better how a certain metric can be impacted. We discuss this in detail in the section on predictive analytics below.

6 Historical Process Analysis

The analysis of process metrics after the completion of processes is typically used when trends across multiple process instances or time periods (such as fiscal quarters or years) are of interest. It can also serve as a baseline, if process changes are imminent and an organization wants to understand if and how these changes will affect process metrics. This type of analysis is valuable as a first step to understand the actual process performance of an organization. The source data for historical process analysis can be found in the log files and event streams of workflow systems and other types of transaction processing software.

While the automated gathering and processing of this type of information is an easy and accurate way to determine process metrics, organizations that are just beginning to analyze their processes may not have the necessary infrastructure to obtain this type of data. In these cases, a manual measurement approach is often the only feasible way to obtain this information (zur Muehlen and Ho 2008).

Historical process information can be stored in data warehouse structures, following star or snowflake schemas of conventional data warehouses (Pau et al. 2007; zur Muehlen 2004; List et al. 2001). For the analysis of this information, OnLine Analytical Processing tools can be employed. If line of business data is captured with the elementary process metrics, the warehouse may contain a hypercube with many dimensions, as the warehouse structure of process audit data intersects with the warehouse structure of the line of business information. The selection of appropriate dimensions for analysis can thus require significant domain expertise.

7 Real-Time Process Analysis

Real-time process analytics focuses on the in-flight control of running process instances. Typically a business activity monitoring (BAM) system updates a set of key performance Indicators in real time (McCoy 2002). When a rules engine is applied to these indicators, a BAM system can generate alerts and actions, which inform managers of critical situations and may alter the behavior of the running processes. A typical example is the monitoring of workload in a BPMS. If the queue of pending work items for any users exceeds a certain threshold, the BAM system can automatically initiate the redistribution of excess work to other qualified performers. If no such performers are available, the system can then alert a manager to manually intervene. The purpose of BAM is to provide real-time control over currently active process instances.

The visualization of the analysis results commonly takes place in process dashboards that resemble a manufacturing control station. Figure 6 shows such a dashboard from a commercial Business Process Management system (Global 360). A properly designed dashboard allows an analyst to drill down into the process instances whose metrics are represented, in order to perform on-the-fly adjustments such as the reassignment of a work item.

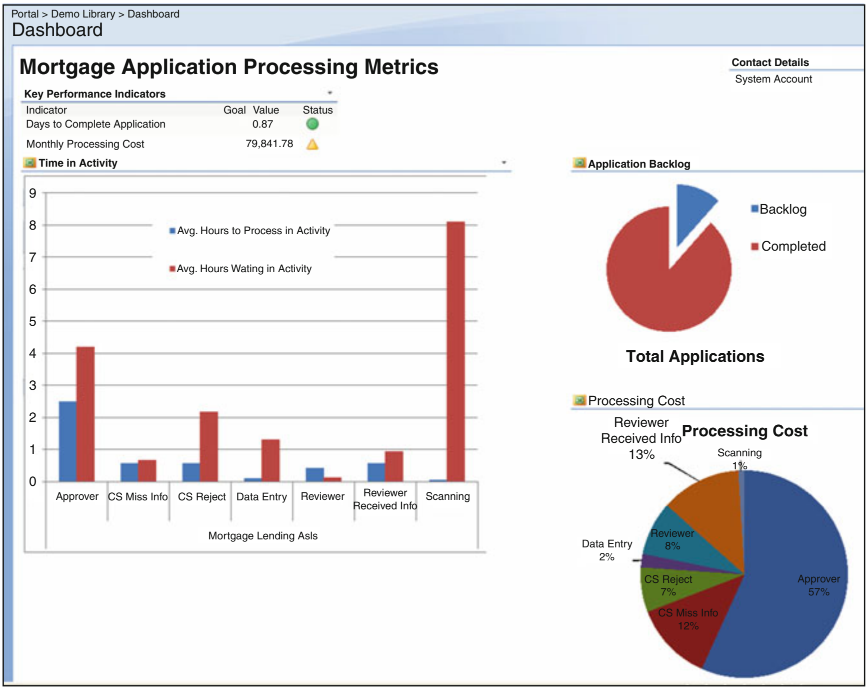

Fig. 6 Process dashboard

An advanced variant of the BAM systems sends analytics events to an embedded rules engine that may trigger automated actions such as the automatic notification of decision makers or the automatic reprioritization of work. This configuration allows the automation of certain exception handling mechanisms and results in the implementation of a simple sense-and-respond environment. BAM systems have an advantage over traditional reporting systems (as well as historical process analytics) in that they reflect current operations that have not yet concluded. Their information is thus available in a more timely fashion than that of a warehouse-based system. However, the nature of the dashboard displays often limits the degree with which an analyst can combine the metrics with line-of-business attributes, since this relationship needs to be known during the design phase of the dashboard.

8 Predictive Process Analysis

Predictive process analysis aims at assessing the impact of process design changes on future instances of a business process. This type of analysis can take place during the initial design of a process model (build time), for example, to determine the performance trade-off between different process configurations, or after a process model has been deployed, for example, to determine whether a newly created process instance will complete within a given set of constraints. Three different kinds of predictive process analysis techniques can be distinguished: simulation, data mining, and optimization.

8.1 Simulation[1]

Simulation models are typically used to perform what-if analyses of process designs before they are implemented. The use of simulation is distinct from animation features offered by some workflow products. While animation lets a developer step through the execution of a single process instance in order to detect potential model errors, simulation typically focuses on the execution of a number of process instances to determine resource and activity behavior under system load. Typical simulation scenarios focus on changes at the resource level (e.g., what if we bought a faster check sorter?), changes of the process structure (e.g., what if we allowed existing customers to skip the credit check activity?), or changes in the process context (e.g., what if the number of customer orders increased dramatically because of a marketing campaign?).

Simulation for new process models can be a useful tool to establish a baseline of expected performance that can be fed into BAM or process controlling platforms.

[1]For a thorough discussion of common pitfalls of process simulation models we point the interested reader to van der Aalst (2014).

In some instances, it may be useful to develop a simulation model of an existing manual process in order to establish a contrast to an improved process design. Figure 7 shows the output of a BPMS simulation component (SunGard IPP) that annotates a process model with information about work queue length for the individual roles, processing times for the individual activities, and transition frequencies for the decision gateways.

The typical type of simulator for making predictions in a business process environment is a discrete event simulator. Most BPMS are well suited to serve as process simulators since they already contain an engine that advances process instances based on the occurrence of individual events. Instead of notifying potential process participants and invoking applications, a simulation engine will simulate the behavior of these resources according to parameters defined in a simulation scenario.

A process simulation scenario consists of the following:

Process Definitions. While many simulations focus on an individual process (e.g., to optimize the account opening process), resources typically participate in the execution of multiple processes. To accurately reflect these dependencies, it may be useful to include more than one process in the simulation scenario. The resulting process definitions provide, at a minimum, information about the activities performed, the routes taken, the rules impacting which routes and activities to perform, and the resources (human and automated) used to perform the activities.

Incoming Work (Arrivals). Each scenario must involve work to be processed. The scenario description includes information about when the work arrives, as well

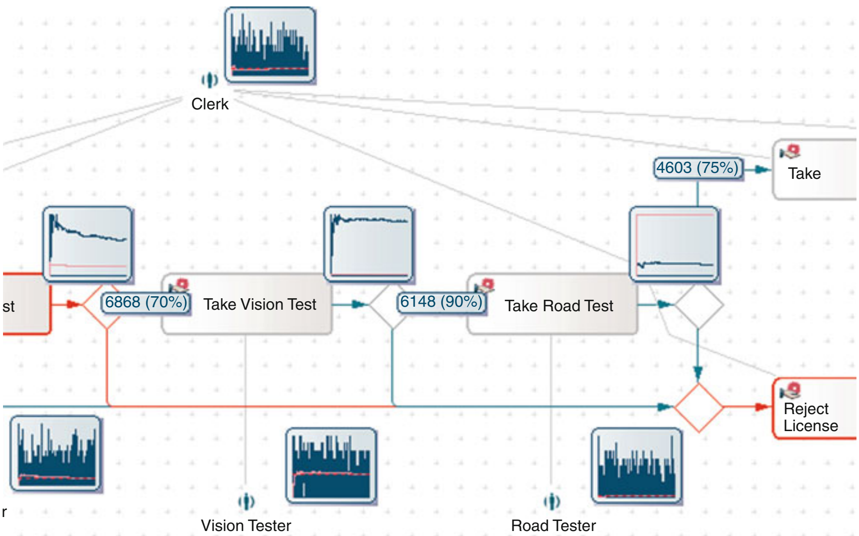

Fig. 7 Process model with simulation data overlay

as all appropriate attributes of the work (e.g., region, amount, size) that may have an impact on processing and routing.

Figure 8 shows the arrival distribution editor of a simulation-enabled workflow system (SunGard IPP). The arrival rate indicates how many instances of the process in question are started on any given day. The business calendar is used to reflect weekends and holidays in the simulation scenario. Finally, the daily distribution area is used to approximate the creation of process instances at different times during a workday. The last aspect can have a significant impact on processing and wait times: for a process that is instantiated by the receipt of mail, the bulk of process instances might be created around the time of physical mail delivery, that is, once or twice a day, while the initiation of a process that is instantiated over the phone may be more evenly distributed throughout the day.

Resources, Roles, and Work Shifts. As work is routed to activities in a process, resources are required to perform each activity. Resources may be human resources; they may be pieces of equipment; or they might simply be application systems. Roles are often used to describe the function performed and the skill required to carry out these functions. Specific resources are then described as performing defined roles. The availability of resources and roles can also be controlled by using shift information and can be defined in a similar fashion to the arrival distribution of the process in question. If a resource participates in multiple processes, it is useful to assume less than 100% resource efficiency for simulation purposes; otherwise, the simulation results will assume that each resource devotes its entire availability to the simulated process.

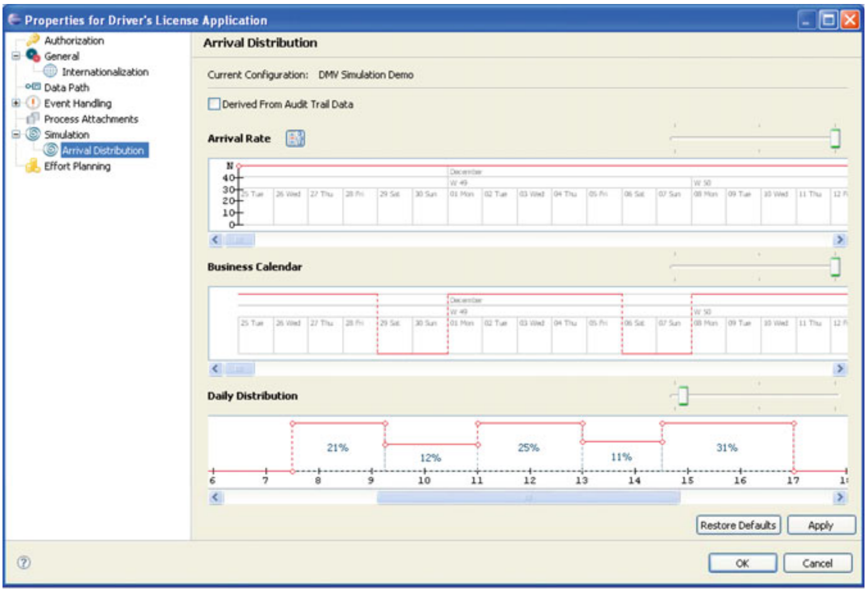

Fig. 8 Defining the arrival distribution of a simulation scenario

Activity Details: In order for the simulator to reflect the real-world processing of a business process, additional information is often appended to the scenario. The duration of an activity is typically not defined in a workflow model, but is included in the scenario information (historical data collected by the analytics may be the source of this information). This and many other details can be expressed as a single integer or a complex expression involving the attributes of the work and/or the use of distribution functions for randomness. Figure 9 shows an example of a distribution duration editor for a process activity called *Perform Background Check*. In this example, the duration of each activity instance is governed by a Gaussian distribution with an expected value of 5 min and a standard deviation of 1.

If the simulation pertains to a new or significantly redesigned process, the duration information may not be known, and therefore estimates or probability distribution functions have to be employed. But if the simulation relates to an established process, it may be possible to derive this information and other scenario data from the historical log files of past process instances, which will lead to more accurate simulations. The integration of simulation components within business process management suites makes the implementation of such history-based forecasting mechanisms increasingly popular. The BPMS shown in Fig. 9 (SunGard Infinity Process Platform) allows the modeler to use historical process execution logs (Audit Trail Data) to automatically calculate the distribution based on historical data, which reduces the number of assumptions necessary to create the simulation model.

Routing Information. Simulation scenarios require additional information that is typically not part of a workflow model, in particular, routing information which tells the simulator under what conditions certain process paths are taken. Routing

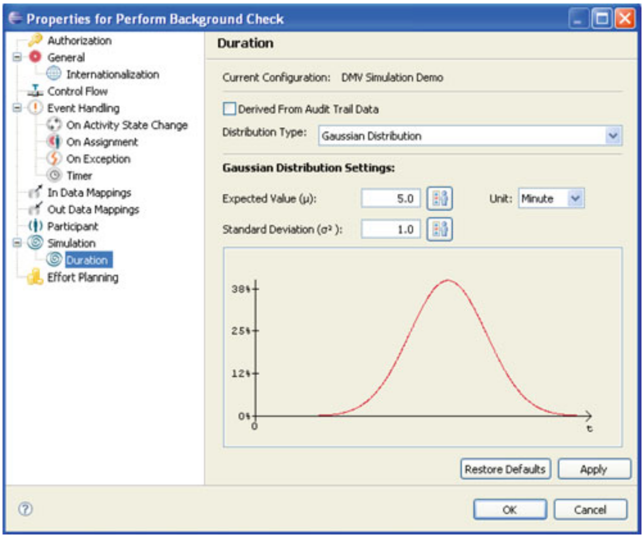

Fig. 9 Duration distribution editor for a process activity (Source system: SunGard IPP)

information is typically based on rules that exist in the process definition, but it is often amended with percentages that reflect the likelihood of a certain outcome or path. In the simplest case, this routing information can be derived from historical data, or simply estimated by subject matter experts. A more accurate way to determine routings is for the simulation engine to perform the same type of evaluation of workflow-relevant data that a BPMS would perform during process execution. In such a scenario, the simulation engine would be supplied with (either actual or hypothetical) work attributes that characterize each process instance to be simulated. If this information can be derived from past execution, it enables the design of *replay* simulation scenarios, for example, a simulation of actual prior process instances within a potentially redesigned process and resource scenario.

A simulation run generates new data, which in turn can be used for analytics purposes, that is, the simulation results can be fed into a process controlling or BAM environment for reporting and visualization purposes, or to establish a baseline for a process design that has yet to be implemented.

8.2 Data Mining

The behavior of business processes depends on many factors: the design of the process and its embedded rules, the arrival pattern of new process instances, the availability of resources and their skill level, the attributes of the business cases processed in each process instance, and other external business factors. Historical process analytics use business-relevant data to classify and navigate process instances and their related performance information. Simulation models are used to forecast the average behavior for a large set of process instances and may use workflow-relevant data to simulate business rules embedded in the process structure. Data mining for process analytics strives to establish correlations between key performance indicators and process-external factors, such as work item attributes, resource schedules, or arrival patterns. If these correlations can be established with sufficient accuracy, it is possible to forecast the behavior of a single process instance, given the current state of the process execution infrastructure and the attributes of the business case to be processed.

A typical application for a mining model would be the analysis of an incoming customer application to provide an estimated processing time to the customer. In order to obtain this forecast, an analyst would mine prior process instances to determine the relationship between the attributes of each business case and the cycle time recorded for each process instance. Based on the attributes of an incoming application, the mining algorithm could then predict the processing time for this specific case.

Another application for a mining model would be the optimization of branching rules in a process. Figure 10 shows a mining analysis of 600 instances of a credit approval process using Microsoft SQL Server. Of the overall set, 350 applications

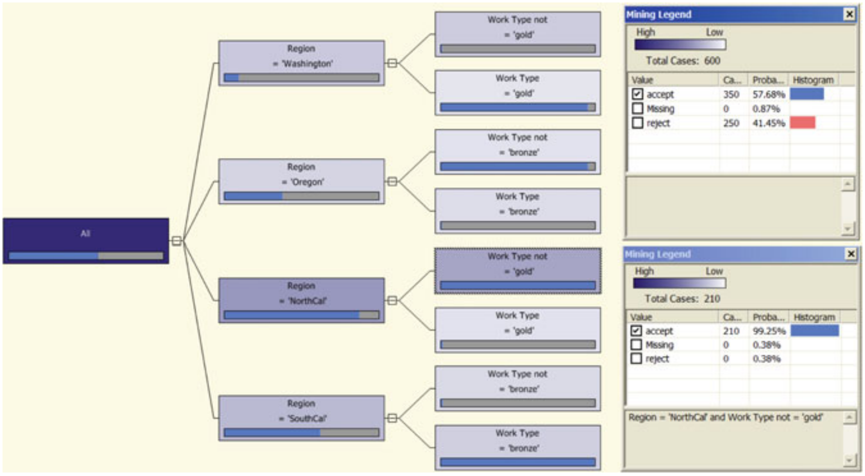

Fig. 10 Data mining example for process optimization

were accepted, while 250 were rejected. In a general simulation scenario, an analyst might use this information to define the simulation scenario with a 58% acceptance probability and a 42% rejection probability. However, if we utilize data mining and analyze the attributes *region* and *work type*, we can determine that all 210 cases with the values “NorthCal” and “gold” have been accepted. Thus a process analyst could create a straight-through-processing rule that would allow cases with these attributes to be automatically accepted, rather than being routed through a manual review.

While the example above is based on just two parameters, most processes are affected by a significant number of business attributes. The design of an appropriate mining structure thus requires an analysis of historical data and subject matter expertise.

There are several differences between the simulation and the data mining approach to process analytics:

- A simulation model must be a sufficiently accurate representation of the collection of processes being executed. It can make predictions for situations not previously encountered so long as the underlying processes have not changed.
- Data mining predictions are based on a statistical analysis of process instances that have already been completed. A trained mining model assumes that these historical patterns are still valid.
- Simulation is computationally intensive. It takes significant time to obtain predictions, in particular if the simulation engine uses workflow-relevant data to enact each process instance in the simulation scenario.
- In data mining, the training is computationally intensive, but once a mining model is trained, predictions can be made at an extremely fast pace. However, periodic retraining may be required to keep the model accurate.

8.3 *Process Optimization*

Automatic process optimization represents the most advanced application of process intelligence and uses historical process analytics and process simulation to generate and evaluate proposals for achieving a set of goals. The analysis of the process structure in conjunction with historical data about processing delays and resource availability allows for the intelligent exploration of improvement strategies.

Optimization is a form of goal-seeking simulation. It uses process goals formulated as key performance indicators, analyzes historical process metrics, and proposes what changes are likely to help attain these goals. It can systematically evaluate the proposed changes, using the simulation tool as a forecasting mechanism. Optimization can be performed in a fully automated manner, with the analysis termination upon satisfying the goal or recognizing that no proposed change results in further improvement. A typical example for the application of optimization technology is the optimization of staff schedules while focusing on end-to-end cycle time and processing cost as key performance indicators. Process optimization technology is currently the domain of specialist providers, but the architecture of BPMS suggests that it will find its way into commercial BPMS over time.

9 Summary

Business process analytics leverages event traces generated by a BPMS infrastructure to generate metrics that feed historical reports, real-time dashboards, and predictive analytics instruments such as simulation and optimization tools. At the core of each of these instruments is a common understanding of the events generated by a process management platform as they follow a universal state model. While basic metrics such as cycle times, frequencies, and utilization can be obtained from the audit trail events alone, most decision makers will require the inclusion of some business-relevant data to place the process metrics in context.

Challenges for process analytics exist in the form of infrastructure systems that are not process aware, yet contribute to the completion of business processes, the sheer number of events generated, the heterogeneity of event formats, and the domain knowledge required to design analytical models, be they hypercubes that integrate process and business data, mining models that correlate business-relevant attributes with process behavior, or simulation and optimization models that correctly reflect the constraints of the real world.

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Managing Regulatory Compliance in Business Processes

Shazia Sadiq and Guido Governatori

Abstract The ever-increasing obligations of regulatory compliance are presenting a new breed of challenges for organizations across several industry sectors. Aligning control objectives that stem from regulations and legislation with business objectives devised for improved business performance is a foremost challenge. The organizational as well as IT structures for the two classes of objectives are often distinct and potentially in conflict. In this chapter, we present an overarching methodology for aligning business and control objectives. The various phases of the methodology are then used as a basis for discussing state-of-the-art in compliance management. Contributions from research and academia as well as industry solutions are discussed. The chapter concludes with a discussion on the role of BPM as a driver for regulatory compliance and a presentation of open questions and challenges.

1 Introduction

Compliance is defined as ensuring that business processes, operations, and practice are in accordance with a prescribed and/or agreed set of norms. Compliance requirements may stem from legislature and regulatory bodies (e.g., Sarbanes-Oxley, Basel II, HIPAA), standards and codes of practice (e.g., SCOR, ISO9000), and also business partner contracts. The market value for compliance-related software and services was estimated as over $32 billion in 2008 (Hagerty et al. 2008). The boost in business investment is primarily a consequence of regulatory mandates that emerged as a result of events, which led to some of the

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_11,

largest scandals in corporate history such as Enron, WorldCom (USA), HIH (Australia), and Societe Generale (France). In spite of mandated deadlines, there is evidence that many organizations are still struggling with their compliance initiatives. Thus, compliance is an important objective of many organizations and, therefore, plays a major role in the strategic alignment of BPM initiatives (Rosemann and vom Brocke 2014).

Compliance is historically viewed as a burden, although there are indications that businesses have started to see the regulations as an opportunity to improve their business processes and operations. Industry reports (BPM Forum 2006) indicate that up to 80 % of companies expect to reap business benefits from improving their compliance regimens.

In general, a compliance regimen must include three interrelated but distinct perspectives on compliance, namely, corrective, detective, and preventative.

Corrective measures can be undertaken for a number of reasons, ranging from the introduction of a new regulation impacting upon the business, to breech reporting, to the organization coming under surveillance and scrutiny by a control authority, or, in the worst case, to an enforceable undertaking. Corrective measures undertaken in a proactive manner, position the organization favorably with regulators or other control authorities.

Detective measures are undertaken under two main approaches. First is *retrospective reporting*, wherein traditional audits are conducted for "after-the-fact" detection, through manual checks by consultants and/or through IT forensics and business intelligence (BI) tools. A second and more recent approach is to provide some level of automation through *automated detection*. The bulk of existing software solutions for compliance follow this approach. The proposed solutions hook into a variety of enterprise system components (e.g., SAP HR, LDAP Directory, Groupware, etc.) and generate audit reports against hard-coded checks performed on the requisite system. These solutions often specialize in certain class of checks, for example, the widely supported checks that relate to Segregation of Duty violations in role management systems. However, this approach still resides in the space of "after-the-fact" detection, although the assessment time is reduced and correspondingly the time to remediation and/or mitigation of control deficiencies is also improved.

A major issue with the above approaches (in varying degrees of impact) is the lack of sustainability. Even with automated detection facility, the hard-coded check repositories can quickly grow to a very large scale, making it extremely difficult to evolve and maintain them for changing legislatures and compliance requirements. In addition to external pressures, there is often a company internal push toward quality-of-service initiatives for process improvement, which have similar requirements.

In this chapter, we promote the use of sustainable approaches for compliance management, which we believe should fundamentally have a *preventative* focus, thus achieving *compliance by design* (Sadiq et al. 2007). That is, compliance should be embedded into the business practice, rather than be seen as a distinct activity. In particular, we argue that a compliance-by-design approach that capitalizes on

Business Process Management (BPM) techniques has the potential to include also detective and corrective measures, leading to a holistic and effective compliance regimen.

The fundamental feature of the compliance-by-design approach is the ability to capture compliance requirements through a generic requirements modeling framework, and subsequently facilitate the propagation of these requirements into business process models and enterprise applications.

The biggest challenges in this regard is aligning control objectives that stem from regulations and legislation, with business objectives devised for improved business performance (KPMG 2005). The organizational as well as IT structures for the two classes of objectives are often distinct and potentially in conflict.

This chapter is dedicated to developing an understanding of the issues and challenges found in achieving the alignment between business and control objectives.

To this end, we will first introduce a guiding scenario in order to establish basic terms and concepts. We then present an overarching methodology for compliance management that focuses on aligning business and control objectives. The methodology demonstrates the use of Business Process Management and related technologies as a driver for managing compliance and is primarily intended to achieve compliance by design. Using the methodology as a basis for discussion, we will then provide a discussion on recent developments in compliance management services and solutions covering contributions from both academia as well as industry. We further present a brief case study targeted at two specific phases of the methodology. The analysis of current solutions as well as the case study indicate that a process-driven approach to compliance management is a highly effective way to address this complex problem. The chapter concludes with a discussion on open questions and challenges toward effective compliance management.

2 Scenario and Background

Consider the following example. In 2006, a new legislative framework was put in place in Australia for anti-money laundering. The first phase of reforms for the Anti-Money Laundering and Counter-Terrorism Financing Act 2006 (AML/CTF) covers the financial sector including banks, credit unions, building societies, and trustees, and extends to casinos, wagering service providers, and bullion dealers. The AML/CTF act imposes a number of compliance obligations or *control objectives*, which include the following:

- Customer due diligence (identification, verification of identity, and ongoing monitoring of transactions)
- Reporting (suspicious matters, threshold transactions, and international funds transfer instructions)
- Record keeping
- Establishing and maintaining the AML/CTF program

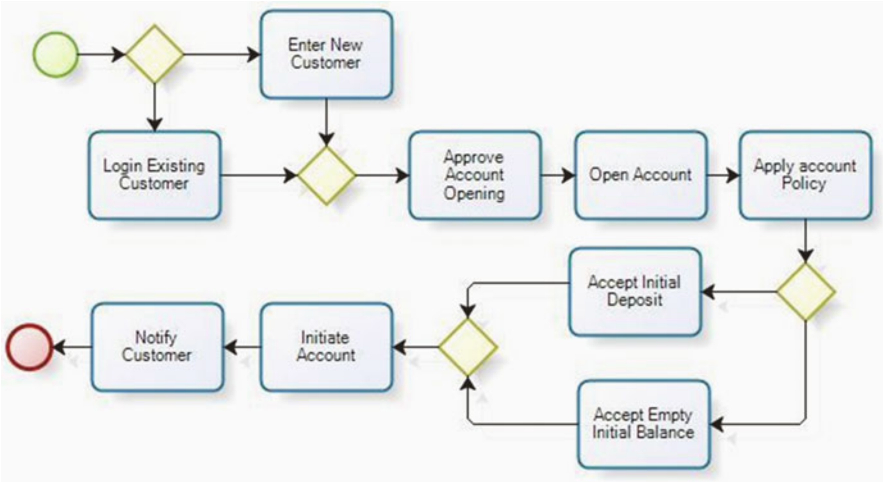

Fig. 1 Example account-opening process

AML/CTF is a *principles-based*[1] regulation, and hence, businesses need to determine the exact manner in which they will fulfill the obligations. This leads to the design of so-called internal controls[2] devised by a particular financial organization. For example, consider an account-opening process as depicted in Fig. 1. An internal control may mandate the "scanning of all new customer accounts against blocked entity datasets" in response to the obligation to provide customer due diligence during the account-opening process. This would require an additional check to be conducted after entering new customer information.

For a principles-based approach such as AML/CTF, the design of the internal controls typically reflects the *risk appetite* of the organization. Effective risk management begins with a clear understanding of an organization's appetite for risk and is essentially the process of identifying vulnerabilities and threats to the organization in achieving its business objectives. When establishing and implementing its system of risk management, a company will consider a number of risks such as financial reporting risks (the risk of a material error in the financial statements), operational, environmental, sustainability, strategic, external, ethical

[1] "The AML/CTF Act is a principles-based piece of legislation. It sets out broad obligations which reporting entities and others affected by the legislation must meet, but leaves the methods of meeting those obligations to be decided by those on whom the obligations fall." (AUSTRAC 2006)

[2] "Internal control is broadly defined as a process effected by an entity's board of directors, management, and other personnel designed to provide reasonable assurance regarding the achievement of objectives in the following categories: effectiveness and efficiency of operations; reliability of financial reporting; and compliance with applicable laws and regulations." (COSO 1994)

conduct, reputation or brand, technological, product or service quality, and human capital, as well as risks of noncompliance (ASX 2006).

In order to handle the risk, the organization may choose one or more well-known strategies such as *avoid risk*, for example, if possible, choose not to implement processes and/or remove the source of the risk; *mitigate risk*, for example, define and implement controls; *transfer risk*, for example, share or outsource risk (insurance); and/or *accept risk*, for example, formally acknowledge existence of risk and monitor it.

The approach to risk management has a profound impact on how an organization would design and implement internal controls in response to compliance obligations. *Controls management* thus becomes a balancing act between compliance obligations, business objectives, and risks.

In the next section, we present a methodology for compliance management that aims to provide a means of aligning business and control objectives by using BPM and related technologies as drivers.

3 Methodology for Compliance Management

Previously, we have argued that *compliance by design* is a preferred approach for compliance management due to its preventative focus. In light of the heavy social, economic, and environmental costs of noncompliance, a priori embedding of requisite checks and triggers into the enterprise applications is clearly desirable but also extremely difficult, given that the business and technology landscape of today's organizations is disparate and distributed.

BPM is recognized as a means to enforce corporate policy. Regulatory mandates also provide policies and guidelines for business practice. One may argue why a separate requirements modeling facility is required to capture compliance requirements for business processes. We identify the following reasons against this argument:

Firstly, the source of these two objectives will be distinct, both from an ownership and governance perspective, as well as from a timeline perspective. Whereas businesses can be expected to have some form of business objectives, control objectives can be dictated by external sources and at different times.

Secondly, the two have differing concerns, namely, business objectives and control objectives. Thus, the use of business process languages to model control objectives may not provide a conceptually faithful representation. Compliance is in essence a normative notion, and thus control objectives are fundamentally descriptive, that is, indicating *what* needs to be done (in order to comply). Business process specifications are fundamentally prescriptive in nature, that is, detailing *how* business activity should take place. There is evidence of some developments toward descriptive approaches for BPM, but these works were predominantly focused on achieving flexibility in business process execution (e.g., Pesic and van der Aalst 2006; Sadiq et al. 2005).

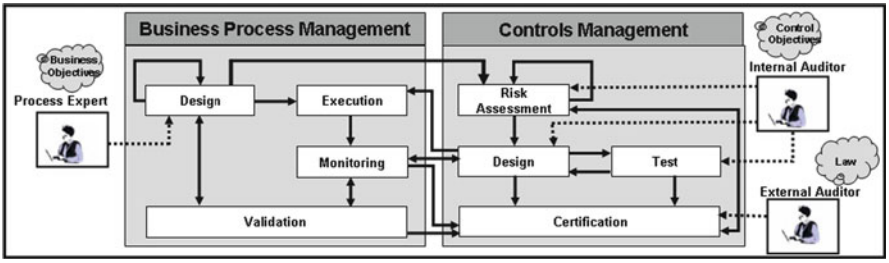

Fig. 2 Interconnect of process management and controls management

Thirdly, there is likelihood of conflicts, inconsistencies, and redundancies within the two specifications. The intersection of the two, thus, needs to be carefully studied.

In summary, we present in Fig. 2, the interconnect between process management and controls management. The two are formulated by different stakeholders and have different lifecycles. The design of control will impact the way a business process is executed. On the other hand, a (re)design of a business process causes an update of the risk assessment, which may lead to a new/updated set of controls.

Additionally, business process monitoring will assess the design of internal controls and serve as an input to internal controls certification.

Given the scale and diversity of compliance requirements and additionally given the fact that these requirements may frequently change, business process compliance is indeed a large and complex problem area with several challenges. Given further that business and control objectives are (or should be) designed separately, but must converge at some point, we present below a list of essential requirements and where relevant corresponding techniques and methods that need to be met/developed in order to tackle this overall problem.

3.1 Control Directory Management

Regulations and other compliance directives are complex and vague and require interpretation. Often in legalese, these mandates need to be translated by experts. For example, the COSO framework (COSO 1994) is recognized by regulatory bodies as a de facto standard for realizing controls for financial reporting. A company-specific interpretation results in the following (textual) information being created:

<control objective, risk, internal control>

For example	
Control objective	Prevent unauthorized use of purchase order process
Risk	Unauthorized creation of purchase orders and payments to nonexisting suppliers
Internal control	The creation and approval of purchase orders must be undertaken by two separate purchase officers

The above example is typical of the well-known segregation-of-duty constraint (one individual does not participate in more than one key trading or operational function) mandated by Sarbanes-Oxley 404.

However, business will typically deal with a number of regulations/standards at one time. Thus there is a need to provide a structured means of managing the various interpretations within regional industry sector and organizational contexts.

We identify this as a need for a *controls directory*. Control directory management could be supported by database technology, and/or could present some interesting content management challenges, but will be an essential component in the overall solution. There is some evidence in industry reports that solution vendors are producing repositories of control objectives (and associated parameters) against the major regulations, see, for example, SAP GRC Repository and SAI Global GRC Knowledge and Information Services. Keeping abreast of frequently changing regulations is a clear challenge in the maintenance of such knowledge bases.

3.2 Ontological Alignment

Due to the diversity of stakeholders in compliance management initiatives, any effort towards providing compliance management solutions demands a common understanding of compliance management concepts and practice. For example, interpretation of regulations from legal/financial experts comes in the form of textual descriptions (see example in the previous section). Establishing an agreement on terms and usage between these descriptions and the business processes and constituent activities/transactions is a difficult but essential aspect of the overall methodology.

In Fig. 3, we present the relationships between the basic process modeling and control modeling concepts. Clearly, the relationship between process task and internal controls is much deeper than shown, as it would require alignment between embedded concepts, for example, task identification, particular data items, roles and performers, etc. However, it is evident that several controls may be applicable on a task, and one control may impact on multiple tasks as well.

What tools and techniques are utilized to provide an effective alignment between the two conceptual spaces is an important question at hand. Some recent work

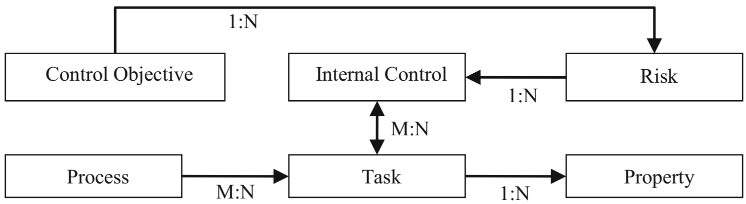

Fig. 3 Relationships between process modeling and control modeling concepts

(Abdullah et al. 2012), reports on research undertaken to develop an ontology to create a shared conceptualization of the compliance management domain, namely CoMOn (Compliance Management Ontology). The ontology concepts are extracted from interviews and surveys of compliance management experts and practitioners, and refined through synthesis with leading academic literature related to compliance management. A semiotic framework has been utilized to conduct a rigorous evaluation of CoMOn through a series of eight case studies spanning a number of industry sectors. The consensus achieved through the evaluation positions CoMOn as a comprehensive domain ontology for Compliance Management.

3.3 Modeling Controls

The motivation to model controls is multifaceted. Firstly, a generic requirements modeling framework for compliance by design will provide a substantial improvement over current after-the-fact detection approaches. Secondly, it will allow for an analysis of compliance rules, thereby providing the ability to discover hidden dependencies, and view in holistic context, while maintaining a comprehensible working space. Thirdly, a precise and unambiguous (formal) specification will facilitate the systematic enrichment of business processes with control objectives.

A fundamental question in this regard is the *appropriate formalism* to undertake the task. In the next section, we will deliberate further on this question and provide a discussion of complementary approaches in this regard.

Note, however, that modeling controls in a precise and unambiguous manner is a necessary first step, but cannot completely address compliance by design methodology. Process model enrichment as explained in the next section, constitutes a second essential step.

3.4 Process Model Enrichment

In this context, we use the term process model enrichment as the ability to enhance enterprise models (business processes) with compliance requirements. This can be

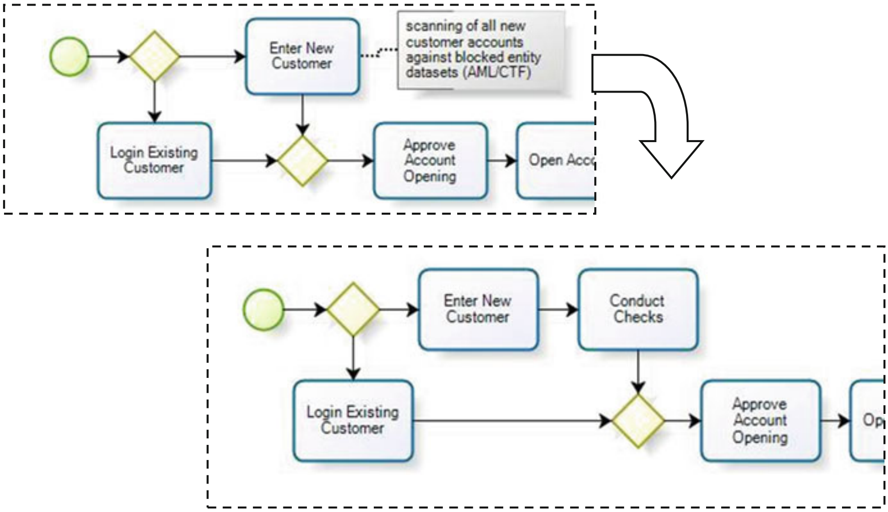

Fig. 4 Example process annotation and resultant redesign

provided as *process annotation*. Process annotations have been proposed by a number of researchers, for example, the notion of control tags (Sadiq et al. 2007), integrating risks on EPCs (zur Mühlen and Rosemann 2005), and semantic annotations (Governatori et al. 2008). The resultant visualization of controls on the process model facilitates a better understanding of the interaction between the two specifications for both stakeholders (process owners as well as compliance officers).

Consider, for example, the account-opening process presented in Fig. 1. An annotation at the activity "Enter New Customer" to indicate the need for "scanning of all new customer accounts against blocked entity data-sets" will assist in identifying the obligations relevant to AML/CTF. Figure 4 depicts a fragment of the process model presented in Fig. 1 and shows an example of process annotation and resultant process redesign.

However, the visualization is only a first step. The new checks introduced within the process model can in turn be used to analyze the model for measures such as *compliance degree* (Lu et al. 2008), which can provide a quantification of the effort required to achieve a compliant process model. Eventually, process models may need to be modified to include the compliance requirements.

In large organizations, the process portfolio may consist of hundreds of process models that may span several business units. A diagnostic facility (Governatori et al. 2008) can empower the organizations to undertake a compliance assessment at a large scale, and then continue with compliance enforcement based on the measured compliance degree (or gap) and associated risks.

Sections 3.1, 3.2, 3.3 and 3.4 as presented above are focused on providing *design time* support for compliance management. Although model-driven enforcement and monitoring is a main objective of the presented methodology, it is not always possible to achieve. Below, we present a brief summary of issues and techniques for *run time* support for compliance management.

3.5 Compliance Enforcement

Enforcement of controls is a key component in the overall methodology. Given that the technology landscape of today's organizations is highly diverse and disparate, translation of designed internal controls onto the IT infrastructure, and subsequently, into business transactions is clearly a significant challenge. A number of complementary technologies can be identified in this regard.

- Records management (e.g., incident logging, data retention systems, etc.)
- Integration technologies (e.g., enterprise application integration, master data management)
- Testing/simulation (e.g., what-if scenario analysis)
- Control automation (e.g., rule engines)

Model-driven business process execution (as envisaged in the ideal BPM vision) is of course a candidate in the above, and arguably provides the most effective means to enforcement of compliance-related controls. Unfortunately, the current state of enterprise systems does not reflect the ideal BPM vision, and hence, compliance enforcement is provided through a variety of tools and technologies.

3.6 Compliance Monitoring

The support provided in the design of compliant processes through process annotation and analysis and resultant process changes can eventually lead to a *model-driven enforcement of compliance controls* (where process management systems are in place). However, it is naïve to assume that all organizations have the complete implementation of the BPM life cycle, and hence the process models and underlying applications may be disconnected. In this case, it is important to provide support for compliance through run-time monitoring. This has been the agenda for several vendors in this space targeting the so-called-automated detection, described earlier. In general, event monitoring is a well studied research topic (see, e.g., www.complexevents.com) and, although has not been widely/explicitly associated with the compliance issue, notably excepting Giblin et al. (2006), its usage in fraud detection and security is closely related.

Although, this chapter is primarily targeted at approaches conducive to achieving compliance by design by adopting a preventative approach facilitated by business process models, several works on formal modeling of control objectives (Governatori and Rotolo 2006, 2010), have taken into account the violations and

Table 1 Sources and frequency of publication

Sources (journals)	Total	Relevant articles	%	Sources (conferences)	Total	Relevant articles	%
CAIS	659	16	2.4	BPM	189	7	3.7
BPMJ	336	5	1.5	ACIS	906	28	3.1
JAIS	158	2	1.3	CAiSE	346	9	2.6
JI&M	502	4	0.8	ICIS	959	14	1.5
CACM	2,178	17	0.8	PACIS	1,025	14	1.4
JISR	199	1	0.5	AMCIS	3,822	46	1.2
EJIS	382	2	0.5	HICSS	4,517	49	1.1
MISQ	281	1	0.4	ECIS	1,489	17	1.1
				ER	400	2	0.5

resultant reparation policies that may surface at runtime. Similarly, in (Conforti et al. 2011) a real-time risk detection method for business processes has been proposed.

4 State of the Art

Governance, risk, and compliance (GRC) is an emerging area of research that holds challenges for various communities including information systems; business software development; legal, cultural, and behavioral studies; and corporate governance. In (Abdullah et al. 2009), GRC challenges emerging from industry have been related to existing activity in IS research between 2001 and 2010. As expected in an emerging research domain, the majority of the publications were found to be in the case study or exploratory paper category – 188 (81 %) of the 328 articles are case study/exploratory articles and 40 (17.2 %) are solution articles. Table 1, presents a snap shot of research contributions from notable IS journal and conferences. See (Abdullah et al. 2009) for more details on methodology and results of the literature review.

However, there are four (1.7 %) articles that matched both types of articles. The results suggest that research on GRC solutions has being initiated but remains still in the early exploratory stages.

In this chapter, we have focused on compliance management from an information systems perspective, in particular the modeling and analysis of compliance requirements. In this section, we report on the contributions from research and academia in the area of compliance management. The primary focus of the discussion is on preventative approaches to compliance or those that facilitate compliance by design, and hence the discussion is structured around issues relating to Sects. 3.3 and 3.4, that is *Modelling Controls* and *Process Model Enrichment*. A case study supported by a prototype implementation of these two phases of the methodology is subsequently presented in Sect. 5.

4.1 Modeling Controls

Both process modeling and modeling of normative requirements are well-studied fields independently, but until recently, the interactions between the two have been largely ignored (Desai et al. 2005; Padmanabhan et al. 2006). In particular, zur Mühlen et al. (2007) provide a valuable representational analysis to understand the synergies between process modeling and rule modeling. Similarly Cheng et al. (2011) provide a basic framework for business process and rule integration using BPMN and SBVR as examples. It is obvious that the modeling of controls will be undertaken as rules, although the question of appropriate formalism is still under study. A plethora of proposals exist both in the research community on formal modeling of rules and in the commercial arena through business rule management systems.

Historically, formal modeling of normative systems has focused on how to capture the logical properties of the notions of the normative concepts (e.g., obligations, prohibitions, permissions, violations, etc.) and how these relate to the entities in an organization and to the activities to be performed. Deontic logic is the branch of logic that studies normative concepts such as obligations, permissions, prohibitions, and related notions. Standard deontic logic (SDL) is the starting point for logical investigation of the basic normative notions and offers a very idealized and abstract conceptual representation of these notions, but at the same time, it suffers from several drawbacks, given its high level of abstraction (Sartor 2005). Over the years, many different deontic logics have been proposed to capture the different intuitions behind these normative notions and to overcome drawbacks and limitations of SDL. One of the main limitations in this context is its inability to reason with violations and the obligations arising in response to violations (Carmo and Jones 2002). Very often, normative statements pertinent to business processes, and in particular contracts, specify conditions about when other conditions in the document have not been fulfilled; that is, when some (contractual) clauses have been violated. Hence, any formal representation to be conceptually faithful has to be able to deal with these kinds of situations.

As we have discussed before, compliance is a relationship between two sets of specifications: the normative specifications that prescribe what a business has to do and the process modeling specification describing how a business performs its activities. Accordingly, to properly verify that a process/procedure complies with the norms regulating the particular business, one has to provide conceptually sound representations of the process on one side and the norms on the other, and then check the alignment of the formal specifications of the process and the formal specifications for the norms.

In the following paragraph, we present an account of the various proposals for formal modeling regulations in the context of business process compliance. Governatori (2005), Governatori and Milosevic (2006) and Governatori and Rotolo (2010) have proposed FCL (formal contract language) as a candidate for control modeling, which has proved effective due to its ability to reason with violations and exceptions. FCL has been obtained from the combination of defeasible logic (for the efficient and natural treatment of exceptions, which are a common feature in normative reasoning) (Antoniou et al. 2001) and a deontic logic of violations (Governatori and Rotolo 2006). In FCL a norm is represented by a rule, where a rule is an expression of the form

$$r : a_1, \ldots, a_n \Rightarrow c$$

Where r is the name of the rule (unique for each rule) $a_1, \ldots, a_n$ are the conditions of applicability of the norm/rule or *premises* (represented by proposition in the logic) and c, the *conclusion* of the rule, is the *normative effect* of the norm/rule (again c is an expression or proposition of the logic).

The propositions of the logic are built from a finite set of atomic propositions, and the following operators: $\neg$ (negation), [O] (obligation), [P] (permission), $\otimes$ (violation/reparation). The formation rules are as follows:

- Every atomic proposition is a proposition;
- If p is an atomic proposition, then $\neg p$ is a proposition;
- If p is a proposition, then $[\mathrm{O}]p$ is an obligation proposition and $[\mathrm{P}]p$ is a permission proposition. Obligation propositions and permission propositions are deontic propositions;
- If $p_1, \ldots, p_n$ are obligation propositions and q is a deontic proposition, then $p_1 \otimes \cdots \otimes p_n \otimes q$ is a *reparation chain*.

A simple proposition corresponds to a factual statement. The deontic operators are then indexed by the subject of the normative position corresponding to the operator. Thus $[\mathrm{O}_s]$*Send Invoice* means that the supplier s has the obligation to send the invoice to the purchaser, and $[\mathrm{P}_p]$*Charge Penalty* means that the purchaser p is entitled (permitted) to charge a penalty to the supplier. For obligations FCL supports both maintenance obligations (e.g., "the supplier must keep confidential the personal information provided by the customer") and achievement obligations (e.g. "a customer has to pay for the services received from the provider"), and for achievement obligations both pre-emptive and non-pre-emptive obligations – see Governatori and Rotolo (2010) for full details. A reparation chain, for example:

$$[\mathrm{O}_s]\mathit{Provides\ Goods\ Timely} \otimes [\mathrm{O}_s]\mathit{Offer\ Discount} \otimes \left[\mathrm{P}_p\right]\mathit{Charge\ Penalty}$$

captures obligations and normative positions arising in response to violations of obligation. Thus the expression above means that the suppliers have the obligation to send the goods in a timely manner, but in case they do not comply with this (i.e., they violate the obligation do so) then they have the "secondary" obligation to offer a discount for the merchandise, and in case that they fail to fulfill this obligation (i.e., we have a violation of the possible reparation of the "primary" obligation), then, finally, the purchaser can charge the supplier with the penalty.

As usual in normative reasoning, there are two types of rules: definitional rules and normative rules. A definitional rule gives the conditions that assert a factual statement or to introduce new terms. A normative rule allows us to conclude obligations, permissions and prohibitions.[3] According to the above distinction in definitional rules, the conclusion is a proposition, and in normative rules, the conclusion is either a deontic proposition or a reparation chain. In both cases, the premises are propositions and deontic propositions, but not reparation chains. For example the definitional rule

$$Customer(x), Spending(x) > 1000 \Rightarrow Premium\ Customer(x)$$

specifies that, typically, a premium customer is a customer who has spent over 1,000 dollars; while the following is an example of a normative rule:

$$restaurant, [\mathrm{P}]sellAlcohol \Rightarrow [\mathrm{OM}]showLicense \otimes [\mathrm{OAPNP}]payFine.$$

The rule above means that if a restaurant has a license to sell alcohol (i.e., it is permitted to sell it, [P]*sellAlcohol*), then it has a maintenance obligation to expose the license ([OM]*showLicense*), if it does not then it has to pay the fine ([OAPNP] *payFine*). The obligation to pay the fine is non-pre-emptive (this means it cannot be paid before the violation). Notice that FCL allows deontic expression (but not reparation chains) to appear in the body of rules.

FCL offers two reasoning modules: (1) a normalizer to make explicit rules that can be derived from explicitly given rules by merging their normative conclusions, to remove redundancy and identify conflicts rules, and (2) an inference engine to derive conclusions given some propositions as input.

Finally, FCL is agnostic about the nature of the literals it uses. They can represent tasks (activities executed in a process) or propositions representing state variables. For full description of FCL and its feature see (Governatori 2005; Governatori and Rotolo 2010).

There have been some other notable contributions from research on the matter of control modeling. Goedertier and Vanthienen (2006) present a logical language PENELOPE, which provides the ability to verify temporal constraints arising from compliance requirements on effected business processes. Kuster et al. (2007) provide a method to check compliance between object life cycles that provide reference models for data artifacts, for example, insurance claims and business process models. Giblin et al. (2006) provide temporal rule patterns for regulatory policies, although the objective of this work is to facilitate event monitoring rather than the usage of the patterns for support of design time activities. Furthermore, Agrawal et al. (2006) have presented a workflow architecture for supporting Sarbanes–Oxley internal controls, which includes functions such as workflow modeling, active enforcement, workflow auditing, as well as anomaly detection.

[3] Note that obligations allow us to capture prohibitions; a prohibition is an obligation plus negation, for example the prohibition to smoke can be understood as the obligation not to smoke.

There has been some complementary work in the analysis of formal models representing normative notions. For example, Farrell et al. (2005) study the performance of business contract on the basis of their formal representation. Desai et al. (2008) seek to provide support for assessing the correctness of business contracts represented formally through a set of commitments. The reasoning is based on value of various states of commitment as perceived by cooperative agents. Research on closely related issues has also been carried out in the field of autonomous agents (Alberti et al. 2006).

4.2 Process Model Enrichment

As discussed previously, modeling the controls is only the first step toward compliance by design. The second essential step is the enrichment of process models with compliance requirements (i.e., the modeled controls). Clearly, this cannot take place without a formal controls model (as proposed by above-mentioned works), or at least some machine-readable specification of the controls.

There have recently been some efforts toward support for business process modeling against compliance requirements. In particular, the works of zur Mühlen and Rosemann (2005) and Neiger et al. (2006) provide an appealing method for integrating risks in business processes. The proposed technique for "risk-aware" business process models is developed for EPCs (event process chains) using an extended notation. Sadiq et al. (2007) propose an approach based on control tags to visualize internal controls on process models. Liu et al. (2007) takes a similar approach of annotating and checking process models against compliance rules, although the visual rule language, namely BPSL, is general purpose and does not directly address the notions representing compliance requirements.

4.3 Summary

Although this chapter has primarily focused on preventative approaches to compliance, it is important to identify the role of detective approaches as well, where a wide range of supporting technologies are present.

These include several commercial solutions such as business activity monitoring, BI, etc. Noteworthy in research literature with respect to compliance monitoring is the synergy with process mining techniques (van der Aalst et al. 2003; van Dongen et al. 2005) that provide the capability to discover run-time process behavior (and deviations) and can thereby assist in detection of compliance violations.

In terms of the compliance services and solutions, a number of compliance service/solution providers are currently available, including large consulting firms providing business services and advisory as well as software vendors. Software services are emerging from large corporations with products such as IBM Lotus workplace for business controls and reporting, Microsoft Office Solutions Accelerator for Sarbanes–Oxley, SAP GRC Solution, as well as niche vendors such as OpenPages, Paisley Consulting, Qumas Inc., and several others (Caldwell and Eid 2008).

Software solutions and tools for compliance are typically found under the umbrella of other technologies such as BI, business rules management, etc. As such, compliance vendors are not easily identified directly. Further, while many vendors provide sophisticated functionality of some aspect of the overall end-to-end methodology (as presented in Sect. 3), these solutions are of a piecemeal nature, for example, a business controls and reporting tool designed to help users manage processes, controls, and information, subject to Sarbanes–Oxley 404.

5 Case Study

In this section we first introduce the architecture for a business process compliance checker based on the methodology developed by Governatori and Sadiq (2009) and presented in this chapter. As we have already discussed that to check whether a business process is compliant with a relevant regulation, we need an annotated business process model (process model enrichment) and the formal representation (modeling controls) of the regulation. The annotations are attached to the tasks of the process, and it can be used to record the data, resources and other information related to the single tasks in a process. For the formal representation of the regulation we use FCL (Governatori 2005; Governatori and Rotolo 2010) as briefly introduced in the previous section.

Compliance is not just about the tasks to be executed in a process but also on what the tasks do, the way they change the data and the state of artifacts related to the process, and the resources linked to the process. Accordingly, process models must be enriched with such information. Sadiq et al. (2007) proposed to enrich process models with semantic annotations. Each task in a process model can have attached to it a set of semantic annotations. In our approach the semantic annotations are literals in the language of FCL, representing the effects of the tasks. The approach can be used to model business process data compliance (Hashmi et al. 2012).

Figure 5 depicts the logical outline of the architecture. Given an annotated process and the formalisation of the relevant regulation, we can use the algorithms proposed by Governatori and Rotolo (2008, 2010) to determine whether the annotated process model is compliant. The process runs as follows:

- Generate an execution trace of the process.
- Traverse the trace:

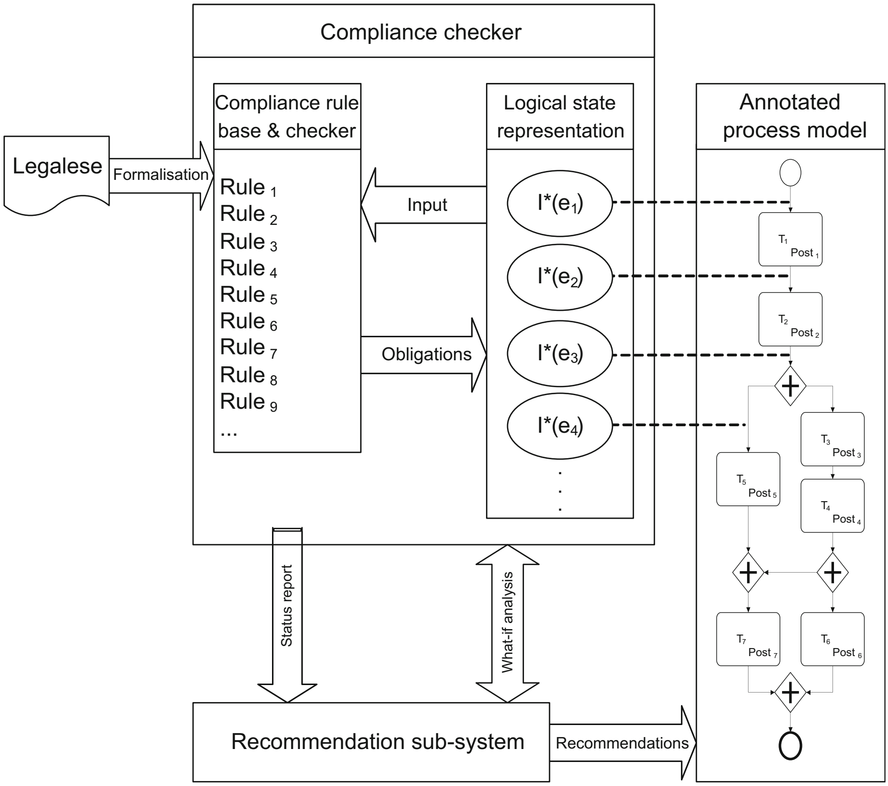

Fig. 5 Architecture of compliance checker

- For each task in the trace, cumulate the effects of the task using an update semantics (i.e., if an effect in the current task conflicts with previous annotation, update using the effects of the current tasks).
- Use the set of cumulated effects to determine which obligations enter into force at the current tasks. This is done by a call to an FCL reasoner.
- Add the obligations obtained from the previous step to the set of obligations carried over from the previous task.
- Determine which obligations have been fulfilled, violated, or are pending; and if there are violated obligation check whether they have been compensated.

• Repeat for all traces.

A process is *compliant* if and only if all traces are compliant (all obligations have been fulfilled or if violated they have been compensated). A process is *weakly compliant* if there is at least one trace that is compliant.

We now describe the implementation of a prototype, called BPCC based on the above architecture, which has been tested an evaluated with an industry scale real life case study, reported in (Governatori and Shek 2012).[4]

BPCC is implemented on top of Eclipse. For the representation of process models, it uses the Eclipse Activiti BPMN 2.0 plugin, extended with features to allow users to add semantic annotations to the tasks in the process model. BPCC is process model agnostic, this means that while the current implementation is based on BPMN all BPCC needs is to have a description of the process and the annotations for each task. A module of BPCC take the description of the process and generates the execution traces corresponding to the process. After the traces are generated, it implements the algorithm outlined in the previous section, where it uses the SPINdle rule engine (Lam and Governatori 2009) for the evaluation of the FCL rules. In case a process is not compliant (or if it is only weakly compliant) BPCC reports the traces, tasks, rules and obligations involved in the non compliance issues (see Fig. 6).

BPCC was tested against the 2012 Australian Telecommunications Customers Protection Code (C628-2012). The code is effective from September 1st 2012. The code requires telecommunication operators to provide annual attestation of compliance with the code staring from April 1st 2013. The evaluation was carried out in May-June 2012. Specifically, the section of the code on complaint handling has been manually mapped to FCL. The section of the code contains approximately 100 commas, in addition to approximately 120 terms given in the Definitions and Interpretation section of the code. The mapping resulted in 176 FCL rules, containing 223 FCL (atomic) propositions, and 7 instances of the superiority relation. Of the 176 rules 33 were used to capture definitions of terms used in the remaining rules. Mapping the section of the code required all features of FCL: all types of obligations apart punctual obligations were used, reparation chains, permissions, defeasibility to easily capture exceptions, and obligations and permissions in the body of rules.

The evaluation was carried over in cooperation with an industry partner subject to the code. The industry partner did not have formalised business processes. Thus, we worked with domain experts from the industry partner (who had not been previously exposed to BPM technology, but who were familiar with the industry code) to draw process models for the activities covered by the code. The evaluation was carried out in two steps. In the first part we modelled the processes they were. BPCC was able to identify several areas where the existing processes were not compliant with the new code. In some cases the industry partner was already aware of some of the areas requiring modifications of the existing processes. However, some of the compliance issues discovered by the tools were novel to the business analysts and were identified as genuine non-compliance issues that need to be resolved. In the second part of the experiment, the existing processes were modified to comply with the code based on the issues identified in the first phase. In addition

[4] For more information about BPCC see http://www.nicta.com.au/research/projects/bpc

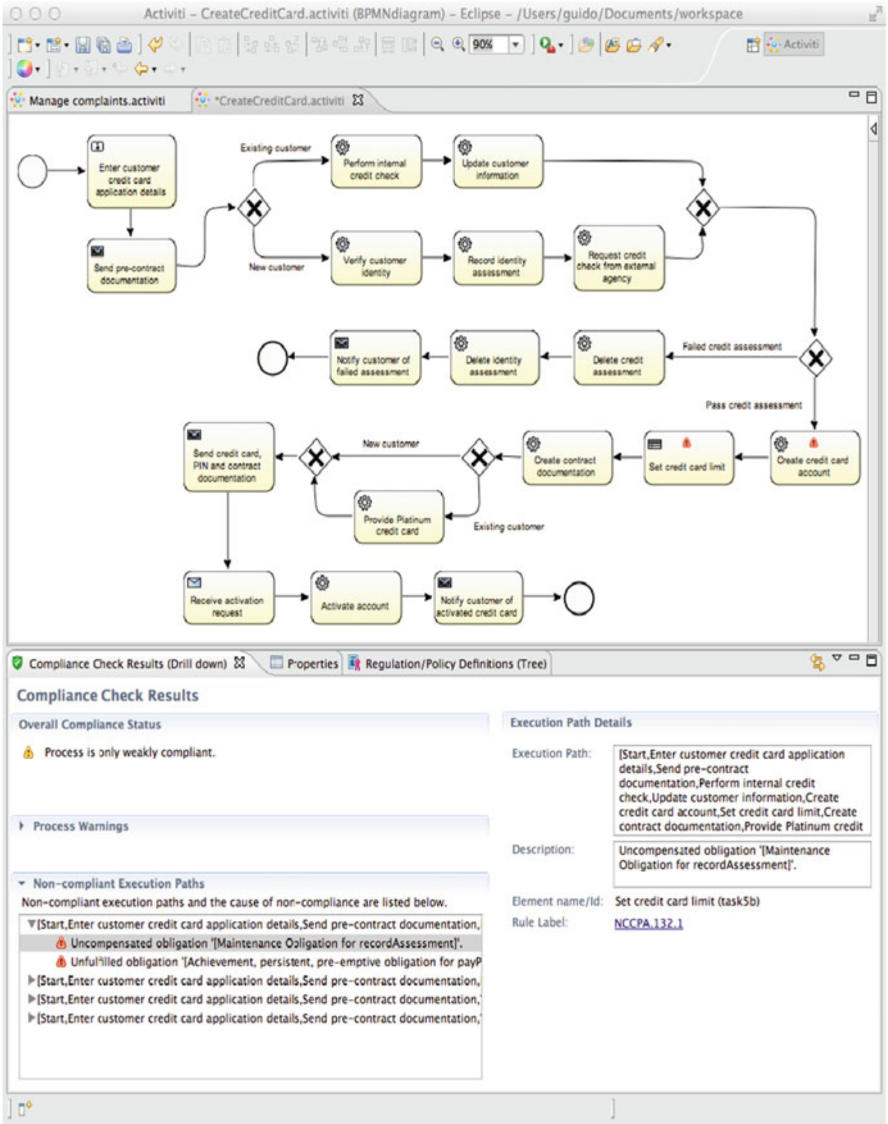

Fig. 6 Example of non-compliant report in BPCC

a few new business process models required by the new code were designed. As result we generated and annotated six process models. Five of the six models are limited in size and they can be checked for compliance in seconds. The largest process contains 41 tasks, 12 decision points, xor splits, (11 binary, 1 ternary). The shortest path in the model has six tasks, while the longest path consists of 33 tasks (with two loops), and the longest path without loop is 22 task long. The time taken to verify compliance for this process amounts approximately to 40 s on a MacBook Pro 2.2Ghz Intel Core i7 processor with 8GB of RAM (limited to 4GB in Eclipse).

A few other compliance prototypes have been proposed: MoBuCom (Maggi et al. 2011), Compass (Elgammal et al. 2012) and SeaFlows (Ly et al. 2012). MoBuCom and Compass are based on Linear Temporal Logic (LTL) and mostly address "structural compliance" (i.e., that the tasks are executed in the relative order defined by a constraint model). The use of LTL implies that the model on which these tools are based on is not conceptually relative to the legal domain, and thus fails to capture nuances of reasoning with normative constrains such as violations, different types of obligations, violations and their compensation. For example, obligations are represented by temporal operators. This raises the problem of how to represent the distinction between achievement and maintenance obligations. A possible solution is to use always for maintenance and sometimes for achievement, but this leaves no room for the concept of permission (the permission is dual of obligation, and always and sometimes are the dual of each other). In addition using temporal operators to model obligations makes it hard to capture data compliance (Hashmi et al. 2012), i.e., obligations that refer to literals in the same task. SeaFlow is based on first-order logic, and it is well know that first oder logic is not suitable to capture normative reasoning (Herrestad 1991). On the other hand FCL and consequently BPCC comply with the guidelines set up in (Gordon et al. 2009) for a rule language suitable for representation of legal knowledge and legal reasoning.

6 Discussion and Outlook

As the importance of GRC grows for various industries, there is an evident need to provide supporting tools and methods to enable organizations seeking corporate social responsibility to achieve their objectives. The challenges that reside in this topic warrant systematic approaches that motivate and empower business users to achieve a high degree of compliance with regulations, standards, and corporate policies.

One of the biggest challenges facing the compliance industry is the measurement of adequacy of controls (KPMG Advisory 2005), that is, achieving a balance between control and business objectives. This has been a driver of the research presented in this chapter. The methodology presented in Sect. 3 provides a systematic means of aligning business and control objectives. However, several open issues still remain. In (Abdullah et al. 2010), an industry driven research agenda for GRC has been presented, which highlights the main challenges and potential areas of future research. The agenda is aligned with the main message of this chapter and is summarized as below.

First and foremost, there is an urgent need for proper benchmarking studies to help address the challenge of high cost. Particularly for SMEs, there is high cost and great difficulty in measuring the adequacy of controls for principles based regulations where the onus is on the organization to design an appropriate compliance regimen. Benchmarking and best practice studies will allow improvement of controls effectiveness, a reduction of costs, and an improved potential to deal with resistance to change through demonstrating methods used by others. Such additional knowledge can further help alleviate the perception of legislation weaknesses in principles based regulations and consequently promote regulation acceptance.

In a related manner, there is also a need for investigation of process reference models relating to various regulations. A focus on the development of such reference models and the study of the impact of the use of such models in organizations (i.e. impact on compliance management spending, frequency of breaches, etc.) is largely missing in Information Systems research. The development of proven reference models, however, may significantly lessen the cost of compliance management in organizations.

The culture of compliance is ingrained in the daily rituals of each of the firm's employees, including senior management, who must learn to lead by example. There is a clear lack of Information Systems research on organisational behaviour. In particular we see a need for investigation of how IT and IS tools can be used to incentivize employees to 'do the right thing' and adapt their practices. There is also a need for the development of relevant IT and IS tools that can help facilitate employee training for compliance management, promote communication among staff and increase organizational capacity to manage its compliance knowledge base.

How the compliance (and risk) factor interrelates with the operations of business units is understudied, with only a small number of researchers working on the conceptualisation of compliance and risk requirements per se let alone their interrelationships with business processes and business activities. A comprehensive and well-grounded conceptual model for compliance and risk is needed.

Further to the point above, tools and methods are needed to annotate, enhance, analyse and simulate business models with compliance and risk modeling elements. This will facilitate better coordination between an organization's compliance and business functions and help employees understand compliance value and business relevance.

Although reporting and monitoring tools of high sophistication are available, there is little development towards tools that provide specialized solutions in monitoring and analysing compliance related data (partly due the absence of generic conceptual models for GRC), thus causing big problems for organisations required to create evidence of compliance. Accordingly, we see a need for affordable IT and IS tools that facilitate compliance management self-audits and compliance monitoring activities in general. Furthermore, there is also a clear need for tools that facilitate the identification of non-compliance processes with respect to a given regulation.

Frequency of change, as well as inconsistency and overlaps in regulations is beyond the realm of IS research, studies to understand the impact of regulation changes (inconsistencies and overlaps) can promote better understanding of the cost of compliance and allow business to lobby for regulatory reform where needed. Multi disciplinary research is warranted in order to cover legal, business and IT aspects. From an Information Systems perspective, there is a need for solutions that can filter out updates that are not relevant to a given organization or industry sector, thus reducing the amount of information that the organization has to process in order to update or assess their compliance management initiatives.

In conclusion, future research endeavors in this area should strive toward compliance management frameworks that provide a close integration of the three perspectives, namely, preventative, detective, and corrective. Such a framework can allow organizations to better respond to the changing regulatory demands and also reap the benefits of process improvement.

Acknowledgment NICTA is funded by the Australian Government as represented by the Department of Broadband, Communications and the Digital Economy and the Australian Research Council through the ICT Centre of Excellence program.

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Prioritizing Process Improvement: An Example from the Australian Financial Services Sector

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Abstract Process improvement has become a number one business priority, and more and more project requests are raised in organizations, seeking approval and resources for process-related projects. Realistically, the total of the requested funds exceeds the allocated budget, the number of projects is higher than the available bandwidth, and only some of these (very often only few) can be supported and most never see any light. Relevant resources are scarce, and correct decisions must be made to make sure that those projects that are of best value are implemented. How can decision makers make the right decision on the following: Which project(s) are to be approved and when to commence work on them? Which projects are most aligned with corporate strategy? How can the project's value to the business be calculated and explained? How can these decisions be made in a fair, justifiable manner that brings the best results to the company and its stakeholders? This chapter describes a business value scoring (BVS) model that was built, tested, and implemented by a leading financial institution in Australia to address these very questions. The chapter discusses the background and motivations for such an initiative and describes the tool in detail. All components and underlying concepts are explained, together with details on its application. This tool has been successfully implemented in the case organization. The chapter provides practical guidelines for organizations that wish to adopt this approach.

1 Introduction and Background

Recent Gartner studies (Blosch et al. 2005; McDonald and Nunno 2007; McDonald et al. 2006, 2008) have identified process improvement as the number one business priority of Chief Information Officers (CIOs). Choosing the correct projects is often

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_12,

identified as a critical factor for a successful business process model (BPM) (Olding and Rosser 2007) and one of the core BPM governance decisions (Harmon 2005; Kirchmer 2014)[1]. Managers often struggle to demonstrate the connection between costs and expected business benefits of BPM projects (Huxley 2003; Huxley and Stewart 2008; Thorp 1998; vom Brocke et al. 2010). The founding fathers of BPM (i.e., Davenport 1993; Hammer and Champy 1993) explicitly state to make the selection of processes-to-improve transparent, and to provide a clear link between process objectives and organizational goals. However, "there is little in the literature that directs organizations towards this knowledge gap or region of complexity in process improvement" (Huxley 2003, Chap. 2, p. 5)[2].

The guidelines available for practitioners are either of very high level and hence not of much assistance when attempting to implement BPM initiatives, or, on the contrary, are so detailed that it can take a significant effort to simply identify the critical processes. For example, Davenport (1993) states that organizations should "focus on the most important processes or those that conflict most with the business vision" and prioritize according to urgency. Hammer and Champy (1993) provide three criteria for selecting processes to improve, stating to base the selection upon (1) dysfunctional processes (those processes that are in the deepest trouble), (2) process importance (those processes that have the greatest impact on the company's customer), and (3) process feasibility (those processes that are most susceptible to successful redesign). Detailed guidelines on how to operationalize this assessment, however, are not provided. How could a practitioner determine the feasibility of a process, or those that are in dysfunction, or which ones are the most critical to business? Thus, while project selection is emphasized to be a critical part of BPM's success (Harmon 2005; Kirchmer 2014), it remains as a "mystery phase" in most available guidelines.

Huxley (2003) and Huxley and Stewart (2008) attempt to address this limitation by identifying "important" processes with a scoring method that has five criteria: (1) dependency (effect of failure of a process on the organization), (2) probability of failure of a process, (3) impact (relative contribution of a process on organizational objectives and goals), (4) cost/benefit of the process improvement project, and (5) probability of a successful process improvement project for that process. The authors' intensions were to provide a step-by-step guide for the identification of "important" processes and the selection of which of these processes should then be improved. Many tools/methods were made available to the practitioner for assessing the five factors of Huxley's (2003) process selection approach. While the authors claim to provide sufficient guidelines to successfully implement the methodology into organizations, the guidelines significantly lack (yet again) instructions

[1]Burlton (2014) presents a methodological framework for implementing business strategies by means of process management. In this framework, the task of prioritizing processes is considered to be a vital step for maintaining effective and efficient process architectures and for keeping such architectures in sync with the strategic guidelines.

[2]Also see the discussion of the various relations between BPM and corporate value provided by (vom Brocke and Sonnenberg 2014) in this handbook.

on how to use these dimensions effectively within BPM initiatives. The tools and methods presented require many tasks to be completed, have few detailed guidelines on when and how to best apply them, and have no guidelines on how to adopt these to varying project and organizational specific contexts.

> "It's not worth trying to deploy a process selection method, if it takes equal or more time and resources to decide on what to do as it takes to actually do the work."
> *(Operations Strategy Manager, QIC, Personal Comm., 10.07.2008)*

In this chapter, the experiences of one of Australia's leading financial institutions, QIC, with BPM project selection are unfolded. It describes the current situation in the organization and how the need for a project selection approach emerged. A robust yet easy-to-use tool that supported transparency with regard to the projects that were selected and aligned with corporate goals was much needed. None of the methodologies and guidelines available suited the specific needs of the organization and hence two business process specialists were deployed to build, test, and implement one.

The remainder of this chapter first introduces the case organization. It then presents the tool, first with a high level overview followed by its detailed component descriptions. The validation process (and lessons learnt) of this tool is presented next. The chapter concludes with an overview of the adoptability and application of this tool.

2 Introducing the Case Organization

QIC[3] is the case organization that this study reports on. QIC is a leading institutional investment manager with $70 billion in funds under management as at present (2009). QIC (previously known as "Queensland Investment Corporation") is a Queensland Government-owned corporation that operates under the provision of the Government Owned Corporations Act 1993 and the Queensland Investment Corporation Act 1991. QIC operates as a fully commercial organization, charging fees for services and paying a dividend to the Queensland Government. It is registered under the Corporations Act 2001 as QIC Limited. QIC commenced investment operations in 1989 and was formally established in 1991. Since then, QIC has grown to be the largest institutional investment manager in Australia. QIC brings specialists from all major asset classes into one highly integrated organization, offering a broad range of solutions across equities, fixed interest, property, infrastructure, absolute return strategies, and capital and exposure management. QIC has over 80 institutional clients, who are located both nationally and internationally, including superannuation funds, government and statutory authorities, insurance organizations, charitable bodies, financial services companies, and educational institutions.

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[3]The Org structure described here was correct as of Sept 09. For further details see http://www.qic.com/.

QIC's vision is to be a leading provider of professional and disciplined investment management services and to remain at the forefront of the industry best practice. QIC's corporate strategy is twofold: (1) to deliver investment performance, products, and services which exceed clients' expectations and ensure that the company remains the client's manager of choice; and (2) grow funds under management and client numbers by developing new business, where it adds value both to the existing business and to QIC's existing clients. In order to achieve these, it is essential that QIC operate on a fully commercial basis, continue to generate new sources of revenue while focusing on operational efficiency, and constantly innovate. The resultant savings and revenue base are used to first reinvest in QIC's people, teams, and infrastructure to ensure that they continue to deliver the best investment outcomes, products, and services; second, reduce clients' costs; and third, provide a return on equity to stakeholders.

> "We are client centric, not product centric" [...] "Our mission is to provide high quality investment management and consulting services to maximise investment returns for our clients, consistent with their expectations and risk tolerances."
>
> *(QIC Annual Report 2008)*

QIC's primary focus is to ensure that their clients meet set investment objectives. Thus, the client services team takes a proactive approach to managing relationships and continues to search for ways to improve client outcomes. The QIC operations division has experienced a significant level of structural change over the past year (see Appendix 1 for a QIC organizational chart and overview). This was driven by the requirement to ensure that the clients' needs are serviced in the most efficient, transparent, and cost-effective manner possible, while also enabling their investment divisions to focus on investment functions rather than administrative activities (QIC 2008, p. 14). One of the key changes was the introduction of operations relationship managers (ORMs). ORMs act as a central point of contact between operations and the other business areas of QIC; six new ORMs were appointed to represent the different business units. This has resulted in increased client alignment as well as more streamlined services. During 2008, a range of initiatives were introduced to improve overall task prioritization and ultimately increase transparency and client alignment. QIC plans to continue to consolidate and scale activities to ensure that the platforms they provide continue to deliver efficient, cost-effective solutions (QIC 2008, p. 14).

In order to cope with various external forces, QIC is continuously in a mode of reviewing and improving their processes. Such projects (also referred to as "improvement initiatives" in some parts of this chapter) within QIC are divided into three categories, mostly determined by the productive time and cost required to complete the task. These can broadly be categorized as follows:

- Low level: Costs less than Au $20,000.00 and requires approximately 20 person days or less to complete;
- Mid-range: Costs between Au $20,000.00–100,000.00, and requires approximately 20–100 person days to complete;
- High level: Costs more than Au $100,000.00, and requires more than 100 person days to complete.

Each project type has a separate governance structure and draws resources from overlapping resource pools. The tool presented here was designed to assist the prioritization of low- and mid-ranged projects only. High-ranged projects followed a different process, and hence are out of the scope of this chapter. The applications/ process improvement team at QIC receives approximately 10 project requests every week (on an average, 10% of these are low-level projects and 90% are mid-range projects). In the past, this team was being utilized on a "first come first served" basis, meaning that improvement initiatives were actioned without an optimal prioritization or evaluation stage taking place. Furthermore, while many project requests still remained in the pipeline, new projects would be added to the queue and possibly actioned "out of turn", especially if the requester emphasized the perceived importance of the project, and depending on the pressure that a particular group of developers/process improvers were experiencing from an internal client. The company ran the risk of fewer things being completed on time as a result of having too much in the pipeline and having to address the disappointment from the various business areas (especially those who had their requests pushed for later, with the newer requests being accepted). The company did not have a transparent mechanism by which the actual business value for any of the requested projects was calculated, nor was there a record of which projects were pushed forward or backward and by whom. Furthermore, as a result of QIC's increasingly commercial focus, there are only limited resources available to work on requests at any one time, and more requests are received than the applications/process improvement team has the capacity to deliver. As a result, a call to review this process was made early in 2008 and a review commenced in April 2008.

A number of objectives that had to be addressed were raised very early:

1. All projects should be evaluated and ranked on the basis of a robust business value score (BVS[4]).
2. A complete view of risk, opportunity, and costs must be captured in determining the business value of the proposed project.
3. The scoring system must have balanced dimensions to capture the softer and harder aspects that are important to QIC's strategic direction when determining risk and opportunity.
4. The method should allow the risk and opportunity to be assessed by both the assenting ("by doing the project") and dissenting ("by not doing the project") views.
5. The overall scoring of a project to determine its business value should take minimal time.
6. The resulting BVS must be a genuine value; hence more than one person should be involved to score the cost and risk assessments.

[4]BVS is a comparative rating which will be used to rank and prioritize all requests for change (RFCs) submitted for development/delivery. It is a measure of the value of a change request, relative to its cost. See Fig. 1 for further details.

7. The resulting BVS must be simple enough to enable the comparison of different projects.
8. All related decisions must be made transparent to relevant stakeholders.

The goal was to derive a single numeric value that would be calculated with sufficient completeness (applying appropriate dimensions and accurate values and assessed by more than one person), so that it would be very clear what project choice is to be made just by simply comparing the numbers. The aim was to have a multidimensional, multilevel, multistakeholder approach in assessment, but collapse the result down to a single number.

3 Building the Business Value Scoring Tool

A number of options were investigated to see if a process selection method could be borrowed to fulfill the above-mentioned goals. Some examples included Kaplan and Norton's Balanced Scorecard (Kaplan and Norton, 1992); the Australian Business Excellence Framework (Australian Quality Council 2001); Critical process identification method (Huxley 2003; Huxley and Stewart 2008); the Australian/New Zealand Risk Management Guidelines AS/NZS 4360 (Standards Association of Australia & Standards New Zealand 1999); and an in-house-built method titled the "Process Filtering Model".[5] None of these was able to address the goals and requirements of the proposed process selection model. Hence a new tool/method was designed aiming to fulfill this.

3.1 High Level Overview of the Business Value Scoring Tool

The tool allows a requester, within approximately 5 min[6], to score a particular project to determine its business value. There are two main parts to it: (1) a risk and opportunity assessment (ROA, which has six dimensions that it works off) and (2) cost. The ROA[7] score is divided by the Cost to give a final BVS. Costing and risk and

[5]This was designed to filter through a set of processes that QIC was looking to improve, which was designed and implemented to manage the prioritization of high ranged projects. In most cases it helped identify areas for improvement, but it did not equate to the available resources."*a list came back with 20 and we distilled that down to 10, but we really only had capability to work on 3, 2 or 3, 3 or 4, and so we had to objectively assess, well which 4 is it going to be*"(Operations Strategy Manager, QIC, Personal Comm.,10.07.2008).

[6]This time frame was only to fill the tool components. It was assumed that the requester would be intimate enough with the requested project to be able to enter the details into the tool without further investigation.

[7]ROA, or Risk and Opportunity Assessment, is a measure of a (requests for change) RFC's value to the business. It requires a critical assessment of the RFC and its value, either through delivery of a benefit or the mitigation of a risk.

Fig. 1 Business value score calculation formula

Simple concept:

$$BVS = \frac{ROA}{Total\ costs}$$

(a)Detailed formula:

$$BVS = \frac{ROA \times 1000}{(\sqrt{Total\ costs})}$$

Where ROA is;

$$ROA = \sum_{All\ dimensions} (Outcome\ score \times dimension\ weight)$$

opportunity scoring is done by two separate parties. The two tasks of calculating the costs and deriving the ROA are deliberately kept independent of each other, to avoid one value influencing the other. There are constants included in the calculation to manage the potential variations. See Fig. 1 for the overall formula for the BVS calculation. The following sections describe each of the main elements of the tool. Appendix 2 provides a summary of the BVS model (initial and revised versions)[8].

3.2 Understanding the Components of the Tool

3.2.1 Dimensions of Measurement

Six dimensions were identified as critical components to consider when assessing Risk and Opportunity for a project: namely, Reputation, Clients, Business Processes, Financial Opportunity, Regulation and Compliance, and Human Resources. Both tangible and intangible dimensions were included to maintain a balanced, complete measurement perspective (following Kaplan and Norton 1992). These were based on ideas generated from past literature (i.e., Australian Quality Council 2001; Kaplan and Norton 1992; Standards Association of Australia & Standards New Zealand 1999), workshops conducted with the developers and requesters, and one-to-one interviews that were conducted with the program managers (those who sponsored the approved projects). They were also evaluated and approved by the General Manager for the Division of Operations at QIC.

The primary criteria for the identification and adaption of these dimensions were based on corporate strategy. Each dimension had to contribute directly or indirectly to QIC's corporate strategy and each dimension was granted a relative weighting (see Table 1 and Column 1 in Fig. 3) to indicate how much each contributed to corporate strategy. These weighting values were derived on the basis of information collected from various strategy-related communications in the organization and

[8]An introduction into foundations of (investment) accounting for BPM is presented in (vom Brocke and Grob 2011) as well as in (vom Brocke and Sonnenberg 2014) in this handbook.

Table 1 Dimensions of the business value score tool and their relative weightings

Dimension	Definition	Weights (as of date)
Reputation	The Reputation dimension was included to focus attention on the fact that requested changes should contribute to maintaining the good reputation of QIC	16%
Clients	The Clients dimension was included to align with QIC's corporate strategy and recognize that QIC's mission is to provide high-quality investment management and consulting services to maximize investment returns for our clients, consistent with their expectations and risk tolerances	22%
Business processes	The Business Process dimension was included, as QIC's ever increasing commercial focus demands that continual improvements be made to offer excellent service to clients while maximizing investment returns	12%
Financial opportunity	The Financial Opportunity dimension was included to align with QIC's corporate strategy	22%
Regulation and compliance	The Regulation and Compliance dimension was included as QIC's vision is to be a leading provider of professional and disciplined investment management services and to remain at the forefront of industry best practice	16%
Human resources	The Human Resources dimension was included in recognition that people are what QIC's success is built on	12%

was confirmed by the General Manager of Operations at QIC, through a series of face-to-face meetings. They were also presented at workshops to participating QIC employees (using the tool) for further feedback and validation.

The senior management determines and controls the content and weightings of the dimensions. These dimension weightings are used as multipliers of the outcome scores when deriving the BVS score (see Fig. 1b and the Sect. 3.2.2).

3.2.2 Outcomes and Scores for Each Dimension

The outcome components were designed to capture the anticipated impact of the proposed project to QIC through simple quantitative means. The requester of the project had to score the project across each dimension. They had three main categories of options to select from (see Columns 2 and 3 in Fig. 3); (1) no impact, (2) anticipated impact when evaluating the project from the perspective of "doing" the project, and (3) anticipated impact when evaluating the project from the perspective of "not doing" the project (see Sect. 3.2.3 for further details on the *doing* and *not doing* options).

One would choose the *no impact* option if there was no justifiable impact from the requested project on a particular dimension. Each of the *doing* and *not doing* action categories have five outcomes to choose from (see Columns 2 and 3 in Fig. 3). The intention was to describe the outcome of the project in association with the dimension in a progressive way and in a simple and clear manner. It was decided to have only five options to describe possible outcomes to maintain simplicity (following scale development and psychometric literature). These outcome descriptors were derived from an iterative effort with multiple rounds, which were completed through a series of workshops. The final version (as depicted in Appendix 2) was validated by the company executives, who critically evaluated each description looking at their alignment with corporate strategy.

Each outcome descriptor had an outcome score (from 12 to 52) to align with the progressive way they were intended to relate to the dimension (see Column 4 in Fig. 3). The outcome scores were squared [12–52 (1, 4, 9, 16, 25) instead of leaving at 1, 2, 3, 4, 5] to create a greater separation in the final score, and give greater weight to those dimensions that scored highly.

It is acknowledged that there may be subjectivity on which outcome descriptor is used based on each individual who scores the project; from person to person, they might move up or down one level. But the idea is that once a person scores a project, he/she has to be able to stand by it and give good reasons why the things were scored the way they were, if asked to explain. Qualitative, descriptive information is not collected within the tool, as it defeats the "minimal time for entry" requirement. However, all assessors are asked to make sure that they can justify their selected options upon request by the company, and this information is closely audited through the overall change management process.

3.2.3 Choice of Evaluation Perspective

The tool was designed to allow the scoring around two action choices (perspectives): "by doing" and "by not doing" the proposed project (see Fig. 3, Column 2). This enabled the assessor to comment on either opportunity or risk for each dimension[9]. A "by doing" action states that the piece of work being assessed aims to pursue an opportunity for a given dimension. A "by not doing" action states that the piece of work being assessed aims to mitigate a risk for a given dimension. For example, one can either say "by doing a particular project, a particular gain is obtained" and "by not doing a particular thing (within a certain dimension), the company could stand to make a particular loss (i.e., loss of reputation, loss of financial opportunity, loss of staff, etc.)." The tool enables one to mix between "by doing" and "by not doing" actions across dimensions within the evaluation of a single proposed project. This was built in to support the fact that while some projects may aim to mitigate against a risk in a particular dimension, it may simultaneously seek to produce opportunity in another dimension.

During the initial roll out (see the Sect. 4 for a further update), all dimensions (except for the Regulation and Compliance dimension) had both choices; by doing

[9]To further elaborate, when 'by not doing' is chosen, it means the assessor wants to validate the importance of doing the project by depicting the negative impact to the company by not doing the project, hence gaining support for doing the project (arguing "don't not do it"). The tool is designed to score the outcomes showing how business value is obtained by mitigating against the negative impact.

and by not doing. For example, Financial Opportunity can make money (opportunity) or prevent losing money (risk mitigation); Reputation can boost the company reputation (opportunity) or can prevent losing the current status (risk mitigation). The Regulation and Compliance dimension only has the "by not doing" option, as compliance does not bring opportunity, rather it only mitigates risk. This dimension in the tool is related purely to the regulation compliance side of things, thus, with the law and regulation compliance, one only has to comply as there are hardly any new opportunities to reach.

The assessor can select either action (by doing *or* by not doing) for a particular dimension and select the outcome options that would best suit the project request (see details in Sect. 3.2.2 and in Fig. 3). Sometimes the choice between "by doing" and "by not doing" could result in quite different scores[10] (as one looks at it from an opportunity view and the other from a risk mitigation view). Thus, when either action ("by doing" and "not doing") could be an option, the assessor has the choice to select the best one (the one with the highest score for the dimension) to support their request.

> "So if 'by not doing' was going to get you a score of 1, but 'by doing' was going to get you a score of four squared, sixteen.., then that's the one you would choose, because ultimately you want your BVS high, because you want your piece of work to get done."
>
> *(BVS Tool Designer and Developer 1, QIC, Personal Comm., 25.11.2008)*

3.2.4 Cost Calculations

The cost calculations are not done as part of this tool. It is calculated separately using common cost estimation methods (e.g., Briand and Wieczorek 2002; Jorgensen 2004) and entered into the tool for the BVS calculation purposes. It is useful to note here that for the purpose of segregation of powers and to mediate any BVS score manipulations, the costing is done by a different person to the one requesting the project. The business representative requesting the project (most commonly the ORM for the business unit) will complete the ROA. The Project Manager or Developer actioning the change does the cost calculations, which is done separately for each project request, at a line-by-line level.

3.2.5 Formula Manipulation

The basic formula was manipulated (also see Fig. 1b) to yield best results for the purpose. The three main elements worthy of discussion are as follows: (1)

[10]See the Financial and HR dimensions outcome options in Fig. 3, for example. The Financial Dimension has the exact opposite, mirror image for both options, where as Human Resources dimension does not – hence potentially yielding different scores depending on which option was chosen.

calculation of dimension scores; (2) the square rooting of the costs; and (3) a constant of 1000 used as a multiplier for ROA. The BVS formula employs exponents in both the ROA calculation and the division by cost in order to achieve a realistic result of business value.

As mentioned earlier, in the ROA calculation, dimensions are scored in the form $d = z^x$, where x is set to 2 and z has a range between 1 and 5. The exponent $x = 2$ produces dispersion in the values of d so as to avoid clumping (the values sitting too closely together), making it easier to discern between higher and lower values. Naturally, as x grows large, values of d disperse more widely. For QIC's purposes, x set to 2 provided for ample dispersion. Other implementations of the BVS formula could set x to any real value. However, for practical purposes, $1 \leq x \leq 3$ deems sensible as it produces a spread between values that is spaced widely enough but not excessively so.

It is reasoned that higher cost projects have less business value than lower cost projects with near or equal ROA values. To encapsulate this in the formula, the process of dividing ROA by cost is performed. However, due to existing dispersion in the dollar values of projects (moving in $1000 increments in the case of QIC), it was necessary to make a mathematical adjustment that would cluster the cost divisors, so as to produce sensible results. Dividing by nonclustered cost amounts resulted in projects with high cost achieving very low BVS values, which was not in line with company expectations of project value.

The cost divisor is denoted as $v = c^{1/y}$, where c is cost and y is set to 2 (thus, being equal to the square root of c). As y grows large, values of v cluster more closely. For QIC's purposes, y set to 2 provided for acceptable clustering of cost divisors. Other implementations of the BVS formula could set y to any real value. When y was set to 1, BVS values produced by the formula were flawed; all high-cost projects achieved low BVS values and all low-cost projects achieved high BVS values. It is reasoned that such a result should not be the case across a diverse range of projects. When y was set to 2, sensible BVS values were achieved (i.e., not all high cost projects are given low BVS values, which is not sensible).

The ROA values were multiplied by a constant (1000) in order to derive meaningful integer values for the resulting BVSs. It was found that without doing this, the resulting numbers were more difficult to understand for stakeholders, both for comparative and communicative purposes. This is a common practice in many mathematical formulas for business use, to make the resulting value easy to read and comprehensible by the users (e.g., DPO calculation used in Six Sigma projects (Breyfogle 2003; Chowdhury 2005)).

We acknowledge some limitations with this approach. In the current implementation of the BVS formula, both x and y are set to 2. While setting x and y to 2 produces excellent results for project prioritization of QIC's current project portfolio, it is not expected that setting x and y to 2 is optimal as a general case, especially for the variable y. It is expected that the value for y would need to depend on the variability in project cost amounts. The expectation is that the higher the variability in cost amounts, the larger y would need to be to produce sensible BVS values.

4 Testing and Implementing the Tool

The validation of the tool occurred in a few stages (see Table 2). Validation activities were built into the very early phases of the tool design. As mentioned earlier, the measurement dimensions and outcome descriptions were created with the interactive and iterative input from the tool users (the ORMs and Business Unit Representatives from QIC's different business units). The dimensions and their weights were also validated by senior management in the tool design phase.

A pilot phase was conducted prior to implementing the tool in the wider business, mainly to cater for user acceptance testing. For this, a random sample of 20 outstanding project requests was selected from the existing project request pool. Eighteen project requesters (mostly ORMs and/or Business Unit Representatives) responded, and they were asked to use the tool to derive a BVS value for the project request they represented. While they were aware of the tool and its functionality (by taking part in the tool design phase), a detailed workshop was conducted to orient them to the tool components and its purposes. All projects were scored after this workshop by the relevant ORM or Business Unit Representatives (who took part in the workshop). These results were then brought into a round table discussion facilitated by the two tool designers.

Inter-person variation with regard to differing BVS values was a critical observation made through this test. The round table session was conducted to investigate the cause for these variations. Projects were scored together by the participants "thinking out loud," which illustrated that the dimensions and outcomes can be interpreted by individuals in very diverse ways. Hence the need for very clear definitions and examples was identified. These were implemented for the next round (through enhanced documentation about the tool and the tool usage process).

The tool was also presented and approved by the executives prior to final implementation. These stages were undertaken to ensure that people within the company felt confident that they were actually using a tool that was in line with the company's strategic direction.

The final phase of validation was a 3-month post-implementation testing phase. The tool was made available through the change management process, and any project request that was made from mid-September 2008 had to present a BVS

Table 2 Business value score tool validation phases

Validation round	Time period	Involved stakeholders
Design phase	April–July 2008	Operations relationship managers Business unit members Senior management
Pilot phase	August 2008	Operations relationship managers Business unit members Senior management
Post-implementation testing	October–December 2008	Operations relationship managers Business unit members

score with the request (with justification, if required). The goal was to see how the tool as a whole and its separate components (i.e., dimensions, outcome descriptors, weights, formulas, etc.) actually functioned when placed in a real-world business context.

Detailed resources in the form of step-by-step user guidelines and power-point slides (all made available on the corporate intranet) were derived and distributed to all tool users. Face-to-face training was conducted to orient the users to the tool and how best to use it. Four primary observations were made from this phase. These, together with the actions taken in response, are briefly described below.

1. *The terminology of the tool can have different meanings to different business units*: The tool was designed in a manner that was applicable to the entire business. However, this can at times cause confusion. For example, with the "Client" dimension, a business unit can have external clients (customers), internal clients (other employees of QIC), or both. Thus, depending on which client cohort one looks at, the scoring for the Clients section can vary. The tool-user guidelines were updated to assist interpretation in such situations.
2. *The mutual exclusivity of the dimensions was questioned*: Mutual exclusivity of the dimensions and if one can "double claim" the same aspect across two or more dimensions was another concern raised. For example, with certain change requests, a process change (i.e., increased efficiency) can be reached while at the same time reducing costs (i.e., changing from manual to automated operations, thereby reducing the required people costs). The user guidelines are updated to clarify whether the same aspect can be included in two or more dimensions if it genuinely brings different (disjoint) benefits and this can be justified.
3. *The Client dimension had to be adjusted*: During the implementation phase, the feedback received from the tool users pointed to the need to edit the Client dimension of the tool. It was recognized that client engagement at QIC were of two different types (namely; client reporting and interaction, and client service delivery) and that the QIC clientele could be clustered around three kinds of clients that they grouped as Gold, Platinum, and Diamond. These had to be represented in the revised outcome options. Further feedback also proved that the "by not doing" action option was not relevant to the client dimension. Thus, the overall Client dimension was changed (see Fig. 4) to address these observations made in the post-implementation testing phase.
4. *Sometimes the BVS score alone is not enough to determine which projects are to be addressed first*: While the BVS indicated the business value a project would bring to the company, this alone was at times not enough to decide upon which project to address first. Mapping the project characteristics (where the BVS played a significant role in determining priorities) to the available resources was a critical task that has to be done outside the BVS tool. For example, while completing a project with a high BVS score, it might also be feasible to merge the efforts with a lesser significant project (one with a lower BVS score) and let it piggyback the bigger one. Projects with a high BVS score might have to be assigned to experienced senior staff, while those with a lower BVS can be

assigned to a junior staff in training. These examples meant that projects with a lower BVS could be completed earlier than those with a higher BVS because of resource availability.

A forum takes place twice a week at QIC to support this mediation, where the project requesting party (represented by the ORMs and/or Business Unit Representatives) and the Change Managers get together to discuss the final decisions on the ranked projects. This is when the actual resource allocations for the projects and any proposed changes to the prioritization list, generated by the tool, are discussed. The decisions made within these forums are carefully captured and archived for trend analysis and auditing purposes. The concept of a "Notional BVS" (see next section for details) was also formalized to allow for and manage such intervention to the BVS.

The limitations identified in these validation efforts have been addressed, and the tool has been deployed at QIC since December 2008.

5 Tool Adoptability and Application

The core components of the BVS tool (the dimensions, the action options, the outcomes and scores, etc.) and the overall validation of its components were presented in the sections above. The goal was to build a feasible, transparent project selection method. While the sections above described the tool as it currently stands, it can be edited and changed to suit changing organizational circumstances. For example, the dimensions can be edited or new dimensions introduced in response to emerging strategic directions. Furthermore, the weights assigned to each dimension can also change (even without any of the dimensions themselves changing) to respond to changes in strategic focus. These changes will only be allowed in long-term intervals (encouraged only every 12 months to reflect changed business directions) with appropriate validations and approval from the senior management.

While the tool will automatically produce a report of the projects, from highest business value to the lowest, this ranking is mediated and the requests' ranking can still be adjusted manually (via discussions at the forum mentioned earlier) – but only with evidence to justify why the requested change was made. All such change requests are recorded and periodically evaluated to identify potential patterns.

> "3 months, 6 months, 12 months down the track, we can print off a report that says okay, what was moved from which rank to which rank. Who motioned for it to be moved and does this person keep moving things all the time."... "It will also help to see what reviews or changes the tool requires as time passes with its application in the company."
> *(BVS Tool Designer and Developer 1, QIC, Personal Comm., 25.11.2008)*

The concept of a "Notional BVS" was developed to allow for human intervention in the final derived BVS. This was in acknowledgement of the fact that owing to the wide variety of project request types received, it may not always be possible for a single model to adequately capture all dimensions of all requests. For example, short-term market conditions may necessitate rapid development and/or modification to existing processes of a business. Urgency is not a dimension included in the BVS model, as urgency does not necessarily imply importance. However, should this need be reflected in the final BVS, a notional BVS can be applied. Following discussion with all involved stakeholders, should it be decided to increase the priority of a requested project, this can be done by overwriting the existing BVS. The possibility for manual intervention increases the flexibility of the system overall. It is important to note that this stage is also fully transparent and auditable, with any notional BVS being suffixed with the letter "n" in the records residing with the tool. It is also necessary for the person who has successfully requested that a notional BVS be applied to register not only their name but also the reason for the application of the notional score. Other situations in which notional BVS would be assigned to a project request include the following:

- A small, simple piece of work which could be packaged with a larger work item (requiring the same skill set) to realize operational efficiency;
- A relatively simple piece of work which may be used to upskill a staff member on a particular skill set.

The BVS tool explained here is very flexible, allowing the company to adjust the tool to address varying environmental and organizational changes. However, it is recommended to review such changes only in longitudinal intervals (i.e., annually) because if the BVS tool's underlying model changes too often, it could invalidate the tool in the eyes of stakeholders. In any case, once bedded into an organization, it is thought that changes to such a tool would only be made to reflect changes in a company's strategic outlook which, in reality, change over timescales measured in years, not months or weeks. QIC's model was built with this in mind, allowing any changes applied to the model to be retrospectively applied to all outstanding change requests in the pipeline, allowing a consistent "apples with apples" comparison between both new and queued requests.

This tool has enabled QIC to achieve its goals. All projects are ranked on the basis of a BVS using a tool, which takes minimal time to complete. This assessment captures the risk, opportunity, and costs, with a balanced set of dimensions (that captured softer and harder aspects that are important to QIC's strategic direction) and the method allows the project to be assessed from both assenting and dissenting views. Different people are involved in the scoring process to maintain genuine results, and the ultimate values (BVSs) are simple to interpret and compare against different projects. All related decisions about what projects are funded and in what order they are completed are transparent to all relevant stakeholders.

> In a nutshell, transparency is what we are looking for; transparency into what is valuable, transparency into who is requesting things, transparency into what is the demand, what is the supply.
>
> *(Operations Strategy Manager, QIC, Personal Comm., 10.07. 2008)*

The tool also enables QIC to conduct and maintain justifiable, transparent business decisions, not only for current project selection but also for long-term planning.

> The application of the tool enables us to analyze what types of projects are requested and what kinds of skills are sought for... Which of these QIC has and which ones QIC should further develop or seek externally for.
>
> *(Business Process Manager, QIC, Personal Comm., 10.07.2008)*

6 Conclusion

This chapter described a BVS model that can be used to assist with project selection decisions for business improvements. It described the current status of project selection challenges for process improvement and introduced the case organization (QIC) which this chapter is based upon. QIC, like most other organizations also was facing these common challenges of project selection. *How does one know which project to commence work on? How is the project's value to the business justified and explained? How can these decisions be made in a fair, justifiable manner that brings the best results to QIC and its stakeholders?* These are just some of the questions that QIC's decision makers were faced with in early 2008.

Every organization is striving for the means to identify only the most value-adding, feasible projects, while stakeholders demand that all decisions made are transparent and justifiable. QIC designed and tested a simple yet robust tool to address this challenge. All details of the tool, i.e., its fundamental concepts, all its elements, the design, validation, and application process, were presented in this chapter in detail. The BVS tool presented here can be adopted and applied within any organization, in particular to support the decision making of small to medium scale process improvement requests.

The tool presented here has a few limitations. For example, the resource planning aspect is not automated as part of the tool. There is also no facility within the tool to account for "project health"; i.e., to take into account what other contextual factors might constitute the success of a project. Arguably, however, this is not something that should be considered when looking solely at project value. Future adopters may use the tool presented here as a basis and add these enhanced features with additional research. Furthermore, we acknowledge some limitations with the calculations related to the tool. In the current implementation of the BVS formula, as explained in Sect. 3.2.5, the ROA is multiplied by a constant 1000, and the square root of the cost is used instead of the direct cost in the formula. While these settings produced suitable results for project prioritization of QIC's current project portfolio, it is not expected that this is optimal as a general case. This is especially true when manipulating the cost variable, and there is need to make this decision on the variability of the costs for the project that this tool will be used for. The chapter explains the rationale behind these manipulations that the future tool adopters can consider when adopting the associated formulas. Further research would propose that a mathematical link be made in the formula between the cost divisor and the variability of cost amounts in the project portfolio.

There are no current plans to further amend the tool at QIC because it is already being used companywide, and constant changing of dimensions and weightings would invalidate the tool. Only major changes in strategic direction should cause the need for significant modification to the tool.

Appendix 1: QIC Organizational Chart

Figure 2 depicts the QIC organizational chart after the structural changes conducted in 2008. One of the key changes was the introduction of ORMs. ORMs act as a central point of contact between Operations and the other business areas of QIC. Thus, six new ORMs and an ORM manager were appointed to represent the different business units. Divisions without an ORM have a named Business Unit Representative who fulfills the same interface function between their area and Operations.

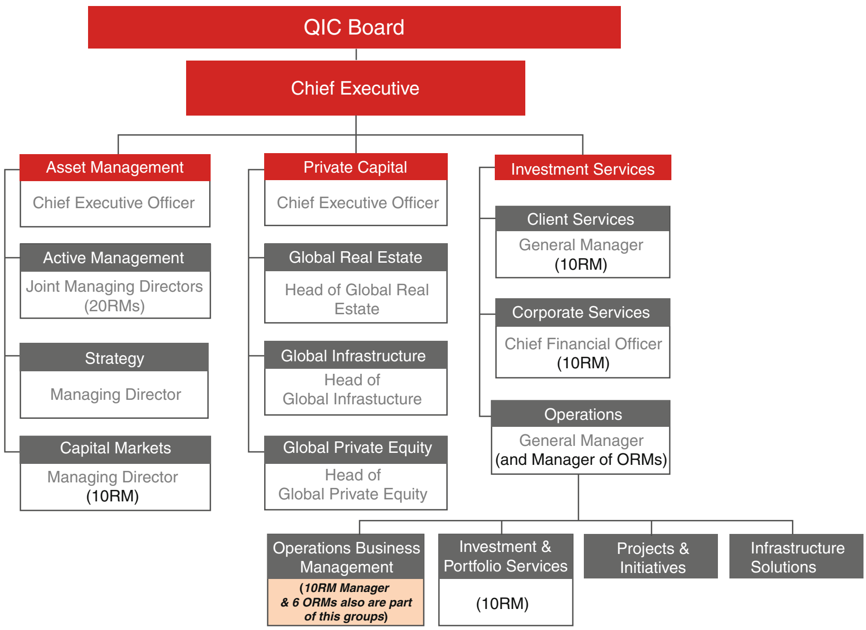

Fig. 2 QIC organizational chart

Col 1 Dimension and relative weight	Col 2 Selected action	Col 3 Outcome	Col 4 Outcome score
FINANCIAL OPPORTUNITY (22%)	*No Impact*	No impact on financial opportunity	0
	By Doing	Will result in a financial gain of $10k	1
		Will result in a financial gain of $100k	4
		Will result in a financial gain of $250k	9
		Will result in a financial gain of $1m	16
		Will result in a financial gain of $5m	25
	By Not Doing	Will result in a financial loss of $10k	1
		Will result in a financial loss of $100k	4
		Will result in a financial loss of $250k	9
		Will result in a financial loss of $1m	16
		Will result in a financial loss of $5m	25
REGULATION & COMPLIANCE (16%)	*No Impact*	No impact on regulation or compliance	0
	By Not Doing	Will be in breach of QIC policy	1
		Likely to be in breach of industry regulation	4
		Sure to be in breach of industry regulation	9
		Likely to be in breach of statutory or case law	16
		Sure to be in breach of statutory or case law	25
HUMAN RESOURCES (12%)	*No Impact*	No impact on human resources	0
	By Doing	Like to cause a slight upturn in staff morale	1
		Likely to have a positive impact on staff morale	4
		Likely to aid retention of key staff	9
		Sure to aid retention of key staff	16
		Contributes and aligns with strategic HR objectives	25
	By Not Doing	Likely to cause a slight downturn in staff morale	1
		Likely to have a negative impact on staff morale	4
		Likely to cause >25% staff turnover at department level within 6 months	9
		Likely to cause >50% staff turnover at department level within 6 months	16
		Likely to cause >50% staff turnover at division level within 6 months	25

Fig. 3 Summary of the initial business value score tool

Appendix 2: Business Value Score Tool Elements

See Figs. 3 and 4.

	Selected Action	*Outcome*	*Score*
CLIENTS (22%)		No impact on client relationship	0
	By doing	will bring about a Client Reporting and Interaction/ Client Service Delivery benefit to a gold client	1
		will bring about a Client Reporting and Interaction/ Client Service Delivery benefit to a diamond/platinum client	4
		will improve a gold client's investment performance	9
		will improve a platinum client's investment performance	16
		will improve a diamond client's investment performance	25

Fig. 4 Summary of the revised business value score tool

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Part II
Governance

The often-dominant focus on the managerial challenges of process-related initiatives must be embedded in guiding principles that clearly define the roles and responsibilities in decision making for BPM on both the program level and the project management level that is, BPM governance. BPM governance addresses questions like who is responsible for which process, what decision rights rest with a process owner, what reporting structures in an organization can increase process orientation, what incentives can facilitate an efficient performance of processes, and what responsibilities are assigned to a central BPM Center of Excellence.

At least two dimensions of BPM governance can be differentiated: the governance of processes and the governance of process management itself. These two dimensions form part of the two opening chapters of this section. In the first chapter, M. Lynne Markus and Dax D. Jacobson introduce the domain of governing processes, pointing out various the mechanisms for designing a cost-effective governance structure. The chapter describes governance mechanisms, identifies their advantages and disadvantages, and provides examples that show how governance mechanisms can contribute to improved business process performance. In addition, the authors clarify the specific advantages and challenges of these mechanisms by presenting real-life cases from US governmental organizations. In the second chapter, Andrew Spanyi takes the perspective of governing the management of business processes, reflecting on how successful companies sustain and optimize performance improvements. Presenting specific principles and practices for BPM governance, Spanyi provides sound guidelines for the practical deployment of performance improvements and a valuable point of reference for the remainder of this section.

After these two introductory articles, the remaining chapters in the section consider specific facets of BPM governance. First, August-Wilhelm Scheer and Michael Hoffmann focus on the process of BPM, taking a holistic, organization-wide perspective and identifying the phases, roles, and responsibilities that are required along the entire process of process management. Then Michael Rosemann describes the widely adopted concept of a so-called BPM Center of Excellence (CoE) as a major element of BPM governance. Rosemann concentrates on the typical set of services that is provided by such an organizational unit, elaborates on the idea of service portfolio management, and discusses the outcomes of an empirical study that shows the levels of popularity of various CoE services. The next chapter builds on the introduction of CoEs by showcasing the setup of a CoE in a Brazilian organization. Authors Leandro Jesus, André Macieira, Daniel Karrer, and Heitor Caulliraux also explain how the role of the CoE might change over time.

The subsequent chapters then address major challenges in BPM governance. The chapter by Roger Tregear on business process standardization looks at the balancing act between global and local BPM, an issue relevant to all companies operating on a global scale. The author describes a global BPM framework that facilitates the management of the conflicting demands of global efficiency and local effectiveness. Another topic of continuous global interest is the management of business process outsourcing (BPO), which is an essential element of future BPM governance. This is the focus of the chapter by Jyoti M. Bhat, Jude Fernancez, Manish Kumar, and Sukriti Goel, who present a framework for BPM analysis and report on experiences from practical cases gathered at Infosys BPO, a global offshore BPO provider.

We close this section with two practical cases on business process governance, which integrate the issues mentioned above. First, the case of ThyssenKruppPresta, presented by Stefan Novotny and Nicholas Rohmann, reports on results from implementing a global process management system. Then a chapter on experiences from implementing BPM in the public administration, presented by Peter Fettke, Jörg Zwicker, and Peter Loos, elaborates on the role of BPM maturity management.

The Governance of Business Processes

M. Lynne Markus and Dax D. Jacobson

Abstract Good business process governance is necessary for the success of business processes, which in turn are essential for business success. The term business process governance refers to the direction, coordination, and control of individuals, groups, or organizations that are at least to some extent autonomous, meaning that hierarchical authority alone is not sufficient to ensure effective performance. Business process governance, whether within or across organizational entities comprises a variety of mechanisms, including organizational *structures* (roles and units for performing and coordinating process activities), allocations of decision making *authority*, and *procedures* (e.g., review and approval processes). Governance mechanisms may be *formal* (i.e., formalized in writing or in law) or *informal* (e.g., not mandated). All governance mechanisms have pros and cons; some mechanisms are more effective (but also more costly) than others. The challenge is to design a cost-effective governance regime, which usually consists of designing several less costly mechanisms to work in combination. This chapter describes various governance mechanisms, identifies their advantages and disadvantages, and provides examples that show how governance mechanisms can contribute to improved business process performance.

1 Introduction

When people mention "governance" in the context of business processes, they usually mean governance of a business process redesign *project* or of a *program* of process redesign efforts (Becker et al. 2003; Kettinger and Grover 1995). Here, the foci of concern include identifying a project sponsor or champion, naming a project leader, composing the process team, ensuring the participation of stakeholders in project activities, etc.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_13,

Effective governance of business process redesign projects is clearly needed and important. But the focus of this chapter is on the governance of *business processes* themselves. In this context, governance refers to how the activities making up the processes are organized and coordinated, independently of any redesign effort.

Business process governance, in this sense, is descriptive of what is; it is not prescriptive of what should be. In other words, the term governance does not automatically imply *effective* patterns of activity organization and process coordination. We can still talk of "governance" when activities are ineffectively organized and when processes are poorly coordinated (or even not coordinated at all). By describing as-is patterns of activity organization and process coordination, we aim to understand their consequences, so that we can make intelligent decisions about what aspects of business process governance, if any, should be changed.

Why is it useful to understand the governance of business processes? There are several reasons. First, business process problems, such as inefficiencies and errors, are often a direct result of how business processes are governed. In some cases, all that is necessary to ensure greater effectiveness of a business process is to change its governance.

Second, understanding business process governance is important because it provides useful information for designing the governance of business process redesign projects or programs. For example, designing effective governance for a redesign project will be more challenging when the as-is process cuts across all major divisions of an organization and lacks explicit coordination than when the as-in process is contained within one division and is coordinated (though weakly) by designated process expediters.

Third, and most important, understanding business process governance is important because the need for effective governance does not end when a business process redesign project is complete. Good governance is necessary for the on-going success of business processes, which, in turn, contributes to business success (Rosemann and de Bruin 2005). If business process governance is ineffective and is not changed as part of a process redesign effort, the proposed process redesign is likely to fail. Most likely, it will never be *implemented*. Even if it is implemented, poor process governance suggests that the redesigned process will not be adequately *maintained*—that is, it will not be appropriately updated as circumstances change. Put differently, the redesign of process flows is not enough for long-term process effectiveness. In many cases, process redesign cannot succeed in its objectives unless the governance of the process is also changed.

The purpose of this chapter is to present and illustrate some key business process governance concepts, alternatives, and their pros and cons. Section 2 discusses the meaning of the concept of governance as used in this chapter. Section 3 explores the tradeoffs involved in designing business process governance. Section 4 provides examples of governance alternatives for intra-organizational and inter-organizational business processes and analyzes them according to the tradeoffs framework developed below.

2 Governance Defined

Governance is a difficult concept because it is used in many research traditions to mean different things. In addition, the concept of governance has been used in both intra-organizational and inter-organizational contexts, where governance arrangements may differ because of the presence or absence of formal hierarchical authority.

For example, inside many organizations, the major business units report directly to chief executive officers who have the ability to exert top-down (vertical or hierarchical) authority over their subordinates. Consequently, when people discuss governance in intra-organizational contexts, they sometimes include vertical authority as part of the governance concept, as when the term governance is reserved for the decision-making role of senior corporate executives and Boards of Directors. (Note however, that the subunits in some complex multinational corporations may be legally autonomous and thus not readily amenable to the exercise of vertical authority.) Other writers differentiate intra-organizational governance from vertical authority, as when they emphasize lateral or horizontal coordination mechanisms (e.g., project management processes) and the distribution of "decision rights" related to IT across various organizational roles (corporate executives, corporate IT unit leaders, business unit executives, leaders of IT units with business units).

These differences in conceptualization can be reconciled by noting that governance occurs at multiple levels (Ostrom 2005). Therefore, in most cases, one should assess *both* vertical authority and horizontal coordination as important aspects of intra-organizational governance This is a core insight of the literature on organizational design, which argues that two key (and interrelated) design decisions are: (1) how to group activities into units (often called structure) and (2) how to coordinate processes across units (often called lateral relations) after the activities are grouped.

An example (drawn from Markus et al. 2012) may clarify the need to consider both vertical and horizontal dimensions as part of intra-organizational business process governance. IT governance arrangements are needed to ensure that organizations obtain the best possible value from their investments in IT. An arrangement that most people would consider part of IT governance is granting to business unit heads the right to decide priorities among proposed IT projects. This governance arrangement is believed to enhance IT business value, but *whether and how it does so depends on the organizational structure*—that is, who directly manages the people who work on IT projects.

Consider three different structures. In the first, IT project personnel report directly to business unit heads. In the second, all IT project personnel report to a corporate chief information officer (CIO), but they are grouped into subunits that are assigned to work only with and for particular business unit heads. In the third, all IT project personnel report to a corporate CIO in a pooled arrangement and are assigned to projects by the CIO.

The outcomes of the same governance arrangement (business unit heads can decide IT project priorities) will differ in each of the three organizational structures. In the first case, the CIO is unlikely to be able to exert any influence on project prioritization because the CIO does not manage the people doing IT project work. In the second case, the CIO may be able to exert some influence at the margin but would probably find it difficult politically to reallocate personnel working on a low-priority project for one business unit head to a higher priority project for a different business unit head. In the third case, regardless of what the business unit heads decide, the CIO could exert a big influence over project prioritization by controlling the allocation of IT personnel to projects.

The point of this example is to show that horizontal governance mechanisms such as allocations of IT decision rights and processes for coordinating IT projects cannot be well understood (let alone designed) without a good understanding of how the related activities are organized and managed vertically. Because these two design dimensions are so interdependent, for the purposes of this chapter, we consider both the organization of activities and the coordination and control of cross-cutting processes to be part of business process governance.

By contrast to the intra-organizational case, the participating organizations in many inter-organizational processes are partially or wholly autonomous of each other (Lynn et al. 2001). This means that there is limited potential for the exercise of vertical authority. Consequently, writers on inter-organizational governance usually confine their analysis to lateral relations across organizations. Here, the distinction between formal and informal governance is frequently made. Formal governance means "impersonal" rules that are documented in writing or formalized in legal arrangements such as contracts. Informal governance refers to interpersonal interactions that are not prescribed by formal rules.

However, there are also writers on inter-organizational governance who recognize a vertical dimension, by noting that formal inter-organizational governance may involve distinct legal organizational forms or structures with different allocations of decision rights. For example, stock markets may be legally organized as collective (member-owned) organizations or as (investor-owned) limited liability corporations. In these two hierarchical structures, decision-making patterns can differ sharply. Similarly, inter-organizational business alliances can take the form of joint ventures or consortia in addition to a direct investment by one company in another. This suggests that both distinctions (1) between *hierarchical* form (structure) and *lateral* relations (coordination processes) across organizations and (2) between *formal* (written, legal) and *informal* (non-prescribed personal interactions) mechanisms represent important features of inter-organizational business process governance.

In practice, the contrasts in governance between intra-organizational and inter-organizational contexts are not as stark as they may first appear. As mentioned above, inter-organizational governance as well as intra-organizational governance can be seen as having a hierarchical dimension (legal organizational form). In addition, intra-organizational governance as well as inter-organizational governance can be seen as having a formal (prescribed) and informal (emergent) dimension as well as the vertical (structure and top-down authority) versus horizontal (lateral coordination mechanisms) dimension. Furthermore, impersonal formal governance mechanisms are rarely effective unless they operate in conjunction with formal and informal personal interaction. For instance, regular committee meetings (formal, personal) and hallway conversations (informal, personal) are often needed to augment service level agreements (formal, impersonal) inside an organization, just as, in inter-organizational business processes, monitoring and the imposition of fines by the buyer are often needed to ensure that suppliers honor the terms of sales contracts.

In short, we define business process governance as the formal or informal, personal or impersonal, intra- or inter-organizational (1) vertical structures by which activities are organized and managed and (2) lateral roles, relations, processes, and rules for coordinating and controlling across business process activities. Business process governance comprises a range of different types of mechanisms that commonly occur in combinations. Each mechanism and combination has advantages and disadvantages. In the next section of this chapter we develop this theme by exploring the tradeoffs in some common business process governance arrangements.

3 Tradeoffs in Business Process Governance

Designing business process governance always involves making difficult tradeoffs. In this section, which draws heavily on Galbraith (1994), we examine common ways of structuring organizational activities and we detail the pros and cons of different strategies for coordinating across them.

3.1 Management Hierarchies and Business Processes

Intra-organizational business processes are frequently depicted as cutting horizontally across functionally structured companies or business units (see Fig. 1). In this functional organizational structure, each specialized unit, such as engineering, manufacturing, and marketing, has a manager whose goals and priorities have been set by the organization's general manager. Often, these goals and priorities have more to do with the activities of the functional units, for example, reducing the manufacturing "box" cost, than with cross-cutting process priorities such as achieving faster delivery of products to the customer. Each functional unit manager, in turn, sets goals and priorities for people within the specialized unit, assigns work to them, and measures and rewards their performance. Because no one person (at operational levels of the hierarchy) is responsible for whole cross-cutting processes, decisions made in the specialized functional units may actually worsen

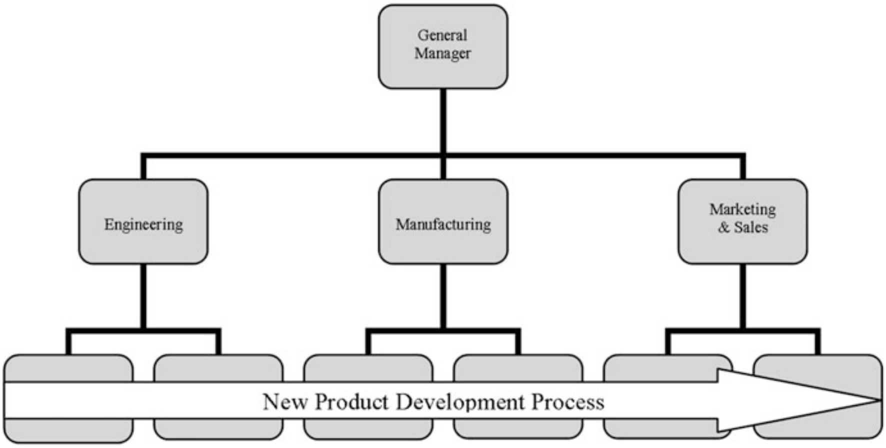

Fig. 1 The new product development process in a functional organization

business process performance. As a result, many functionally organized enterprises have poorly performing processes and are seen as needing process redesign.

The problem is, of course, that if a redesigned process is grafted back into an existing functional organizational structure *with no other changes* (for instance a change in performance incentives), the prevailing managerial emphasis on functional concerns will continue, and process performance will eventually suffer again. To understand what other changes are needed to ensure the smooth operation and continuous improvement of redesigned business processes, one needs to understand the advantages as well as the disadvantages of various organizational structures and what can be lost as well as gained by structuring organizations differently.

Any organization that grows in size beyond a large team creates a hierarchy of business units, because otherwise the supervisory and decision-making demands on the general manager become too great. The hierarchy may be flat or tall, but it exists, and the reason is to break up the people and activities of the organization into units that can each report to the general manager as a single entity, thus reducing the manager's span of control. The hierarchy is a crucial aspect of organizational design, because it sets the action execution framework for the organization; it defines the organization's most important activity groupings (also called the bases of organization); and it identifies the individuals responsible for getting these activities done—usually people with the authority to allocate resources to activities and to monitor and reward process workers' performance.

Specialized business functions (e.g., accounting and marketing) represent one basis by which people and activities can be grouped into organizational units. Organizations can also be structured around products or services, customers or geographies, and indeed around business processes. Organizations frequently need to manage multiple bases of organization simultaneously, but effective execution usually demands deciding which is *the* most important basis of organization—units of this type report directly to the general manager—and subordinating the other

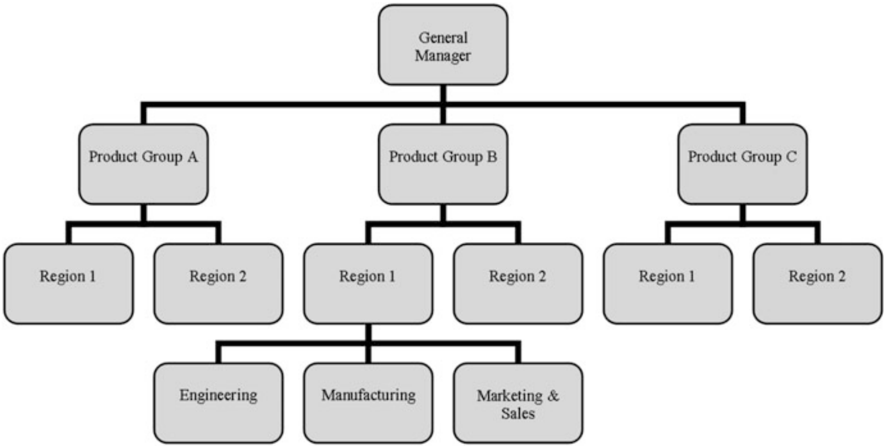

Fig. 2 A multinational organization design

bases of organization to the most important one. Thus, in multidivisional organizations, the top level of the hierarchy may be organized around product groups; each product group may have customer-oriented subunits; and each customer unit may be functionally organized (see Fig. 2).

Regardless of how the organization is structured, there will always be issues that cut across units. In a product-structured organization, there may be opportunities to attract new customers with a "product solution" involving products from several different business units or opportunities to develop entirely new products that require the technical experience found in two or more units. In a customer-focused enterprise, there may be opportunities to create standardized product offerings that are more efficient to produce or the need to develop shared business services to lower administrative costs. In a functionally organized business unit, the process of new product development may require expertise from marketing, engineering, and manufacturing units. Because there are always cross-cutting issues in organizations, there will always be needs for coordination across units.

There are three basic ways to handle cross-cutting issues in organizations: (1) referral of issues up the *hierarchy* for decision, (2) *lateral relations*, and (3) creation of one or more *new organizational units*. The first approach is for the issue to be referred up to a higher level manager for resolution. For example, a new product development project could be led by the general manager in conjunction with functional unit heads. Naturally, this approach is unavailable for processes that involve multiple legal entities, unless they agree to participate jointly in some sort of alliance (Markus and Bui 2012). Furthermore, it is not a preferred approach, even within organizations, because it diverts general managers' attention from their own key priorities (often facing outward toward customers and financial markets) and reflects poorly on subordinates' ability to manage their responsibilities. Thus, the second approach, in which the relevant decisions are made lower in the hierarchy by means of what is called a lateral organization or lateral relations is often preferred to the upward referral approach. Examples of lateral relations include both *formal* personal governance mechanisms (e.g., liaison roles, coordination units, standing committees) and *informal* personal governance mechanisms, (e.g., ad hoc meetings, phone calls, e-mails) described more fully below. The third approach involves the creation of new activity units around the cross-cutting issue, thus making the process a primary basis of organization. This last strategy is often advocated by business process experts, but, like the other approaches, it has disadvantages as well as benefits, as discussed below.

In different language, cross-cutting issues can be thought of "business processes," an example being new product development. The lateral relations approach is the strategy most commonly employed by organizations for "business process governance." And creating an organizational unit to operate a business process is an instance of what is called "process unit." We now examine various commonly used mechanisms of business processes governance in more detail.

3.2 Mechanisms of Business Process Governance

The lateral relations that coordinate and control business processes across organizational units span the range from completely unprescribed to legally mandated. In many cases, lateral relations occur spontaneously and informally, without official encouragement or recognition by the organization. Alternatively, lateral relations may be explicitly set up as written or even legal organizational responsibilities and accountabilities. These formal lateral mechanisms vary in their requirements for organizational commitment—that is, in the level of resources necessary to fund their operation. Finally, organizations can entirely restructure along process lines.

At the *informal* and *personal* ends of the governance dimensions, people in different units who are mutually involved in a cross-cutting business process may call ad hoc meetings, place phone calls, or send e-mails when they experience a situation that needs coordination. For example, an engineer working on a new product design may call a colleague in manufacturing to ask whether the proposed design would be expensive to build or difficult to maintain. The most important drawbacks of informal personal relations as a strategy for business process coordination is that they are not certain to happen, because the responsibility and accountability for these lateral relations have not been explicitly assigned. After all, if people do not liaise well informally, they cannot really be accused of not doing their jobs.

Furthermore, if problems arise during informal coordination that cannot be resolved by the parties involved, the conflicts must be escalated up at least two levels of hierarchy (to the manager of the managers of the units in which the coordinators work) in order to be resolved effectively. In practice, such escalation rarely happens, because doing so reflects badly on the participants. Consequently, processes fraught with informal conflicts often remain poorly coordinated.

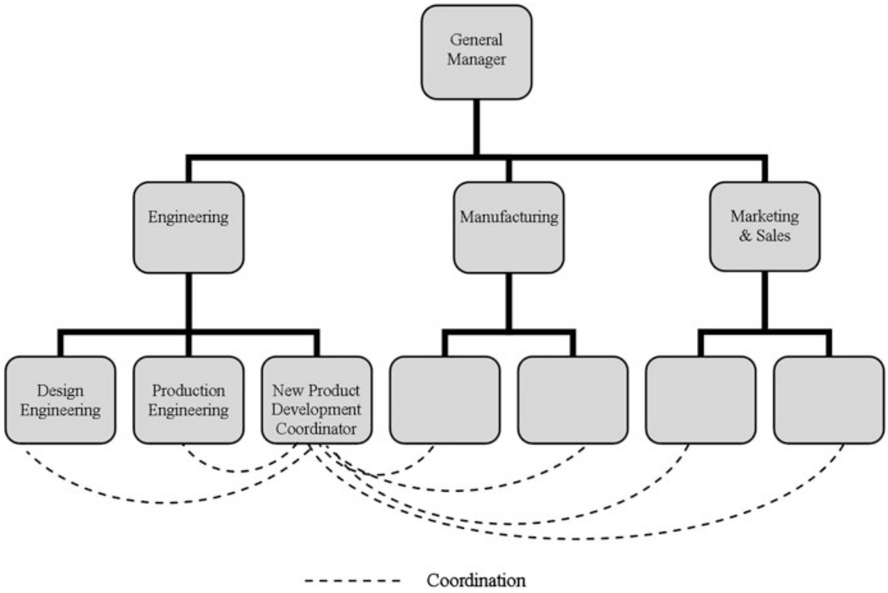

Fig. 3 A new product development liaison role

Finally, although informal liaison can work adequately for the ongoing operation of a process, it generally fails when the process needs to be improved or redesigned. The reason is that process improvement and redesign generally require the allocation of resources (e.g., people's time to work on the redesign team, funds for new software or equipment), and informal coordinators often lack the authority to make these resource commitments. In general, if the process is at all important to the organization, it requires some level of *formal* lateral coordination.

At the lowest (least expensive) level of formal process coordination, an organization can designate a *liaison role*, assigning to someone the responsibility for coordinating across organizational lines (see Fig. 3). At greater expense, the organization may set up a *standing committee*, often staffed with relatively senior managers from the affected units, to oversee the operation and improvement of a cross-cutting business process. Such a group would typically identify appropriate process metrics, track them, and recommend improvement actions. But the group would have no authority to allocate resources (other than their own budgets, if any) or to compel the execution of its recommendations, so the group members would have to negotiate with other leaders to ensure that changes are made.

An even more expensive lateral relations strategy is for the organization to create a separate organizational unit charged with responsibility to coordinate a business process, while the activities that make up the process continue to be executed in operating business units. This *process coordination unit* (often called a "process owner") would generally have only a small staff and would be responsible for such activities as process design, setting process performance targets and budgets,

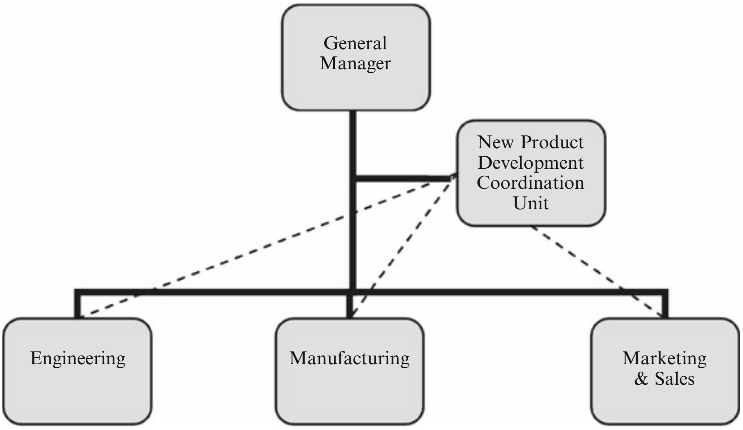

Fig. 4 A new product development coordination unit

providing training, "purchasing" products or services from operating units, and so forth. This unit would not, however, actually "manage" process workers and activities (see Fig. 4).

Moving beyond these purely coordinative strategies, the organization could restructure around processes—that is, change the basis by which activities are combined into units and hierarchically managed. In the *process unit* version of this strategy, the organization sets up a new operating unit to perform many activities associated with a business process, such as new product development (see Fig. 5). This new product development unit differs from the product

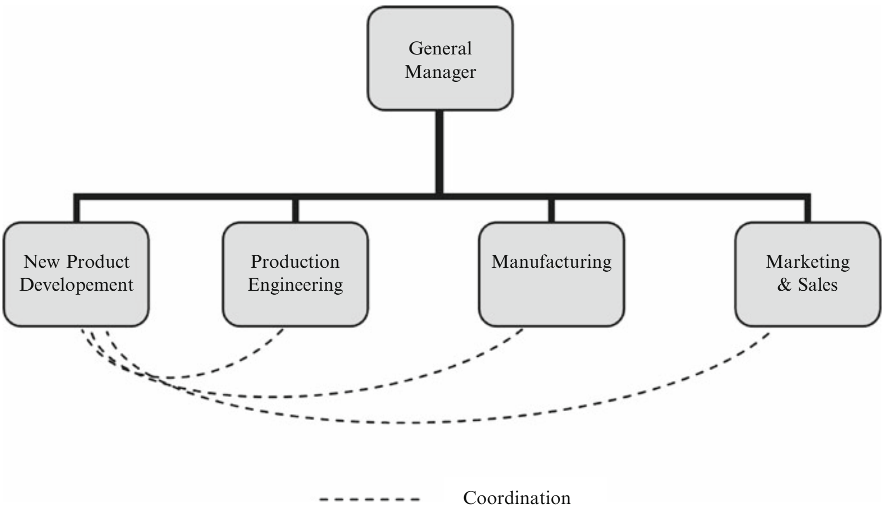

Fig. 5 A new product development process organizational unit

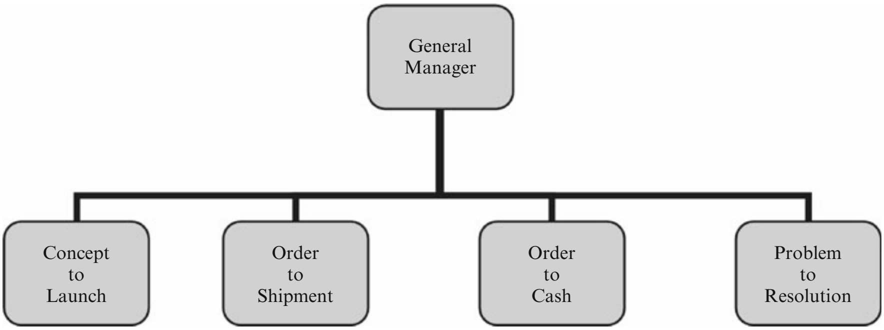

Fig. 6 An organization structured entirely along process lines

development *coordination* unit in Fig. 4 in that the development unit actually performs the product development activities whereas the coordination unit does not. In the most extreme version of restructuring strategy, the organization is completely reorganized along process lines, thus creating a *process organization* (see Fig. 6).

3.3 Tradeoffs in Organizational Design and Business Process Governance

Clearly, restructuring an organization to create a new operating unit for a particularly important process or restructuring entirely along process lines focuses the strongest levels of managerial attention on business processes, maximizing the chances that the processes will perform well. Why, then, would an organization even consider lower levels of process coordination (e.g., informal lateral relations)? The short answer is that restructuring the activity units of an organization is always more expensive than creating lateral coordination mechanisms. Furthermore, emphasizing processes to such an extent means de-emphasizing other bases of organization, and organizational executives must be absolutely convinced that the merits of reorganization will outweigh its greater costs.

To be more specific, setting up a process unit or process organization involves moving people, organizationally and often physically as well, from functional units to process units. In the course of restructuring, employees get new bosses and new co-workers—a very stressful situation for everyone. In addition, the organization's reporting, budgeting, and control processes must all be redesigned, which may require a substantial investment in information systems or services. On top of that, the new unit still needs to coordinate with other operating units, thus new lateral relations must be developed or encouraged to emerge.

For instance, consider an organization that sets up a new unit to perform new product development, not just to coordinate development across functional departments, as shown in Fig. 5. Every time the new department creates a new product, responsibility for that product must be transitioned to the operational units responsible for selling it, manufacturing it, servicing it, etc., along with information about how it is to be built, sold to customers, maintained, etc. Lateral relations must to be created to coordinate these transitional activities. New lateral relations would be required even if the entire organization were restructured along process lines, as depicted in Fig. 6. In this case, the lateral relations would probably focus on functional expertise.

The sad truth is that every way of structuring and managing organizations and every way of designing and governing business processes has pros and cons. (See Table 1 for a summary.) Every design choice involves trading off some costs to achieve some benefits. For example, completely reorganizing from a functional structure into a process-based one does not eliminate the need for a lateral organization to coordinate across units. It merely changes the kind of lateral coordination that is needed. In a functional organization, business processes need to be coordinated laterally across functional units; in a process organization, functional expertise and efficiency need to be coordinated across process units.

The functional organizational structure may appear deficient when viewed from a process perspective, but it is efficient, because it reduces the need to replicate functional specialists in many different units. The functional organization also enables the organization to develop depth of specialized expertise in areas such as mechanical engineering, electronics or hydraulic technology, marketing research, software development, etc. Thus, the decision to reorganize an enterprise or business unit on the basis of processes is a business decision that processes are more important to manage than functions are, and therefore, that the functions either do not need to be explicitly managed (in other words, they can be left to informal coordination) or that the functions should be governed lightly through formal liaison roles or coordination units.

The same holds true for any basis of organization, for example, for product and customer bases of organization, in addition to process and function. The decision to elevate one basis of organization, say customers, in importance is a decision to de-emphasize another basis of organization, for example products. Occasionally, two bases of organization are believed to be nearly equal in importance, and complex "matrix" structures are set up to coordinate them. But these structures can be extraordinarily expensive to maintain, because they involve parallel management systems for goal setting, budgeting and scheduling, performance evaluation, and financial control.

In general, organizations large enough and complex enough to have multiple product lines and multiple customer segments are organized primarily by one or both of those bases; functions such as manufacturing and operational business processes such as new product development are generally subordinated to customer and/or product units. (In other words, the customer or product units report higher in the management hierarchy than the functions or processes do.) Naturally, it follows

Table 1 The pros and cons of different types of governance mechanisms

Governance concept	Definition	Pros	Cons	When to use
Impersonal governance	Governance achieved when individuals and organizations adhere to norms of behavior or documented rules promulgated by institutional actors, such as governments, standards bodies, industry associations, etc.; includes laws, rules, procedures, contracts, budgets, SLAs, pricing plans	Can clearly specify roles and responsibilities, compliance requirements, and penalties for non-compliance; if norms are internalized, the costs of governance can be low; can avoid some of the conflicts associated with personal governance	Impossible to pre-specify every contingency; may be ineffective without expensive monitoring and enforcement	When certain levels of service are required and can be monitored; when coordination is needed across organizations
Personal governance	Governance exercised directly by people regardless of authority or responsibility; includes vertical (hierarchical) authority, horizontal or lateral relations, and organizational restructuring along process lines	Flexible; has the ability to respond to unforeseen circumstances	May provoke more conflicts than impersonal governance; may result in less consistent application than documented rules	Always required in some form, for instance, needed to create impersonal rules
Vertical (hierarchical) authority	Direction or control exerted by superiors in a managerial hierarchy	Effective for activities that occur entirely under the direct authority of a line manager; can help generate commitment to business process changes within organizations	Not sufficient for business processes, because they cross intra- or inter-organizational lines	
Horizontal or lateral relations	Coordination across boundaries within or across organizations; includes informal and formal governance; excludes organizational restructuring along process lines			Always required for business processes, because they cross organizational lines
Informal governance	Governance negotiated informally by people with responsibility for various tasks or resources; includes ad hoc meetings, phone calls, e-mails, hallway discussions, etc.	Execution requires informal governance—this is how work gets done; facilitates development of shared understanding; can compensate for gaps in structure or governance	No way to ensure that informal coordination will happen; no formal method to resolve issues, leading to escalation up the hierarchy; ineffective for process redesign	Always required; should be encouraged in addition to other governance mechanisms; not recommended as the sole form of business process governance in complex organizations

(continued)

Table 1 (continued)

Governance concept	Definition	Pros	Cons	When to use
Formal governance	Governance administered or negotiated by people working in formally assigned coordination roles; includes liaison roles, standing committees, and process coordination units	Ensures that functions and organizations are represented; problem ownership and resolution are clearly identified	Often expensive	Especially important when coordination involves the allocation of resources
Liaison roles	Formal assignment of responsibility for coordinating a business process to a designated person (see Fig. 3)	Relatively low cost formal mechanism, because the liaison role may be an additional assignment to an existing role	No authority to allocate resources or compel execution of recommendations	When business process governance requirements are relatively "light"
Standing committees	Creation of a permanent group of people, representing the different organizational units involved in a business process, with formally designated responsibility for governing a business process	Ensures that the organizational units involved in a process are represented in process governance, signaling and reinforcing attention and commitment	More costly than the liaison role because such committees are often staffed by relatively senior people; no authority to allocate resources or compel execution of recommendations	When the business process is important enough to require high-level visibility and commitment from multiple organizational units
Process coordination units, the "process owner" strategy	Creation of an organizational unit to coordinate (but not execute) a business process (see Fig. 4)	More effective than liaison roles and standing committees, because such units often have budgets to purchase services from operating units and thus have a say in the operating units' performance evaluations	More costly than liaison roles, because new jobs are created and staffed; more costly than the standing committee, because the process coordination unit and a standing governance committee are often used in combination	When the organization is prepared to manage the process formally—that is, to set goals and metrics, to draw up budgets, and to evaluate and reward performance
Organizational restructuring	Change in the basis for organizing activities and their reporting relationships; includes process organizational units and process organizational structures	Powerfully directs managerial attention to one or more key business processes	Always more expensive than lateral relations	When the organization is prepared to make very significant resource commitments
Process organizational unit	Creation of an organizational unit to execute a business process (see Fig. 5)	Gives the business process considerable autonomy to pursue its own goals and objectives	Requires the creation of new governance arrangements, because the new unit will need to liaise with the existing operating units	When the process is vitally important to the health of the organization, the process has underperformed under previous governance regimes, and the organization is unwilling to completely restructure

The process organizational structure	Complete reorganization of the enterprise changing the primary basis of organization from function, product, or geography to process (see Fig. 6)	Gives major managerial attention and visibility to end-to-end customer facing processes	Extraordinarily expensive, because it completely reassigns people, authority, and responsibility; requires creation of new management systems and governance arrangements; may result in significant erosion of functional, product, or geographic capability	When the organization is convinced that process is the most important basis of organization and is willing to incur the extraordinary expense of complete reorganization

from our earlier discussion that there will still be issues that cut across the product or customer units. A prime example is decision making about enterprise IT systems and shared business services (e.g., human resource management and accounting). Some of these cross-cutting issues may be thought important enough to be formally governed by means of the strategies described above.

In short, business process governance cannot be designed in a vacuum. Business process governance needs to be designed in conjunction with an enterprise's primary organizational design decisions, which are strategic business decisions. Whether or not a "process owner" (liaison role) should be named or a process organization structure set up is not a black or white question, and no one solution is best in every situation. Tradeoffs must always be made. That said, let us now examine some actual examples of governance choices.

4 Process Governance Examples

In this section, we analyze four examples of business process governance drawn from our own (and colleagues') research on IT governance in US governmental organizations. The examples differ in the extent to which vertical authority eased the way to better process governance.

The first two examples involve the management of IT and other administrative processes within the executive branch of US State Governments. Here, the authority of State Governors undoubtedly facilitated major reorganizations intended to improve business process performance. Therefore, these two examples may be thought of as cases of intra-organizational business process governance. The two States we examine chose different governance arrangements: Virginia originally implemented a process coordination unit, but later outsourced all performance of IT activities to an external services provider. Washington opted for a complete reorganization along process lines (process organization) for its administrative activities.

The second two examples concern processes for information sharing and emergency medical services provision in US counties. Counties are a unit of local government within States. Many counties comprise multiple cities and towns as well as agencies. Consequently, business process coordination within counties is often initiated as informal peer-to-peer collaboration, rather than as top-down directed organizational change. Thus, these two examples are more inter-organizational in character than the two State cases.

Despite the informal nature of the coordination that initiated business process change in the two counties, governance of these business processes did not remain informal. Real and lasting improvement in the business processes required formalization of coordination mechanisms. The two examples we examine chose different governance arrangements. Winnebago County elected to house the activities of running its shared court and case management information system within a shared services center (a process unit, in our terminology) located in the county's IT department. They enacted shared (inter-organizational) governance of the center by means of a hierarchy of committees and by impersonal mechanisms such as service level agreements (SLAs). By contrast, San Mateo County executed a master (legal) contract (a formal, impersonal mechanism) as the primary vehicle by which numerous independent county entities would coordinate with private sector companies that provided ambulance services. They supplemented this mechanism with a standing committee and informal interactions.

4.1 A IT Process Coordination Unit in the State of Virginia

US State governments are large, complex organizations—the smallest has over 15,000 employees; the largest has around 400,000. State governments are functionally organized, composed of Agencies devoted to such matters as Transportation, Health, Public Safety, and Administration. IT is used in every Agency, and managing IT efficiently and effectively across State government is a business process of great importance.

Like many organizations around the world, American State governments need to obtain better value from their investments in IT, particularly in light of financial pressures from the series of recessions that started in the year 2000. In doing so, many States are hampered by a legacy of decentralized IT management, in which each Agency was responsible for its own IT activities and decisions.

In 2003, the State of Virginia faced a budget shortfall of US$6 billion. A newly elected Governor aimed to reduce the shortfall in part through efficiencies and cost reductions in IT. A policy commission formed by the Governor recommended that IT activities in the State be centralized. This recommendation would have meant forming a process unit for IT activities such as desktop services and software development.

This recommendation understandably met with considerable resistance from the Agencies. It would have involved a major reorganization of IT work, and Agency heads may have had justifiable concerns about how well the new unit would support their priorities. In response to the negative reactions, the new central IT unit, VITA (Virginia Information Technology Agency) was set up as a process coordination unit, rather than as a process unit (Hvalshagen 2004). The Agencies continued to conduct their own IT activities, while VITA coordinated and attempted to streamline them. For example, the Agencies were required to develop strategic IT plans and forward them to VITA for approval. VITA also approved procurements and projects over $100,000.

As a process coordination unit, VITA may have been able to generate some IT efficiencies, but not nearly to the same extent as if VITA had been set up as a process unit. Perhaps it should be no surprise, then, that shortly after VITA was set up as a coordination unit the governor decided to outsource all IT activities to an external IT services provider. This in essence accomplished the original goal for VITA—centralizing all IT activities and removing them from the vertical authority of individual Agencies. The process of IT management in the State of Virginia is now an inter-organizational process, involving a different set of governance mechanisms, such as the legal contract between the State and the external service provider.

4.2 A Process Organization for Administration in the State of Washington

The process unit, as envisioned for IT management in Virginia, represents significant organizational change. Implementing such an arrangement involves time, effort, expense, and considerable disruption of normal operations—which are justified only in the expectation of big returns. At the same time, the process unit is relatively limited in both costs and benefits, because organizational change is restricted to a single (albeit highly important) process.

By contrast, the process-based organization is a much more radical and expensive organizational intervention, because it affects multiple process groupings. At its most extreme, a process-based design can reorganize an entire enterprise from (usually) a functional basis to a process basis. But a new process-based organizational design can still be revolutionary if it affects only a single large family of related processes, such as “logistics”, “business services”, or “administration.”

The State of Washington in the Pacific Northwest region of the US recently implemented a process-based organization for administration. Previously, administrative activities in Washington, like the core government Agencies of Education, Transportation, etc., were functionally organized. That is, there was a Department of Personnel, a Department of Information Services, a General Administration unit (for facilities maintenance, property management, etc.), a Department of Printing, and an Office of Financial Management (budgeting, procurement, etc.). Naturally, Agencies frequently had to bear the burden of coordinating across two or more of these units when trying to get work done. For example, to hire new employees, the Public Safety Agency might have had to work with both the Department of Personnel and the Office of Financial Management.

Concerned about the operational inefficiencies of the existing functional structure and facing financial crisis-driven budget cuts, the State of Washington embarked on a radical reorganization that consolidated the five old functional administrative Departments into three new process-oriented Departments—the Department of Enterprise Services, Consolidated Technology Management, and the Office of Financial Management. Each of the three new Departments contains some activities formerly performed in each of the five old Departments. The new organizational units are designed to group together all activities involved in common administrative processes—thereby supporting end-to-end process coordination.

For example, the major activities formerly performed within the Department of Information Services (e.g., desktop computer support, new systems development, and IT strategy and planning) were reallocated to the most appropriate new Department where they could be grouped with the related activities from other functions (i.e., the Department of Enterprise Services, Consolidated Technology Management, and the Office of Financial Management, respectively). As a result of this reorganization, IT strategic planning and policy issues are now combined with the process-related activities of workforce planning and financial investment analysis in the Office of Financial Management. By contrast, in the old Department of Information Services, IT strategic planning and policy issues had been combined with the functionally-related (but process-unrelated) activities of routine desktop support and new software development.

Time will tell whether the process-based reorganization of administrative activities yields the benefits that the State of Washington anticipated. The costs and the risks of this form of business process governance are high. But the potential benefits are also high—potentially much higher than with lighter-weight coordination approaches such as the (single) process unit. Other States will certainly be watching to see whether the Washington experiment pays off.

4.3 A Shared Services IT Process Unit in Winnebago County, Illinois

Before it set up VITA as a coordination unit, the State of Virginia had contemplated setting it up as a process unit to perform IT related activities. A new process unit set up within the Winnebago County Department of Information Technology to provide access to criminal justice information offers an example of how a process unit works.

In 2004, criminal justice officials in Winnebago County faced up to their needs for shared court and case management system (Tomasino et al. 2012). Other counties had implemented integrated systems that provided shared access to the information needed by multiple stakeholders (e.g., judges, clerks of court, probation officers). Creating such an integrated system involves assembling information from multiple sources and organizing it by "party" (e.g., a defendant) rather than by court "case." By contrast, the non-integrated systems that supported the Winnebago County criminal justice community in 2003 had been developed for particular functional silos. The key systems used by the courts were organized by "cases" not "parties," which rendered them useless for the purposes of other stakeholders.

The project to develop an integrated court and case management information system for Winnebago County was a model of good business process *project governance*. Key stakeholders came together and agreed on the requirements for the new system; they monitored project progress, and took key decisions about next steps. But ongoing *governance of the new process* for sharing system resources and information also needed, first, to oversee day-to-day activities of running the system and, second, to provide strategic oversight: monitoring system performance, correcting course as needed, and dealing with the need for system enhancements and eventual replacement.

Community members decided that day-to-day system operations should be managed independently of any one member organization. A "shared services center" (Davis 2005) to run the court and case management system on behalf of all parties was set up within the Department of IT. This shared services center is an instance of what we have called a process unit. In addition to this organizational structure, service level agreements (SLAs, e.g., performance targets and usage costs) were created to ensure the accountability of the shared services center to those it supported. These impersonal arrangements were complemented by a hierarchy of committees (see also Grant et al 2007), including an executive committee with representation from all key agencies, as well as a set of working teams tasked with addressing less strategic issues (e.g., minor change requests).

4.4 Augmented Impersonal Governance of Emergency Medical Services in San Mateo County, California

The provision of Emergency Medication Services (EMS) in the US is an inter-organizational process involving both governmental agencies and private businesses—police and fire services, hospitals, ambulance services, etc. The process entails numerous handoffs, and no vertical (hierarchical) authority can command efficient and effective process performance (Horan and Schooley 2007). Officials in the EMS Agency of San Mateo County, California, took responsibility for leading process improvement, and, after a 4-year redesign activity with the participation of paramedics, nurses, physicians, hospitals, fire agencies, and a private ambulance provider (American Medical Response or AMR), EMS catalyzed an innovative public–private partnership that addressed the end-to-end emergency medical services process (Schooley and Horan 2007).

Central to the redesigned inter-organizational process was an impersonal governance mechanism—a master contract with AMR for ambulance and paramedic first response services. This award-winning "performance-based" contract specified target response times that varied with responder type and emergency location and required at least 90 % compliance with the targets.

The master contract, however, covered only one part of the EMS process. Other key parts included the response of police and fire services and patient treatment in hospitals. To ensure that collaboration among all parties remained effective, the San Mateo County EMS Agency convened a monthly standing committee. The focus of committee meetings was to evaluate the performance of the end-to-end process and to manage its continuous improvement. In addition, the Agency developed standards for process worker training, record keeping, and communication. Thus, the success of the EMS process in San Mateo County depended on a combination of impersonal governance mechanisms (e.g., the master contract) and personal governance mechanisms (e.g., the formal standing committee and ongoing informal interactions).

5 Concluding Remarks

Governance becomes both more necessary and more challenging to do well when the scope of business processes increases, particularly when processes cross the boundaries of autonomous legal entities. But our examples show that, regardless of scale, business process governance comprises a range of mechanisms, including (1) organizational structures for managing the process activities (e.g., roles, units, organizations), (2) decision making responsibilities and forums (i.e., a hierarchy of committees), and (3) new procedures and processes (such as planning, review, approval, and monitoring activities). Business process governance mechanisms can be informal or formal, impersonal or personal. A single governance mechanism, be it a legal contract or a process-based reorganization, will rarely suffice for effective business process governance. Almost always, a combination of mechanisms will be needed for better process outcomes.

Our examples also show that, regardless of whether a process is largely intra-organizational or inter-organizational, and regardless of whether process activities are "in-sourced" or "outsourced," there is no one best way to govern a business process. Heavier-weight coordination mechanisms (e.g., process organizations versus process coordination units) may be able to exert greater control, but they do so at greater cost—in terms of time, money, and interpersonal conflict. Therefore, decisions about business process governance always involve making tradeoffs. Many times, the most effective approach is to use several lighter weight governance mechanisms in combination (e.g., a combination of formal lateral relations like coordination roles plus impersonal mechanisms like rules and procedures) rather than relying on a single powerful intervention (e.g., organizational structure change to create a process organization).

Business processes need governance to ensure their ongoing smooth operation and continuous improvement, not just to coordinate their initial design or re-engineering. Although effective business process governance can be challenging to design and expensive to deploy, it is as essential as business process redesign for the long-term effectiveness of business processes.

Acknowledgement This work was supported in part by the National Science Foundation under award number SES-0964909.

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The Governance of Business Process Management

Andrew Spanyi

Abstract Most executives, if not all, are concerned about improving business performance. While this may be obvious, what is not nearly as apparent is precisely how the most successful firms are able to sustain and optimize such performance improvements. Whereas most firms are becoming increasingly adept at executing improvements to their operations in projects of small scope, many firms continue to struggle when it comes to projects of larger scope requiring broad cross-functional collaboration. More importantly, they often do not put in place the subtle, yet critical, elements of BPM governance, including the refinements to organization structure, executive roles and responsibilities, and measurement discipline that are needed to sustain and optimize operational performance improvements. This chapter examines the management practices of BPM governance that enable achieving sustainable, consistent, and flawless execution.

1 Introduction

Let us agree on a basic premise. A company creates value for customers and shareholders via the effectiveness and efficiency of activities or work that flows across traditional organization boundaries – often referred to as the firm's complex, cross-functional business processes (Spanyi 2006).

In order to optimize and sustain improvements to business performance, it is essential to overlay some form of governance that creates the right structures, metrics, roles, and responsibilities to measure and manage the performance of a firm's end-to-end business processes. This is called BPM governance.

Most firms are becoming increasingly adept at executing improvements to their operations in projects of small scope. Why have many organizations become more

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
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proficient in executing projects of small scope? The principal reason is that the various methods of process improvement, such as Lean, Six Sigma, Lean-Six Sigma, and Continuous Process Improvement, have become codified over the past decade. As these projects are often defined within the boundaries of one department or unit, the needed governance is in place due to the existing organization design.

But that is not the case when it comes to projects of larger scope requiring broad cross-functional collaboration. Indeed, the success rate for such larger projects remains disappointing. It has been widely reported that 50 to 70 % of reengineering projects fail, and IT projects over the past decade have not fared much better. The Standish Group has been conducting a survey on the performance of IT projects since 1995, and even though project success has increased from 16.2 % in 1995 to 35 % in 2006, over 60 % of IT projects were still challenged in 2010 (The Standish Group 2009). Although some observers have challenged the Chaos report findings, this statistic might be more dismal if the survey had been limited to large projects requiring cross-functional collaboration. It has also been suggested that nearly 60 % of all corporate Six Sigma initiatives failed to yield desired results.

Why do companies continue to struggle when it comes to executing larger operational improvement projects and sustaining results? There are at least three reasons:

- Lack of a robust framework. While business literature emphasizes the importance of improving and managing key end-to-end business processes, there is a deficit of information on precisely how to do it (Davenport 1993; Hammer 2001a, b, 2007; Hammer and Stanton 1999; Harmon 2003; Rummler and Brache 1995).
- Lack of codification of management practices. The codification of process improvement methods does not sufficiently emphasize the need for the type of leadership behavior that is intrinsic to BPM governance.
- Resistance to change. The majority of companies continue to be organized along traditional lines, and the traditional financial metrics continue to dominate executive thinking and behavior (Herbold 2004). There is resistance to the subtle, yet important, changes in measurement and management practices that are needed for BPM governance to sustain improvements to operational performance.

This chapter will begin with an overview of the results of research on what organizations need to do to effectively execute and sustain improvements to operational performance. Next, a more thorough discussion of the impediments to effectively execute and sustain improvements to operational performance will be presented. Then, the final section of this chapter will examine the role of BPM governance in how to effectively execute and sustain improvements to operational performance.[1]

[1] Markus and Jacobson (2014) additionally describe various governance mechanisms, identify their advantages and disadvantages, and provide examples that reveal how governance mechanisms contribute to business process success. For the positioning of BPM governance within the core elements of BPM see (Rosemann and vom Brocke 2014).

2 Research

There is a gap in the literature when it comes to leadership mindset and behavior needed for BPM governance. This author's work on the Mindset Study was one appraisal that did examine this topic (Spanyi 2005, 2006). The Mindset Study, conducted in collaboration with the Babson College Process Management Center, was a qualitative survey of the management practices of 18 firms, which had professed advanced levels of process orientation. The research took the form of a qualitative survey, and interviews were conducted with respondents from businesses who were considered to be concerned with improving operational performance and had advanced levels of process orientation. This was supplemented with Internet-based secondary research. Air Products and Chemicals, Caterpillar, Infosys, Nokia, and Xerox were just a few of the companies in this survey.

Two of the primary insights derived from this qualitative research were thought provoking. (1) There is increasing interest and skill in improving operational performance when it involves a single business process of limited scope. (2) The traditional mindset of leaders continues to be one of the major obstacles in taking process management principles and practices to the next level via BPM governance, where there is sustainable focus on the improvement and management of the firm's large, end-to-end business processes.

The research set out to identify the set of leadership behaviors that organizations need in order to effectively improve operational performance via process management. The hypothesis was that the leading firms would have made progress in all three of the following areas: models, metrics, and accountability.

Table 1 below summarizes the hypotheses and findings of the Mindset Study.

Do those firms that have established the needed behaviors for BPM governance, that is, the leading firms, have better financial performance than typical firms? There is some supportive evidence in this respect. Five of the six leading firms were publicly traded companies in the USA. Four of the five consistently beat the Dow Jones Average over the period 2004–2008. In contrast, in examining the typical firms, five of which were also publicly traded companies in the US, it was found that four of the five typical firms failed to beat the DJI over the same period. Of course, there is much more to financial performance than a process orientation, and while this trend did not survive the 2008 financial crisis, yet these findings are thought provoking.

The respondents from the group of typical firms laid the blame for their relative lack of progress in the areas of models, metrics, and accountability on two primary factors: a traditional, functional mindset, and a narrow view of process. Even the respondents from leading firms continued to struggle with these two obstacles. The prevalence of a traditional, functional mindset was emphasized by respondents in several ways. The COO of a major health care institution said, "In health care – the org chart gets in the way of care delivery." And it was not just in health care, the majority of respondent expressed concern about leaders' perception of the

Table 1 Leadership behaviors supportive of process management on an operational level

Hypotheses	Characteristics of leading firms	Behaviours of leading firms
The leadership team would have monitored key performance metrics from a customer's point of view, and attempted to link these to the key financial metrics	Passion about performing for customers. Respondents from the leading companies talked about customer satisfaction twice as often as respondents from typical firms. In these companies, there was a dual purpose for executing process improvement efforts – increasing customer satisfaction and reducing operating costs	Leaders broadly communicated the enterprise process model or schematic, and the appointment of process owners throughout the corporation. This was done primarily via their Intranet, and reinforced through "town hall" meetings, executive presentations, memos, and e-mail
The leadership team would have developed an enterprise view of the business in process terms, a schematic or map, for example	A compelling business threat. All of the respondents from leading companies expressed concern with a perceived imminent competitive threat and/or flattening growth	Leaders placed increasing focus on monitoring key performance metrics from a customer's point of view. Two of the commonly observed metrics were company performance in delivering "perfect orders" and responsiveness in resolving customer inquiries and complaints
The organization would have appointed business process owners or stewards for some of the firm's large cross-functional business processes	A receptive culture. Each of the leading companies had a long history of improving operational performance. In most cases, this dated back to before the birth of methods such as reengineering and Six Sigma. Further, in each of the leading companies, the CEO was a vocal proponent	These companies appointed some process owners for end-to-end processes that crossed traditional organizational boundaries and set up a small group of subject matter experts in a center of excellence type of structure

organization as a group of functional entities. The VP Operations for a technology company said the following with respect to the common mental attitude of leaders at his company, "I think there's some understanding . . . but I think it still reverts back to the siloed concept at various levels. When you get to the upper levels, the executive levels of the company, it's like OK – so that's what happens inside this operational financial space, so if I'm in Engineering, I don't really have to worry about that. And you may choose to do that, and that's an initiative you're spending time on, well –we've got other initiatives that we're working on."

An unduly narrow view of process was the other broadly perceived obstacle to progress. A VP from a major chemical company stated that "Most of the time I'm pleased with the existence of processes. Sporadically, I loathe them. You are more apt to hear that the process doesn't allow something as opposed to hearing that sure – we can handle that special request easily" (Spanyi 2005). Clearly, this respondent's view of process was at a tactical, procedural level as opposed to being at the level of an end-to-end, value creating set of activities. The COO of a major health care institution expressed concern about the fact that management tends to view processes as being solely within their own functional areas and said that a move needs to be made such that leaders understand the following, "In health care – we all have a responsibility for the whole process – no matter where we sit in the process. . . I think leaders have to be looking at the whole system and not just the pieces – it's back to this institutional approach. Breaking down silos. Turning tables. Working together." (Spanyi 2005)

The combined impact of a traditional, functional view of business and an unduly narrow view of process is significant. It serves to limit process improvement efforts to cost reduction and stands in the way of developing the key, needed elements of BPM governance. The following section explores some of the underlying reasons for the persistence of these obstacles.

3 Obstacles

It is somewhat puzzling why leaders continue to cling to a traditional, functional view of business and an unduly narrow view of process (Herbold 2004). For nearly two decades, thought leaders have emphasized the need for cross-functional collaboration and for viewing business in the context of an organization's end-to-end business processes (Davenport 1993; Hammer 2007; Harmon 2003; Rummler and Brache 1995; Spanyi 2006). Yet, the pace of progress in influencing the mindset of executives has been slow. Some of the blame must be placed squarely at the feet of academia. Most universities have relegated the study of process improvement and management to the confines of their courses on operations and information systems. Essential process concepts are rarely part of MBA courses on leadership (which is precisely where they belong). While there have been some progress in this respect during the past few years, the pace of adoption of fundamental process concepts into MBA curricula is still slow. So let us turn our attention to other underlying reasons that stand in the way of viewing business from the customers' point of view and establishing the needed elements for BPM governance. There are at least three important areas to consider in this respect:

- The prominent process reference models do not sufficiently address the need for customer focus and cross-functional collaboration.
- The codification of process improvement methods, Six Sigma in particular, does not sufficiently emphasize the need for the type of leadership behavior that is intrinsic to BPM governance.

- When the governance needed for sustainable operational performance improvement is addressed, it is often related to "process maturity models" and appears complex and perceived as "just too hard" to do.

3.1 Reference Models Lack Cross-Functionality

The Massachusetts Institute of Technology (MIT) business activity model and American Productivity & Quality Center's (APQC)'s process classification framework are two of the more widely known process reference models. The work on the MIT process handbook dates back to 1991, and the foundation for the APQC process classification framework (PCF) also began in the early 1990s (Malone et al. 2003; APQC 2009). Both models offer a wealth of information to organizations interested in increasing their level of process orientation. Yet, the highest-level process definitions for both models do not go far enough in acknowledging the importance of cross-functional collaboration. Instead, it is all too easy for companies to interpret these process reference models solely in accordance with traditional functional lines. Figure 1 depicts the MIT business activity model. Note how the key activity areas are closely aligned with the traditional functional departments of R&D, Procurement, and Sales/Marketing.

We observe a similar phenomenon with the APQC PCF which is depicted in Fig. 2. While the APQC PCF provides more detail on both operating and enabling business processes, the nomenclature employed is such that again these are closely aligned with traditional functional departments.

This is also an issue with industry specific process model such as eTOM (tmforum 2009) which serves the needs of the telecommunications industry, and Association for Cooperative Research and Development (ACORD) (2009), which is targeted at the insurance industry. Accordingly, it is not uncommon to see organizations define their own enterprise process models in the context of their organization chart versus the end-to-end processes that truly create value for customers and shareholders.

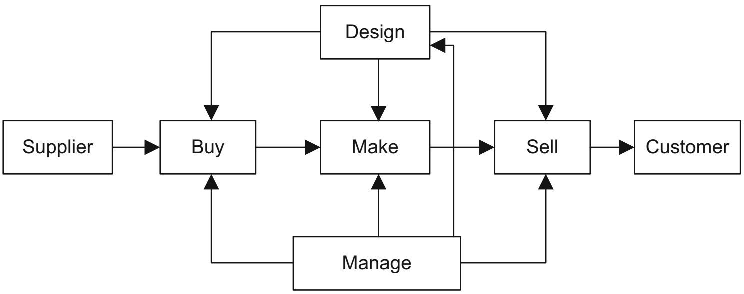

Fig. 1 The MIT business activity model (Malone et al. 2003)

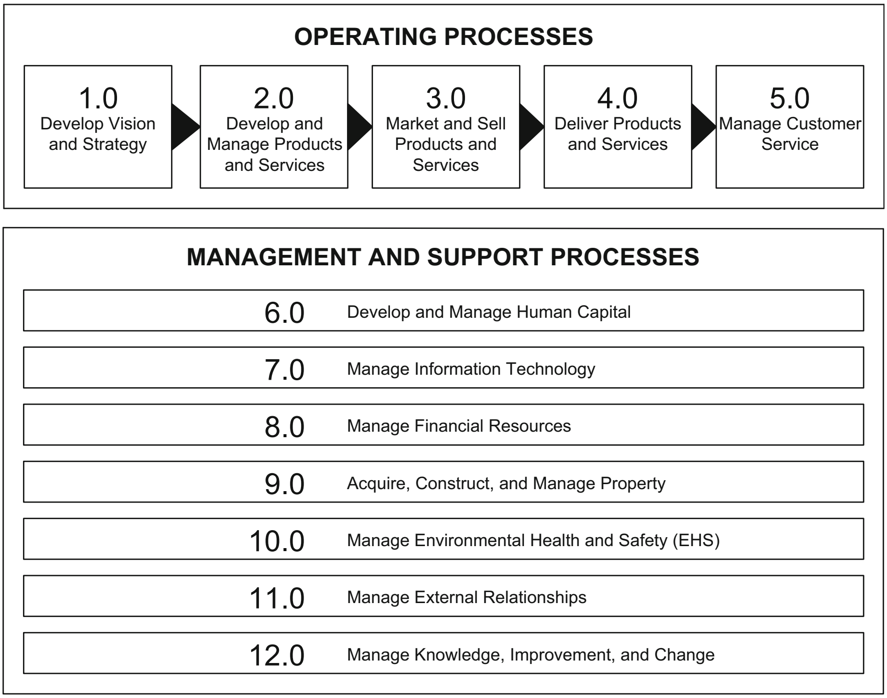

Fig. 2 The APQC PCF (APQC 2009, The APQC PCF is also discussed by Aitken et al. 2014)

3.2 Improvement Method Deployment

The way in which process improvement methods are deployed is the second major underlying reason for why leaders continue to adopt a traditional, functional view of business and an un-duly narrow view of process. Six Sigma is the undisputed leading methodology used to improve and manage processes. In theory, Six Sigma is indeed a robust method. In practice, it has some flaws. In theory, Six Sigma should be deployed to meet customer needs and strategic improvement objectives. In theory, it is focused first and foremost on improving the customer experience through defect reduction. In practice, Six Sigma is often deployed as the means to cut costs, even though lip service is paid to improving the customer experience.

A surprising number of firms simply do not get beyond the phase of deploying Six Sigma for cost containment and never reach its true potential. Simply stated, Six Sigma is frequently deployed along functional or departmental lines simply because that is the predominant mental model of leadership. Whenever Six Sigma is deployed on a departmental basis, it is observed that Black Belts are trained and assigned to the functional departments. They are then typically tasked with completing four to six projects per annum, where each project delivers around $250,000.00 of cost savings. In many instances, Black Belts receive bonuses for bringing in the targeted cost savings. This naturally leads to a narrower definition of projects, as that tends to improve the likelihood of completing projects on time and reaching the targeted goals. In other words, while the rhetoric may emphasize customer centricity, the action is focused on cost reduction, and when it comes to actual projects, there is a very high degree of reliance on the Black Belt.

This method of deployment understandably leads to a large number of relatively small projects, which in turn drives a certain degree of duplication of effort. Given the predominant practice of launching many smaller projects, it is not surprising that most projects are not very cross-functional in nature. Accordingly, some of the largest opportunities for improvement, which have to do with managing cross-functional handoffs in a different and novel way, are not addressed.

There are three key points to note here. First, as some of the largest opportunities for improvement are found at cross-functional handoffs, the firm that fails to tackle the end-to-end, cross-functional processes sub-optimizes the opportunity for performance improvement. Then, due to the high reliance of the Black Belt role, the Six Sigma methodology has done far less to codify the needed leadership behaviors. Instead of using well-defined steering teams, reliance is placed on so called stakeholders, where roles and responsibilities are not as well defined as they could be and certainly not executed consistently. Finally, whenever dozens or even hundreds of small Six Sigma projects are launched to fix the problems in one large process, there is a need for an overarching process framework to integrate results and exercise control. In the absence of such a framework, the longer-term benefits of the improvements can, and frequently are, compromised.

3.3 Process Maturity

The third area that stands in the way of further progress in the development of BPM governance is that it simply seems too hard to do. There exists an extensive body of literature on business process maturity models that attempts to define key activity areas. Invariably, governance is one of these key activity areas needed for increased process maturity (see Rosemann and vom Brocke 2014). The degree of complexity inherent in such business process maturity models is daunting (Table 2). Figure 1 depicts the framework for one such model.

The daunting level of complexity is not limited to work emanating from academia. Dr. Michael Hammer, considered by many to be the *principal proselytizer* for process orientation, released his version of a business process maturity model called Process and Enterprise Maturity Model (PEMM) (Hammer 2007). This model includes one assessment instrument for enterprise maturity and a second for process maturity. The key factors in the PEMM are outlined in Table 3.

There are two issues with these complex maturity models. The first is that they are indeed complex, all encompassing, and perceived as hard to do. The second is that there is simply not a strong enough link to operational performance. The size of

Table 2 Delphi study: process management maturity (de Bruin 2005)

Strategic alignment	Governance	Methods	Information technology	People	Culture and leadership
Process improvement plan	Process management decision-making	Process design and modeling	Process design and modeling	Process skills and expertise	Responsiveness to process change
Strategy and process capability linkage	Process roles and responsibilities	Process implementation and execution	Process implementation and execution	Process management knowledge	
Process architecture	Process metrics and performance linkage	process control and measurement	process control and measurement	Process education and learning	Process attitudes and behaviors
Process output measurement	Process management standards	Process improvement and innovation	Process improvement and innovation	Process collaboration and communication	Leadership attention to process
Process customers and stakeholders	Process management controls	Process project and program mgmt	Process project and program mgmt	Process management leaders	Process management social networks

For a more detailed discussion on process management maturity and its relations to the topics by Rosemann and vom Brocke (2014). To see how the process maturity model is applied in practice, refer to de Bruin and Doebeli (2014)

Table 3 The components of Dr. Hammer's PEMM (Adapted from Hammer 2007)

How mature is the enterprise?		How mature are the processes?	
Leadership	Awareness	Design	Purpose
	Alignment		Context
	Behavior style		Documentation
Culture	Teamwork	Performers	Knowledge
	Customer focus		Skill
	Responsibility attitude to change		Behavior
Expertise	People	Owners	Identity
	Methodology		Activities authority
Governance	Process model	Infrastructure	IT systems
	Accountability integration		HR systems
		Metric	Definition uses

the prize is un-clear and hence the effort involved in taking action is difficult to justify for the leaders of most organizations.

A combination of three factors – lack of useable models, shortcomings in the codification of the needed leadership behaviors, and the perception that it is "too hard to do" is a substantial obstacle. Yet, some companies have made progress in installing the needed elements for BPM governance, and the next section addresses some of the relevant critical success factors in this respect.

4 BPM Governance Principles and Practices

Based on the mindset study research, it is clear that models, metrics, and management accountability for end-to-end process performance are a few of the critical success factors in establishing the type of BPM governance needed for sustainable improvements to operational performance. While there is no shortage of guidance on why companies should increase their focus on end-to-end business processes and generally on what they should do, there is little guidance on how to do it. That is the topic of this section.

The topic of BPM governance is only germane once the leadership team is committed to employing a process focus to improve performance for both customers and shareholders. So, let us assume that this intent is in place. Then, there are the following fundamental principles, essential for BPM governance, to consider:

- The highest-level process model for the enterprise must explicitly address the need for cross-functional collaboration and management accountability for the firm's end-to-end business processes.
- Operational performance must be measured from both the customer's and the company's point of view.

- The organization needs to have a plan in place that outlines the top priorities for the improvement of operational performance.
- Enabling information technology (IT) is one of the most powerful catalysts.

A number of management practices need to be put in place so as to convert these guiding principles into action.

5 Management Accountability

Any organization dedicated to the use of process thinking for sustainable improvements to operational performance will see the need to develop a high-level process model. The terms used to define end-to-end processes in this respect are important. There are three common conventions for naming processes in such models: one word (MIT, Supply Chain Operations Reference Model (SCOR)), phrase (APQC), and "from-to" (Malone et al. 2003; Spanyi 2005; Supply-Chain Council 2009). The major drawback of only using the one word or the phrase naming convention is that the process names can easily be mistaken for traditional departments. The benefit of the "from-to" naming convention is that it explicitly addresses the boundaries of the business process. Further, it lends itself to catchy memorable expressions that capture the need for cross-functional collaboration. While the exact nature of a firm's high-level process model varies understandably from one company to the next, Table 4 illustrates the value of combining the "from-to" naming convention for some of the typical, major enterprise processes.

By indicating which functions are involved, the table illustrates the fundamental cross-functional nature of each end-to-end process. There are two alternatives to assigning accountability for the performance of these large cross-functional processes. Some companies have chosen to appoint a well respected department head (who sometimes manages most of the resources in the process and has the most to gain or lose based on process performance) as the process owner. In this instance, the process owner wears two hats – one for the function or department and the other for the process. Other organizations have chosen to appoint a full-time senior staff member as the process owner. In this latter case, the role of the process owner is to encourage collaboration among the functional leaders involved in the process. Achieving a shared understanding of the definition of the full set of end-to-end business processes is a fundamental requirement for BPM governance (Spanyi 2006).

The executive process owner often recognizes the need to assemble a group of managers from various departments to work on a part-time basis as a standing process management team. It is this team that expands the degree of detail in the definition of the end-to-end process, monitors the relevant performance measures, and provides support to the executive process owner in terms of the identification and execution of process improvement opportunities. Any discussion of accountability is meaningless in the absence of performance measures. That is the topic of the next section.

Table 4 End-to-end processes

Process name	From-to	Abbreviation (nickname)	Output	Functions involved
Sales	Promotion to order	P2O	Order	Sales marketing call center
Delivery	Order to delivery	O2D	Delivery	Operations call center
Development	Concept to customer	C2C	Product or service	Sales R&D operations
Procurement	Requisition to receipt	R2R	Product or service	Purchasing operations others
Inquiries/ complaints	Inquiry to resolution	I2R	Solution	Call center others

6 Measuring Performance

Most executives would readily agree with the principle that operational performance needs to be measured from the customer's as well as the company's point of view. It is well known that customers want and expect to receive what they ordered, when they asked for it, complete and error free. The supply chain council calls this metric a "perfect order." Customers also want and expect their problems resolved and their inquiries handled right the first time. Yet, according to the Mindset Study, the senior leadership team monitored these two metrics in only about a third of the companies surveyed. A further complication is that some of the performance indicators that customers care about are in the middle of the end-to-end processes. For example, customers want and expect timely and complete proposals. On the other hand, most companies are typically quite clear on the major metrics of company performance. Indeed, when a leadership team selects the 5–8 key metrics to monitor week in and week out, the performance measures that are important to the company seem to dominate. Table 5 gives a comparison of the customer view and the company view for selected end-to-end processes.

Monitoring what's important to customers as well as the company is simply the beginning of the needed discipline for BPM governance. Executive process owners in a process oriented firm will task their process management team to identify the set of performance measures for each sub-process in the relevant end-to-end process. For example, for the end-to-end delivery process, it is important to identify the relevant metrics for the sub-processes of order entry, credit check, scheduling, packing, and delivery. Then, the process-oriented firm will also recognize the importance of the following:

- Including customer centric metrics in monthly operating reviews
- Establishing a keen focus on the top 4–7 enterprise-level metrics
- Developing the means to cascade metrics to the next level for rapid diagnosis
- Using the principal performance metrics as the foundation for recognition and reward systems
- Expressing the impact of improving process performance in financial terms

Table 5 The customer view versus the company view

Process name	From-to	Output	Metrics – customer view	Metrics – company view
Sales	Promotion to order	Order	Orders Accurate and complete proposals, timely and complete	Sales revenues
Delivery	Order to delivery	Delivery	Perfect order	Cost/order
Development	Concept to customer	Product or service	Available when promised	On budget, on time
Procurement	Requisition to receipt	Product or service	Available when promised	On budget, on time
Inquiries/ complaints	Inquiry to resolution	Solution	First time right	Cost/inquiry

This set of management practices also equips the leadership team to estimate the size of the gap between current performance and desired performance which is valuable in terms of identifying the high potential process improvement projects.

7 Process Management Plan

Once the leadership team has a shared understanding of the definition of the firm's enterprise-level business processes and its current performance, the company can define a plan that will improve and manage the firm's large, cross-functional business processes. This plan needs to answer two fundamental questions: Which of our business processes need to be improved, and by how much, in order to achieve our strategic objectives? Who will be held accountable for this planned improvement and performance management?

The role of BPM governance also involves certain management practices that will increase the likelihood of success in deploying the process management plan. This includes the development of an effective communication plan, on which processes will be improved in what priority and why, establishing and maintaining a permanent, part-time process management team for each end-to-end business process, and assembling a small group of subject matter experts with deep skills on the various aspects of process improvement. This latter group is often referred to as a "center of excellence."

The process management plan becomes the reference point for the process-oriented organization as it proceeds on the journey to improve and manage key end-to-end processes. It should be noted that the focus of improvement efforts is not always on the full end-to-end process. Instead, some targeted improvement efforts may be on a specific sub-process within the end-to-end process. Table 6 provides a partial process improvement and management plan for a manufacturing company.

Table 6 Process improvement and management plan

End-to-end process	Process owner	Process improvement focus	Goal	Scope of improvement needed
Promote to order	VP sales	Responding to RFPs	98 % on time, complete	Incremental
Order to delivery	VP operations	Perfect orders	97 % perfect order delivery	Moderate
Concept to customer	VP R&D	Product launch	100 % on promised date	Significant
Inquiry to resolution	VP customer service	Complaint resolution	95 % first time right	Moderate

While improvement methods such as the Define-Measure-Analyze-Improve-Control (DMAIC) approach in Six Sigma may be useful to address incremental improvement of certain business processes, invariably there are one or two end-to-end processes that call for more radical change. That is why organizations that emphasize the development of various integrated methods of process improvement appear to have greater success sustaining a process orientation. A joint study between Babson College and The Queensland University of Technology found that "methods," as defined by "the approaches and techniques that support and enable consistent process actions and outcomes," was one of six critical success factors in the assessment of the degree of process management maturity of an enterprise (de Bruin 2009).

In addition, the effective use of influence is surely one of the critical success factors in the improvement and management of end-to-end business processes. The ability to influence peers is an essential skill set for process managers at all levels and particularly for process owners. This has to do with the fact that the end-to-end business processes are typically too large for any one individual to have absolute control. Similarly, the enabling role of IT, as one of the primary catalysts of change is crucial, partly due to the sheer size of end-to-end processes.

8 Deploying Information Technology

The role of IT is fundamentally to enable the performance of an organization's business processes in creating value for customers and shareholders. In this day and age, practically any broad-based improvement effort relies extensively on IT. An essential role of BPM governance is to assure that IT investments are closely linked to the company's business strategy, and that the payoff from IT investments is directly derived from the specific improvements in business process performance. This will minimize the chances that technology is implemented for its own sake, and should positively impact the relationship between business users of IT and IT practitioners. The potential for IT to act as the primary catalyst for change increases in proportion to the size of the process under consideration. That is one of the reasons why improvement methods that employ dozens and even hundreds of projects of small scope find it difficult to engage IT in the improvement program.

Those organizations that recognize the potential enabling role of IT will emphasize the following as part of their management practices:

- Process improvement-related IT projects are close to the top of the IT agenda (right after compliance-related items).
- IT subject matter experts are involved early in all major process improvement efforts.
- IT subject matter experts play a role on each permanent, part-time process management team.
- IT subject matter experts are represented in the organizations' "center of excellence" for process management.

Organizations intent on establishing a governance framework for BPM might wish to consider their progress in terms of the following checklist:

1. There exists a high level inventory of primary, support and management processes.
2. A one page schematic, depicting a high level process view of the business, has been developed and broadly communicated.
3. For each primary (e.g. customer touching) process, the metrics that matter have been defined and are monitored by the senior leadership team.
4. The senior leadership team has estimated the size of the gap between current and desired performance for at least the primary processes.
5. There exists a plan to improve/redesign the critical few processes in alignment with strategic objectives.
6. The IT organization is fully engaged with process improvement efforts.
7. Recognition and reward systems have been aligned such that the contribution of individuals and teams on process improvement efforts is visibly recognized.
8. Senior executive accountability has been put in place for the continuous improvement of at least the primary business processes.
9. The organization has made an ongoing investment in process improvement training.
10. The IT organization has made progress in terms of investing in technology in accordance with the estimated improvement in process performance.
11. The impact of BPM governance efforts is such that employees can describe the process that they work within in 25 words or less.
12. The impact of BPM governance is such that the senior leadership team devotes as much time and attention to discussing cross-functional, value creating activities as they do on departmental agenda items.

9 Emerging Trends

An increasing interest in customer experience management and business architecture are two of the emerging trends that may have potential to stimulate increased focus on BPM governance.

The topic of business architecture has received significant attention and some controversy on both www.bptrends.com and www.soa-consortium.org. The EA2010 working group defines business architecture as *the formal representation and active management of business design*, while the OMG defines it as "*A blueprint of the enterprise that provides a common understanding of the organization and is used to align strategic objectives and tactical demands*" (http://bawg.omg.org/).

As the practice of business architecture matures, and the close relationship between "capabilities", "value streams" and "business processes" is recognized, there may be the potential to stimulate interest in some form of governance of an organization's business processes which might ultimately lead to more progress on BPM governance. However, for this to occur it will be important for IT professionals to elevate their view of process to the enterprise level.

The development of customer experience management is also gaining traction, with considerable attention in blogs at Forrester for example (FORRESTER 2013). The codification of a management practice around customer experience is still in its early stages and in many cases consists simply of a conversation about the client lifecycle, the key touch points, and analysis of what's most important to customers. As the work on customer experience progresses, it's possible that there will be a more broad based recognition that customer value is created via the organization's end-to-end business processes and hence some form of governance such as BPM governance is needed. However, such an evolution will only occur once customer experience management professionals learn that all value creating work is delivered via the organization's complex, cross functional processes.

10 Summary

This chapter began with an overview of the results of research on what organizations need to do to effectively execute and sustain improvements to operational performance. Then, a discussion of the impediments to being able to effectively execute and sustain improvements to operational performance was presented. The final section of this chapter examined some of the management practices intrinsic to BPM governance that enable the effective execution and sustainment of improvements to business performance. Four areas of management practice for BPM governance effectiveness were discussed and a checklist of factors was proposed. Finally, two emerging trends that may have potential to stimulate increased focus on BPM governance was presented.

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The Process of Business Process Management

August-Wilhelm Scheer and Michael Hoffmann

Abstract This chapter describes the process of Business Process Management (BPM), and highlights the phases of business process strategy, business process design, business process implementation and business process controlling. Innovative approaches, like business process tailoring are introduced. After that the elements needed, to establish a holistic, organization-wide BPM approach are described. An optimal organizational infrastructure for achieving a holistic BPM approach and to identify the processes, roles, and responsibilities that need to be put in place will be introduced. The chapter starts with an emphasis put on the necessity of a holistic, organization-wide BPM approach and typical misinterpretations of the meaning of BPM within that context. Based on an analysis of the process of BPM itself, the main elements of a holistic BPM approach are then identified and described in more detail. The description of the Center of Excellence for BPM, its services and responsibilities within a company, and the resulting roles needed for a company's BPM structures build a guide for the organizational implementation of BPM.

1 Introduction

Today, managers are facing a fast-moving business environment with changing customer needs and expectations, fast-evolving technologies and product lifecycles, strong globalization effects, accelerating innovation, and increasing digitization of products. Within this environment, managers need to ensure long-term business success for their company. In a growing market, it is important to respond by investing in innovative new products, sales channels, and marketing strategies. Organizations operating in a tough economic environment, on the other

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
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hand, need to focus on optimizing costs, timescales, and product resources in order to boost efficiency.

Long-term business success is all about the ability of an organization to respond quickly to the changing market conditions, adapting their business model, and bringing their market strategy to operational execution through appropriate business processes, people, and technologies.

Business Process Management (BPM) is essential to ensure long-term business success based on flexible, market-responsive structures that simultaneously promote efficiency. But what is BPM and what is the right way to set up BPM structures that work within a company? What are the main elements of an effective BPM approach and which roles should be defined? What are good examples and best practices? Complementing some essential contributions from volume 1 of this handbook, such as (Hammer 2014; Harmon 2014; Rosemann and vom Brocke 2014), this chapter is dedicated to show some examples and structures of how to establish efficient BPM structures.

A *business process* is a continuous series of enterprise tasks, undertaken for the purpose of creating output. The starting point and final product of the business process is the output requested and utilized by corporate or external "customers" (Scheer 1999). Business processes enable the value chain of the enterprise, as well as focusing on the customer when the output is created (Hammer and Champy 1993). All companies have business processes, regardless of size or industry. A company's internal and inter-company processes are comparable to a body's nervous system. When maintained and optimized, they will ensure competitiveness and survival in the marketplace. In a nutshell: "Processes are not just something your business does; processes are your business" (Brabänder and Davis 2007)."BPM has enabled many organizations to eliminate the chaos of the historically grown business processes, helping companies to structure their procedures in a better way and to make them transparent and standardized at the same time." (Scheer 2012).

Often, there are different reasons for a company to launch a business process-related initiative. One of the main reasons is to boost operational efficiency and reduce costs. Based on process analysis, it is possible to make the right decisions, significantly improve product and service quality, boost efficiency, and cut costs. Hence, it provides insights into weaknesses in important corporate processes and reduces the cost associated with daily workflows.

CosmosDirekt, Germany's biggest direct insurer, leveraged BPM to slash wait times by half when processing life insurance applications, reduce the number of cases where additional information or clarification was needed by 28 %, and cut complaints by 60 %. Collectively, these measures delivered cost savings of 20 % (Ströbele 2008). Other projects also demonstrate the efficiency of actively managing a company's BPM activities. BMW Financial Services was able to streamline and significantly shorten credit and leasing processes and cut processing times in the Dealer Service Center (DSC) by 69 %. The BPM initiative slashed process costs by 58 % and staff requirements by 67 % (IS Report 2005).

But there are also other triggers for launching BPM initiatives within a company:

- Implementing IT systems and business applications such as ERP, CRM, and SRM systems or
- Executing processes based on workflow management systems or BPM execution engines
- Establishing quality management systems for ISO certification or
- Initiating Six Sigma projects
- Implementing standardization frameworks, such as Zachman, TOGAF, etc.
- Introducing process-based requirement analysis for software engineering and software development processes
- Adopting legislation-based compliance management approaches that focus on business processes, e.g., Sarbanes-Oxley Act, KonTraG, etc. (Hoffmann 2009).

Although all these different use cases can trigger a BPM initiative and are related to business process analysis, this is not always BPM per se.

BPM is a structured approach employing methods, policies, metrics, management practices, and software tools to coordinate and continuously optimize an organization's activities and processes. Its objective is to control and improve an organization's business through active, coordinated governance of all aspects of the specification, design, implementation, operation, measurement, analysis, and optimization of business processes in order to effectively and efficiently deliver business objectives (Brabänder and Davis 2007).

Hence BPM is a management discipline itself (Melenovsky 2006), but research into the "State of Business Process Management" in 2008 found that only 40 % of 274 participating companies regard BPM as a "management discipline to organize, manage, and measure an organization based on the organization's core processes" (Harmon and Wolf 2006). All other participants saw BPM as a kind of business process improvement project (29 %), cost-saving initiative (13 %), and the use of technologies to manage IT (9 %), or other activity (8 %).

All activities performed by businesses to optimize and adapt their processes are part of BPM. To fulfill the requirement of adapting business processes to an ever-changing environment, the BPM process itself is structured like a continuous improvement lifecycle (Scheer and Jost 2006). This is the basic difference between a holistic BPM approach and business process analysis as an isolated initiative for process improvement or as part of an ERP implementation or BPR project (Hegedus 2008). BPM itself is a process that must be implemented and executed inside an organization. Doing this requires that process steps are clearly described and defined and the corresponding roles and responsibilities within the company must be identified and embedded in organizational structures. It is thus important to examine the BPM process in detail in order to better understand the associated roles, tasks, and responsibilities.

2 The Process of Business Process Management

The BPM lifecycle required to manage operational business processes consists of four major phases, as described in Fig. 1:

- Business process strategy
- Business process design
- Business process implementation
- Business process controlling

A typical BPM process follows the four phases and every phase consists of many typical work steps or activities related to the expected outcome and result of each phase. However, depending on the objective and the complexity of the organization, the focus area, and the problems to be solved with BPM, certain activities within the phases will always be implemented, while others can be optional or may be adapted to the needs of the organization. Beside the BPM lifecycle Fig. 1 shows the units of a company that are typically involved in BPM projects. The BPM lifecycle is attended by the processes of change management and continuous process improvement.

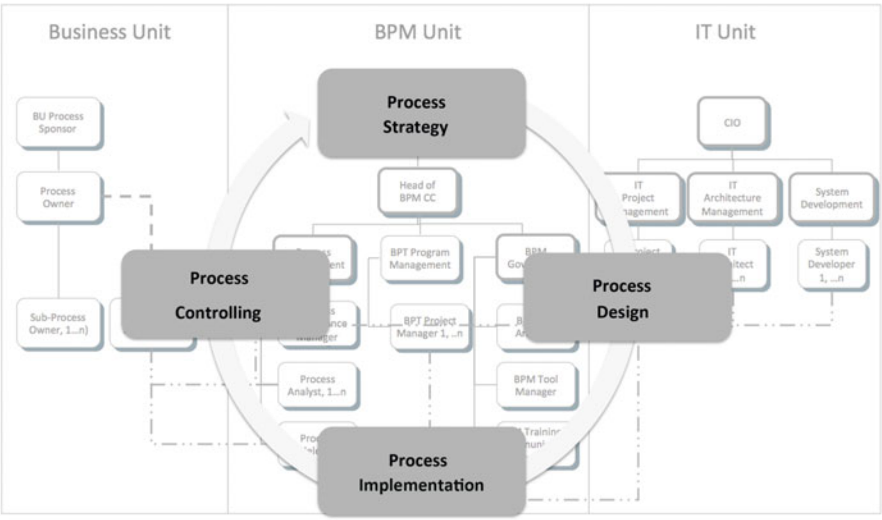


Fig. 1 The BPM lifecycle

2.1 Business Process Strategy Phase

The enterprise strategy is the starting point. This includes the risk and compliance strategy, the IT strategy as well as the market situation and the business segments that should be covered in the future. The business objectives and the key performance indicators for the controlling of the achievement of these business objectives have to be defined. Only those organizations that define and regularly modify targets can work toward them and be successful in the marketplace.

The important stakeholders for the achievement have to be identified as well. Candidates are responsible, accountable for the rightsizing of the structure of objectives or have to be consulted or informed in case of changes.

The core business processes enable organizational solutions to optimally support the chosen strategy. Therefore, the business process strategy phase forms the foundation for aligning business processes with general corporate strategy.[1] Depending on the business model and market environment, organizations often adjust their strategies within very short time periods.

These changes in strategy need to be reflected in business processes. Thus, with every strategy change, a company must pay careful attention to the underlying business process strategy and the changes to business processes. Key success factors in introducing a business process strategy are the commitment of top management and the involvement of employees through appropriate communication activity. Knowledge of the company's strategy and business objectives is essential to align this with the appropriate business processes. Additionally, an "enterprise process map" provides a high-level entry point into the organization's enterprise architecture and processes (Chhabra 2007). A process map represents a bird's eye view of the organization's core processes. Figure 2 shows a typical enterprise process map defined for a company. An enterprise process map can be created from scratch or – much faster and simpler – by leveraging an industry- specific reference model. These models contain predefined process content, which can be selected according to specific criteria (Hilt 2008).

Another important step is the development of the project scope and the corresponding business case. This includes the definition of the objectives and the outcomes to be achieved by the project, the measures to control these objectives and the compliance requirements that may be relevant within the project. The project set-up and the detailed documentation of the strategic point of view are the results of the strategy phase (Hoffmann 2009).

The following questions are a good starting point for key success factor analysis and the creation of an enterprise process map during the strategy phase (Hilt 2008):

- What products/services are offered to which markets?
- How important are the different business segments for the achievement of the overall strategy?

[1] Burlton (2014) is dedicated to present a methodological framework for realizing business strategy through process management. Process governance is regarded a vital prerequisite to establish a sustainable process architecture which is aligned with the business strategy.

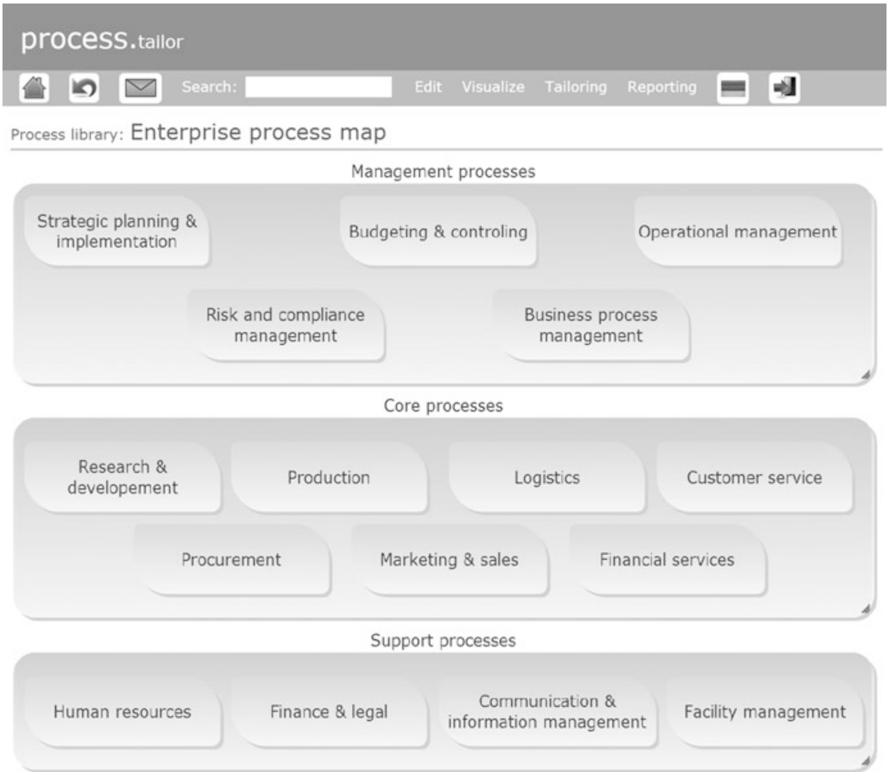


Fig. 2 Enterprise process map of an automotive company in Scheer Process Tailor© (2013)

- What are the critical success factors that define the business objectives we wish to achieve?
- Which members of the organization are key to achieving the business objectives?
- What is the company's high-level process structure, organizational structure, and IT structure?
- Which process areas and which processes are related to the business objectives and what are the related processes KPIs (key performance indicators)?
- Which activities are required in order to achieve the business objectives?
- What is the organization's overall BPM strategy?

2.2 Business Process Design Phase

The major goal of the business process design phase is the alignment of a company's processes with the needs and requirements of the market, including the design, analysis, and optimization of the processes as part of a continuous improvement cycle. The function of the design phase is to provide transparency

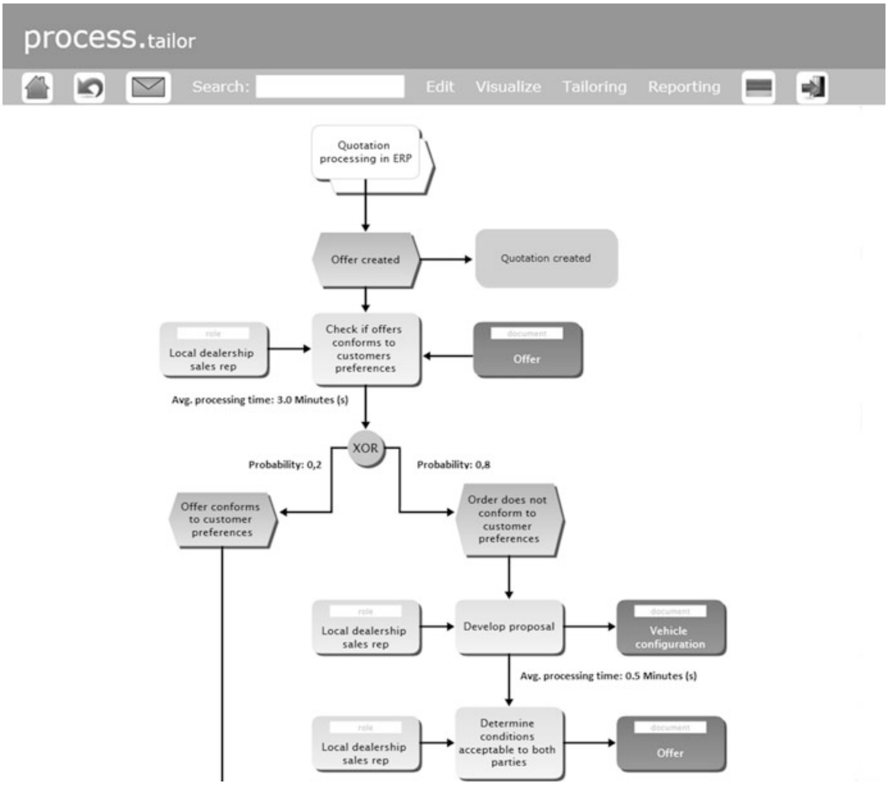


Fig. 3 Contract process in an automotive company based on an Event-Driven Process Chain in Scheer Process Tailor ©

of the current "as-is" process flow, to analyze the process flow, and to optimize it by creating a more efficient "to-be" process flow with higher quality.

This requires a method-based approach and a unified, structured, and understandable description language (Scheer 1994). The design phase answers the questions: "Who does what, in what sequence, what services or products are produced, and what software systems and data are used to support the process?"

As part of the process analysis, organizational, structural, and technological weak points in the processes are revealed and improvement potential is identified. This can be done solely by visualizing a business process, but it is also possible to simulate processes to uncover more detail about bottlenecks, costs, and resource problems. A standardized and common modeling notation, such as the Event-Driven Process Chain in Fig. 3, ensures that BPM design phase results can be compared across the organization.

The first step toward professional BPM involves the related areas of design, analysis, and optimization. Design consists of recording the actual status of existing ("as-is") processes (see Fig. 3). Processes can only be made visible and subjected to

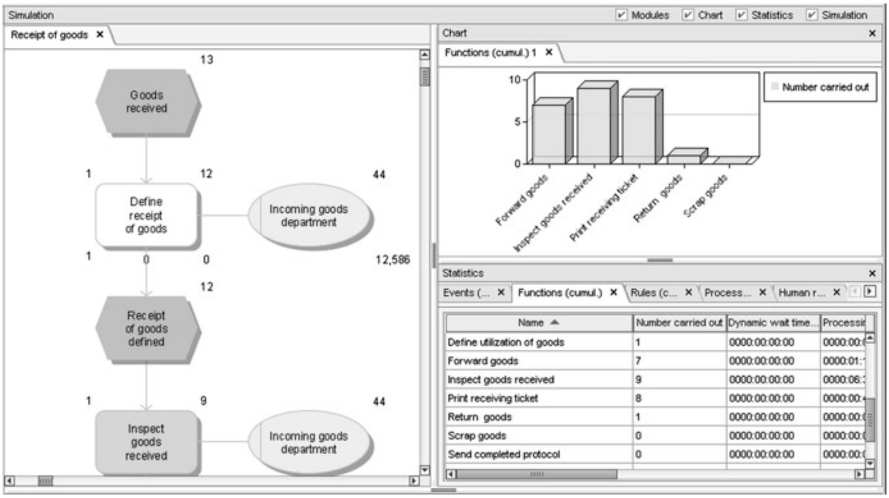


Fig. 4 Dynamic process simulation to identify bottlenecks in a goods receiving process, based on an EPC model

detailed analysis after the consolidation of all the knowledge available about them. This knowledge exists primarily in the heads of the employees who are in charge of or otherwise involved in the operation of the processes.

The analysis phase provides detailed information about the structure and efficiency of business processes. Cost center and resource utilization levels, as well as process bottlenecks caused by changes in medium and discontinuity in the underlying IT systems, become evident. Evaluation and reporting (i.e., process cost analysis, what-if analyzes, or process simulation) provide organizations with important process indicators regarding processing and wait times, utilization of resources, and costs (see Fig. 4).[2]

The results of the analysis, combined with corporate goals, are used to derive and define target or "to-be" processes (i.e., processes that will help the company to create better value in the future).

During the business process design phase, different roles and skills are needed to get the best results. There is a need for people with project and/or process responsibility to drive the BPM process itself. But BPM methodology experts are also necessary to help the people in charge of the business express their knowledge about the workflow they already have in their heads. The roles involved in this phase are not only project leaders, BPM methodology experts, and department managers, but also business users or employees who are responsible for daily operations within the area affected by the BPM analysis.

[2] For a detailed discussion refer to van der Aalst (2014). The chapter by zur Mühlen and Shapiro (2014) is dedicated to the overall field of process analysis and provides a comprehensive overview of analysis methods, such as process mining and process simulation.

Within the design phase, the following questions need to be answered:

- What is the detailed process architecture in the relevant main processes?
- What is the "as-is" process flow, including the related roles, data, and IT systems?
- What are the dynamic resource requirements and the end-to-end processing time?
- What is the resource-related process time and what are the costs for the processes?
- What weaknesses do the processes display, and how can we overcome them?
- How can we restructure the processes at a high level and in detail? What are the implications?
- Which changes do we have to implement in order to successfully optimize the process and what does the newly designed "to-be" process flow look like?
- Which process areas can be optimized using new technologies (e.g., SOA)?
- Which processes need high flexibility and where do we need to service-enable our existing software systems?
- How can we ensure process-based and non-disruptive support via IT systems that meet the requirements of individual business departments?
- Is a Software as a Service (SaaS) – approach an adequate way to support the business process in a efficient way (Hoffmann and Triebel 2011)?

2.3 Business Process Implementation Phase

BPM does not end with modeling and analysis of the improvement potential of business processes. The process changes must be implemented in practice by way of a transformation and change management process. Besides changing the workflow itself, process changes often impact a company's organizational structure and IT systems. The information technology to support, implement, and improve company processes is assuming ever greater importance. Increasingly, IT departments are taking on the role of business process innovators through the implementation of evolving IT technology. As information technology becomes more and more commoditized, standardized, and more flexible, the role of IT and the CIO is changing from a technology-oriented focus toward a business-oriented focus and is becoming responsible for the overall enterprise process architecture and company-wide BPM approach (Jost 2004).

The business process implementation phase focuses on the transformation of the daily process flow itself, the associated change in employee roles and responsibilities, and the seamless mapping of business processes and business requirements into operating application software with minimum information loss (Scheer et al. 2005). An organization must first focus on the business processes to be implemented and, only then, on actual implementation and IT systems. When processes have been modeled as "to-be" processes and the operational requirements are clearly understood, implementation through technology can commence. A variety of technologies can be used:

- Implementation of standardized ERP systems (i.e., SAP, Oracle, etc.)
- Establishing a service-oriented architecture (SOA)
- Implementation of workflow systems
- Implementation of ProcessApps
- Classic software engineering and custom software development

In addition to IT-related implementation, communication and training concepts also need to be developed and executed to support employees affected by the new process and organizational changes. Process participants must be informed about the changes and take ownership of them (Hilt 2008). The process implementation phase requires not only IT experts and process methodology experts, but also people with good skills in internal communication and training in the context of change projects.

Typical questions in this phase are:

- Who will be affected by the process changes and organizational changes?
- Which roles and responsibilities will change within the organization?
- How can the defined automation requirements in the "to-be" processes be realized?
- Where can components and functionalities delivered by standard software be used?
- Which business activities require custom development work?
- What new employee tasks are created and which new IT functionalities do users need training for?
- How will the communication and training process be handled?
- How should process changes and role changes be communicated and which tools should be used?

2.4 Business Process Controlling Phase

If it cannot be measured, it cannot be managed. The business process controlling phase enables qualitative and quantitative measures to be compared against targets, thus revealing areas with potential for improvement and greater productivity. The business process controlling phase involves measurement of the efficiency of the business processes implemented with the help of IT systems and the implementation of internal control systems to monitor compliance with a wide range of regulations. The basic target of process controlling is to ensure the implemented business processes are running as they were defined during the design phase and that all process control steps are in place and working.

Furthermore, process efficiency is measured and analyzed against targets defined for the key performance indicators (KPIs) in order to identify opportunities to make

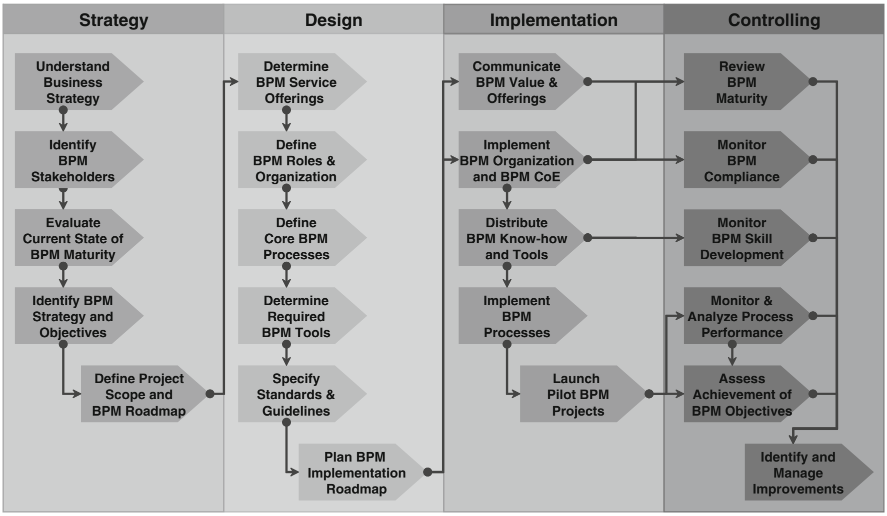


Fig. 5 Important steps of the process of Business Process Management

changes that close the BPM optimization loop. This improvement potential can be analyzed on the basis of actual data, such as process throughput times, return frequencies, and deadline reliability.

Complete control of operational processes allows companies to introduce proactive BPM. Strategic corporate goals are monitored by installing a process performance management system that continuously monitors each "as-is" process instance against a set of "to-be" targets defined during the process design phase. This can provide prompt warning of deviations from planned figures and allow appropriate countermeasures to be taken.[3] Continuous monitoring of actual business processes bridges the gap between corporate strategy and its operational implementation and helps measure and control business performance (Jost 2008).

The following questions should be answered during the controlling phase:

- How is the organization performing? Do bottlenecks still exist?
- Is the performance of the processes as planned? How can we improve them?
- Are the processes being executed as modeled during the design phase? Where are the differences and why are the processes running differently?
- How are the transformed applications and systems performing? Are service level agreements being met?
- Are the defined roles and responsibilities working as defined?
- Is the process improvement and feedback cycle up and running?
- Are the processes compliant with the defined frameworks?

[3] Heckl and Moormann (2014) comprehensively discuss related problems and methods.

- How can we continuously improve and manage the processes and quickly react to required changes?
- Have we installed a process release cycle management system?

Figure 5 highlights the most important steps of the phases business process strategy, business process design, business process implementation and business process controlling.

3 Challenge: Individualized Processes

The performance of a company is increasingly measured by its ability to develop products and services individually customized to the requirements of its clients and with regard to the processes involved in this as a service. For this purpose it is necessary to answer once more and individually the traditional questions of Business Process Management "Who makes what, when, in what quality and using which software applications?" for each process instance. Traditional BPM approaches and solutions reach their limits right from the start as these only capture normative processes. E.g. around the discussion about the 4th industrial revolution (Feld et al. 2012) one topic is, that discrete manufacturers have to manage an average size of order from one piece. So every production order has to follow its own process variant. To manage this wealth of variants approaches like process tailoring have been developed (Scheer 2012). This approach is supported by the 'Scheer Process Tailor' ©, a software solution of Scheer Management GmbH.

Figure 6 describes the customer individual tailoring of process models from an official standard, like the IT service management standard ITIL® to a company wide standard. The tailoring from this company wide standards to process variants e.g. for subsidiaries in other countries and the tailoring of the specific activities are supported as well (Bommersbach et al. 2011).

The missing bridge from the business process design to business process execution is another gap for the handling of these process variants in an efficient way. Business applications are very expensive in terms of time and IT resources if they have to be developed in a traditional way. To avoid this, every Business uses E-Mails, spreadsheets or even paper in different ways and consequently there is no overview of these fairish structured processes. This can lead to significant disadvantages in terms of performance and competition both from a business and IT perspective.

ProcessApps are closing the gap from process design to process execution. Each process can be executed immediately in a simple way. With a few clicks business people are able to create ProcessApps to support people centric processes without support of the IT organization. Figure 7 shows the ProcessApp for the support of the Supplier Negotiation Preparation process in Scheer Process Tailor©.

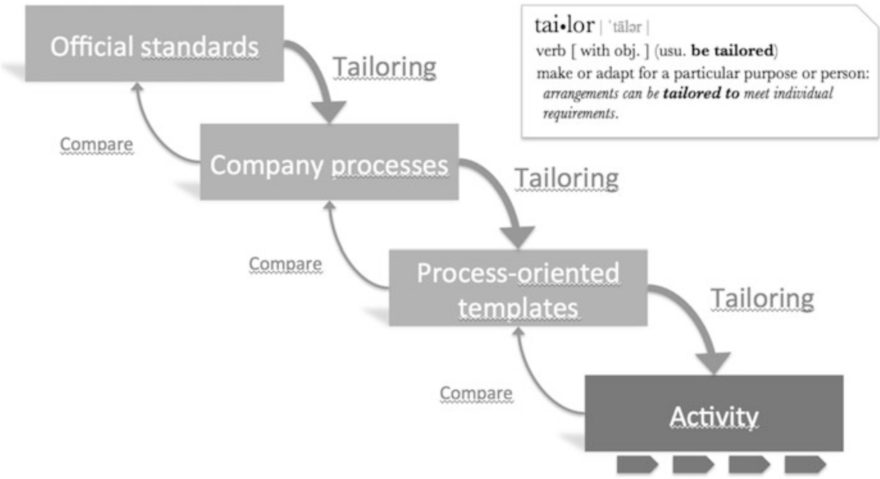


Fig. 6 Process tailoring approach

4 Main Elements of a Holistic BPM Approach

The process of BPM as a holistic management practice described in the previous section is an ideal-world model. Organization-wide implementation of the BPM process is a non-trivial and challenging task. In enterprise reality, the organization-wide adoption of BPM typically goes through *multiple stages* (Rosemann 2014):

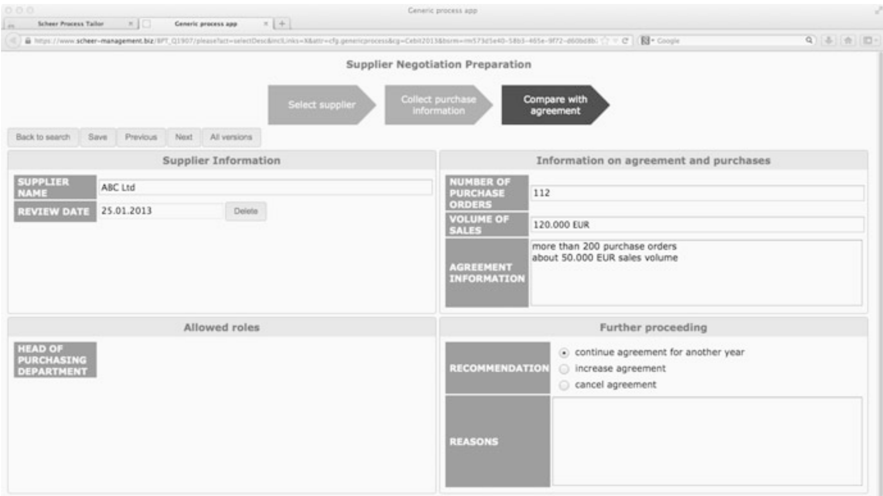


Fig. 7 ProcessApp supplier negotiation preparation in Scheer Process Tailor©

- *Become aware of the benefits and methodologies of BPM*: During this stage, a deeper understanding of the methodologies and benefits of BPM as a management discipline has to be developed, based on detailed information and training.
- *Convert awareness into the desire to adopt BPM*: Based on a business-related driver (e.g., mergers, IT system implementations, new business segments, cost reduction activities, etc.), the desire to adopt a BPM approach within the organization grows (Harmon and Wolf 2006). Often, the existence of a BPM champion within the enterprise, an individual with a passion for the idea of BPM, is a major success factor in driving this awareness and desire. During this stage, BPM champions can be found within different layers of the organization (e.g., IT managers, line of business managers, chief executives, etc.).
- *Set up, execute, and monitor individual BPM projects*: BPM credibility and its capabilities are built up within the organization. BPM projects are often executed to achieve quick win situations and to market the idea of BPM across the organization.
- *Convert from multiple BPM projects to a governing and more centralized BPM program*: If several BPM projects were successful, organizations seek to capitalize on the BPM idea. They convert from multiple BPM projects to a more centralized and governing BPM approach. In this stage, BPM becomes a management discipline that supports the BPM process, as described below. An overall and organization-wide BPM methodology needs to be designed. Methods, techniques, and tools have to be specified, documented, installed, communicated, and maintained. During this stage, a BPM strategy must be developed. An enterprise-wide process architecture and a process hierarchy, as well as BPM guidelines, standards, and conventions, must be established. In this stage, the use of a BPM maturity model can help develop a BPM roadmap for the organization.
- *Productize BPM through a BPM Center of Excellence*: In this stage of the BPM adoption process, a BPM group is formed within the organization. This department or group is sometimes called a “BPM Center of Excellence,” a “Global Process Office,” or a “BPM Support Office.” The main goal of this stage is to productize BPM, i.e., to consciously identify the BPM-related services on offer by such a BPM Center of Excellence. A BPM service portfolio for the BPM Center of Excellence is defined, and the services are offered to the stakeholders within the organization, e.g., to business departments, the IT department, etc.

Ultimately, the different stages of BPM adoption converge toward a single goal: To run the process of BPM efficiently and beneficially for the whole organization.

To reach this goal of a holistic BPM approach, the same elements must be in place that are necessary to run any process efficiently:

- The definition and clear understanding of the process of BPM itself
- *Clear objectives* regarding the outcome and benefits of BPM activities
- A *BPM organization and a BPM Center of Excellence* with appropriate knowledge, roles, and responsibilities

- *A defined, organization-wide BPM methodology*, BPM standards, and BPM service offerings
- *A mature BPM technology and tools* that optimally support an efficient BPM approach across the organization

If these elements are in place, the process of BPM can be run efficiently within an organization. A Gartner research note states that 80 % of enterprise companies conducting BPM projects will experience a return on investment greater than 15 %. The survey looked at responses from 20 companies that had completed 154 BPM projects and 95 % of the companies experienced more than a 90 % success rate among their BPM projects. All successful projects had a return on investment greater than 10 %, Gartner found. Seventy-eight percent of the respondents had ROI rates greater than 15 % (Dubie 2004).

Organizations with an identified BPM Center of Excellence can achieve a five times greater ROI over those with no Center of Excellence or dedicated process team (Palmer 2007). Similarly, those with a dedicated business process team in place reported nearly twice the ROI of those without any dedicated team in place (Palmer 2007).

In a survey from BPM Trends covering 74 companies worldwide, only 15 % had successfully implemented a BPM Center of Excellence (Palmer 2007). As shown in Fig. 8, about 46 % of the participants have identified and defined an internal team tasked with business process services. Sixteen percent are planning to create a BPM Center of Excellence, and 23 % have not identified or defined specific process teams. The survey shows a clear positive correlation between BPM project success and the leverage of a dedicated process team or establishment of a Center of Excellence. Companies with neither of these in place were significantly more likely to face problems or lack of success with BPM programs. On the other hand, the only organizations reporting very successful BPM were those with a Center of Excellence or business process team in place.

A similar situation is revealed by another BPM study from BPTrends (Harmon and Wolf 2006), where about a third of the respondents (269, in total) say they do not have a BPM group or a Center of Excellence. Of those having a BPM group, about equal numbers have the group located at the executive level, at the departmental level, or at the divisional level and in IT. Only 20 % of the respondents from large companies said they did not have a BPM group, while 47 % of those from small or medium-sized companies reported that they lack a formal BPM group.

This shows that the installation of a *BPM Center of Excellence* within an organization is crucial for the success and efficiency of an organization's BPM activities. But many companies have still not achieved this organizational implementation of BPM. The main tasks of a BPM Center of Excellence are to provide BPM governance and additional BPM services for the company, as well as to establish appropriate roles and responsibilities for an efficient BPM organization.

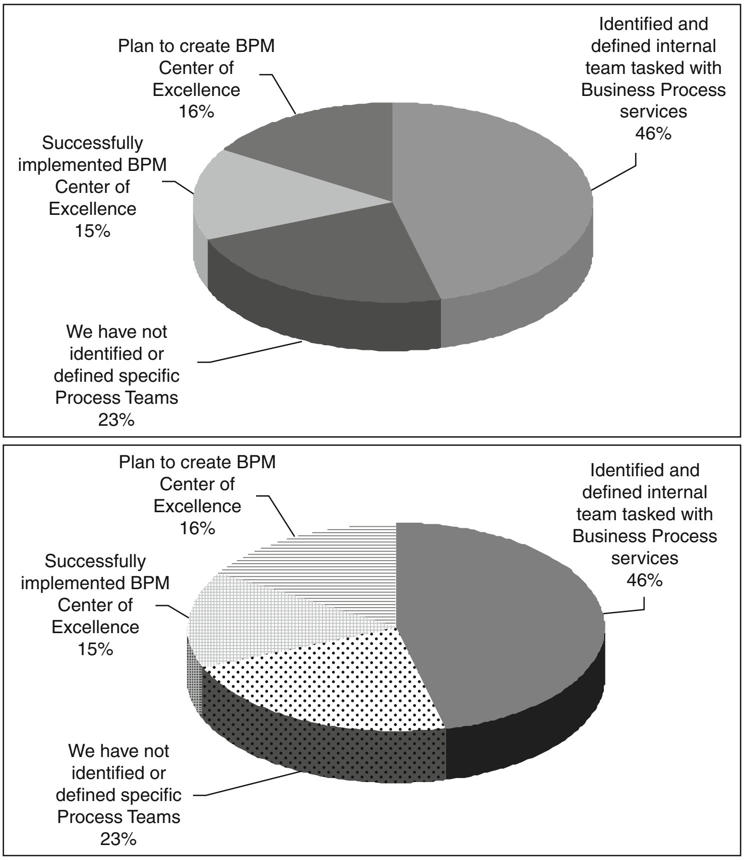


Fig. 8 Status of business process initiatives (Palmer 2007)

5 Services and Responsibilities of a BPM Center of Excellence

In order to implement a BPM Center of Excellence within an organization to support a holistic BPM approach, specific service offerings for stakeholders should be defined, along with internal roles and responsibilities. A service offering is a combination of methodology, tools, and communication activities that together address a strategic BPM target field of the organization. The organization's BPM target fields should be analyzed and prioritized first to identify the necessary BPM service offerings. Every target field (e.g., strategic decision support, ITIL implementation and review, IT system implementation, cost reduction initiatives, or the market launch of new products and services, etc.) must be identified and described. Current projects in the context of every target field should be analyzed. Additionally, the strategic and operational importance of every target field should be evaluated. Based on this prioritization, the necessary service offerings can be defined as a combination of BPM methodologies, tools, and communication activities.

Rosemann proposes analyzing and managing the BPM services portfolio offered by the BPM Center of Excellence based on the two dimensions of demand and capability (Rosemann 2014). Demand reflects the current organizational needs and appetite for a specific BPM service that can also be derived from the above-mentioned BPM target field analysis. The capabilities describe the readiness of the BPM Center of Excellence to provide a certain service. This dimension reflects the accumulated knowledge, skills, and experience of the BPM Center of Excellence, as well as the technological capacities to successfully deliver the defined BPM service. Four quadrants can be differentiated in this portfolio analysis:

- *The Perfect Match*: It exists if high demand meets high capability.
- *Over-Engineering*: If the BPM Center of Excellence provides a set of capabilities without there being a corresponding demand for them.
- *Vacuum*: If the demand for a specific BPM service is high, but the BPM Center of Excellence lacks the capabilities to deliver.
- *No-Action Zone*: This indicates a lack of both demand and capability.

Every BPM service offered and/or provided by a centralized BPM Center of Excellence can now be analyzed within this portfolio framework. Based on the quadrant, appropriate strategies can then be implemented to provide the relevant services.

When it comes to producing and delivering the required services, five main responsibilities of a centralized and enterprise-wide BPM Center of Excellence organization can be identified:

- BPM leadership
- Regulatory framework
- Project support
- Training and communication
- Process controlling

5.1 BPM Leadership

The area of BPM Leadership summarizes activities, such as the identification of the BPM stakeholders, the evaluation of BPM maturity, and the definition of a BPM vision and a BPM strategy for the company, as well as the internal marketing and communication of the value of BPM (see Fig. 9). Based on the BPM strategy, a master plan and a BPM roadmap need to be defined in a 2–3 year plan that provides a preliminary assessment of the topics that the internal resources will have to be focused on and the timeframe in which specific milestones can be achieved within the BPM target fields. The design of the BPM offerings, the development of the

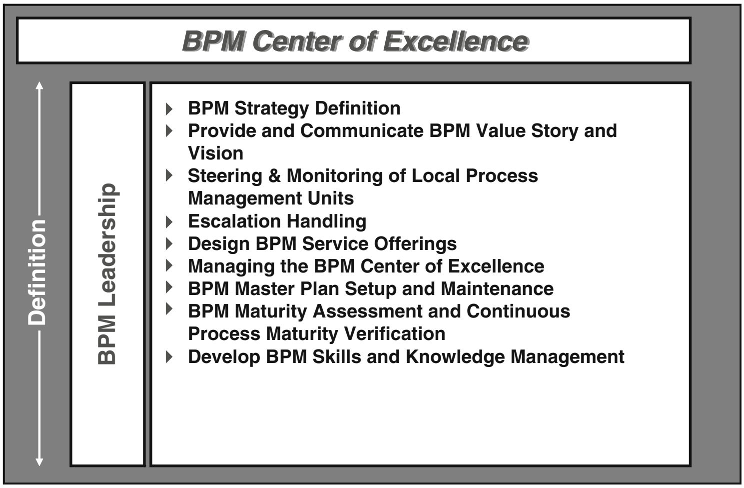


Fig. 9 Main elements of the BPM leadership

necessary BPM skills, and the setting up of a BPM knowledge management system are typical BPM leadership activities.

The identification of the BPM stakeholders is an important part of BPM leadership. After identification of the BPM stakeholders, it is important to understand their current influence and in what ways they can be influenced in the future. Stakeholders are analyzed from a level, structure, culture, power, and trust point of view. A "stakeholder influence map" can help analyze the stakeholders with regard to their influence in the organization. The influence map assists in identifying stakeholders' interests, making it possible to understand their main needs and requirements. Each stakeholder or stakeholder group is analyzed based on their interest in the organization. A list is created that includes their needs and requirements and, consequently, their expectations with regard to the BPM organization.

A fundamental service within BPM leadership is the ongoing assessment of the BPM maturity of different parts of the organization. The evaluation of "as-is" BPM maturity is an important starting point for the definition of a BPM vision and strategy and a further BPM roadmap. During the BPM maturity assessment, the maturity level for each phase of the process of BPM is determined. Five stages of BPM maturity can be differentiated within the area of analysis:

- *Stage 1*: *Initial*: No structured activities in the area of analysis.
- *Stage 2*: *Awareness*: Awareness for the subject exists within the area of analysis. Planning activities have begun.
- *Stage 3*: *Defined*: The subject is clearly defined within the area of analysis. Implementation has not yet begun or is ongoing.
- *Stage 4*: *Managed*: The subject is implemented and managed within the area of analysis (i.e., people and roles are assigned; communication to relevant roles is taking place, etc.).

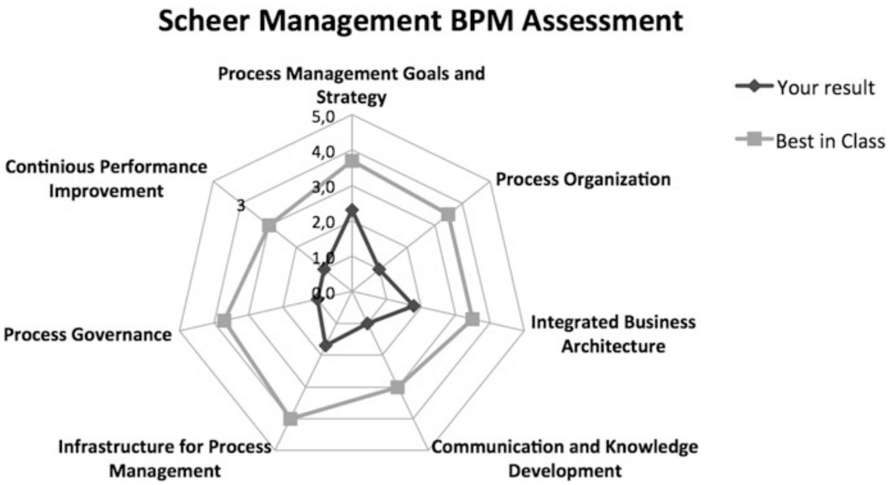


Fig. 10 Scheer Management Maturity Check

- *Stage 5*: *Excellence*: The subject has been implemented enterprise-wide, and an ongoing review and improvement process is in place.

Every phase of the BPM lifecycle within an organization can be evaluated and assessed in terms of these five maturity levels to identify weak points and improvement potential and to create a BPM strategy and BPM roadmap for the organization. A BPM maturity assessment should analyze every phase of the BPM process in detail. Figure 10 gives an overview of the results of a Scheer Management Maturity Check (2013).

5.2 *Regulatory Framework*

The regulatory framework provided by the BPM Center of Excellence ensures a BPM approach that is consistent across the enterprise, reusable, and efficient (see Fig. 11). The development and maintenance of policy, conventions, and standards for an enterprise-wide BPM approach are the main tasks of the BPM Center of Excellence. The BPM standards cover the definition of the roles within the BPM organization, the definition of a process framework (enterprise reference processes), process conventions, and an enterprise-wide process architecture.

The enterprise-wide process architecture is a hierarchical structure of process description levels and directly related views covering the whole organization from a business process point of view (Brabänder and Davis 2007). It starts with high-level process maps representing a conceptual business view down to the detailed process flow descriptions describing specific tasks and their relation to roles, organization, data, and IT systems (see Fig. 8). The business process architecture and the related

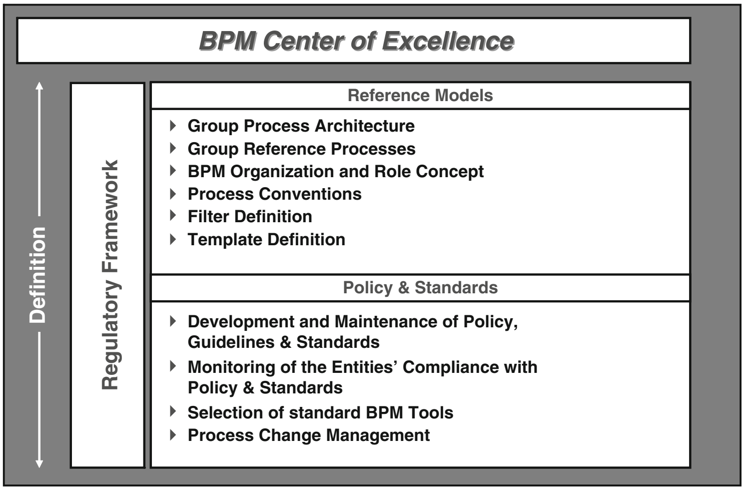


Fig. 11 Main elements of the regulatory framework

modeling conventions help structure the BPM landscape within an organization. The architecture describes how to structure the business process models horizontally by segmenting models into manageable chunks, which link together, and how to structure them vertically in a hierarchical structure that decomposes each model into increasing levels of detail.

Typically, the business process architecture consists of between four and six levels of process models. Besides the structure of process models, the architecture will also include other views (e.g., organizational diagrams, data models, objectives diagrams, IT landscape models, etc.). Once the process architecture is in place, it becomes a useful tool for everyone in the organization because it helps them to orientate what they do in the process structure and identify potential improvements. Figure 12 shows the process hierarchy at British Telecommunications (BT) as an example of a six-level process architecture including role diagrams, system application model, and other views in addition to the process hierarchy (Brabänder and Davis 2007).

Based on the process architecture, an enterprise-wide reference process structure and the related basic building blocks can be derived for every element of the process architecture that describes reusable parts within the process modeling environment. These elements will be managed by the BPM Center of Excellence and provided within a central BPM repository, such as Scheer Process Tailor.

The process architecture and the BPM standards are described and communicated by means of process conventions. A process convention handbook developed by the BPM Center of Excellence is the basis for all BPM projects within the organization and describes the process architecture and all related BPM elements and procedures. The process convention handbook provides the BPM policies and standards for the process of BPM and process modeling. It is regularly reviewed

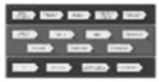
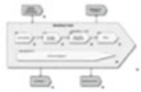
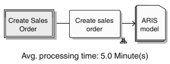
Level	Object		Model	
Level 1	Process Area	Marketing & Sales	Enterprise Process Map	
Level 2	Main Process	Sales order management	Process Area Map	
Level 3	Process	Sales order processing	Main Process Model	
Level 4	Activity	Create sales order	Process Model	
Level 4	Activity	Create sales order	Activity Model	

Fig. 12 Process view and process architecture levels

and updated by the BPM Center of Excellence based on new stakeholder requirements or project experience (Fig. 13).

5.3 Project Support

Project support for BPM projects is one of the main services provided by the BPM Center of Excellence (see Fig. 14). The BPM methodology and process management experts of the BPM Center of Excellence provide support throughout all the phases of the BPM project, from strategy phase to design phase, implementation phase, and controlling phase. Throughout all phases, the BPM experts will help ensure that all necessary project steps during the process of BPM are realized and the requirements of stakeholders are met. In addition to project support and execution, this also includes project review and a final status report detailing project benefits and lessons learnt. Newly developed knowledge about process management methodologies or BPM project management is gathered within the feedback pool and knowledge management system of the BPM Center of Excellence.

To support all the phases of a BPM project, the BPM Center of Excellence team needs to have in-depth knowledge of BPM methodologies, as well as good skills in

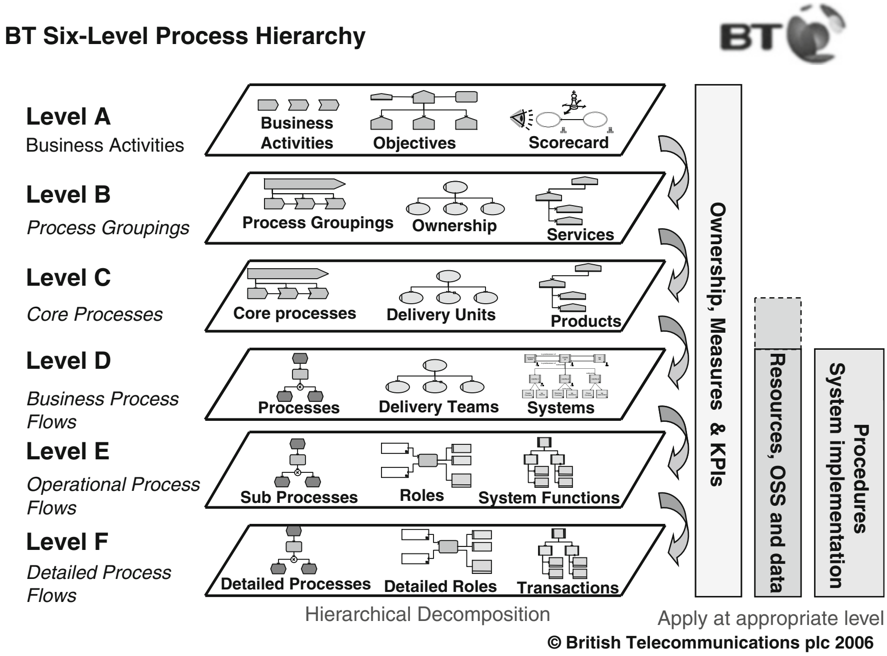


Fig. 13 Six-level process hierarchy at British telecommunications (Brabänder and Davis 2007)

project management. During a project, they need to stick to their policies and conventions, but they also have to be open to improvement proposals and new stakeholder requirements. That means they also need very good soft skills in

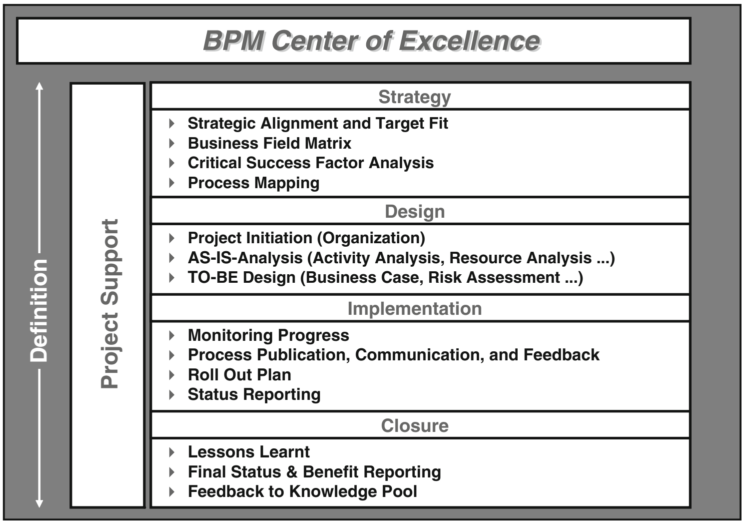


Fig. 14 Main elements of the project support

working together with a large number of individuals from other departments. During the course of the different projects, the BPM standards are rolled out into the organization.

5.4 Training, Communication, and Process Controlling

The training and communication responsibilities include all activities relating to installation, license management, and first-level user support for the internal BPM software and tools, such as Scheer Process Tailor (see Fig. 15). The provision and maintenance of BPM software, including the associated administration services, are also part of this area of responsibility.

Furthermore, training programs are developed to cover enterprise-wide BPM methodology and to train people to use the BPM technology and software chosen for the enterprise-wide BPM approach by the BPM Center of Excellence.

The communication activities target both change management measures within the company and internal marketing activities to promote the BPM concept and BPM Center of Excellence within the organization.

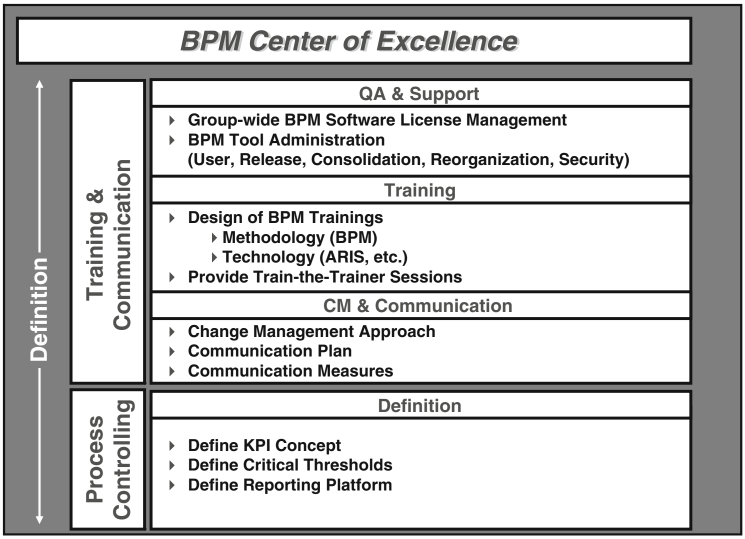


Fig. 15 Main elements of training, communication and process controlling

6 Roles Within a BPM Organization

Setting up a BPM Center of Excellence and identifying the appropriate services to support the process of BPM within an organization are important steps toward establishing a holistic BPM approach. However, based on the main services and the responsibilities, it is also important to understand the roles that are necessary within that BPM structure.

The BPM governance process defines the accountability framework for creating a decision-making process that determines the services, architecture, standards, and policies for continuous management of business processes. It ensures that a management process is in place for setting goals and establishing policies, practices, procedures, organizational structure, roles, and responsibilities to ensure that enterprise goals will be achieved. A major part in this BPM governance process is played by the BPM Center of Excellence and its related roles. In the following paragraph, the roles within organizational BPM structures will be analyzed in more detail.

- *The BPM Sponsor*
  Before a BPM Center of Excellence can be established, the commitment of the top management to the concept of BPM has to be ensured. This means that a "BPM Sponsor" is needed at the executive board level, who is willing to initiate, fund, and drive this important topic from a senior management perspective. The BPM Sponsor must understand the importance of BPM for the organization. He or she also needs to understand that setting up a BPM Center of Excellence and establishing the process of BPM in the organization can have a significant impact on the organization's business performance and requires organizational change. He or she should be aware that BPM is not a separate function or activity, but that it is inextricably linked with the business.

  The BPM Sponsor must also agree that people responsible for the operational business processes need the support of business process experts from the BPM Center of Excellence who understand BPM methodologies and concepts. The BPM Sponsor is a member of the organization's BPM Steering Committee.

  If the company already has a strong business process culture, the role of the BPM Sponsor can be enhanced to become the Chief Process Officer, who is responsible for BPM initiatives within the organization at the executive management level (Jost 2004). Without a BPM Sponsor at the executive level who is committed to internally marketing all BPM initiatives, BMP awareness and status will not be strong enough. If there is no such BPM Sponsor, the holistic BPM approach could fail.
- *The Head of BPM*
  The Head of BPM supervises and manages all process management activities at a group or regional/local level and manages a team of organization-wide business process experts gathered together in the BPM Center of Excellence. The Head of BPM should be experienced in BPM and be well accepted by the individual business departments. He or she should have detailed process knowledge, strong knowledge regarding methodologies, coupled with well developed

negotiation and communication skills, so that his or her authority will be accepted by the organization's senior management. The Head of BPM should also have excellent personal and social skills as he or she is often the mediator between different business units and also between the business units and the BPM Center of Excellence.

While the BPM Sponsor stresses the importance of BPM and markets it at the executive level, the Head of BPM is responsible for organization-wide implementation and structuring of BPM activities. He or she is tasked with establishing a BPM Center of Excellence, proving that BPM efforts and projects within the organization are efficient and that they help improve business performance.

Typical tasks of the Head of BPM are:

– Defining the organization's BPM strategy
– Managing and coordinating organization-wide BPM efforts
– Defining the enterprise process map
– Operating process working groups
– Designing the BPM services offered by the BPM Center of Excellence
– Suggesting process-related KPIs and building a consensus to support them
– Developing and managing a BPM master plan and the associated implementation work
– Steering and monitoring regional or local BPM managers and process coordinators
– Joint leadership of the BPM Steering Committee

Depending on the size of the organization, there may be a need for multi-level BPM structures. Large organizations with regional and local entities can implement a Head of BPM at the group level and also at the regional level. These individuals will have similar responsibilities but with a different regional or local focus.

• *The BPM Steering Committee*
The BPM Steering Committee is responsible for setting, monitoring, and directing the BPM strategy of the business (Olding and Rosser 2008). The committee is chaired by the Head of BPM and is attended by the BPM Sponsor. The steering committee is also attended by the regional Heads of BPM (in a large organization) and specific business process experts as required, based on current BPM activities and projects.

The main responsibility of the BPM Steering Committee is to oversee and monitor all BPM-related activities and projects within the organization and to align these activities to achieve higher efficiency. In the event of escalation or uncertainty, the BPM Steering Committee will be asked to make a decision.
• *The BPM Center of Excellence*
The BPM Center of Excellence is led by the Head of BPM and comprises business process experts from throughout the enterprise. The responsibilities of the BPM Center of Excellence are BPM leadership, implementing a

regulatory framework for BPM, offering project support, providing training and communication, and process controlling and governance. The BPM Center of Excellence offers internal process management consultants for group-wide business projects and is in charge of methodological excellence.

- *Business Process Experts*
  The Business Process Experts work as internal process management consultants for organization-wide business projects and are in charge of methodological excellence and the rollout of BPM knowledge into all projects. They are attached to the BPM Center of Excellence and are led by the Head of BPM. They have profound knowledge regarding BPM methodologies and process management tools, as well as project management skills.
- *The Process Owner*
  Process Owners own a dedicated core process (e.g., generic processes like sales order processes, procurement processes, and also industry core competences, such as retail loan processes, central credit processes, etc.) and are responsible for the operating performance and continuous process improvement of their process. They can be located at the group level or at the local/regional level, depending on the size of the organization. Process Owners should have a good knowledge of the enterprise and of the process areas under their supervision. They should also have an understanding of the business process architecture and the IT systems used in their business area. Furthermore, they should have some expertise in process management and the use and management of process key performance indicators (KPIs).

  Typical responsibilities and activities of Process Owners are:

  – Monitoring and managing business process performance (meeting KPIs)
  – Process improvement
  – Ensuring customer satisfaction
  – Identification of process interfaces and integration into the business process architecture
  – Defining process KPIs in compliance with the organization's process KPI structure
  – Recording and publishing process KPIs (e.g., time, cost, and quality)
  – Communication with process participants and process coordinators

- *The Process Coordinator*
  Process Coordinator is a special and extended role of a Process Owner. They own a dedicated business process area or a core process (i.e., retail loan processes, etc.) at the global/group-wide level and are responsible for standardization of these process areas and coordination of interfaces to other process areas. They should have a good knowledge of their business area and processes under their supervision and should understand the business process architecture of the organization. The Process Coordinator needs to understand the enterprise process map and the systems in use.

  They work together with other process coordinators and members of the BPM organization to establish transparent, measurable, comparable, and well-

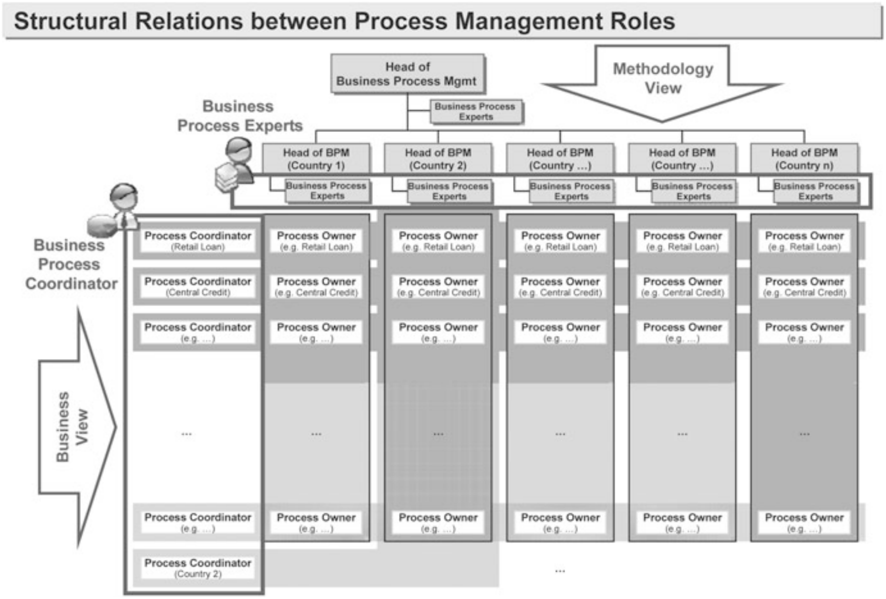


Fig. 16 Structural relationships between BPM roles within a large organization (project example)

standardized processes for their area. They lead and coordinate the activities of all process owners in their process area and try to find the most practicable routes toward process standardization (see Fig. 16).

The work of Process Coordinators can help achieve high efficiency in process standardization and positive cost effects throughout the organization. The SCALE project at Coca-Cola offers an example of a high degree of standardization based on the roles of Process Owners and Process Coordinators. Coca-Cola's largest bottling companies have established uniformity in all their processes using a process-oriented approach for the harmonization of their IT systems. Within the SCALE project, they established roles for group-wide coordination of BPM activities, plus roles for the regional coordination, standardization, and realignment of business processes (named "Process Leads"), which are comparable with the role of Process Coordinators and Process Owners. When Process Coordinators from the various business areas started to analyze the standard business processes, they found that the degree of alignment was extremely high, but human resources and bookkeeping areas showed significant country-specific differences that couldn't be included in, the global standardized process architecture without some adjustment. The market-to-cash process met up to 94 % of the requirements, forecast-to-deploy came in at 99 %, and procure-to-pay was 100 % identical. Beyond the main process lines, 94 % of the processes were ranked as easy to standardize and another 5 % could get there with justifiable cost and effort. Only 1 %, were classified as highly specific (SCHEER Magazine 2008).

- *The Process Modeler*
  An important role needed for a business process design project and for a BPM organization is that of the Process Modelers. They are located in the local business organization and are responsible for business process modeling and process verification in compliance with the defined BPM modeling standards. Typically, they will also be responsible for promoting BPM and modeling tool knowledge. Some experienced Process Modelers may take on more responsibility in their teams by offering technical services, such as method filter configuration, database administration, creating and maintaining modeling libraries, or publishing models. They are often trained and supported by Business Process Experts.

7 Conclusion: How to Establish a Holistic BPM Approach Within an Organization

Based on the main elements of a holistic BPM approach, the methodology and procedural model describe the proposed steps that are necessary to install the process of BPM, the BPM Center of Excellence, and the necessary roles and responsibilities within an organization. The approach comprises four phases: strategy, design, implementation, and controlling.

The procedural model summarizes the different steps needed to establish enterprise-wide BPM with the main elements as described in the previous paragraphs. To achieve this goal, the company and its corporate culture as a whole must be examined. Maturity and process orientation are strictly evaluated during the strategy phase. In addition, relevant persons (stakeholders) are identified to persuade them, of the value of BPM as a solution for the company's most urgent issues. The core tasks in the design phase include defining BPM roles and responsibilities on the organizational side, as well as specifying architecture standards and frameworks for technical implementation. Finally, in the design phase a BPM framework that fully describes all tasks, responsibilities, tool support, and methods, is created. In the implementation phase, this framework is gradually established within the corporate organization, while training sessions and project monitoring make successful implementation and controlling easier.

The chapter describes a best practice approach for enabling organizations to handle BPM far more efficiently. By installing the process of BPM, defining the appropriate roles and responsibilities, and setting up a defined organizational unit responsible for driving the efficiency of BPM (BPM Center of Excellence), the impact and value of BPM can be made much more visible to both divisional managers and the executive management team. Successful project examples underline the value of BPM.

In the future we have to pay more attention to innovative approaches for the individualization of reference processes and the management of process variants. This will be the base for customer individualized products and services.

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The Service Portfolio of a BPM Center of Excellence

Michael Rosemann

Abstract Centers of BPM Excellence (CoE) are a popular organizational setup for the centralized provision of Business Process Management. Organizations establish a CoE (aka BPM Support Office) as their BPM maturity increases in order to ensure a consistent and cost-effective way of offering Business Process Management services. The definition of the offerings of such a Center and the allocation of roles and responsibilities play an important role within BPM Governance. In order to plan the role of such a BPM CoE, this chapter proposes the productization of BPM leading to a set of 15 distinct BPM services. A portfolio management approach is suggested to position these services. The approach allows identifying specific normative strategies for each BPM service, such as process improvement, process training or process forensics. A public sector case study provides further insights into how this approach has been used in practice. Empirical evidence from a survey with 18 organizations confirms the coverage of this set of BPM services and shows typical profiles for such BPM Centers of Excellence.

1 Typical Stages of BPM Adoption

The enterprise-wide adoption of Business Process Management in organizations tends to go through multiple stages.

First, an *awareness* of the benefits and methodologies of Business Process Management has to occur. In many cases the limited adoption of BPM is simply a result of a lack of a deeper understanding of BPM. Reasons for this missing appreciation of BPM could be an existing strategic imperative focusing on different dimensions, a previous commitment to another methodology for organizational engineering or the absence of a demand for change and improvement. The BPM

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_16,

proponents may be familiar with BPM methods and tools, but lack the ability to convincingly justify the merits and how these could be utilized within the specific context of the organization. Overall, an inhibiting lack of awareness is often due to lack of training, which, once conducted, is the most promising means of creating, increasing, and maintaining BPM awareness.

Second, this awareness and understanding of BPM has to convert into a *desire to adopt*. This is a critical stage and requires a business driver, i.e. a sense of urgency (e.g., a large system implementation or a corporate merger) and a champion, i.e., at least one individual with passion for the idea of BPM. Such drivers and champions can be found in various parts and on alternative layers of the organizational hierarchy. In some cases, IT managers build the business cases for BPM. This is typically the case when process automation is the main source of benefits to be derived from process improvement. In this context Davenport and Short differentiate among others transactional, geographical, automational, analytical, informational and sequential IT capabilities (Davenport and Short 1990). In other cases the desire to adopt BPM is triggered by business improvement teams, HR departments, or business stakeholders such as line managers or senior executives. It remains, in any case and without a doubt, an ongoing challenge for the community that BPM has no classical home in an organization. In a recent study with Accenture, we identified that one third of all BPM teams report directly to a C-level executive, one third to an IT executive, 17 % to an operations manager and 10 % to a line of business (plus 6 % others) (zur Muehlen et al. 2013).

Third, and assuming the business case was successful, individual *BPM projects* have to be set up, executed, and monitored, often with the desire to achieve quick win situations that can then be used to market and expand the BPM ideas across an organization. This is typically the phase in which organizations build up BPM capabilities and credibility. It also often means that individuals develop a fascination with BPM, identify potential career paths in its development, and take (often unofficial) BPM ownership.

Fourth, assuming that individual BPM projects have been successful, organizations seek a wider capitalization on the BPM idea and convert multiple, but potentially isolated BPM projects into a governing and typically more centralized *BPM program*. In this stage, an overall BPM methodology needs to be designed. Methods, techniques, and tools have to be specified, documented, installed, communicated, and maintained. A main challenge in this phase is the design of a BPM strategy that has in its core a roadmap that specifies the planned BPM-related activities over the next 3–5 years. For this exercise the use of a BPM maturity model centered on the factors of strategic alignment, governance, methods, process-aware information systems, people, and culture is recommended (Rosemann, de Bruin, Power 2006; see also the chapter by Rosemann and vom Brocke in this Handbook, Vol. I). A high number of organizations globally adopted this approach and have specified roadmaps that describe how and in what sequence they plan to increase the maturity in each of these six factors (see also the chapter by de Bruin and Doebeli in this Handbook, Vol. II). Once this type of momentum is gained, accountabilities have been assigned and a strategic BPM roadmap is agreed on, a more specific definition of the deliverables and the overall benefit realization of BPM is required.

This fifth phase of a BPM adoption is the focus of this chapter. The typical scenario is at this stage that a centralized BPM Center of Excellence is formed in order to consolidate all BPM related-activities and ensure consistency and cost-effectiveness in its delivery. In addition to the activity-focused view of a maturity-driven BPM roadmap, it is now required to *productize BPM*, i.e., to consciously identify the BPM-related services offered by such a central BPM Group. In this chapter, we will *not* discuss how the set of these services varies over time with increased BPM maturity as this would lead to highly contextualized recommendations.

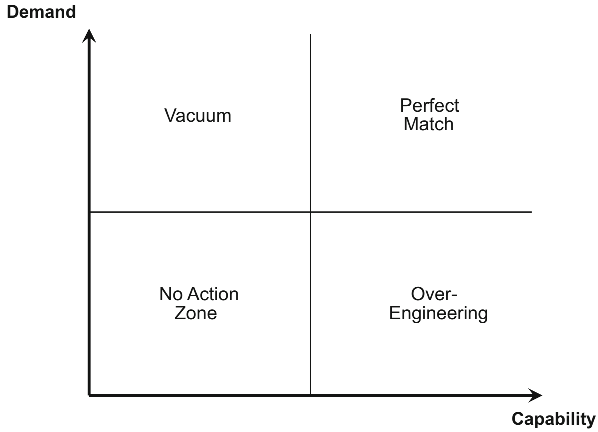
2 The BPM Service Portfolio

The following overview of typical, as well as emerging and in parts rather visionary, BPM services has been derived through a series of workshops with three Australian organizations from the public and private sector. These workshops took place as part of an engagement that was aimed towards the design and organizational setup of a BPM Center of Excellence. This set of services enables managers in charge of an BPM initiative to start productizing their portfolio of current and future BPM services. The conceptual idea behind this framework is the design of a BPM service portfolio (Fig. 1); i.e., all services offered by the BPM Center of Excellence are positioned in a portfolio with the two dimensions of demand and capability. Each of the two dimensions represents a continuum and not just a simple dichotomy of high and low. *Demand* reflects the current organizational appetite for a BPM service. Like all demands, the demand for BPM services can be influenced through appropriate marketing and communication strategies. The given demand is a good first indicator for the prioritization of the current suite of BPM services, especially when the Center of Excellence is project funded. *Capabilities* describe the readiness of the BPM CoE to provide a certain service. These capabilities reflect the accumulated knowledge, skills, and experience of the BPM CoE as well as available technological capacities to successfully deliver the individual BPM service.

In this portfolio, four quadrants can be differentiated (Fig. 1).

The *perfect match* exists, when high demand for a service and high capability to deliver it meet. Organizational requests for a BPM service can be satisfied assuming the BPM CoE has a sufficient bandwidth to deliver and a funding model that supports growth with increasing demand. Being able to comply with service level agreements and providing skilled resources are key challenges. A typical strategy for sustainable and scalable service delivery is to progressively transfer accountabilities from the BPM CoE under the banner of “BPM self services” into the lines of business. This can be typically observed for services such as process modeling or process improvement.

Fig. 1 The demand-capability-portfolio



A more critical situation exists when the BPM Centre of Excellence possesses a set of capabilities without corresponding demand for it. This could indicate capabilities that, at least at a certain moment in time, are *over-engineered*. The BPM CoE might have undertaken training in process simulation, in the conversion of conceptual to logical process models, or in the implementation of Business Process Management Systems for process execution. However, the organization may not (yet) see the demand for such services. There are two possible pathways from here. Either the service will be retired, or the BPM CoE is convinced of the importance and benefits of the service.

Assuming that the capabilities are of sufficient quality, the CoE will invest in a stakeholder-specific communication and marketing plan for this service in order to increase the awareness for the potential future benefits of the service.

A very different challenge exists when the demand for the BPM service is high but the BPM CoE lacks the capabilities to deliver. This scenario is, in fact, most often the case for newly established BPM initiatives. Awareness and the desire to adopt exist, but there is no corresponding investment in BPM training and education programs. This obvious *vacuum* is often filled, in the short term, via external service providers. The internal BPM CoE has to carefully consider whether or not to build up the required capabilities internally. Funding such a capability development and the sustainability of the demand will be the main challenges and require sound business based on a long term BPM strategy. In some cases, this might be simply a very specific or just a temporary demand (e.g., compliance management or support for a corporate merger).

The *no-action zone* indicates a lack of demand *and* capability. However, ongoing monitoring for emerging BPM services (e.g., process forensics or process portfolio management) is advisable. A continuous assessment (e.g., by using surveys or focus groups) is required in order to evaluate the demand for further capability building.

As with all portfolio management approaches (e.g., Jeffery and Leliveld 2004), a BPM manager would seek a natural balance between the BPM services. In a fee-for-service environment, certain services such as process modeling might become cash cows that can be used to subsidize the development of entire new services (e.g., process forensics or process portfolio management). Also, existing capabilities and skills should be carefully screened in order to identify potential for further growth.

Overall, BPM services might be differentiated into three types. First, essential 'keep the lights on' services (e.g. library management) are managed in a cost center (service) fashion. They provide a supportive capability (hygiene factors) to the organization but have limited impact on the current or future business model, customer experiences or overall revenue. Funding for such services will require a central, non project-specific budget to ensure the sustainability of the service delivery. Second, some services will be critical for the quality of the interaction with external stakeholders. An example for such a service could be process improvement. These services could be seen as a 'profit services'. Funding could come from specific projects and the consuming side within the business will have a high level of interest in being involved in these services. Third and finally, there is a class of 'innovative services' (e.g. process portfolio management). A specific innovation fund needs to be allocated to develop these services even when the business case for this development cannot be clearly articulated.

3 A Proposed List of BPM Services

The introduced portfolio can now be populated with specific BPM services. While the list (and labels) of these services will vary from organization to organization and by no means claims to be complete, the reference list provided in the following serves at least as a starting point for the identification of BPM services. We focus on those services that potentially could be offered by a centralized BPM Center of Excellence. However, it is acknowledged that many of these, and additional services, could (and should) be offered by other departments (e.g., IT, Corporate Governance, Business Improvement, Compliance Management, Project Management, Human Capital Management, external providers) and that the service ownership might vary over time. An appropriate funding model (e.g., budget and cost recovery) and service governance models are important. However, these issues are out of scope for the purpose of this chapter.

3.1 BPM Maturity Assessment

As indicated above, we see the ongoing assessment of the BPM maturity of different parts of the organization as a fundamental service. Nowadays, a number of BPM maturity models are available (Hammer 2007; OMG 2008; Roeglinger et al. 2012; Rosemann, de Bruin, Power 2006). While these models differ, among others, in their understanding of BPM, their scope, their depth, the richness of the supporting methodology, or their empirical or theoretical foundation, they have in common that they are designed around a number of perceived critical factors. Following the BPM maturity model by (Rosemann, de Bruin, Power 2006) the evaluation of the six central organizational capabilities – strategic alignment, governance, methods, process-aware information systems, people, and culture – provides a starting point for the identification of BPM priorities and a corresponding roadmap for BPM implementation and evolution (see also the chapter by Rosemann and vom Brocke in this Handbook, Vol. I). Such a BPM maturity assessment service could be offered in different packages, ranging from interviews with senior executives and workshops with multiple stakeholders, to comprehensive surveys. It could also focus on a subset of the factors within the maturity model, e.g. strategic alignment only. The key contribution of this service is the triangulation of different sources of information to a rich, valid and reliable picture about the current status of the organizational BPM capabilities and the design of a way forward that considers organizational context factors such as executive buy-in, organizational disposition, or relevant external factors (de Bruin 2009).

3.2 Strategic Alignment

Before any BPM activities (e.g., process documentation or process improvement) are initiated, a dedicated service needs to target the assessment of a process under consideration, or of BPM overall, in terms of its alignment to corporate strategy and mission (de Bruin 2008). The value proposition of this service is twofold. First, it will help allocating priorities to processes based on their strategic alignment. Second, it will ensure that all process-related work will contribute to the corporate agenda. This service is based on a solid understanding of the organizational strategy and the way it can be operationalized for various processes. Strategic tools such as Strategy Maps can be utilized for this purpose (Kaplan and Norton 2004). It also requires the capability to regularly collect relevant process performance data in order to quantify the alignment without making this data collection a large project on its own. The deliverables of this service most notably feed into potential business cases and operationalize objectives and constraints for BPM activities such as process documentation or process re-redesign.

3.3 Process Modeling

The advanced graphical and repository-based documentation of business processes in the form of process models can be broken down into two sub-services. First, it includes the methodology for model lifecycle management itself. For this purpose, the BPM CoE should host the BPM methodologist and the process modeling tool competence. Related services can then include training in this methodology and supportive tools, model governance, development of procedural models, methodological upgrades, and the provision of conventions and advanced practices. It will also facilitate the adaptation of this methodology to emerging requirements (e.g., process-based compliance or risk management). Second, process modeling as a narrowly defined service covers the actual capture and documentation of a current or intended future business process (Dumas et al. 2013). This service could be offered on different levels of granularity and may cover modeling high level enterprise-wide processes, cross-departmental value chains, and detailed and more transactional business processes. It could also require attending related workshops and interviews, and providing process modeling support, facilitation and coaching services as part of these events (Sharp and McDermott 2008). Process modeling is often the "bread-and-butter service" of a BPM CoE, and it demands substantial scalability and expertise. Junior process analysts with limited domain and process improvement knowledge, but a deep knowledge of underlying methods, tools, architectures, and modeling conventions, can provide this service especially for more transactional processes. However, it is important to stress that the required skills go beyond mastering the modeling tools and techniques as multiple pitfalls are related to process modeling (Rosemann 2006a). The more process modeling is about enterprise-wide processes or the design of a process architecture (see also the chapter by Aitken, Stephenson and Brinkworth in this Handbook, Vol. II), the higher will be the requirements in terms of the qualification and domain experiences of the process analyst. It is important for the BPM CoE to define a clear strategy how the fast increasing number of process models can be managed in terms of integration, update, change management, communication and simple scale ('modeling in the large'). Moreover, it has to be defined when process model ownership will be transferred to the business. Otherwise, a further ongoing process model maintenance service could be offered.

3.4 Library Management

In addition to modeling and managing business processes, a number of related artifacts have to be maintained. These artifacts can, for instance, be complementary conceptual models of data, knowledge, risks, services, and applications, as well as conventions, policies, business rule descriptions, best practices, etc., that provide a wider context for the business process models. A BPM CoE will typically outsource the management of at least parts of these models to other groups (e.g., IT or Human Capital Management), and provide some sort of methodological constraints to these groups to ensure the overall integration. The BPM CoE, however, might also decide to maintain at least a subset of these artifacts itself (e.g., organizational charts, knowledge maps) and potentially charge other departments for the service of bringing essential artifacts to a higher conceptual and more integrated level. In any case, this service will require close alignment with the design and ongoing management of the Enterprise Architecture. Furthermore, the Library Management service could include managing a process-related knowledge repository, covering, for example, emerging social network solutions such as communities of practices (e.g., bpm-collaboration.com, bpmroundtable.nl), discussion groups, and the entire management of process issues and process improvement ideas.

3.5 Process Improvement

Process improvement as a BPM service goes beyond simple process modeling, and concentrates on deriving an improved version of a process. The involved process analysts should be more senior than those involved in basic reflective process modeling. A certain understanding of the domain and a wide set of skills, including creativity management and organizational improvement skills, but also financial analysis or risk and compliance assessments are essential. The capability to improve a process requires expertise in process analysis (e.g., Pareto, bottleneck, viewpoint or root-cause analysis), process enhancement (e.g., the transfer of as-is into to-be models using techniques such as TRIZ or process improvement (best practice) patterns) (Mansar and Reijers 2007), process utilization (e.g., a resource-driven approach towards process improvement such as positive deviance), process derivation (e.g., use of external reference models and benchmarks), and process innovation (e.g., the design of entire new solutions and processes via brainstorming, de Bono's Six Hats or other lateral think skills). Further capabilities related to moderation (Rosemann et al. 2011), presentation, change, and conflict management are essential. Process improvement is a high-value add activity of the BPM CoE and may be its most important profit service. The related service specification has to be clear about the final deliverable, which will often be a set of (to-be) process models, issue registers, and improvement proposals. A concluding business case is, often out of scope and in the hands of a project manager outside the BPM CoE.

3.6 Designing Process-Aware Information Systems (PAIS)

In many cases, improving the business process will, at least in parts, demand process automation or support through existing or future IT infrastructure (Davenport and Short 1990). Detailed process design captures all services related to the development of models that build on the process analysis and convert these conceptual models into requirements that inform the design and configuration of process-aware information systems (Dumas et al. 2005) or even entire service-oriented architectures or web service ecosystems. This service will require very specialized resources, deep knowledge of Business Process Management systems, close affiliation with related vendors and standards and training to ensure a high level of awareness with current technologies. The service provides the critical glue in the overall aim of process-oriented business-IT alignment.

3.7 Process Automation

Further from the process design, a BPM service could exist that is dedicated to the actual implementation and execution of a business process. This will be typical system development work that tends to be located in the IT department or an external service provider. Process automation is a fast developing BPM service that requires staying on top of topics such as cloud computing, social software, mobile applications, etc. It also covers the evaluation, selection, and implementation of process-aware information systems.

3.8 Process Change Management

In addition to the IT-related implementation challenges, change management will be required to ensure a smooth transition of all organizational issues, procedures, policies, reporting structures, forms, cultural values, etc. This rich service covers organizational re-design, cultural assessments, personal and organizational profiling, job ranking, recruiting, policy and document revisions, etc. While it is the core act in the transformation to an improved process, a centralized BPM Group tends to have a rather secondary role in this service. Its involvement focuses on ensuring consistency with the conceptual process blueprints, required revisions, and extensions of it, and also the provision of support services for the change manager. In any case, it is important to integrate existing Business Process Management and Change Management approaches within the organization.

3.9 Management of BPM Projects

In addition to services related to the individual steps of a BPM initiative (e.g., process modeling, process improvement, process analysis), a service might be dedicated to the task of managing the project. A process-minded project manager will ensure a strong focus on business processes during the entire project. Strong BPM skills have to be complemented with deep knowledge of the enterprise-specific project management methodology (e.g., PRINCE2, PMBOK). A BPM CoE that provides project management as a service will take over a more significant influence in projects leading to a higher opportunity to stress the critical role of process design. Merging process management, project management and also change management methodologies will be a main challenge in this context.

3.10 Process Governance

Services related to the setup of appropriate process governance structures will often stretch beyond the initial competencies of Enterprise Architects and Business Analysts. Nevertheless, it is an essential capability, and should be part of the initial BPM service catalogue. Governance covers roles (e.g., process owner, process manager, process analyst), responsibilities, duties, and decision-making processes (see also the chapter by Spanyi in this Handbook, Volume II). While the governance of BPM itself is a more internal activity in the setup of the BPM CoE (e.g., who nominates process owners, who signs off on a new BPM methodology, etc.), a core BPM service can evolve around the governance of specific business processes. This service includes advice on the responsibilities of a process owner, the implementation of corresponding decision-making authorities and procedures, and the institutionalization of process-related tasks in a line of business. It will typically involve a close collaboration with Human Capital Management.

3.11 Process Compliance

The design of not only high performing, but also compliant, processes has become an area of substantial interest (see also the chapter by Sadiq and Governatori in this Handbook, Vol. II). Organizations increasingly acknowledge the role of business processes and business process models in their transfer to more compliant entities. The related challenges for the BPM CoE will be to build up a sufficient level of knowledge about relevant compliance standards (e.g., BASEL III, SOX) in order to customize the BPM methods, tools, and techniques. This will typically mean collaboration with (external) compliance experts and auditors. The contributions of a central BPM CoE tend to be limited to the design of compliant process models (i.e., does a process model comply with a mandated standard?). However, this service could also include support services related to ongoing compliance monitoring (i.e., does the organization work in a way compliant to the specified process model?). Again, the BPM Group will be challenged by issues related to scalability when a high number of compliance standards in various regions of the world matter as this not only requires dealing with a high number of standards but also deep knowledge in each of these.

3.12 Process Performance Measurement

Measuring the performance of a business process is another potential high value service of a BPM Group (see also the chapter by Heckl and Moormann in this Handbook, Vol. II). Many organizations show a high interest in, but only a limited uptake of, process-based performance management or process analytics (see also the chapter by zur Muehlen and Shapiro in this Handbook, Vol. II). The BPM CoE will have to possess, or have access to, solid skills related to techniques such as activity-based costing (ABC), economic value added (EVA), selected Six Sigma techniques (see also the chapter by Conger in this Handbook, Vol. II), forecasting, process simulation or process/data mining. Process performance measures will have to be derived from available documents such as Balanced Scorecards and Strategy Maps (Kaplan and Norton 2004). Appropriate and cost-effective ways of collecting and analyzing the identified measures have to be established. The identification, collection, and collation of process performance data is another high-value but also highly specialized service. The BPM CoE requires not only substantial skills within the group, but also high maturity in the line of business demanding this service, as well as in the IT-based implementation and application of these measurement concepts. Advanced BPM suites already offer a wide range of technological services to support the measurement of process performance.

3.13 Process Forensics

Process forensics is dedicated to the objective of identifying the reasons for process failures. While thorough process governance will strive for the avoidance of such a situation, it can never be completely excluded. Process forensics as a service is a clear statement that an organization is committed to uncovering the causes of past errors in the execution of business processes. This service will require close collaboration with other (e.g., financial) forensic activities in an organization, and naturally will be triggered by insufficient process performance or compliance. It may even be envisaged that process forensics can be integrated with other ex-post analysis approaches such as incident and problem management.

3.14 Process (Management) Education/Training

Educating the organization on Business Process Management will be an ongoing BPM service and is key to warranting sustained BPM success. Demand will increase when an enterprise-wide roll-out of BPM is the ultimate goal. While many organizations utilize external offerings from professional or academic BPM training partners, some organizations start to internalize this service, for instance, by adopting train-the-trainer education methodologies. In addition to providing process management skills (e.g., process improvement skills, process methodologies), the BPM CoE could also create a service related to process education, i.e., teaching the specifics of a certain process. Such a service could be, for example, consumed by the Human Capital Management department as part of an induction process for a new cohort of employees.

3.15 Process Portfolio Management

In higher stages of BPM maturity, an organization will convert from a reactive approach, in which the BPM CoE responds to specific needs for process improvement articulated by the lines of business, to a more proactive approach in which the BPM Group uses process portfolios to identify relevant processes (Rosemann 2006b). Process portfolio analysis requires an Enterprise Process Architecture and is used to identify those business processes that are of highest priority for initiatives, such as compliance management, process improvement, or the upcoming roll-out of an Enterprise System (see also the chapter by Bandara, Guillemain and Coogans in this Handbook, Vol. II). As such, process portfolio management can provide a BPM service of high interest for senior executives in an organization as it helps to condense the high volume of process (model) information, and it has the potential to become a substantial base for decision-making processes.

4 Case Study

A brief case study provides some insights into an organization from the public sector that adopted the BPM service portfolio management approach described in this chapter. Four former Business Analysts in this organization had been assigned the responsibility to establish and populate Business Process Management within a specific line of business of this Australian organization comprising approximately 200 employees.

The four analysts undertook 6-day BPM training with the BPM Discipline of the Queensland University of Technology (www.bpm-training.com). While 5 days were dedicated to establishing essential skills in process modeling, improvement, analysis, and BPM evolution, the additional day 6 of the program was dedicated to customizing the contents of the previous days for the specific purposes of the organization. Based on the 15 potential BPM services above, a portfolio was designed that clearly positioned each of these services in the demand-capability-diagram shown in Fig. 1. For each of the 15 above-mentioned services, the organization also differentiated the intended ownership model (BPM CoE or line of business). Each service was evaluated in terms of demand and capability by each of the four analysts. The resulting portfolio (Fig. 2) is used for the design of the wider BPM roll-out and specifies upcoming BPM training needs (i.e., to increase BPM capabilities). It also helps with the BPM communication and marketing plan targeted towards increasing the organizational appetite for some of the low-demand services (i.e., to increase BPM demand).

Process modeling and improvement are the clear and expected mainstream services in this portfolio. BPM education will be another main target for the near future, even though it is envisaged that Human Resource Management and individual business managers will be in charge of process education. The BPM CoE of

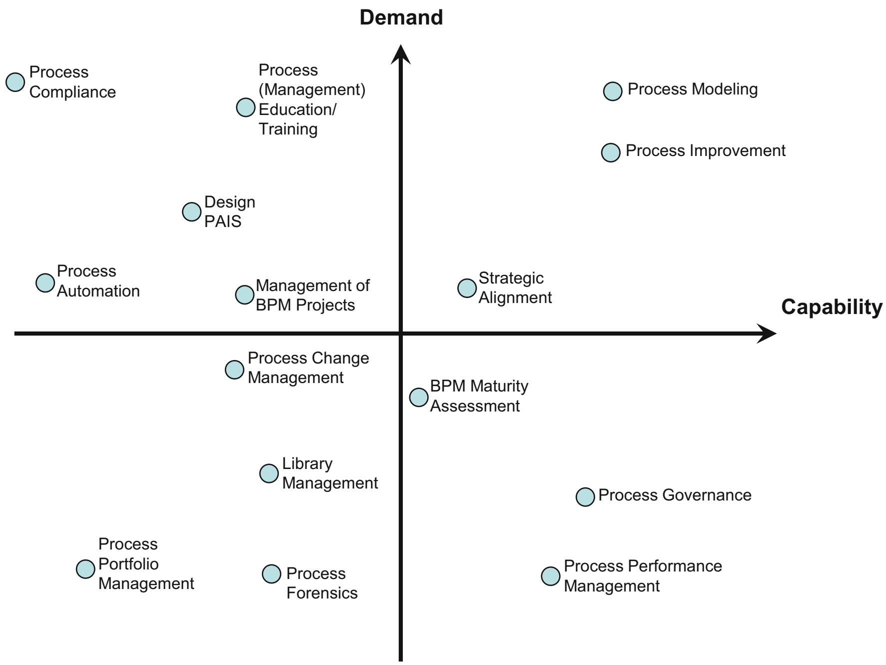


Fig. 2 The demand-capability-portfolio in the case of a public sector organization

this organization is committed to invest in further training related to the design of PAIS. Due to the specific expertise required, process compliance and process automation will only be secondary priorities for the BPM CoE. Specific communication and marketing strategies are planned for process governance and process performance management as the BPM CoE is convinced that the low demand can be explained by a lack of awareness more than by a lack of importance. Process change management and library management will be approached when internal resources become available while process portfolio management and process forensics are seen as interesting and relevant services in the future. However, at this stage both the line of business and the BPM CoE lack the required maturity.

5 Patterns in BPM CoE Service Portfolios

In order to generalize beyond the findings from a specific case study and to gain insights into typical patterns in the configuration of the service portfolio of a CoE, a brief survey was conducted in May 2008. All participating organizations are an active member of the Australian BPM Community of Practice (http://bpm-collaboration.com). They belong to a variety of industries (among others aviation, retail, banking, energy, consulting, state government). Most of these organizations are part of Australia's Fortune 100. The survey instrument was sent to 38 members of this community of practice. Membership is individualized and by invitation only. It is restricted to the manager in charge for Business Process Management within the organization. At its core, the instrument asked for a ranking of the perceived capability and the perceived internal demand for each of the 15 listed service above on a 1–5 Likert scale with 1 meaning very low and 5 meaning very high. The managers were also asked to name any further services that their BPM Centre of Excellence provides beyond the set of 15 services listed in the instrument.

In total, 15 valid responses (39 % response rate) were received. The following four additional services were all mentioned only once indicating a high level of completeness of the identified set of services.

- Process documentation (policies, procedures, work instructions)
- Business process analyst resource pool management
- Business analysis
- Balanced Scorecard reporting and analysis

It was interesting to note, that when asked for the name of the central BPM entity, a long list of names came back as responses indicating a lack of common branding in the BPM community. Here the titles as reported by the survey participants:

- Process Support and Improvement Group
- Business Excellence
- Business Process & Systems
- Process Capability
- Business Process Services
- Corporate Development
- BPM Team
- BPM Support Office
- Business Improvement Group
- BPM Group
- Architecture and Liaison Office
- BPM Center of Excellence.

In a similar way, it was astonishing to note the high diversity of reporting structures in which the BPM Group is integrated. Explicitly, we asked the question 'Who does the Head of the central BPM Group report to?' The following list of responses (no answer was mentioned twice) indicates the severe problem of a 'default home' for a Business Process Management Center of Excellence.

- Chief Financial Officer (CFO)
- Chief Information Officer (CIO)
- Chief Technology Officer (CTO)
- General Manager Shared Business Services
- Global Director Business Process & Applications
- Manager Employee Relations & Development

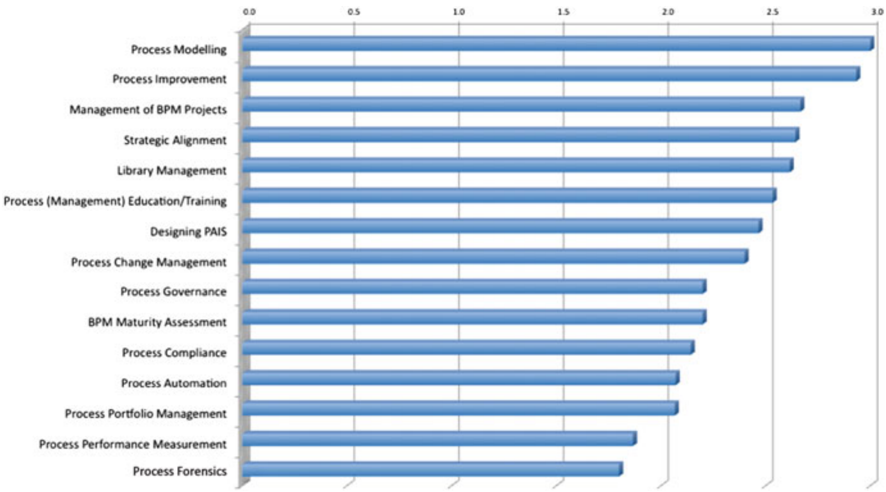


Fig. 3 The perceived capability to deliver BPM services

- General Manager Operations
- Director Business Performance & Improvement
- Director Project Support Office
- Executive Director, Division of IT
- Manager Enterprise Solutions (IT)
- President of Customer Services

When asked how the individual managers rank the perceived quality to deliver the individual services on a Likert scale from 1 to 5 with 5 being the highest, the two 'mainstream services' process modeling and process improvement clearly stood out (see Fig. 3 with the average values per service).

In a similar way, the next Fig. 4 reports, using the same 1–5 scale, on the perceived internal demand for each of the 15 services. Again, process improvement and process modeling were the highest ranked services.

The interesting analysis is now to calculate the perceived gap between demand and capability, i.e. where do the demands for certain BPM services exceed the internal capability, and vice versa. Figure 5 shows the result when calculating perceived capability – perceived demand. Strong negative values indicate that the organizational demand exceeds the perceived BPM CoE capabilities. This is in particular evident for the following services; process automation, process performance management and process change management. However, also the two mainstream services process improvement and process modeling appear in this list. On the opposite site, it is interesting to note that the three services that appear to have a capability that exceeds the demand can all be regarded as belonging largely to BPM program management, and less to the set of services required for an individual process re-design initiative. This can maybe seen as an indicator that the high demand of organizational departments is indeed with the specifics of

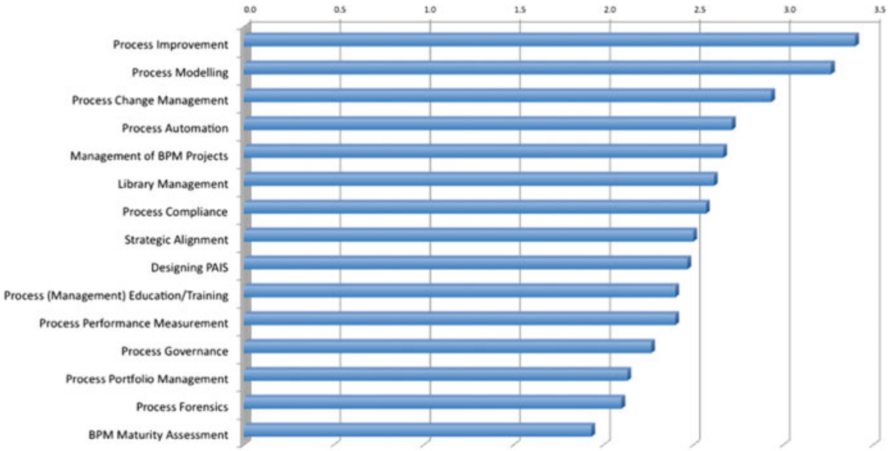


Fig. 4 The perceived internal demand for BPM services

process re-design, and that the development of a wider BPM capability is less appreciated (at this stage).

It is important to be clear about some of the *limitations* of this study. First and foremost, the study reports on the perceptions of BPM managers. As such, there are constraints with regards to the validity and reliability of the data. There might also be bias within the group of respondents. We also did not seek multiple responses from within one organization due to the individualized membership. Second, the notions of capability and demand do not necessarily equal actual activity levels per service and cannot reflect any future developments. Third, we are very much aware

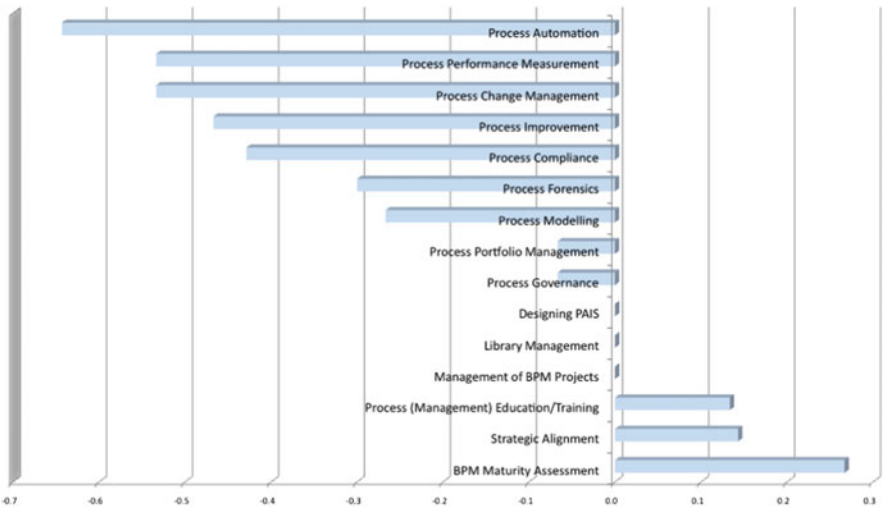


Fig. 5 The difference between perceived capability and perceived demand for BPM services

that a set of 15 respondents is too small to derive statistically significant data. However, we are convinced that the data presented in this chapter shows at least important trends. Fourth, while we added definitions per service to the survey instrument, we cannot exclude differences in the interpretation of the meanings. This potentially compromises the comparability of the responses. Fifth, the comparability of the demand and capability scores (see also Fig. 5) is not guaranteed so that this last diagram can only show rough directions.

6 Conclusion

While the academic and practical BPM literature comprehensively covers BPM methods, techniques, and tools, there is a shortage of advice on BPM strategy design and BPM adoption and evolution models. Previously, we proposed a BPM maturity model (Rosemann, de Bruin, Power 2006) for the design of a BPM strategy roadmap. This chapter ventures to complement this work and provides some guidance on the actual specification of the portfolio of BPM services for an emerging BPM Centre of Excellence as a cornerstone of organizational BPM Governance. A set of 15 BPM services has been defined that gives organizations with an interest in institutionalizing a BPM program a guideline for how they can specify and improve the services of such a group. Insights from a public sector case study provide an example for such a populated service portfolio. Results from a survey with 15 large Australian organizations across multiple industries provide an impression for common patterns in the setup of such BPM CoEs.

Further challenges are related to the exact specification of the two fundamental dimensions of demand and capability (supply), related service level agreement and funding models, the contents of related training programs, and how BPM communication and marketing plans can help to increase the organizational demands for BPM. Moreover, a closer alignment of this set of services with the proposed BPM maturity model will be required to ensure consistency between these two models (De Bruin 2009). It can also be observed that some BPM CoEs started considering the commercialization of their services beyond the narrow boundaries of their organization. This will lead to new business models and requires deeper investigation.

While applied research in these areas is currently undertaken, we believe that the proposed model, even in its current form, will be beneficial for stakeholders in charge of Business Process Management and its governance.

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BPM Center of Excellence: The Case of a Brazilian Company

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Abstract The BPM Center of Excellence (CoE) has been widely adopted in organizations that believe in BPM's potential as a tool to promote an organizational environment that is technically and culturally prone to innovation and change. This chapter shows the relevance of a BPM CoE in order to implement an effective BPM Governance that generates synergy, efficiency, and collaboration within all types of existent BPM initiatives inside an organization. It also discusses lessons learnt related to the implementation of a BPM CoE by presenting a real case in a Brazilian company.

1 Introduction

The world of management has never been more complex and competition has never been fiercer. Research shows that the average time a company spends in the Standard & Poor's 500 List has declined by 80%, from 75 years in the late 1930s to 15 years in 2000 (Hagel and Brown 2005). Moreover, managers are increasingly facing a fast-moving business environment with changing customer needs and expectations, fast-evolving technologies and product lifecycles, strong globalization effects, accelerating innovation, and increasing digitization of products (Scheer and Brabänder 2014).

This context has led modern enterprises to continually invest in new management techniques, and one of the most relevant of these techniques has been Business Process Management (BPM). Hence, in recent years, several organizations have made significant investments in a multitude of BPM initiatives. In Brazil, as well as in South America as a whole, there are numerous examples where BPM projects lead to significant transformations inside organizations, such as process automation,

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_17,

performance monitoring enhancement, organization's structure redesign, and implementation of reference models.

This scenario shows that BPM is widely recognized as a powerful instrument to improve and modify an organization's operation, with the potential of being a starting point to several improvement initiatives that affect the overall way of doing business.

However, a key characteristic that all these BPM initiatives seem to share is that most of the time they are conducted in an isolated way inside an organization, leading to a waste of resources and diminished return on investment. In this context, conceptual research as found at (Jeston and Nelis 2008; Richardson 2006; Vollmer et al. 2008) shows that managers face serious issues, as follows:

- "I have mapped my organization's processes. What do I do next?" One of the big challenges in the BPM adoption is assuring sustainability from the executed actions, and effectively maximizing the return on investment.
- "How do I turn BPM into a technique that is legitimated and used as an improvement tool throughout my entire organization?" Value from BPM initiatives range from modest to substantial, accordingly to its purpose, degree of synergy with other continuous improvement initiatives, and degree of BPM cultural adoption.

These two main motivations are driving the necessity for creating a formal BPM group usually called BPM Center of Excellence (BPM CoE) or BPM Office. A BPM CoE is an important organizational mechanism that has been adopted by many enterprises aiming at institutionalizing BPM initiatives and perpetuating its benefits throughout the years. An effective BPM CoE empowers process vision as a central axis in an innovative and systemized way of thinking of an enterprise's operations.

This chapter will be based on this main idea having the following objectives: (1) discuss the main roles that should be assumed by a BPM CoE; (2) describe a BPM CoE implementation case detailing the major steps done; (3) present practical insights on the difficulties and obstacles faced when conducting this effort; (4) discuss the value gradually obtained when implementing a BPM CoE, as an evolutionary effort that is highly linked with the organization's management maturity and its strategic needs.

In the next section, we provide a brief description of the three capabilities of a BPM CoE. After that, in Sect. 3, a case study on the implementation of a BPM CoE in a Brazilian company is given. Finally, in Sect. 4, we present our final conclusions and observe some trends in the BPM field that will impact organizations and BPM CoE initiatives in the future.

2 The BPM CoE's Three Main Capabilities

In Sect. 1, we have already discussed that the BPM CoE is an important instrument to institutionalize business processes based initiatives inside an organization. In order to achieve these objectives, the BPM CoE must execute three main capabilities that should be gradually developed (Table 1):

Table 1 The BPM CoE three main capabilities

Capability	Description
Diffusion of BPM Culture	Establish a common understanding that BPM is about creating a cultural and technical environment that is prone to a continuous and qualified discussion of how things are done. BPM should be thought of as the organizational engine to continuous change and performance improvement through a collaborative, empowered and sustainable way.
Creation of Convergence among BPM Initiatives	Promote the alignment, governance, and convergence of all BPM-related initiatives, increasing its synergy, efficiency and return on investment. This helps strengthen the adoption of BPM-based initiatives as a management best practice within the organization.
Internal Consulting Orientation	Implement and maintain a service orientation approach for each BPM-based initiative putting the organizational strategy and the business units as important clients that demands productivity increase, managerial visibility enhancement and innovation promotion.

During the remainder of this section, we will present a detailed analysis of these three main capabilities based on practical experiences in implementing BPM CoE in Brazil as well as on conceptual research on BPM literature (Harmon 2007; Jeston and Nelis 2008; Richardson 2006; Rosemann 2014; Snabe et al. 2009; Spanyi 2009; Spanyi et al. 2008; Vollmer et al. 2008). These capabilities will serve as the basis upon which we will draw our understanding of the case study presented in Sect. 3.

2.1 Diffusion of BPM Culture

Some of the main questions that arise in the early phases of a BPM CoE implementation are as follows: how can we convince businesses areas that they have to map their processes? What is the best way to convince top management that business process practices will actually bring value to an organization? How do we ensure that process documentation will not end up stuck in somebody's drawer? All these questions represent the anxieties of professionals who are trying to materialize the value of BPM into an organization that does not have BPM culture oriented to performance improvement (see also the introduction to the concept of culture in BPM in Schmiedel et al. 2014 as well as the Hilti case in vom Brocke et al. 2014).

To answer these questions, first of all, it is important to change the corporate mindset about what BPM is all about. An effective BPM philosophy should be based on three central principles:

- To manage business processes of an organization is to continually change the way this organization executes its activities (Scheer and Brabänder 2014), aiming at significant performance improvements such as: operational excellence strengthening, managerial visibility enhancement and innovation promotion

- BPM value comes from constructing an ideal environment to rethink the way an organization executes its activities. This environment should be collaborative, culturally sustainable, and supported by appropriate methods and tools
- Process models are not a BPM final result, but an intermediary tool. Thus, the key question to be asked to a manager should not be only “are there any processes left to be mapped?”, but “are there any opportunities to reduce cost, improve business areas interfaces, and optimize decision making inside my organization?”

Hence, the BPM adoption starts with a cultural change. Organizations need to understand and disseminate internally the idea that BPM is about organizational performance improvement.

In this context, BPM CoE must be thought of as the organizational gatekeeper of the BPM Brand, and consequently the formal responsible for BPM Marketing activities inside the organization. This means that the CoE itself must create an image of competence and professionalism, and disseminate throughout the organization the importance of BPM as best practices management tools to leverage organizational performance.

According to this, a BPM CoE has to make sure that all stakeholders are continuously aware of the benefits of each BPM-based solution, and how these benefits can be obtained. This helps decision makers get comfortable using BPM-based solutions as a legitimate mean to: (1) strengthen operational excellence, (2) enhance managerial visibility, and (3) promote organizational innovation.

The BPM Marketing and BPM Brand concepts also create the need to provide proof and evidence that the BPM initiatives are actually bringing value to the organization, as well as institutionalizing the BPM culture. This means that the BPM CoE must carefully plan its strategy to strike the right balance between process quick wins and long term improvements.

2.2 Creation of Convergence Among BPM Initiatives

Processes are at the center of today’s and tomorrow’s competition. Organizations have to come to the conclusion that efficiency as well as quality and customer experience, are to be delivered by business processes. Due to this tendency, Business Process Management came to light as an attractive bundle of management solutions that address a variety of organizational problems (Willaert et al. 2007).

Therefore, BPM has emerged as a robust portfolio of management solutions that attend to a series of heterogeneous problems, challenges and opportunities. Initiatives like Enterprise Architecture definition, six sigma adoption, compliance management, performance monitoring, risk analysis, and competencies management are all examples of business process-based initiatives. These initiatives have been used throughout the years to support the achievement of a myriad of organizational objectives, such as: cost reduction, expertise retention, client’s satisfaction enhancement, and product differentiation.

The key common element in all these BPM-related initiatives is the idea of synthesizing the reality and the complexity of an enterprise operation into process models ruled by notation standards and specific taxonomies. In all these BPM-based initiatives, business process models are used as fundamental tools to guarantee a coherent and consistent understanding of the organization, and consequently, an intelligent and effective intervention. Consequently, the BPM concept could be positioned at the center of all these approaches to improve operations performance.

However, these BPM initiatives tend to emerge in organizations for different reasons, sponsored by different actors and with different scopes. This leads to several problems: process model documents being underutilized, difficulties to consolidate different modeling techniques, different areas demanding the same information from other business areas, redundant actions plans, inefficient intervention, focusing on consequences beside root causes, misalignment with enterprise strategy, among others.

In this context, generating convergence among the many BPM-related initiatives is an important managerial attention point and a fundamental cornerstone of the BPM CoE. This implies that the BPM CoE should propel an organization to enhance its BPM governance, helping organizations to migrate from isolated BPM initiatives to integrated and synergic ones.

But what process governance is really about? Getting back to BPM literature we could find out some important definitions:

- "Process Governance is the organization of management. It refers to goals, principles and organizational charts that define who can make what decisions, as well as the policies and the rules that define what managers can do" (Harmon 2007).
- "Governance in the context of BPM establishes relevant and transparent accountability, decision making and reward process to guide actions" (Richardson 2006).
- "In order to optimize and sustain business process improvements it's essential to overlay some form of governance that creates the right structure, metrics, roles and responsibilities to measure, improve and manage the performance of a firm's end-to-end business processes" (Spanyi 2007).
- "In order to optimize and sustain improvements to operational performance it is essential to overlay some form of governance that creates the right structures, metrics, roles, and responsibilities to measure and manage the performance of a firm's end-to-end business processes. This is called BPM Governance" (Spanyi 2014).

Based on that, some examples of a BPM CoE's attributions are:

- To manage business area demands for BPM-related initiatives, improving organizational performance while conciliating its heterogeneous purpose, timing, and scopes
- To support the delimitation of roles and responsibilities for each actor somehow involved in BPM initiatives

- To ensure that all BPM initiatives are not only methodologically aligned, but that they are built on convergent foundations and aligned with organizations strategic priorities
- To map the information inputs and outputs associated with each BPM initiative assuring that the same information will not be demanded for a business area more than once
- To create a collaborative planning approach in order to optimize the best possible way to execute all BPM-based initiatives minimizing redundancies
- To promote convergence to all action plans generated by each BPM initiative, helping to create a unified "management agenda" and avoiding the duplication of efforts

Finally, it is very important to point out that putting the BPM CoE as the governance center of all BPM initiatives by no means implies that it must be responsible for the direct execution of all BPM iniatives. The success of a BPM CoE depends on its ability to recognize and interact with the particular organizational political and power contexts associated with those BPM initiatives that occur within.

2.3 Internal Consulting Orientation

If the previous capability focused at increasing the synergy and efficiency of how BPM initiatives are done, this third and final capability discuss how to significantly increase the value created to areas that benefits from each BPM initiative.

The BPM CoE should study and analyze the current portfolio of BPM initiatives and formulate how to redesign it as a portfolio of BPM-based services to be offered to business areas. The conceptual idea is to design a BPM portfolio that is both honed to the organization's demand for process management services as it is to the organizations strategic priorities. This logic of work allows the BPM Center of Excellence to align its activities with the organizations strategic objectives and consequently its appetite for BPM services.

One clear point should be made here: this is not just a simple change of terms. This means that the traditional approach of BPM initiatives should be updated by a new paradigm that puts business areas as clients of a portfolio of BPM-based services.

A BPM service should be understood as a customized and flexible product of performance improvement delivered to business areas according to its specifics issues and problems: high cost, lack of visibility, high rate of errors, interface gaps between areas, competence gap, excess of manual inputs, etc.

To mature from BPM initiatives to BPM services means that a BPM CoE has to understand existing demands in each business area and customize a proper management solution combining the available BPM services and consequently linking the available BPM tools, techniques, and methods. Also, with this new client orientation to BPM Initiatives emerges the necessities:

- To improve process prioritization methods as in (Bandara et al. 2014) to better understand the nature and business impact of areas' demands. A better identification of the improvement opportunity will be fundamental to determine the proper BPM services to be delivered.
- To increase usage of BPM Maturity Models as in (Hammer 2007; de Bruin 2009; de Bruin and Doebeli 2014) to better understand the whole scope of possible BPM actions. Seeing the whole picture of BPM in a consistent framework will be very important to plan BPM development strategy – service by service – during the years.

Finally, the next section will describe the case of a BPM CoE detailing all the steps, highlights, challenges, and findings perceived during this implementation.

3 Implementing a BPM CoE in a Brazilian Company

In this section, we will provide a rational reconstruction of the history of the implementation of a BPM CoE in a Brazilian Company, placing special emphasis on the practical insights, learning points, difficulties, pitfalls, and landmarks of this process. Also, throughout the case, we will show the evolution of the roles assigned to the BPM CoE and to discuss whether it has delivered value to the organization through time.

This section will be divided as follows: first, it will present a brief contextualization of the organization and an inventory of BPM actions that were conducted. Second, it will present a detailed explanation of the initial cycle of the design and implementation of the BPM CoE, with the main lessons learnt. Third, the CoE's evolution as a coordination mechanism and service provider to the organization, characterized by the inclusion of more strategic services to it, will be shown. Finally, we will discuss some of the tendencies related to its future roles and services, perceived by an analysis of its evolutionary path.

3.1 Organization's Main Characteristics and its History of BPM Initiatives

The organization in question is a business unit of a Brazilian Oil & Gas company. From now on, we shall refer to the business unit as just "organization," since it will constitute our main unit of analysis in this case study.

This organization has more than 1,500 employees (800 direct employees, and more than 700 third-party employees) and provides internal support services such as: maintenance of infrastructure and equipments, engineering services, supply procurement and general logistics, janitorial and linen services, internal transportation, and patrimonial security.

Due to the nature of these services, the organization has strong managerial guidelines that focus on procedures and process standardization and emphasize the effort for efficiency and agility in internal process execution through the utilization of an Enterprise Resource Planning (ERP). The main focus of the organization is to achieve the desired level of excellence in its internal services provisioning.

The organization's relationship with the BPM concept and initiatives started during the year of 2005, with a first pilot initiative of process redesign that focused in the *service desk* and its processes. These processes deal with the relationship of the organization with its clients. At the time, there was a perception by the Top Management that the modeling and redesign of these business processes was crucial to optimize utilization of the ERP system, as well as to improve the interfaces that existed between different business areas. At this point, the organization sought help from an external consulting group for executing this initiative.

Throughout the year of 2005, this process redesign initiative turned into a broader management concern, when the Top Management decided to join the Brazilian National Quality Award. This decision performed a shift of focus in the BPM initiative, concentrating its efforts in the redesign of all of the organization's processes and procedures. This decision also broadened the conceptual focus of the initiative that by this time included not only the redesign of processes itself but also themes such as KPI's definition, workforce competence revision, re-structuring of all IT systems and infrastructure to support processes, and organization's structure redesign.

With this major shift of focus, during the year of 2006, all the organization's processes were modeled and redesigned. To accomplish that task, the organization created several specific collaborative workgroups that were centered in specific themes. These workgroups had full sponsorship from the Top Management to propose improvements to their processes and were composed of several employees from the organization's internal areas.

The implementation of the proposed improvements and solutions led to the need of institutionalization of BPM practices and tools, through the transferring of knowledge related to BPM's best practices and solutions that are utilized in the BPM market, from the consulting team to the organization. In this context, the continuous maintenance and improvement of process models and its building blocks (by-products such as the knowledge architecture, strategic indicators map, etc.) became a cornerstone to the success and the sustainability of all managerial actions. Therefore, some employees started to be trained in best practices and BPM solutions that would latter constitute the basic knowledge to the BPM CoE.

Besides, this, a strong idea of an area that would be responsible for continuously promoting a process-aware culture emerged. This activity was perceived by the Top Management as a crucial point to enable the effectiveness of all actions presented in the management agenda, enhancing productivity and leveraging organizational performance. Since the organization was committed to performing well at the Brazilian National Quality Award, BPM's best practices and techniques were seen as the main bridge needed to support the introduction of innovative managerial practices that would conduct them to a new level of excellence.

3.2 The BPM CoE Initial Design and Implementation

For the initial design and implementation of any BPM CoE, six main decisions must be made. These decisions will be represented from letters A to F in this subsection and referred to: (a) Insertion in the Organizational Structure; (b) BPM Services and Governance Design; (c) Internal routines, methods and tools design; (d) Design of the relationship with organizational Areas; (e) Resource Base Design; and (f) Implementation design.

For the case study, the rational reconstruction of this first design and implementation round will follow each basic step, punctuating the main lessons that were learned regarding each decision that was made.

3.2.1 CoE's Insertion in the Organizational Structure

The first step that was taken to create and effectively implement the BPM CoE was to define its position in the organizational structure, as well as its roles and goals.

The BPM CoE itself started becoming a reality in the organization in the beginning of 2007, when several improvements and solutions that emerged from the diagnosis phase were still being implemented. The Top Management concluded that the most adequate position for the BPM CoE in the organization was within an internal area called Integrated Planning – a managerial area created to work as a lateral coordination mechanism to integrate and enhance the collaboration among all other business areas of the organization. This decision reinforces the ideas discussed in the Sect. 2 – the BPM CoE acts as an area that supports managerial work with BPM-related best practices and solutions, aiming to leverage organizational performance and address business strategic needs.

Hence, some roles originally attributed to the BPM CoE were:

- To be the guardian/gatekeeper of all BPM best practices, solutions and methodologies that would support management and help leverage organizational performance
- To coordinate the several process improvement and other BPM-related initiatives; working closely with all the organization's business areas
- To perform a continuous and rigorous analysis of all business processes and to report to the Top Management, process improvement needs

3.2.2 BPM Services and Governance Design

Once all macro-roles related to the BPM CoE were designed, further details of BPM Services that were going to be provided to the Organization were needed. Also, it was clear that a proper governance structure, including a clear definition of roles and responsibilities around these BPM services, was a critical success factor for the initiative, due to the existence of several organizational stakeholders that strongly interacted with them. This was also important to ensure the maximum synergy among BPM initiatives, and to guarantee that all BPM-related initiatives were supporting the organization's strategic objectives and actually leveraging the organization's performance (as mentioned in Sect. 2.2).

The table below describes the services that were originally conceived for the BPM CoE at that point in time. For each service, a list of details is pointed out: a brief description, the service to client logic and the main stakeholder (Table 2):

The execution of all services was the direct responsibility of the BPM CoE. However, most of them involved approvals and/or collaboration of other organizational actors. The way these several organizational actors interacted can be illustrated by a RACI chart as displayed below. This RACI chart states the responsibilities and accountabilities of each relevant organizational actor for each BPM Service through the following terminology: (R) means "is responsible for"; (A) means "approves"; (C) means "contributes to" and (I) means "is informed about" (Table 3).

Table 2 BPM services portfolio for the case study – initial phase

BPM service	Details
Process modeling	*Description*: Modeling and publishing processes in the organization's intranet, through specific interviewing techniques. *Service to client logic*: on demand or triggered by the CoE's perception of updates and improvements in specific processes. *Main stakeholders*: business areas.
Process analysis and redesign	*Description*: Identification and analysis of problems and improvement opportunities in the modeled processes. *Service to client logic*: provided upon request through the conduction of thematic workgroups composed of CoE's members and the organization's workforce. *Main stakeholders*: Top Management and business managers.
Improvement implementation monitoring	*Description*: Monitoring and reporting the implementation status of all prioritized improvements in the processes. *Service to client logic*: provided upon request through the conduction of thematic workgroups composed of CoE's members and the organization's workforce. *Main stakeholder*: Top Management and business managers.
Procedures design and maintenance	*Description*: elaboration, maintenance, revision, publishing and communication of internal procedures based on the designed processes. *Service to client logic*: on demand or triggered by the CoE's perception. *Main stakeholders*: business areas.
Process audit and compliance	*Description*: Verification of the adherence of the process models to reality. *Service to client logic*: Bi-annual interviews with the workforce and unobtrusive observations. *Main stakeholders*: business managers.
Process-based competence modeling	*Description*: Process-based competence (knowledge, ability, and attitude) modeling for each position. *Service to client logic*: annual interviews with the workforce. *Main stakeholders*: Human Resources area and business managers.

Table 3 RACI chart for the BPM services – year 1

BPM service	Top management	Business areas	BPM CoE	IT area	HR area
Process modeling		C, A	R	C	
Process analysis and redesign	A	C	R	C	
Improvement implementation monitoring	I	C	R		
Procedures design and maintenance		C, A	R		
Process audit and compliance		I	R		
Process-based competence modeling		I	R		I

3.2.3 CoE's Internal Routines, Methods and Tools Design

Based on the previous decisions, it was time to design the CoE internal work routines, methods, and tools that would effectively enable the CoE's operational execution. First, we would like to point out two important tools that were designed to support the initial structuring of the BPM CoE.

One of them is the "service request form." This tool should be used by any member of the organization that had a demand for the execution of a BPM Service or had the need to improve some performance variable that could be leveraged through the provision of a BPM Service. This tool's main goal was to organize and prioritize all of the CoE's staff workload, as well as position the CoE as a Service provider of BPM Services within the organization. This tool also served to create an image of the CoE as facilitator that would work hand in hand with the organization's business areas to improve their managerial practices, levering their performance through the application of BPM-related best-practices and solutions.

The "service request form" was communicated to the entire organization so that all areas could effectively demand BPM Service to the CoE at any time through e-mail. Only e-mails with fulfilled requests were accepted by the CoE as legitimate demands.

The second tool that was created in this first year of implementation and design was the process compliance check (PCC). Its purpose was to provide to the organization and to the CoE's staff a systematic routine of verifying adherence of process models and procedures, to a reality check. By interviewing workforce and observing executed processes, CoE's staff could check out if there were any nonconformities in execution and/or if process models needed to be updated. This meant that, while the service request forms were a part of a reactive and on demand way of providing the BPM Services to the Organization, the PCC represented a more proactive way of work of the BPM CoE.

Besides these tools, the BPM CoE also assimilated from the external consultant group more traditional BPM related methods:

- A method of process design and redesign
- A process modeling notation standard that should be followed by all initiatives
- Templates for the documentation of improvement opportunities
- The systematic of constituting thematic workgroups

3.2.4 Design of the CoE's Relationship with Other Organizational Areas

No service level agreements between the BPM CoE and the other organizational areas were agreed on the first year of implementation. However, there was a tacit understanding that, as the BPM CoE matured, the internal expectation's level would rise, and with that, the definition of performance parameters through service level agreements would be important to mediate the CoE's relationship with other organizational areas.

Although the organization had chosen that the BPM CoE would relate with its business areas through a service to client orientation, the CoE's budget and financial resource allocation did not follow the same direction. In other words, the CoE's budget was not estimated on the average cost of each service and allocated to the area that benefited from the service. Instead, the CoE's budget was a fixed one in a defined cost center inside the "Integrated Planning" cost structure.

This was due to two specific factors: the first one was a lack of historical data to create a baseline on how each BPM Service would cost. This made the budgeting exercise less precise. Also, to allocate the CoE's cost to the business areas that actually benefited from them would demand a huge maturity leap that the organization was not ready to perform at the moment.

3.2.5 CoE's Resources Design

BPM CoE's team was constituted of three employees from the organization and two external consultants. All of the employees' profiles were constituted of industrial engineers and/or business degrees.

This initial arrangement meant that a mixed team of internal employees and external consultants aimed at transferring the accumulated knowledge that was generated through the consulting project to the organization. It is necessary to point out that a formal specialization and division of labor was not agreed upon – all of the BPM CoE resources were included in all tasks, which facilitated the knowledge sharing process, but also made it inefficient.

Technological resources that were estimated to support the work at the CoE included the allocation of a Business Process Modeling and Analysis tool to each of the CoE workers. Processes publication in the intranet was performed with the support of Information Technology area.

3.2.6 Implementation Design

Aiming to implement all the definitions given above, the organization performed an effort of communication and dissemination of BPM CoE's concept to each area of the organization. All business managers were directly involved in initial presentations that were performed to disclose the BPM Services Portfolio, in order to increase the legitimacy and the institutionalization of BPM CoE within the organization.

The initial structuring and implementation effort of the BPM CoE lasted throughout the year of 2007. One the main lessons learnt is to highlight the internal resistance from all the organization's employees in relation to the process culture instead of a more functional one. This was highly due to the fact that the concept of BPM itself had a low level of maturity within the organization, and that in the beginning most of the knowledge related to BPM practices resided in the external consulting group.

Despite that, the results that were achieved in the first year of implementation were quite satisfactory, although still with a strong focus on efficiency and productivity improvement. In this sense, there were obtained significant reductions in process execution lead-times in two important organizational processes, which served as an important quick win to reinforce the role of the BPM CoE as a producer of managerial and operational benefits to the organization. A certain level of better visibility to support decision making was also already perceived by the organization, since the CoE allowed the organization to better integrate its BPM-related initiatives. However, the BPM's best practices and solutions still did not in fact enable decision making in the organization.

3.3 The Transition to a more Strategic Role of the BPM CoE

At the end of 2007 and through the beginning of 2008, it could be observed that the initial obstacles faced by the BPM CoE began to be fully surpassed. The internal routines and practices of BPM CoE became more mature and the organization's maturity as a whole in terms of incorporating Business Process Management as an enabler of continuous improvement also increased.

The rational reconstruction of this second design and implementation round can be told using the same structure as the first one, to allow comparability.

3.3.1 CoE's Insertion in the Organizational Structure

The decision to establish the CoE within the Integrated Planning Area is regarded by the organization as one of the critical success factors for the CoE's implementation, and that did not change in the first year. However, the organization felt the need to approximate the CoE's work to the organization's performance drivers and decision making needs. To achieve this purpose, two new roles were incorporated into the BPM CoE:

- Support all decision making processes in the organization
- Communicate and reinforce a process-aware culture in the organization

3.3.2 BPM Services and Governance Design

In order to fulfill these two new roles, some new services were incorporated into the original BPM Services Portfolio. A first service was the monitoring and revision of all key performance indicators (KPIs) related to the business processes. A second service was BPM-related training and dissemination of a process-aware culture in the organization. A third service was the periodical process-based operational risk analysis.

These new BPM Services reinforced the link between the BPM CoE's work, the organizations strategy, and the Top Management interests. This symbolized the effort to move away from a strictly productivity and efficiency improvement benefits in the direction to better visibility to support decision-making. In this context, the CoE started to be perceived as an important actor supporting the organization's strategic planning and goals revision. This also created a positive pressure that all process improvements started to be conceived connected to the organization's strategic goals and targets.

All other services that were presented on the previous year's portfolio remained unaltered. The table below shows all new services that were incorporated into the BPM Services portfolio, on top of the old ones (that were still maintained) (Table 4):

The execution of all services still remained as BPM CoE's direct responsibility. However, most of them involved the approval or collaboration of other

Table 4 New BPM services portfolio for the case study

BPM service	Details
Key Performance Indicators Monitoring	*Description*: support in the definition of the most adequate KPIs related to internal processes and in their monitoring. Also includes the structuring and maintenance of BAM performance dashboards that enable decision making. *Service to client logic*: monthly. *Main stakeholder*: managers.
Process-based training	*Description*: training in process methods, tools, and practices and road shows to disseminate a process-aware culture. *Service to client logic*: on demand or triggered by the CoE's perception *Main stakeholder*: business areas.
Process-based operational risk analysis	*Description*: analysis of the most relevant operational risks in each process and proposal of internal controls to mitigate those risks. *Service to client logic*: Bi-annually, through a specific interviewing technique with employees. *Main stakeholder*: Top Management.

Table 5 RACI chart for the BPM services – year 2

BPM service	Top management	Business areas	BPM CoE	Communication area
Key performance indicators monitoring	I	A, C	R	
Process-based training	I, A		R	A, C
Process-based operational risk analysis	I	A, C	R	

organizational actors, especially Top Management since the added services had a more strategic flavor. Responsibilities and accountabilities associated to these services can be seen below (Table 5).

3.3.3 CoE's Internal Routines, Methods, and Tools Design

The three services that were added required new methods and tools to support them. The "Key Performance Indicators Monitoring" service required that some KPIs dashboards were created, in a first effort to constitute a Business Activity Monitoring (BAM). These dashboards could be monitored by several different employees and managers, and allowed effective decision making.

For the process-based training, several educational videos and messages were created with the help of the Communication area, in order to disseminate the process-aware culture in the organization.

Finally, for the process-based operational risk analysis, several tools were created, to better enable decision making based on the organization's risk profile. Such tools were:

- The risk and control strategic matrix
- Process prioritization's and risk rating matrix
- Symptoms table

3.3.4 Design of the CoE's Relationship with Other Organizational Areas

The perception on business managers was that the organization had not yet matured to develop service level agreements that regulated the relationship between the CoE and other organizational areas. Hence, this item was the one that changed less throughout the whole project.

3.3.5 CoE's Resources Design

The fact that the current portfolio had a more interesting mix of operational and strategic services suggested that a more formal division of labor should be adopted, segregating workers that would attend to operational demands and workers that would coach managers and attend to more strategic demands. However, such division of labor did not occur.

3.3.6 Implementation Design

With this need of enabling decision making throughout the entire organization, a second wave of awareness efforts was performed, but this time with a stronger focus on the managerial and top management levels.

These levels appeared to offer more resistance to change, and this awareness efforts are not completed yet. Results remain to be seen on this matter.

3.4 BPM CoE's Implementation Analysis

The implementation path that was undertaken by the BPM CoE in both cycles can be compared as below:

The Fig. 1, estimates the organizational perception of value added on each one of the six decisions presented, based on selected project team members' point of view. There is no formal scale to measure the value added by each decision. The used method was a roundtable between selected project members, where a discussion would be made regarding the value of each decision in relation to the others. This method was utilized since the main variable that the chart wishes to highlight is the differential importance of each decision (the relative importance of each decision in comparison to the set of decisions), and not the absolute value of each decision.

Based on the result of this exercise, we can conclude that the first round of the CoE's design and implementation has resulted in a low value perception, basically associated with efficiency benefits in the processes redesign. The CoE was seen essentially as an operational area. The second round improved this value perception, mainly because of the creation of new BPM services that contributed to organizational strategic management.

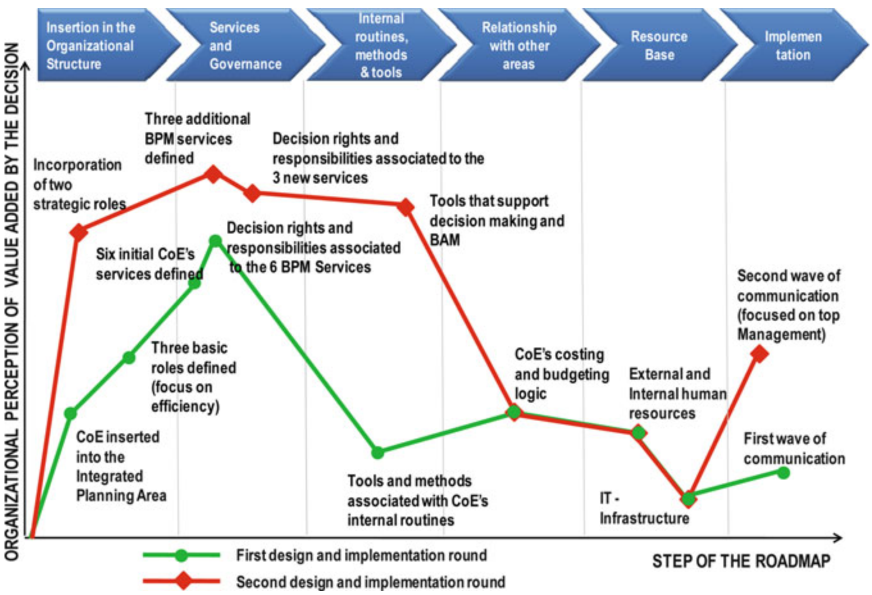

Fig. 1 Implementation path for the BPM CoE

Table 6 BPM CoE vision main goals applied to the case study

Capabilities	Description
Diffusion of BPM Culture	There were several established action plans to disseminate a process aware culture, focusing on the fact that BPM constitutes on a set of best practices and solutions that can help managers leverage their organizational performance. All mapped processes are published in the organizations Intranet to stimulate their use as an effective managerial instrument. The link between processes and KPIs has provided an important bridge between operation execution and decision making at a tactic/strategic level.
Creation of Convergence among BPM Initiatives	All BPM related initiatives must have the involvement of the BPM CoE, mitigating the risk of misalignment BPM-related actions. Besides that, the BPM CoE strives to provide effective support to managers and top managers of the execution of such processes. This is mainly done through the Key Performance indicators strategic maps. There is not, however, a systematic methodology of evaluation the Return on Investment on BPM-initiatives.
Internal Consulting Orientation	The BPM CoE is legitimately recognized as an internal service provider. As time passes, new services are being added to its portfolio of BPM services, in an effort to align its line of action with the organization's strategic priorities. Besides that, the CoE has recently began to take part in scientific events and communities of practice in order to guarantee excellence in its services and deliver state of the art best practices and BPM solutions to its clients.

In spite of that, we believe there are still many value improvement opportunities, for example, developing SLA's with its clients and formalizing a labor division within its internal staff.

We can also analyze CoE's maturity in the organization by comparing it to the three capability levels defined in Sect. 2 (Table 6):

3.5 *Synthesis of Lessons Learnt and Tendencies of Evolution*

We believe that there are some important lessons that could be learned from this case study. The following table synthesizes, in the authors point of view, some of the major success factors and pitfalls related to the BPM CoE implementation.

Furthermore, we believe the current design of the BPM CoE signals some tendencies regarding its future evolutionary path. Some of these tendencies include:

1. The decentralization to process owners of activities and responsibilities of process design and redesign under the methodological orientation of the BPM CoE. The BPM CoE would then gradually start to act as a gatekeeper of knowledge and process standards.
2. A deeper analysis of the return on investment that is obtained from the BPM Services, with the creation of a formal ROI evaluation method.

3. The establishment of formal service level agreements that could regulate the delivery of BPM services and balance the expectations regarding the provision of services, both on the costs and benefits dimensions.
4. A deeper level of specialization and segregation of roles among the BPM CoE staff, with the establishment of specific focal points for each of the organization's process.
5. An increasing demand for organizational innovation supported by the process culture, with the incorporation of new attributions to the BPM CoE related to the best practices of benchmarking and prospection of new managerial solutions for the organization.
6. The development of a financial methodology to fund the BPM CoE operation with specific rules to charge for each BPM services according to its local impact to the demanding area and total impact to the business.

4 Final Conclusions

Once presented and exemplified the strategic roles of a BPM CoE, it is important to finish this chapter stressing two points we believe are crucial to any CoE implementation. First, a BPM CoE should act inside an organization in order to change the mindset and the way BPM is faced, as follows:

- From process models as main products to process models as management improvement understanding platforms
- From punctual improvements to continuous improvements
- From isolated BPM initiatives to systematic BPM services and strengthened culture
- From a competitive advantage based on efficiency to one based on flexibility and innovation

In the second place, it is important to highlight that an organization should gradually implement the three roles proposed in this article, in the order they were exposed. As discussed in Table 7, it takes time for an organization to be able to absorb and internalize the idea proposed in each role.

The following, in Fig. 2, illustrates an organization's trajectory passing through the three strategic roles described in this article:

A BPM CoE in the first stage does not yet add significant value with BPM actions. This type of BPM CoE usually has several improvement opportunities, but is not yet mature enough to implement the strategic roles and change the way BPM is dealt with internally.

Once passed this stage, an organization and its BPM CoE advance toward promoting operational excellence. Several BPM initiatives have started to proliferate aiming at eliminating many organizational problems. At that point, BPM starts to be perceived as a solution to eliminating existing pains. The first strategic role of a BPM CoE is now activated.

Table 7 List of challenges, success factors, and pitfalls related to the case study

Key success factors	Pitfalls
Top Management's sponsorship: since the beginning of the journey, Top Management commitment was clear to all stakeholders involved. This commitment remains the same and helps evidence the strategic role of BPM and its Center of Excellence	*No previous conscience of the need of a BPM CoE during first BPM initiatives*: BPM CoE emerged when it became clear to the organization that it needed to internalize BPM methods and tools. If it was planned since the beginning of the consulting work, results obtained could have been better and transfer of knowledge could have been easier.
Gradual implementation of BPM services: there was a previous conscience that BPM services needed to be introduced in the organization gradually. This means the BPM CoE would not be as robust as desired at first implementation cycle, but instead would become more mature throughout the years	*No planned composition of CoE's team*: we believe the CoE's team could have been formed as a mix of people with distinct competencies, including interpersonal abilities, previous knowledge of organization's internal processes and/or BPM-related knowledge. This was not possible since there was not enough time to recruit and select the adequate employees. CoE was created with a team of similar competencies.
Strong communication: there was always a strong effort of communication of BPM CoE's role to the organization, in order to disseminate process-oriented culture and avoid any misunderstandings and possible resistance.	*No defined metrics to evaluate the success of BPM CoE*: as there were no previous metrics defined, it's still difficult to prove BPM CoE implementation's success and tangible results. A better emphasis at BPM CoE ROI should have been given since the beginning.
Service to client orientation: BPM CoE was always placed as an internal service provider. This showed business areas that the CoE's team wanted to help them improve their processes and activities and therefore could be seen as a partner.	

Within this second stage, some of the perceived benefits are systematic optimization about the way work is executed throughput multiple areas to deliver products and/or services to the client; Reduction of losses, better use of raw material and labor hours, smaller lead times and failures.

In advancing to the third stage, the organization starts to look for convergence among diverse initiatives, until then disintegrated, through the BPM CoE. This way, managerial visibility for decision making increases through BPM initiatives. The second role of the BPM CoE is also now implanted.

Within this third stage some of the perceived benefits are general coordination capacity and decision making improvement throughout the organization; clear visibility and accountability about what's happening day by day; better and faster information for decision making.

Finally, at the fourth stage, the BPM CoE itself starts to adopt a service orientation to other areas. Such services are integrated to the organization's strategy in order to promote flexibility and innovation. It is at this point that the third and last BPM CoE's role has been achieved.

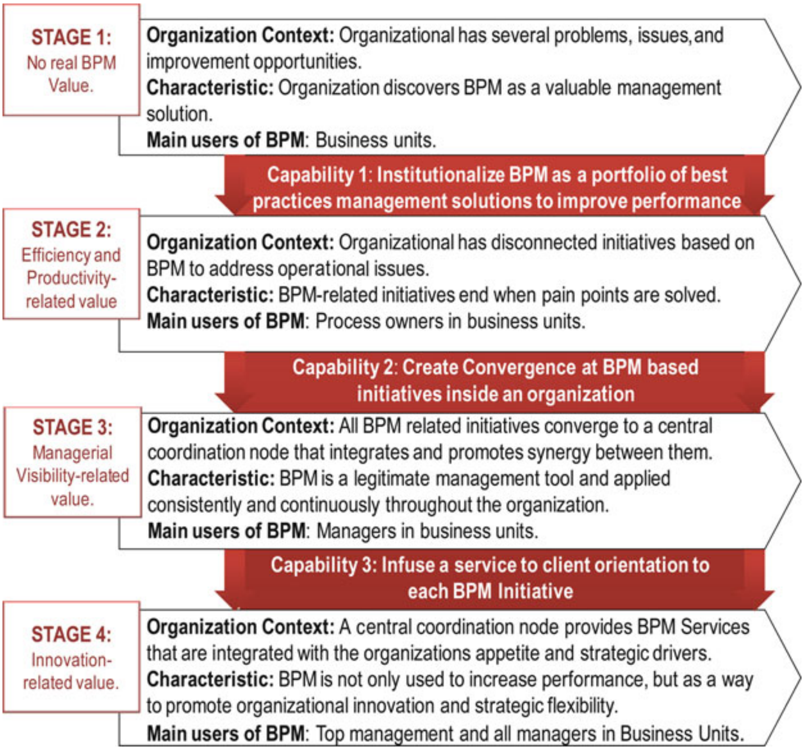

Fig. 2 BPM CoE strategic roles adoption stages

Within this fourth stage, some of the perceived benefits are gaining of flexibility and adaptability to quickly detect and explore opportunities that are aligned with the organization's strategy; high success rate of change, ability to explore new opportunities; high synergy between actions at different areas; collaborative discussions, that lead to new ways of doing business.

Under a practical perspective, we studied the case of the BPM CoE implementation in an Oil & Gas company in Brazil. As it is always important to point out, this process takes a long time until it reaches a point in which the BPM CoE starts to really add value to the organization.

In that case, it was not different. BPM initiatives began very timidly in 2005 with a few process design initiatives. But it was not until the Top Management started to realize the great potential value behind these initiatives that the BPM culture and implementation started to take off in the organization.

Once implemented a massive BPM initiative in which the whole organization was analyzed and improved, the BPM CoE came as a natural solution to be formalized. The organization as a whole had already perceived a great deal of improvement gained from BPM, so it was a smart decision to internalize and institutionalize this capability in order to maintain a continuous improvement throughout the following years. The way of doing this was creating a new area accountable for this role, the BPM CoE.

This BPM CoE implementation was made in a structured six step way:

- CoE's insertion in the Organizational Structure
- BPM Services and Governance Design
- CoE's Internal routines, methods, and tools design
- Design of the CoE's relationship with other organizational areas
- CoE's resources design
- Implementation design

After the BPM CoE implementation, it started to rethink itself in order to encounter ways of adding more value to the organization. The way of doing this was revisiting the same six steps taken in the implementation in order to find possible changes to be made that could improve the job made by the BPM CoE.

After almost 4 years from the first contacts with BPM, this organization's BPM CoE has made its way through the three value stages and is today a fundamental piece that institutionalizes a portfolio of best practices management solutions that promotes the convergence of BPM based initiatives and provides excellence to the organization in a service to client orientation.

However, this has not stopped this BPM CoE as well as the whole organization to keep looking for new and better ways to execute their jobs and delivering services to their customers.

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Business Process Standardization

Roger Tregear

Abstract Across its own functional and geographic structures, every organization has many processes with the same, or similar outputs and inputs. These processes comprise comparable activities, are constrained by similar rules, and are supported by like resources. They are common processes. They could be identical processes; multiple instances of the same process. Consider the corporate process, Purchase Goods, based on a global standard to use a single contracted supplier. At the same time, credible arguments can be made for local variations on these common processes to meet local requirements. Should a local variation of Purchase Goods be allowed in a location where the sole supplier has no office? In planning the implementation of a large software application for use in 30 countries, to what extent should local practice be allowed to customize the corporate application, potentially creating 30 different instances of the application? Is 30 too many? How about 10? 20? How many is too many? At what point does the cost-benefit balance shift away from global standardization to favor local relevance?

In this chapter, we address complex issues about process standardization. A Global BPM Framework is described that facilitates management of the conflicting demands of standardization for global efficiency versus variation for local effectiveness.

1 Standardization Dilemma

Every organization would like to avoid uncoordinated business process activity with isolated business units constantly re-inventing the wheel. The arguments for standardization are compelling. So are those for variation in response to particular

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_18, © Springer-Verlag Berlin Heidelberg 2015

local requirements. This is true on any scale within and across state, province, or national borders[1].

In this context, process standardization means the development of a standard or best-practice process to be used as a template for all instances of the process throughout the organization. Our emphasis here is on the organization development and culture issues that relate to BPM governance.

The development and use of technical standards, e.g. BPEL and BPMN, for the development of BPM systems are not part of our considerations. These issues are covered by Leymann et al. (2014).

Neither does this chapter address the technical management of process model variants. These issues are covered by Hallerbach (2014).

Questions about the effective standardization of business processes go to the heart of process governance. They can drive or limit process change. They bring into sharper focus questions of process performance accountability. They shape organizational culture.

Harmon (2007) states the case for standardization plainly "... if a company is doing the same activity in many different locations, it should consider doing them in the same way."

Any organization seeking to develop a process-centric culture must find ways to reconcile the tension between standardization and local variation, between centralized control and distributed autonomy. Can we achieve business process change with a predisposition toward standardization and still support critical local differences?

Hammer (2014) discusses seven axiomatic principles of process management. One of these principles is that "One process version is better than many" and he says "Standardizing processes across all parts of an enterprise presents a single face to customers and suppliers, yields profound economies in support services such as training and IT systems, allows the redeployment of people from one business unit to another, and yields a host of other benefits. These payoffs must be balanced against the intrinsically different needs of different units and their customers, but our bias should be in favor of standardization."

Standardization actually involves two related questions: How should standards be developed and how should compliance be managed. Should process best practice be determined centrally or can the wisdom of the crowd of process participants be harvested to inform best practice decisions?

We discuss a two-tier approach that can deliver business processes that work at both the global and the local levels. We describe a Global BPM Framework that facilitates the execution of a Global BPM Strategy, which delivers a process view that is globally consistent and locally relevant.

Drawing on the Object Management Group's definition of strategy from its Business Motivation Model (BMM) (Object Management Group 2009) we define

[1]For a real case on the challenge of globalization and localization in BPM see the Hilti case in vom Brocke et al. (2014).

a Global BPM Strategy as the essential course of action required to achieve the goal of process-based management. The case for committing to process-based management is made elsewhere in this handbook, for example, in Hammer (2014) and de Bruin and Doebeli (2014). In this chapter, we assume that general commitment and suggest how it might be operationalized with a particular emphasis on the question of standardizing common processes across the organization.

The Global BPM Framework is a set of concepts, principles, constraints, and relationships that provide the basis for the development and execution of the Global BPM Strategy.

The more general aspects of BPM governance are discussed in detail by Markus and Jacobson (2014) and Spanyi (2014). Baumöl (2014) and vom Brocke et al. (2014) also cover cultural aspects of BPM.

Many of the concepts discussed in this chapter have been developed and refined in working with a leading international financial services provider. Given both the sensitivities that surround their business environment and their significant internal change in management opportunities and challenges, we are unable to identify the company[2].

1.1 Defining Variation

Before we discuss options for reducing and managing business process variation, we should be clear about what we mean by such variation.

The simplest process diagram (Burlton 2001; Harmon 2007) is a single box showing inputs, outputs, guides and enablers (see Fig. 1.). The process is a sequence

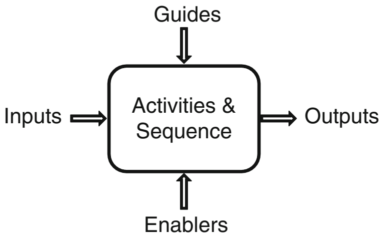

Fig. 1 Simple process diagram

[2]Operating in 30 countries with 6,000 staff, its banking, finance and leasing services are essentially the same in most places. The company is a major player in each of its markets. Total operating income is €1 billion and the company is profitable with excellent credit ratings. Global efficiency objectives and the desire for common systems make global standardization attractive. The contrary attraction for local specialization is driven by local customer demands and regulatory requirements. These are ongoing discussions. The ultimate choices are not just financially and operationally significant, they are mission critical.

of activities that transforms inputs into outputs using the enablers and informed and constrained by the guides. The key focus is on the outputs and this must include the customer(s) for whom the process output represents some form of value. The impact on other stakeholders such as suppliers and partners must also be considered. Variations occur with one or more of the inputs, guides, enablers or sequence of activities transforming inputs into outputs. Deriving the same outputs based on different suppliers (inputs), or different regulations or policies (guides), or by using different IT systems (enablers), gives rise to the potential for standardization.

2 Globally Consistent or Locally Relevant

As in many of life's dilemmas, the question is one of balance. The idea of the "one true process" executed consistently throughout the organization is persuasive. The conflicting argument for a primary focus on particular needs at the customer interface is compelling.

2.1 Attraction of the Global

In a perfect (process) world, an organization would have many standardized processes throughout its operations. Whether it is a single site operation or spread across a country or spread across many countries, the same process would be executed exactly the same way in each place. Common processes would be documented, executed, managed and measured in the same way in every instance. The "one true process" would be maintained and enforced, if not by cultural norms, then by a central authority.

Training would be uniform. People and work would move seamlessly between locations. Customers would always have the same experience of the same process irrespective of location. Partners would have an optimized and well understood role in the supply chain. IT development, implementation and maintenance costs would be greatly reduced. Other elements of the infrastructure of common process execution would also be consistent across the organization. Economies of scale would be significant. Opportunities for consolidation, outsourcing and offshoring would be more readily and accurately identified, and consequently, more effectively managed.

Quality assurance would be consistent and more manageable across the organization. Compliance management generally would be greatly enhanced, leading to better understanding and management of risk.

In this environment, it would be possible to have comparable performance measures between locations (process instances) and process improvements would be redesigned once for immediate implementation across the organization, giving the added benefit of economies of scale. Management of the organization and its processes would also be standardized.

The opportunity to create common standardized process does not arise only where an organization operates across national borders. An organization working from a single location will also have common processes. These processes could be executed by different parts of the same organization in the same building or across the world. The case for standardization will be just as strong, and its achievement may be just as difficult, in this single location as in a global diverse organization.

There are many benefits to be gained from the standardization of processes. Surely the arguments are compelling. The conclusion must be that every organization should document its process architecture, model its processes to at least two levels, assign process owners, seek out variation, determine its "best process" and standardize. Next stop, Nirvana.

2.2 Attraction of the Local

In reality, most organizations working across a range of geographies, cultures and operating environments do not achieve this level of standardization. Indeed many do not even want to try.

For them, the arguments for local variation are just as compelling. Each location or business unit is best left to run with reasonable autonomy. Global management is not done by micromanaging from afar in the Head Office. Local requirements require process differences in each location. Having the various business units only loosely coupled to the Head Office, and each other, makes them much easier to sell or reorganize when required. Establishing and maintaining the degree of rigor required for effective centralized control is difficult and distracting. The traditional arguments against enforced standardization are that it is too hard, takes too long and can be disruptively confrontational.

2.3 Balancing Act

Let us consider this global/local balancing act in general terms before we return to a more detailed analysis of the drivers and costs of local variation.

The polar opposites of centralized control and loosely-coupled association have given rise to many debates in the lives of individuals and communities.

How can we resolve the tension between the competing cases for standardized global processes versus locally tailored processes? Should organizational energy be expended in enforcing compliance with global standards or in managing the variability that is inevitable in complex organizations? Do we achieve standardization at the expense of agility or do common processes increase the ability to safely and quickly achieve meaningful change?

A further aspect of the balancing act involves choices about the degree of authoritarianism involved. How do we determine what the standard processes should be? Should a central unit work out what is best and issue instructions? Perhaps a central unit's primary role should be to relentlessly capture and disseminate examples of good practice and thereby facilitate the evolution of standard processes?

Once a standard has been set, how will its use be enforced? Careful choices are required in limiting local autonomy. The culture of the organization and it's customary approach to policing compliance will play a large role. No organization allows business units to design their own accounting systems. Such rigor may not be so strictly applied to the management of processes. For a multinational operation, differences in national cultures will be important. Hofstede (2001) reminds us that "culture is more often a source of conflict than synergy".

The problem also changes at different process depths. At the highest levels of the processes' architectural view of an organization, there are many seemingly common, or at least similar, processes. A common process that might be described in any public or private sector organization of any size and in any country is Hire-to-Retire. Such a process would describe all of the activities, policies and rules involved in HR management. You can easily imagine a level one process sequence such as Define Role, Recruit Employee, Manage Employment, and Finalize Employment. At this level, such a sequence could be common throughout an organization, indeed perhaps common between different organizations. The further we drill down into the subprocesses, the more variation we might find. One example of variation would be that recruitment might be done via public advertising or via an agency. Reference frameworks such as the Supply–Chain Councils process reference model, Supply–Chain Operations Reference (SCOR)[3] and the APQC's Process Classification Framework[4] also illustrate the levels of abstraction issue. The SCOR model's highest level defines five processes that describe any supply chain across a wide variety of organizations: Plan, Source, Make Deliver, and Return.

Another consideration will be whether it might be appropriate to maintain standardized "back office" processes at a particular business unit location while having customized "front office" processes. Even if a customer segment genuinely requires customization of customer-facing processes, that may not mean that the changes need to be deep. Variation may need to go no further than the customer's limited field of view.

Whatever standardization approaches are adopted in an organization, there will need to be some flexibility in their application. Some business units and locations will be able to successfully introduce much better local variations. Others will lack the maturity to be allowed to vary far from the global standards.

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[3]Supply Chain Council, http://www.supply-chain.org/.

[4]http://www.apqc.org/portal/apqc/site.

There will be genuine reasons for some process variations from location to location, from business unit to business unit. Clearly identifying similarities and differences in business processes allows us to validate the cost-benefits and re-use best practice for business optimization and change.

The intent is not to create robotic organizations all working in the same way in every aspect. Henry Ford's phenomenal success was built largely on standardization of the components and construction processes of the Model T, the "Car of the Century" (Brooke 2008). Even so, he was keen to point out that "The eventuality of industry is not a standardized, automatic world in which people will not need brains. The eventuality is a world in which people will have a chance to use their brains ..." (Ford 1926). This idea is reflected in the Toyota concept of "autonomation" meaning "automation with a human touch" (Ohno 1988, pp. 6; Shigeo, 1989, pp. 59).

Given the current condition of the automotive manufacturing industry, there is some irony in comparing the beginnings of the Ford and Toyota companies. The Toyoa family studied the work of Henry Ford very carefully and for some years before establishing their Toyota company in 1936. By this time the Ford Motor Company was well established. The manufacturing and marketing phenomenon that was the Model T had been over for nearly a decade. Taiichi Ohno, the architect of the Toyota Production System was "in awe of (Henry) Ford's greatness" (Ohno 1988, pp. 97). Today, the Toyota Motor Corporation in Japan receives some 600,000 improvement suggestions each year from staff. A staggering 99% of these suggestions are implemented (Magee 2007). That is almost one successful improvement per month per employee. Katsuaki Watanabe, the then President of Toyota Motor Corporation, said in 2007 that "There's no genius in our company. We just do whatever we believe is right, trying every day to improve every little bit and piece. But when 70 years of very small improvements accumulate, they become a revolution" (Stewart and Raman 2007).

What if every organization had a way of collecting successful process improvements made across its locations and business units and standardizing processes based on that knowledge? Over time, would a complete set of standardized processes evolve?

3 Local Variation

Inevitably there will be local variations on common processes. These variations will arise for many reasons. Each variation imposes a cost on its host organization.

3.1 Reasons for Variations

Despite the compelling arguments for standardization, there are many reasons why common processes are designed and executed differently in different locations. Some of these reasons, for example, legislative requirements, make variations inevitable. Other causes are less proscriptive. Some seem to result from personal whims. To understand the validity of a variation and the cost of supporting it, it is necessary to understand why the variation exists in the first place.

Various reasons for business process variations can be described.

- *Legislative requirements*: These are mandatory and unavoidable variations that come from differences in financial regulations, taxation regimes, import/export regulations and employment practices.
- *Local market imperatives*: Although these changes can be harder to define, they are more common and have a significant effect. They are caused by differences in national or regional culture, customer expectations, market maturity, competitive landscape or local market conditions.
- *Personal preference*: Some differences are more to do with the personal preference of an individual with authority to make, stop, or change.
- *Knowledge is power*: Related to the effect of personal preferences, but less benign, some see the sharing of knowledge about how a process works as a loss of control and power.
- *Drift*: Processes can change for no obvious reasons. Over time they drift away from the standard by the accretion of many tiny variations.
- *Resource constraints*: What works in one location may not be possible in another if the necessary resources are not available or affordable.
- *Product/service variations*: Differences in product and services may require variation in the processes that create, deliver and maintain them.
- *Mergers & Acquisitions*: When organizations join there are usually at least two versions of notionally common processes. In theory, this problem would be resolved and a single process selected, but old processes sometimes die hard.
- *IT driven*: IT systems, particularly legacy systems, may force variations in business processes.
- *Unstructured, unmeasured and unrepeatable* (Davenport 2005): Knowledge work is often said to be impossible to document and model as a process.

There are many reasons why variation from a global standard for a particular business process might occur. Some of the variations are inevitable and organizations need to manage that diversity. Others have no such compelling purpose.

It is common for people and business units to express the view that what they do is "special" and "different" and cannot be seen to be standard. Sometimes this is true. Mostly, it is less so. We rarely hear people successfully argue that financial management or project management should be handled in a special way for their business unit. Should process management be different? Resolution of this tension is a complex and important aspect of global management.

3.2 Costs of Variation

There is a cost for variation. Such costs are not always apparent as they seldom appear as line items in financial reports. They are no less real. Continued support for unnecessary process variations is a lost opportunity for performance improvement. "Opportunity losses" are seldom recognized, let alone reported.

Across a large organization, and even in some smaller ones, there can be many processes in play that could be standardized but this opportunity is not recognized because nobody is looking. Expressing a fundamental premise of what we would come to know as Lean Management, Shigeo Shingo (1988) wrote in 1981 that "We cannot find and eliminate waste if we are not looking for it".

The costs of variation take many forms.

- *Customer dissatisfaction*: Customers expect the consistent outcomes that result from consistent processes when they deal with an organization. Customer dissatisfaction leads to loss of sales and/or resources wasted in dealing with complaints.
- *Inefficiency*: The performance of most processes can be made more efficient. There can be a significant cost in not removing inefficiency.
- *Ineffectiveness*: No matter how efficient a process is made, it is entirely wasted if it is the wrong process.
- *Training*: Multiple versions of a process can impact on training material incurring additional development and maintenance costs.
- *Documentation*: Process variation means multiple versions of documentation are being maintained (or should be).
- *Lack of information*: There is a potential opportunity cost in decision making not informed by the best consistent and comparable information.
- *Loss of "best process"*: Without a system to identify and standardize "best process" across an organization, it is inevitable that some parts of the organization will be operating in a suboptimal way.
- *Increased complexity*: Organizational complexity is increased by process variations. Complexity adds cost and risk to management.
- *Re-inventing wheels*: Uncoordinated business process activity by isolated entities re-inventing solutions is clearly wasted.
- *Losing competitive advantage*: Failure to reduce costs, improve customer satisfaction, reduce time to market and reduced quality decision making must result in the loss of competitive advantage.
- *IT development & support*: Process variations will often require variations in IT systems to support them, creating additional development and maintenance costs.
- *Staff impacts*: For almost all organizations, staffing costs are significant. In many cases they are the largest single cost. Suboptimal processes waste and disrespect these important and expensive resources.

There are many ways in which the existence of, unnecessary process variations impose costs on an organization. In large and complex organizations, these costs could amount to many millions of dollars, perhaps annually.

Each organization needs to assess the trade- off between the cost of standardization and the costs of nonstandardization. In doing so, most organizations will find that the financial costs of standardization are reducing. The availability of better global information and knowledge management tools, reducing communication costs and improving technology, and globalization of thinking and operations are weakening financial arguments against standardization. This trend will continue.

Variations in process may have both costs and benefits. A variation that might seem beneficial at one level of cost may seem extravagant at another. The common circumstance is that this cost-benefit is neither calculated nor challenged.

4 Resolving the Dilemma

A two tier approach is proposed to deliver business processes that will help balance the demands of standardization and local variation. There are two integrated and closely coupled activity streams. One involves the development and maintenance of a Global BPM Framework[5]. The Framework includes models, templates, and general guidance. The second stream entails the use of the Framework in the execution of the Global BPM Strategy. Both streams are continuous and enduring.

The Global BPM Strategy is realized via the following artifacts:

- A *Global BPM Framework* supports ongoing development and management of globally consistent and locally relevant processes.
- A *BPM Governance Scheme* provides policies, principles, and conventions for coordinated process development and management.
- A *Global Process Council* is the custodian of the global policy aspects of the Global BPM Framework.
- A *Global Process Office* conducts day-to-day operations, analysis, and reporting on the global usage of the Global BPM Framework and supports the execution of the Global BPM Strategy.
- *Local Process Councils* in each location/country are the custodians of the local policy aspects of the Global BPM Framework.
- *Local Process Offices* conduct day-to-day operations, analysis, and reporting on the local usage of the Global BPM Framework and support the execution of the local aspects of the Global BPM Strategy.
- A *BPM Knowledge Exchange* captures and disseminates learnings from across the organization about BPM's best practice.
- A *BPM Capability Development Plan* provides a common method for developing BPM implementation and management capabilities.

Guiding the operation of the Global BPM Framework is a tri-state definition of levels of process standardization (see also Fig. 2) The three levels provide a trajectory for development of processes towards a global standard. The three states are:

[5]Some aspects of the Global BPM Framework are derived from the published models and training material of BPTrends Associates. http://www.bptrends.com and Harmon (2007).

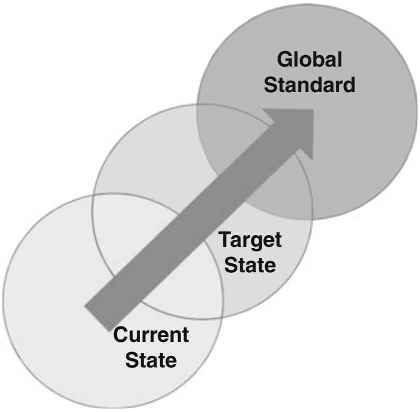

Fig. 2 Levels of process standardization

- *Global Standard*. This is the notional global standard representing the ideal state for all business units everywhere from a standardized process perspective. The global standard may be one of the available process reference models such as SCOR or it may be an internally designed reference.
- *Current State*. This is the current state of the process in the particular business unit. Where complete standardization of the process has been achieved, this would be the same as the Global Standard. Where local variation is accepted as a necessary process may never move further toward the Global Standard.
- *Target State*. This is the current target for the process in a particular business unit. It represents improvement from the Current State. Although the trajectory from Current State to Target State would ultimately reach the Global Standard, the Target State may be short of the Global Standard. Where local variations have been accepted as valid, the Target State and Current State are coincidental.

The Global Standard is maintained by the Global Process Office with the authority of the Global Process Council. Current and Target States for business units are managed by the Local Process Offices and Councils.

4.1 Global BPM Framework

The Global BPM Framework allows all business units to develop coherent approaches to BPM. Standardization is encouraged and necessary local variation is supported.

The Global BPM Framework is shown in Fig. 3. Its most obvious characteristic is the integration of global and local perspectives. The Global BPM Strategy is developed and managed by the Global Process Council assisted by the Global

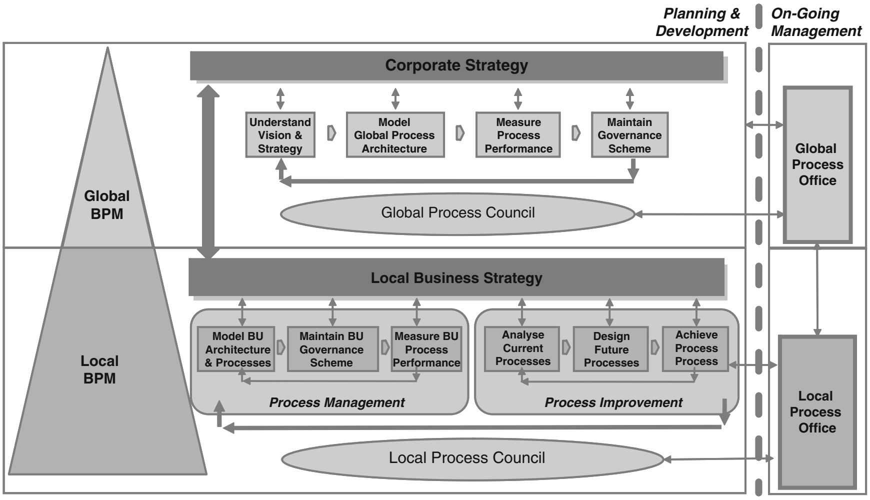

Fig. 3 Global BPM framework

Process Office. The Local Process Councils are accountable for the implementation of the Global BPM Framework adjusted for local conditions. The Local Process Office supports the management, measurement, and reporting of local process performance and the coordination of process improvement activities.

Global BPM activities are driven by, and fed back to, corporate strategy. Similarly, local business strategies are closely coupled with local BPM activities.

The Process Councils are responsible for BPM policy. Process Offices are responsible for day-to-day management, logistics, coordination and support of process improvement and management activities.

Local Process Offices and the Global Process Offices, work together to provide global and local support for BPM.

4.2 Development and Management

The Global BPM Framework, (Fig. 3,) provides the basis for the execution of the Global BPM Strategy.

An important distinction is made between development and maintenance of the Strategy and its ongoing execution. The thick dotted vertical line in the schematic shows the relationship between these closely coupled aspects. Planning and development of the Strategy involves its initial creation and subsequent maintenance. The other side of the vertical line represents day-to-day process execution and management. These separate but integrated aspects create a process management environment that is consistent yet responsive to changing organizational needs.

4.3 Balancing Global and Local

Some aspects of the Global BPM Framework must be managed and controlled on a global level. These elements need to have a single owner and be used in identical ways in all business units.

Apart from the Framework itself, such global aspects include:

- BPM Knowledge Exchange
- Global Standards (for common process)
- BPM Capability Development Plan
- Global and Local Process Council Charters
- Global and Local Process Office Charters
- Process Architecture
- Global analysis and reporting specifications
- Global process modeling and management tools
- Process modeling conventions and standards.

The global-local balance must be maintained in a dynamic environment. It is not a matter of designing systems and achieving balance just once. Rather the requirement is to maintain equilibrium despite changes at both the global and local levels. The Global Standard, Current State, and Target State are all able to change as an organization's circumstances change.

Global standards should change over time. As Henry Ford said "If you think of standardization as the best, that you know today, but which is improved tomorrow – you get somewhere. But if you think of standards as confining, then you stop." (Ford 1926) Interestingly, Taiichi Ohno, the creator of the Toyota Production System and progenitor of Lean Management, makes a very similar point "... standards should be changing constantly. Instead, if you think of the standard as the best you can do, it's all over. The standard is only a baseline for doing further kaizen." (Ohno 2007) Change control requires input from all stakeholders. Change requests are considered, in consultation with local Process Councils and Process Offices, to determine whether (1) a change should be made on a global basis, (2) a localized change should be made or (3) no change should be made at all. Such decisions would be made on a case-by-case basis. Some general questions can be applied. Can the local variation be justified; do the benefits of variation out way the initial and ongoing costs? Is the local variation really necessary; what is the business impact of not having the variation? If the local variation is justified, is the same variation applicable in other local environments? Is the variation so widely applicable that it should become the new global standard?

Changes will also occur at the local level as an organization responds to changes in customer demand, competitive pressures, new product developments, economic conditions and other external factors.

Harmonization of activities is managed by the Global and Local Process Councils (policy) and the Global and Local Process Offices (operations).

Fig. 4 Harmonization matrix

While global consistency is important, it is equally important to ensure that global requirements do not adversely affect local business operations. Fig. 4, illustrates the four integrated harmonization activities:

1. global planning and development
2. local planning and development
3. global day-to-day management
4. local day-to-day management.

Global Standards are established from reference models, other best practice sources, or personal experience. These set the nominal target for all parts of the business using the common processes. Local requirements are considered and, if a case can be made, local variations to the Global Standard are approved and implemented. Local variations are also assessed for more general applicability. Where local variations can be usefully applied globally, they are used to challenge and change the Global Standard. In this way, a bias toward global standardization is harmonized with requirements for localization.

The Framework separates, but leaves closely coupled, the activities undertaken as part of the Global BPM and Local BPM.

4.4 Global BPM

At the global level, the process management focus is on creating a global approach that supports local business requirements. The key purpose of the Global BPM Strategy is to enable the coordinated management and continuous improvement of local business processes.

GLOBAL BPM			
	Global BPM Key Activities		
Process	Global Lead Activities	Local Involvement	Outcomes
Understand Vision & Strategy	• Develop and maintain BPM Global Framework • Develop change control mechanisms • Communicate vision and strategy to stakeholders	• Advise Global Process Council	Shared under-standing of how the concepts of BPM are applied
Model Global Process Architecture	• Create/maintain global reference model • Develop change control mechanisms • Communicate with stakeholders	• Review for local applicability issues • Submit change requests	Agreed model describing major processes and their relationships and dependencies
Measure Process Performance	• Define global process performance measures • Establish measurement methods • Set targets for measures • Establish current per-formance levels • Review/maintain meas-urement architecture	• Advise Global Process Council • Localize process performance schemes	Agreed descrip-tion of measures, targets, measure-ment methods and current values for major process.
Maintain Governance Scheme	• Define global governance • Establish Process Ownership	• Integrate global governance in local Governance Scheme	Agreed account-ability for process performance.

Fig. 5 Global BPM activities

As illustrated in Fig. 3, BPM planning and development is based on four subprocesses that are closely coupled to corporate strategy. Each step draws on, and provides feedback to, the corporate strategy. Together they articulate a vision for global BPM, describe the organization and its business performance in process terms, and create mechanisms for the management of these processes. These activities are undertaken by the Global Process Office, in consultation with Local Process Offices and the Global Process Council. Figure 5 shows, for each subprocess, the key activities at the global level, how the local business collaborates, in these activities and the shared target outcome. Beyond some initial one-off setup requirements, these activities are enduring.

4.5 *Local BPM*

Figure 3 shows how, at the local level, process activity has two focal points, Process Management and Process Improvement.

Local Process Management involves the establishment of levels of BPM capability and planning to close identified process performance gaps within a localized process architecture and governance scheme.

Local Process Improvement involves the running of process redesign projects to improve processes selected by local management with the advice of the Local Process Office.

The six subprocesses are described in Fig. 6.

5 Managing The Dilemma

At the outset we described the "standardization dilemma" as follows: "Can we achieve business process change with a predisposition towards standardization and still support critical local differences?" In theory, all common processes would be standardized everywhere giving consistent interfaces for customers, suppliers and other external stakeholders as well as cost savings in IT, training and documentation management, with work and people moving freely across organizational and geographic boundaries. In practice, local variation in business processes is inevitable and necessary. Local variation must be constrained by cost-benefit considerations. Such constraint must not be allowed to stifle genuine business needs and aspirations.

The Global BPM Framework presented in Fig. 3, provides a coherent environment to manage the global versus local balancing act. It provides a pragmatic division of labor between global and local process management via Process Councils and Process Offices. The BPM Knowledge Exchange facilitates the dissemination of the emerging best practices and the details of current global standards across the process architecture. Since all of this must be achieved in a dynamic environment, the task is to manage the dilemma rather than resolve it. There can be no static resolution in a changing system. A quasi-stationary equilibrium is maintained in local management autonomy versus centralized control, global efficiency versus local effectiveness and centralized process design versus organic evolution of best practice.

The Framework is a big picture view of managing the conflicting demands of standardization for global efficiency versus variation for local effectiveness. Practical use of the Framework will need to be informed by a range of variables resulting in different timetables and degrees of change. Key issues may include: The level of BPM maturity of the organization, internal and national cultural variation across the organization, current practices regarding centralization versus local autonomy, the sense of urgency (Kotter 2008) perceived by middle management and their teams, motivations for the change, and the more pragmatic issues such as resources, funding, and executive support.

5.1 Achieving Standardization

A key issue requires further consideration. How can process standardization be introduced across an organization while nurturing and sustaining a culture of

LOCAL BPM				
		Local BPM Key Activities		
	Process	Local Business Lead	Global Involvement	Outcomes
Local Process Management	Model BU Architecture & Processes	• Create/maintain a local process architecture consistent with the global architecture • Develop local change control mechanisms • Communicate with local stakeholders	• Review/advise • Provide support to develop and maintain • Make local architectures available	Agreed local model describing processes, their interrelationships and variations from the Global Standard and local Target State
Local Process Management	Maintain BU Governance Scheme	• Define local process governance • Establish local process ownership • Report outcomes	• Review and advise on local governance • Capture best practice	Clear under-standing of BPM governance in each business area
Local Process Management	Measure BU Process Performance	• Define local process performance measures • Establish measurement methods • Set targets for measures • Establish current performance levels • Maintain measurement architecture	• Review and advise on local measurement approaches • Capture and disseminate best practice	Agreed descrip-tion of local measures, tar-gets,measure-ment methods and current values for major processes
Local Process Improvement	Analyze Current Processes	• Priorities processes • Model processes and collect related data • Document process issues and impacts • Consult BPM Knowledge Exchange	• Collect, collate local issues into BPM Knowledge Exchange • Support local activities	Thorough under-standing of curr-ent processes, problems and scope for improvement
Local Process Improvement	Design Future Processes	• Redesign processes to improve performance • Assess impacts/risks • Review process measurement system changes • Communicate change • Prepare Business Cases • Plan Change Management • Prepare Projects Plan(s)	• Assess change proposals • Approve global variations • Update Knowledge Exchange • Update global process measurement arrangements	Continuous lo-calized process improvement in a controlled, risk managed and constructive environment
Local Process Improvement	Achieve Process Changes	• Initiate and manage process change projects • Measure performance and ensure changes effective	• Post Implemen-tation Reviews • Assess global process change requirements	Forecast changes achieved; learnings gathered for future projects

Fig. 6 Local BPM activities

innovation, creativity, and resourcefulness? Michael Hammer suggested that "business units are no longer independent, but merely executors of centrally designed processes" (Raman 2008). Will the McDonaldization (Ritzer 2007) of global business mean the end of local business units?

The Toyota Motor Corporation is the world's most successful manufacturing company. Not immune to the current difficult economic conditions, it is still in the order of magnitude more successful on most measures than its competitors, and most other companies. Toyota is widely known for having extremely detailed work instructions and extensive training programs for its workers to ensure that all work is done precisely and consistently. Toyota managers are considered to be fanatical about the close adherence to detailed work instructions. Toyota workers are seen to be well crafted (and willing) cogs in superefficient factories that are entirely micromanaged in fine detail. This is to misunderstand the Toyota Way.

Standardized work is a cornerstone of the Toyota Production System. However, not all work is standardized to the same degree. Toyota determines the most critical parts of the work and requires those parts to be executed flawlessly. They document these critical processes in significant detail and train the workers relentlessly to achieve perfection. Other parts of the work are completed with less control. By focusing on the critical processes and being relatively relaxed about the other parts, Toyota consistently produces extraordinary results (Liker and Meier 2007).

In developing global standards, it is sensible to think carefully about the degree of standardization to which common processes should be subjected.

A recent book, "Extreme Toyota" (Oson et al. 2008), written by Japanese speaking authors with unprecedented access inside the company, sheds light on the local variation versus standardization question within Toyota. The book gives a more nuanced view of how this dichotomy is managed. It identifies six balancing forces that drive constant renewal characterized by both continuous and discontinuous change.

One of the six forces is *local customization*, which sees Toyota customizing "products and operations to incorporate the sophistication and diversity of local markets around the world". The instructive twist in the tail here is that the process starts with customizing to suit the local market and then collecting and collating those innovations into a global repository. Bottom-up much more than top-down. Global standards and proven variations are developed from the experiments and experience of local business units. Toyota culture actively encourages a high level of controlled and purposeful experimentation and insists on the institutionalizing of successful practice via an extensive ecosystem of information sharing. The intent of the Toyota information nerve system is to allow everybody to know everything, based as much on personal human contact as on accessing digital information. IT enabled knowledge sharing is not seen as a substitute for social networks based on personal human interaction.

Other organizations can learn a lot from this. Standardization and centralized control are not the same idea. The intent of globalization of common processes is to capture and make available the "best process" outcomes from throughout the organization. Implemented properly, global process standardization is less like a police action and more like a collaborative information sharing exercise. Good ideas for process improvement bubble up from the workplace. They are collected, collated, and disseminated. With echoes of Darwinian theory, standardized, best processes evolve based on many choices made in the organizational ecosystem.

Table 1 Coercive and enabling systems

Coercive systems & procedures	Enabling systems & procedures
Systems focus on performance standard so as to highlight poor performance.	Focus on best practice methods: information on performance standards is not much use without information on best practices for achieving them.
Standardize the systems to minimize game playing and monitoring costs.	Systems should allow customization to different levels of skill/experience and should guide flexible improvisation.
Systems should be designed so as to keep employees out of the control loop.	Systems should help people control their own work: help them form mental models of the system by "glass box" design.
Systems are instructions to be followed, not challenged.	Systems are best practice templates to be improved.

Jeffrey Liker (2004) draws on Paul Adler's analysis of Toyota's organizational practices to further understand the balancing act between highly proscriptive environments where rules are rigidly enforced and organic environments where flexibility, empowerment, and initiative are the valued attributes.

Adler (1999) contrasts "coercive" and "enabling" bureaucracies. Coercive bureaucracy seeks to control people via standards. Enabling bureaucracy uses standards to help people control their work. In Table 1, he summarizes how a coercive approach looks for something wrong and the enabling approach looks for something right (Adler 1999).

In global process standardization initiatives our efforts will be much better rewarded if we create enabling rather than coercive systems. We should first carefully decide which processes will give an appropriate return from standardization investments. We must also strike a balance between standardization being based on process design originating from the Head Office and a proactive system of collecting global best practice and making it available to all.

6 Summary

The arguments for the standardization of common processes across an organization are compelling. Customers and suppliers have a consistent interface. There are economies of scale in training, IT development and operation, document control, process improvement, change management, performance measurement, and quality assurance.

Are these benefits enough to sacrifice local variations that respond to local needs? The arguments for allowing, indeed promoting, local variation in common processes are also persuasive.

The dilemma faced by an organization moving to process-based management is where to strike the balance between global efficiency and local effectiveness. Issues of central control versus local autonomy often arise in developing process governance policies. These tensions must be resolved if process management is to be adopted as the core management philosophy.

Should organizational energy be expended in enforcing compliance or used to encourage diversity? Do we develop standard processes centrally and promulgate them as mandatory decrees or can the wisdom of the crowd be used to inform best process decisions? Do variations need to be deep or just within the customer's field of view? Will compliance with the standards be achieved by forceful policing or empowering encouragement? At what level of the process architecture will standardization be required?

The need to balance centralized control and loosely-coupled association is enduring. As circumstances change, so do the balance points.

We have described a Global BPM Framework comprising a set of concepts, principles, constraints, and relationships that provide the basis for execution of a Global BPM Strategy, the essential course of action required to achieve the goal of process-based management.

Global Standards are established by the Global Process Council. This is achieved via reference models, other best practice sources, and personal experience. The Global Standards set the nominal target for the common processes. Local requirements are considered by the Local Process Councils and, if a case can be made, local variations to the Global Standard are approved and implemented. Local variations are continuously assessed for more general applicability. Where local variations can be usefully applied globally, they are used to change the Global Standard. In this way, a bias toward global standardization is harmonized with genuine requirements for localization. The flow is circular; both bottom-up and top-down.

This approach separates, but leaves closely coupled, the activities undertaken as part of Global BPM and Local BPM. The dilemma is not so much resolved as managed, since the global-local balance must be maintained in a dynamic environment. There can be no static resolution in a changing system.

The BPM Framework provides a solid basis for modeling, communicating, analyzing, testing, proving, controlling, and managing the costs and benefits of global consistency versus local relevance.

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Business Process Outsourcing: Learning from Cases of a Global Offshore Outsourcing Provider

Jyoti M. Bhat, Jude Fernandez, Manish Kumar, and Sukriti Goel

Abstract Process outsourcing industry, a multibillion dollar market, is a highly competitive area with intense competition among companies across outsourcing destinations. After the initial cost advantages, Business Process Outsourcing (BPO) clients increasingly expect innovation and improved performance, which acts as a driver for BPO providers to adopt different aspects of Business Process Management (BPM). Most of the literature on BPO and BPM focuses on the outsourcing organization's point of view. While BPOs use Six Sigma techniques and IT for improving their performance, the adoption of BPM by a BPO has not been analyzed from a holistic perspective. In this chapter, the authors analyze the various BPM lifecycle activities and supporting elements as applied to a BPO provider-client relationship and the benefits derived using a BPM framework. This chapter uses case studies from an Indian BPO provider and is based on the considerable experience of the authors in BPM and BPM implementations in a BPO service provider.

1 Introduction

Business Process Outsourcing (BPO) has slowly gained popularity from the initial experiments to a must-have item in the organization strategy in the last few years. BPO involves contracting specific business processes and tasks to a third-party service provider. The processes being outsourced are typically important functions, but classified as noncore (Namasivayam 2004). BPO, according to Scholl (2003), includes the outsourcing of entire functions such as supply (moving, storing, making, and buying of goods and services) and demand (customer selection, acquisition, retention, etc.) management, and some enterprise-related areas for

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_19, © Springer-Verlag Berlin Heidelberg 2015

example, HR, finance, IT, and facilities management and customer-related processes such as marketing and support.

From a focus on leveraging the cost efficiencies of outsourcing noncore processes to external service providers with skilled resources, organizations are exploring process outsourcing options to take advantage of process optimization, flexibility, and scalability of resources (number, types of skills, etc.), skills and technologies. Typically, the initial expectations of the outsourcing company cover cost arbitrage and availability of skilled resources. Over time, client expectations mature and focus on innovation, performance improvements, and parameters such as speed and flexibility (Kaka et al. 2006). Today, increased competition in the BPO market is putting pressure on the rates the BPO organizations can charge their clients. Additional challenges are the increased costs of resources (due to manpower salary rises) and that of retaining valuable employees in an industry environment where high attrition is common. BPO vendors face a strong imperative to constantly innovate and improve their performance to remain competitive while meeting the rising customer expectations. BPO vendor competencies and relationship governance plays an important role in moving the BPO relationship from a transactional BPO to a strategic and transformational BPO (Saxena and Bharadwaj 2009).

The success of the relationship between the BPO service provider and the client depends on how the entire lifecycle of the outsourcing relationship is handled in a holistic manner covering management processes, governance structures, technology usage, monitoring, service level agreements, and commitment from all stakeholders. Given this, Business Process Management (BPM) provides an appropriate framework for BPO vendors to meet their objectives and address the challenges of the outsourcing relationship. The BPM term has expanded considerably from its initial narrow focus and is today understood to cover a holistic approach to managing processes using appropriate methods, standards, and technology, together with the right supporting elements of governance, people aspects, infrastructure, etc. (Bhat and Fernandez 2008). The outsourcing relationship between the BPO and the client, post deal finalization, usually follows a pattern: discovery phase (process identification, analysis, etc.), transition of the process from the existing client environment to the BPO vendor environment, stabilization at the BPO vendor, and finally the steady state. In a steady-state mode, the BPO vendor usually aims to continuously improve and transform the process, based on client expectations and the vendor's motivation to remain competitive. In addition, a closer analysis of the relationship will reveal that there are the governing elements of SLAs, audits, reporting, etc.

The applicability of BPM to the BPO landscape can be analyzed from different dimensions. The first dimension is how the organizations exploring process outsourcing can leverage BPM principles for success of their BPO strategy, which has been studied by many and is available in literature (Martin et al. 2008; Mattig 2008). Some authors have also studied use of BPM technologies like BPMS and web services in process outsourcing (Grefen et al. 2006) and developed the architecture and methodology for model-based process orchestration (Elhadad et al. 2008).

Second, BPM as applied to managing the BPO service provider would be a case similar to the BPM adoption strategy by any business organization. In fact, the most frequently studied client firm capabilities in BPO are BPM capability and BPO vendor (supplier) management capability (Lacity et al. 2011). But applying BPM principles to the BPO relationships of the provider and analyzing the various activities and elements of BPM governance is not a well-researched item.

We will examine the BPM elements (see Rosemann and vom Brocke 2014) and its adoption by the BPO providers in managing the outsourcing relationship with their clients. To analyze how BPM principles can support the BPO relationship objectives, it is useful to bring in a suitable BPM framework that covers the BPM lifecycle elements on both process and technology along with the supporting elements including governance. In this chapter, the various aspects of a BPO relationship are examined from a BPM point of view using three outsourcing relationship case studies (at different levels of maturity) from a global BPO organization. The analysis covers the adoption of process management methods, BPM technology adoption, success factors, and benefits to the client and the BPO provider.

2 Business Process Outsourcing: A Closer Look

Organizations exploring BPO usually look at IT-enabled processes or using IT to enable the outsourcing exercise, which has led to common BPO definitions having an IT flavor.

Halvey and Melby (2000) give two definitions:

> The management of one or more specific business processes or functions (e.g., procurement, accounting, human resources, asset or property management) by a third party, together with the information technology (IT) that supports the process or functions.

and

> The delegation of one or more IT-intensive business processes to an external provider who, in turn, administers and manages the selection processes based upon defined and measurable performance metrics.

Rouse and Corbitt (2006) have explored the various definitions of BPO and the types of outsourcing, including offshore outsourcing. Their investigation into the previous research on BPO reveals that academic research on BPO has yet to catch up with the popularity of BPO. An offshoot of BPO is knowledge process outsourcing (KPO), which includes those activities that require greater skill, knowledge, education and expertise to handle for example, valuation research, investment research, patent filing, etc. (Sen and Shiel 2006).

The BPO space has seen tremendous growth and considerable changes over the last few years. The BPO market worldwide grew from $19 billion in 2004 to an estimated $133 billion in 2011 and is expected to continue growing at 5 % CAGR for the next 5 years according to Gartner. The global BPO market is forecast to hit

$209 billion by 2017 (NelsonHall 2012). Mehta et al. (2006) attribute the phenomenal growth to technological advancements, (e.g., Internet) which have brought down communication costs and enabled the internationalization of business processes and services. The BPO industry has multiple categories, for example, horizontal process domains such as HR, logistics, or finance, or vertical specializations for example, medical transcription (health sector) and check processing and imaging (banking sector). Some vendors focus only on a single process for example, accounts payable in banking; others are more comprehensive and support multiple business processes within a single support area for example, finance. The more complex BPOs offer services to clients in multiple domains for example, a vendor may be responsible for HR, core processes in finance, and accounting, as well as customer relations for clients across different verticals. Another variation in the BPO relationship is the location from which they deliver the services to the client – same country, near-shore (like Canada and Mexico for US clients and Eastern Europe for Central European countries) and offshore locations (India, China, Philippines, Israel, South Africa, etc.). While the choice of location for the BPO service is primarily driven by cost, resource availability, and client comfort, the lifecycle activities, governance mechanisms and technology usage in the BPO provider and client relationship are similar, irrespective of the location.

Feeny et al. (2005) portray three competencies that BPO vendors possess, regardless of the domain and type of services they offer. *Delivery competency* – it is a measure of how well the supplier responds to the client's day-to-day operational requirements; *Transformational competency* – this represents how well the vendor is able to improve the outsourced services on dimensions of cost, quality, performance, etc.; and finally, *Relationship competency* – the extent to which the vendor is willing to invest in building a win–win relationship aligning client and supplier goals and incentives over the longer run. Feeny et al. (2005) also talk about the BPO vendor capabilities, which are critical for a successful relationship like business management, technology exploitation, process re-engineering, governance, program management, organizational structure, etc. Click and Duening (2004), while discussing the BPO relationship success factors, mention project management, IT integration, cultural integration, client involvement and commitment, governance, and goal alignment as some of the factors that need focus. A research survey of European clients by Bharadwaj et al. (2010) found that client firms focus on BPO outcomes for building successful relationship and the BPO outcome is highly correlated with BPM and IT management competence of the vendors.

Lacity et al. (2011) examined 15 years (1996–2011) of research by reviewing 87 empirical BPO articles in 67 journals and developed two models of BPO; one addresses BPO decisions and the other looks at the determinants of BPO out-comes. They find that while BPO decisions is determined by variables related with motives to outsource, transaction attributes, and client firm characteristics, the model of BPO outcomes has contractual and relational governance, country characteristics, and client and supplier capabilities as the determinants. Their review finds that studies related to supplier capabilities are limited to Human Resource Management capability and there is a gap in the study of supplier firm capabilities, in spite of the high dependence on supplier ability for BPO performance.

BPO vendors are developing and maturing their capabilities by adopting frameworks, best practices, and technology that have been proven in other industries. Defined processes and various IT architectures for delivering process outsourcing are being employed by BPO providers. The outsourcing process has defined stages such as feasibility study, transition, and execution to ensure the smooth transfer of the business process from the client organization to the BPO, and ongoing improvement on the process. Process outsourcing services are offered on different delivery architectures, from advanced offerings such as software as a service (SaaS), BPM platform-based process offerings, standardized processes using packaged applications, web-based collaborative process executions, etc., to basic process automation and even manual processing. The delivery architecture depends on the type of process being outsourced such as simple data entry, decision-making based on business policies and rules, or knowledge-based services. BPO initiatives are typically led by the business units in the client organizations, while the IT group is involved to identify data and system interfaces and integration with the BPO provider's systems. The partnership between client's IT group and the BPO's IT group is a required aspect of governance. While the dependency is high during the transition phase, it is also required on an ongoing basis to support and sustain operations, as well as the process improvements being brought in.

A BPO relationship passes through various lifecycle activities before it reaches a steady state, during which aspects related to process methods and technologies, process performance, organization structure, management, reporting, escalations, training, and governance are addressed. Given these characteristics of a BPO relationship and its apparent similarities to the BPM paradigm, we use a suitable BPM framework, which encompasses the aspects of process lifecycle activities, technology implementation, governance requirements, critical success factors, etc., to examine the BPO relationship through the BPM lens. Though handling cultural differences and governance mechanisms are critical to the BPO relationship, we do not examine these aspects in this chapter.

3 Business Process Management Framework for Analysis

A BPO relationship goes through various BPM lifecycle activities around the business process being outsourced and the technology used to implement the process along with other program management and change management issues related to training, client and vendor commitments, organization structure, roadmap definition, etc. An analysis of the BPM frameworks available today shows that they can be classified into two groups: Firstly, the maturity models and assessment tools and secondly, BPM lifecycle methodologies. The BPM maturity models provide a comprehensive view into the various elements of process management maturity and technology implementation, including governance and strategy. Notable examples of these are the BPM maturity model developed by the Queensland University of Technology (Rosemann et al. 2004),[1] OMG's Business Process Maturity Model (OMG 2008), Michael Hammer's Process and Enterprise Maturity Model (Hammer 2007), and Gartner's BPM Maturity and Adoption Model (Melenovsky and Sinur 2006). These models are quite comprehensive and detailed and appear to address the needs of assessing process management maturity. A BPO relationship starts with activities that are associated with the early stages of a typical BPM journey and hence they are not ready for such elaborate and rigorous assessments (Bhat and Fernandez 2008).

The BPM lifecycle views cover the various stages of the lifecycle of implementing BPM and show the linkages between different elements and the iterative nature of the lifecycle (zur Mühlen 2004). Mahmoodzadeh et al. (2009) propose a BPO framework based on BPM and knowledge management (KM) lifecycles to address the risks arising out of KM issues. They identify KM issues as an important set of risks in outsourcing based on a review of outsourcing models and frameworks. Tate and Ellram (2009) provide a framework for offshore outsourcing which considers several aspects relevant to the BPO relationship like stakeholder buy-in, top management commitment, relationship specific investment, etc. However, these frameworks and lifecycle models do not provide a holistic view of the lifecycle and enablers, such as governance, people aspects, etc.

To analyze the BPO relationship from a BPM viewpoint, we use BizPAD – *Bus*iness *P*rocess Management *Ad*option Framework (Bhat and Fernandez 2008) as it integrates the lifecycle model and the elements of the BPM maturity model covering process management and technology implementation. It covers measurements, monitoring, analysis and the feedback loop back to process planning. The framework facilitates identification of gaps to realize the promise of BPM. The granularity of the framework elements is designed to bring business and IT groups on the same page so that the activities and interfaces between IT and business are made visible. Organizations can extend and define the next level of granularity of the framework by linking it to methods, methodologies, tools, and standards for the different elements of the framework and publish it as the standard for their organization.

The BizPAD framework (Fig. 1) depicts the BPM lifecycle elements grouped under phases on one dimension and the lifecycle support ecosystem which covers the enablers for the lifecycle elements (standards, technology and methodology) along with BPM governance, people, and infrastructure as the other dimensions. The process lifecycle is separated into high-level phases, namely, *Create, Align,* and *Execute*. These phases and activities have been created to ensure segregation of activities related to business process design, IT design and implementation activities, and the operations and control type of activities. The governance aspects that

[1] Rosemann and vom Brocke (2014) provide a detailed discussion of the six core elements of the BPM maturity model. de Bruin and Doebeli (2014) demonstrate the application of the BPM maturity model in practice.

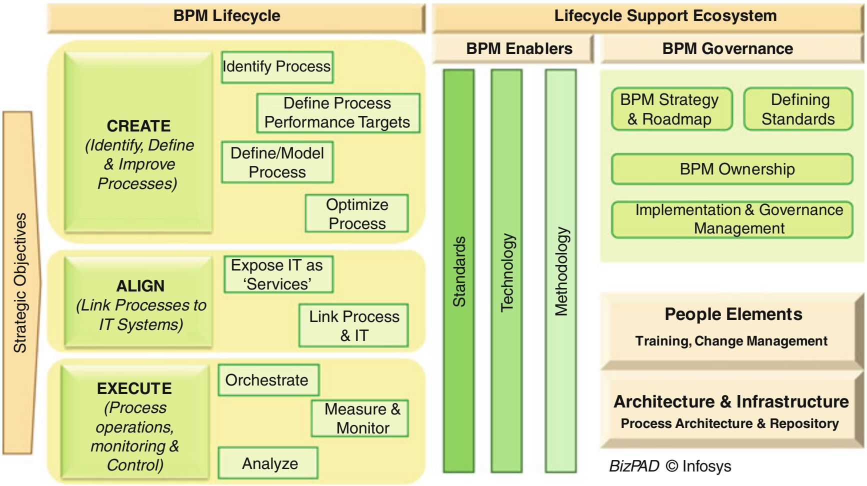

Fig. 1 BizPAD: the BPM adoption framework

support the BPM life cycle cover the BPM strategy and roadmap, role clarity in BPM, and ensuring consistency. The people elements cover change management, training, etc., while Infrastructure elements include process architecture, repository, architecture elements, technology library, and building blocks, etc. BizPAD helps blend the various individual elements of BPM into a harmonized entity.

We will use BizPAD to analyze the three BPO relationship case studies to understand all the BPM elements that are relevant in a BPO relationship: the BPM lifecycle activities, the BPM enablers, and other success factors, which form the ecosystem supporting BPM.

4 Case Study

Infosys BPO (IBPO) (http://www.infosys.com/bpo) is one of the highly rated offshore BPO providers with an employee strength of about 25,800 and revenues of $583 million (April 2012–March 2013). IBPO has 11 delivery centers across India, China, Philippines, Mexico, Brazil, Poland, and Czech Republic. IBPO, which started in 2002, has had a rapid organic growth with a focus on continuous process improvements along with an integrated process and IT approach and leading people management practices. The organization has adopted different frameworks to meet its improvement objectives for example, the Six Sigma process framework, ISO 9001:2001, eSCM level 4 amongst others. IBPO provides outsourcing with a focus on end-to-end business processes and functions and partners with clients to move from "operating" their business processes to “transforming” the business process through innovation, process re-engineering, and the use of technology.

In the following sections, we describe three outsourcing relationships of IBPO, which are at different levels of engagement maturity to bring out the variations and the relevance of BPM principles in maturing a BPO relationship.

4.1 Business Process Outsourcing Relationship 1: Maturing from Cost-Effective to Optimized

The client company, Alpha’s core business is to provide aggregated financial information, with a focus on accuracy and timeliness, to professionals and enterprises to help them in their businesses. In the process under study, Alpha aggregates data from various analysts and provides a consensus view to its clients on the expectations on each company. The outsourced segment of the process involves aggregating analysts’ estimates of company performance and share price forecast processing, consolidating the data, and sending it back to Alpha for further analysis. Earlier, Alpha used to purchase the aggregated data from a third party data provider, which was discontinued because of data, quality issues related to inaccurate data aggregation and summarization like incorrect averages, numbers’ mismatch, etc. Alpha then decided to manage the information aggregation process themselves by partnering with IBPO.

4.1.1 Process Details

Alpha receives data from different investment analysts and sources in various forms: e-mails, spread sheets, and documented reports like balance sheets. The outsourced process handled by IBPO focuses on the documented reports available in pdf and HTML formats. The process activities (Fig. 2) involve receiving the files, reading the textual data in the document, analyzing it, and entering relevant data into a database; essentially converting the data from an unstructured to a structured format. The data extraction falls under three categories, namely, earnings estimate, profiles data for key personnel in the companies, and analyst recommendations from all the major financial markets. Subsequently, the data is normalized for consistency in the usage of business terms and sent back to Alpha as an XML file. About 848,000 files per annum across 14 different languages (English, four Asian, and nine European languages) are received for processing. The volumes for the process peak in the month following a financial quarter end because of the various earning reports and company announcements being made.

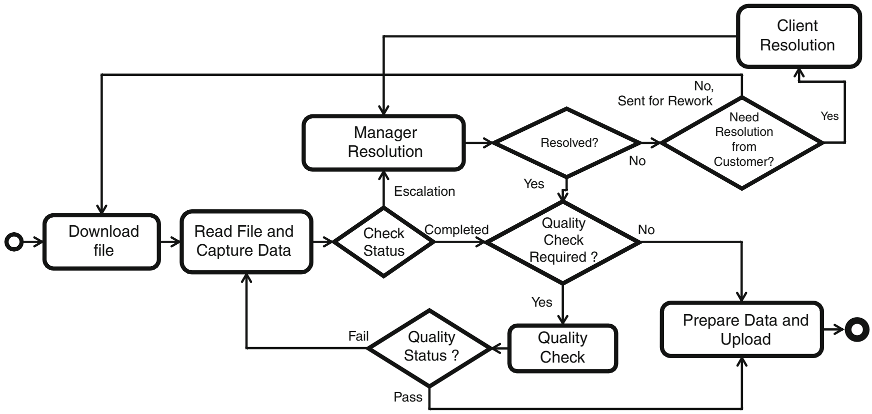

Fig. 2 Alpha's data aggregation process model

4.1.2 Challenges/Interesting Aspects

Alpha did not have the in-house process as it used to purchase the data from a provider. IBPO did not receive any process knowledge from Alpha, apart from some business rules, and consequently, the process hand-offs and other process details were not clear. Knowledge of applicable tools and methods was also not available. This meant that IBPO had to recreate the process from the desired end output specified by the client (which was an "XML" file).

In this regard, Alpha partnered effectively, by taking the responsibility of creating and maintaining detailed process documentation. It also handled the responsibility of ongoing training and maintenance of a knowledge management repository.

To handle the work in multiple languages, IBPO had to execute the process from three locations (India for English, Czech Republic for European, and China for Asian Languages). The process is executed 24 $\times$ 5 with employees working shifts across all the locations.

Alpha set aggressive tiered turnaround times (TAT) based on the importance of the company covered in the research report, starting from 4 h (Tier 1) and 12 h (Tier 2) to 24 h (Tier 3). Quality of deliverables was a critical aspect (99.5 % accuracy for the extracted data) so as to avoid the data integrity issues of the previous data provider.

Alpha is an integral part of the process execution as IBPO can escalate specific items to Alpha for clarifications. IBPO was, in some cases, asked by Alpha for the exact source location of the extracted data point. Alpha also requested many process changes as it was learning along with IBPO on this process.

4.1.3 Process Requirements

The tasks were related to varying complexities and languages with different SLAs, which could be handled by specific resource pools across geographies. This required focus on task allocation, queuing, and SLA tracking. Some of the task durations were more than the shift hours (8 h) with TATs less than a day and hence there was a need for coordination mechanisms to ensure that the work gets reallocated at the end of the shift to agents of the next shift. Task reallocation and support was another requirement.

Audits were introduced to meet the quality objectives. The customer, Alpha, audited the process only from the outcomes perspective and was not involved in the in-process details. For auditing and customer visibility, the traceability between the input file and the extracted data had to be maintained. There was also the requirement to be able to include the customer in a specific process instance.

4.1.4 Technology Usage

IBPO realized that the existing mechanisms of work allocation, tracking, data extraction, and consolidation which was facilitated using spreadsheets would not scale up to meet the needs of the process. The financial data aggregation process needed to be superimposed with the workflow and project management processes. Hence, the data aggregation process workflow was set up on a third-party BPM product to handle the task allocation and process handoffs between the various participants across geographies, namely, the manager, the agents, quality auditors and the client. This ensured allocation of work to different geographies based on skill and prioritization based on TAT and reallocation during shift change. In addition, the tasks allocated to each employee was prioritized and presented based on the time left to meet the TAT. The visibility provided by the BPM platform helped manage the TAT and quality requirements and added scalability and productivity improvements. Issue resolution was also handled by including an escalation mechanism in the workflow through the BPM platform, wherever customer input and feedback were required for completing the task. On completion of the task by the employee, tasks were assigned to the quality auditors for verifying the quality of work. The process was further automated by integrating and storing the inputs and outputs of the task as part of the BPM platform. This facilitated smooth transfer of a task between employees during shift change as the next shift picked up the task and started filling in data from the point where the employee from the previous shift had left.

4.1.5 Process Improvement

IBPO had committed on continuous process improvement to Alpha at the beginning of the contract. While Alpha provided continuous feedback based on its domain and process knowledge to improve the process, IBPO team used Six Sigma techniques and technology solutions for process optimization. These focused on reduction of defects, efforts, etc., and productivity. Given below are a few examples:

- Initially, IBPO spent a lot of effort in review. To minimize review effort and yet maintain quality levels, instead of auditing every file, a quality control algorithm was developed based on employee performance and learning theory. This enabled the planning of an optimal number of audits based on the need so as to ensure quality levels. Once all the anomalies were corrected, the file was packaged as an XML output file, validated for good form, encrypted and posted back to the client.
- Knowledge Management was introduced by storing the inputs and feedback received from Alpha on various escalations in a knowledge repository for reference at a later date. This improved the productivity, TAT, and reduced the customer involvement required going forward.
- As process knowledge was not strong initially within the IBPO, there were a lot of escalations to the client. Later, IBPO found that 50 % escalations were solved by the customer by referring to data from their terminals. IBPO requested access to the customer terminals and integrated it with the process flow, further reducing the need for customer involvement.
- Utilization levels were improved by training the employees on multiple languages and allocating primary and secondary languages, tiers, and priorities to them. Task allocation and queuing on the BPM platform was leveraged to support this. IBPO was able to transfer all the work from Czech Republic to the China center as the Chinese employees learnt three languages and were able to handle all the European language requirements. Currently, this process operates out of India (110 people) and China (125 people).
- Many technology solutions were integrated with the workflow setup on the BPM product to improve the process.
- Automatic case creation and allocation to employees based on the input pdf file and the language tag of the file picked up directly from Alpha's servers replaced the manual download and task allocation by the IBPO managers.
- Use of *Poka Yoke* (Mistake-proofing): Important data and figures in the unstructured data were highlighted and color coded using text mining and knowledge engineering technologies to ensure that the employee did not miss it.
- Reducing waste of motion: two screens to provided the employee to eliminate the switching between windows.
- Improved Data capture through the use of a "point and shoot" solution: instead of copying data from document to the data entry screen, the point-and-shoot application replicated the selected data to the desired field in the data entry screen.

- Auto population of data based on business rules.
- Regular update to Alpha was done usually through daily, weekly, and monthly reports. Now, a dashboard is being developed on the BPM platform to provide real-time visibility to Alpha.
- Initially, IBPO could not contest the SLAs and TAT set by Alpha because of lack of historical data. At times, IBPO found it difficult to meet the stringent TAT while maintaining quality. But, once IBPO was able to demonstrate predictable and improving process performance through the application of various methods and technologies, Alpha was able to appreciate the need to revise the SLAs. Subsequently, Alpha and IBPO worked together to baseline suitable SLAs for the outsourced process which could meet the requirements of both Alpha and IBPO.

4.1.6 Critical Success Factors

Many of the success factors for a BPO relationship are visible in the IBPO–Alpha relationship such as process ownership, organization structure, usage of technology, client commitment and involvement, program management, and goal alignment. IBPO's organization structure had a dedicated operations team (Ops), which handled the execution of Alpha's process, and a central Transformation Solutions Group (TSG), which provided the technology solutions and support. The effective synergy between Ops and TSG had been one of the core foundations for success. While Ops identified process improvements based on process execution data, TSG looked at improvements through technology implementation. The Ops team owned the process and hence took complete ownership of the application with detailed involvement and provided the requirements for the BPM technology implementation. The Ops team established an effective feedback mechanism on process changes which resulted in new feature requirements on the technology. The BPM platform enabled TSG to adopt an iterative development methodology and provided frequent releases of the application instead of a big bang approach. The use of BPM technology enabled the TSG team to measure and analyze the process KPIs and report improvement in the process against the process KPIs. Though the decisions on process design and technology architecture were taken by IBPO, Alpha was involved in reviewing and providing feedback. Alpha's commitment and involvement could also be seen from the ownership it took for training, process documentation, and knowledge management. IBPO's process execution framework established interfaces with Alpha's people (escalation resolution) and technology (direct access to customer terminals and file upload/download). IBPO's strong program management capabilities were supported on the BPM product and regular reporting to Alpha was another factor contributing to the success of the relationship. The joint fine-tuning of IBPO's goals and deliverables to Alpha ensured that both Alpha and IBPO met their business objectives.

4.1.7 Impact of the Business Process Management Initiative

IBPO was able to scale its process volumes and increase productivity because of the process changes and the technology architecture used. The increased productivity (50 % improvement in TAT) of IBPO resulted in a capacity creation within IBPO for Alpha. Alpha was able to scale rapidly and introduce new product lines to their customers much faster at no additional cost. The outsourcing relationship which started with an objective of cheaper and better data 5 years ago matured to provide newer capabilities to Alpha. This resulted in additional processes being planned for outsourcing. Apart from the business benefits, IBPO also benefited from increased employee morale.

4.2 Business Process Outsourcing Relationship 2: Eliminating the Work

Beta is a financial services organization operating in the US and Europe offering credit cards and a variety of loans and savings products. The outsourced operation is a part of the process which handles credit card application processing at Beta. The credit card application process can originate through three different channels in Beta. The applicant calls up Beta and the Beta representative enters information about the applicant (caller) into the origination system, and a form along with terms and conditions is mailed across for signatures and any modification (if required) by the applicant. Alternatively, the applicant can fill in a physical form and send it to Beta or the form can be filled online through the internet by the applicant. The first two scenarios result in physical forms. The process work outsourced to IBPO involves the data extraction from these physical forms and creation of structured data to be fed into the origination system. The origination system then does the credit verification with the various bureaus before making a decision. This process, "keying-in process" given in Fig. 3, was transitioned from an existing vendor to IBPO.

4.2.1 Process Details

Beta scans the physical credit card application forms, creates batches of a maximum of 25 applications and sends it to IBPO through a secure channel. IBPO employees read the data from the scanned image and key it into specific formats. A prespecified format is provided by Beta to IBPO for different application form templates (initially there were 25 forms). The data in the prespecified format is sent back to Beta by the batches received. The volumes for the process ranged from 2,000 to 6,000 credit card applications per month. The scope also includes

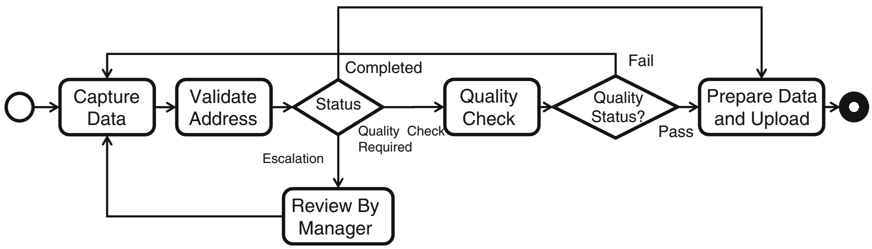

Fig. 3 Beta's keying-in process model

"Managing Exceptions" which focuses on addressing errors found in the keying-in process. IBPO employed 19 people to handle the two processes.

4.2.2 Challenges/Interesting Aspects

This process was earlier serviced by another vendor. On analysis of the process, IBPO decided that the existing vendor's processes and tools for managing the process execution were not very suitable and decided to recreate the process and the supporting tools. As part of the transition process which lasted 3 months, the IBPO team studied the process and created a detailed process manual right down to the key stroke level. As Beta had expectations of 90 % compliance to the prespecified format and data quality, IBPO built in checks and counterchecks into the process to enable mistake-proofing.

Beta introduced new credit card application forms based on business needs, to the existing 25 different forms. This introduced new prespecified formats for IBPO to key into, requiring changes in task steps and technology. Illegible writing in the scans received from Beta and typos by IBPO employees introduced errors in the output file. TAT SLA agreed with Beta was 12 h for 70 % of the batches with the remaining 30 % to be completed in 24 h.

4.2.3 Process Requirements

The TAT is applied to each batch received from Beta; hence, the task allocation had to be done such that a batch could be split and handed over to different employees for parallel processing of individual applications. Here, there was a need to split a batch and consolidate the work back into a single output file before sending it back to Beta. On analysis, IBPO realized that processing a batch sequentially took 75 min, whereas if it could be split up, the time could be brought down to 3 min. For this, the batch needed to be split up into separate cases, each with a unique identifier, so as to enable consolidation postprocessing. This step to handle batch splitting had to be integrated with the keying-in processes. Shift support was another requirement, as the TAT was greater than the shift duration.

The process was heavy on key strokes, with 25 different types of application forms with an average of 299 fields in each form. Hence, reducing keystrokes was essential for increasing the productivity and reducing errors. In addition, the process had to incorporate the stringent quality audits to ensure compliance.

4.2.4 Technology Usage

TSG built an application, "keying-in application," on a third party net-based BPM platform using the detailed process manual created by the Ops team. The keying-in application is used for work flow management, allocation of work, work prioritization, queue management, escalation, monitoring, and audit. The IBPO team leader can allocate and reallocate work items to the employees who can directly fetch the work items from the system and key the data into the forms. Forms are built into the system with built-in data validation checks. New forms can be designed quickly based on new credit card application templates of the customer. The system saves the data from specific forms into the designated prespecified file formats. Form-specific quality audit checks are facilitated by the keying-in application by linking the relevant audit checklists. The "keying-in application" is integrated with Beta's software through file uploads to ensure transfer of input batches from Beta and output files from IBPO.

4.2.5 Process Improvements

The main objective of process improvements was to extract the data from an image and key it into a form in the least time with zero errors. The Ops group studied the process execution to create a key stroke level process model and made the operating procedures more robust using methods such as Failure Mode and Effect Analysis (FMEA), leading to better process control. Some of the process improvements done were: Identifying critical and noncritical fields in the form, because for the noncritical fields, the cost of validation was more than cost of error. New processes were defined as in the case of similar names of prospective customers, for which rules were defined to identify whether it was a name change application or a new applicant. This was codified as business rules on the system to auto-update fields and disable edits by the key-in on certain fields.

TSG provided innovative technical solutions to improve key stroke level performance; such as multiple page images to reduce waste in motion, double keying for critical data fields, highlighting missing mandatory fields, auto-update of some fields based on business rules, etc. IBPO studied the credit card application and suggested changes in the template to Beta to reduce the data entry effort and errors. This in turn helped Beta improve its web-based origination application. The suggested changes also include implementing Optical Character Recognition (OCR) for the process. This will reduce work in keying and is expected to result in 30 % productivity improvement.

The errors in entering the address fields because of illegible scan or typos has been reduced by integrating the application with the postal system's address database for carrying out address validation. This also reduced the number of fields to be typed in. The reduction in the errors in the data entry in turn reduced the workload on the downstream process of Manage Exceptions (also handled by IBPO) which used to handle the errors and other exceptions discovered during quality checks.

4.2.6 Critical Success Factors

Process re-engineering supported by technology was one of the factors that contributed to successful transition of the process to IBPO. During the transition phase, IBPO analyzed the process, redesigned it, and implemented it on a BPM platform before taking over the process from Beta's existing vendor. The role clarity and ownership of the Ops and TSG team in process redesign and process improvements exercise was another factor. Further, process integration with third-party data providers and technology usage provided improved process performance. Client commitment and involvement was an important contributor as Beta was involved in all the key stages of the process and application design and validated it at all stages. Beta even invested into the building of the application by IBPO.

4.2.7 Impact of the Business Process Management Initiative

IBPO has been able to increase the acceptance of the applications by 30 %, which has reduced the need for Beta to go back to the credit card applicant for further validation. The team also achieved a reduction in the number of exceptions to be managed, bringing it down from 30 to 5 % currently. Since this process was charged to Beta on a per transaction basis, the cost of the process to Beta has reduced considerably. Further, the new enhancements implemented have resulted in productivity benefits to the tune of 30 % (at peak volumes). Other suggestions by IBPO, such as form redesign and improvements in its web-based application, when implemented, can drastically reduce/eliminate the need for the keying in.

The process improvements carried out by IBPO reduced the number of people required to handle the processes. While the improvements were done at IBPO's initiative, its revenues went down because of reduced billing. Such situations typically create a conflict of interest for the BPO vendor in pursuing improvements. Mature client–BPO relationships will look at the bigger picture of reducing overall cost and resource requirement so that more processes can be outsourced. In this case, IBPO has been able to win other process outsourcing contracts from Beta based on the benefits delivered through process excellence.

4.3 Business Process Outsourcing Relationship 3: Stabilizing for Predictability

A global bank, Gamma, with employees across different geographies outsourced its HR support processes to IBPO. The outsourced process here is to provide first and second level support for all HR process areas in the bank, and covers the following areas: HR Helpdesk, Payroll second level support, people and positions related. The HR Helpdesk provides voice/e-mail support to employees on all HR-related matters with average calls per month handled in the range of 10,000 whereas the e-mails responded to are in the range of 4,000 per month. The Payroll support covers running defined payroll-related reports and correcting errors. The SLA for this process is completion of the daily defined tasks (certain set of reports each day of the month) by 6 pm, with an accuracy of 100 %. Pay roll run is done at 6 pm on Friday on a fortnightly basis.

The people and positions support pertains to the areas of organization structure, new code creation, letter of offers, etc.

4.3.1 Process Details

IBPO executes this process from a single location. The calls are routed to IBPO through an IVR through which the IBPO employee responds to Gamma's employee queries and requests. The e-mail support is handled by responding to the e-mails on Gamma's mail system. IBPO employs 27 people to handle the HR helpdesk. The payroll processing is done on Gamma's SAP system, which is accessed remotely by IBPO.

4.3.2 Challenges/Interesting Aspects

Gamma was new to process outsourcing and was not able to appreciate the need for a proper "discovery" phase before the process was transferred, owing to which this phase was shortened significantly. While Gamma did not invest enough resources into transitioning the process, IBPO on the other hand underestimated the complexity and variability in understanding the HR processes and policies. Further, the staffing of the IBPO Discovery and Transitioning team also was not of the right skillets. As a consequence, IBPO's understanding of the HR Helpdesk process was not complete and this increased the time taken to transition and stabilize the voice support process. These issues were subsequently addressed through proper training involving both Gamma and IBPO.

As most of the processes can be executed only on Gamma's systems, the task allocation, tracking, and reporting happens in a disjointed manner on IBPO's application. The process flow and the project management processes are currently not executed in an integrated manner.

4.3.3 Process Requirements

Knowledge management and training were identified as a critical aspect of this process as the process tasks were complex and knowledge-intensive. The payroll processing support, which has an accuracy requirement of 100 % with a 6-pm deadline everyday, has stringent audit requirements. In view of the stringent quality requirements, a comprehensive auditing plan was introduced. The auditor is either drawn from the peer group or the team leader; this group is supplemented by auditors from the Quality Group. The audits are carried out based on sample transactions chosen. The e-mail support for the HR Helpdesk before outsourcing operated from 8 am to 5 pm. After the process was transitioned to IBPO, they suggested to the client on having three shifts in India to ensure more complete coverage and also to complete the daily work backlog. This has helped improve performance as well as customer satisfaction.

4.3.4 Technology Usage

In the initial stages for this client, IBPO used an excel-based tracking mechanism which was supplemented by an MS-Access tool for tracking SLAs and productivity. Subsequently, the Ops and the TSG groups partnered to build a new tool, the Operations Excellence Management system (OEMS) to facilitate the SLA and operations data reporting and tracking. IBPO has recommended a set of enhancements to Gamma's SAP system to help in improving the process. These recommendations are currently being taken up for implementation.

4.3.5 Process Improvement

The splitting of the HR Helpdesk workforce from one shift (as planned initially) to three shifts helped improve the process performance significantly. The HR Helpdesk is intended to address six streams of HR areas as per Gamma's requirement. To ensure better resource utilization, IBPO initially organized the helpdesk as a single resource pool, which was expected to be well-versed with the processes and policies of all the six HR streams. This was difficult to manage both from training and work allocation perspective. Subsequently, IBPO found it better to split the helpdesk such that each HR stream is supported by two dedicated groups who received specific training. This helped in better performance because of the specialization of the workforce along different tracks.

A Wiki has been planned to capture the knowledge of the IBPO team as it learns the process.

4.3.6 Critical Success Factors

This relationship is fairly new and as such the emphasis has been more on stabilizing the processes transitioned. IBPO and Gamma faced some initial challenges as they did not focus on certain critical factors such as client involvement, goal alignment, and process knowledge. These were later addressed through focused analysis of the process and appropriate training to suit the client's specific contexts. BPM technology implementation to integrate the process workflow with the program management processes is another factor which could not be leveraged here as the clients systems are not yet integrated with the IBPO systems.

4.3.7 Impact of the Business Process Management Initiative

This relationship took some time to stabilize because of the factors mentioned above. Today, the client appreciates the process improvements made by IBPO as the turnaround time and the quality of the HR Helpdesk improved considerably from the pre-outsourcing levels. IBPO has the challenge and the opportunity now to deepen this relationship by bringing in more aspects of BPM for example, a BPM-based workflow to integrate IBPO tracking systems with the client's systems.

4.4 Case Study Analysis

The three outsourcing relationships described in the previous section exhibit different levels of BPM adoption and BPO relationship maturity. We analyze the BPM applicability in the three cases by exploring the usage of various BPM principles and lifecycle activities using BizPAD.

4.4.1 Strategic Objectives

IBPO's strategic objective is about reducing the resource cost per transaction in addition to increasing customer satisfaction and revenue growth. Most of the process improvements across all the cases studied detail IBPO's efforts toward meeting these objectives. The IBPO's client objectives are also met as the SLA and commitments on improvement defined at the beginning of the transition are driven by the clients. Alpha's objective was to improve the quality of financial analysis and estimates and the process design, which focused on reduction of error in data consolidation, was geared to achieve this. Beta's objective of reducing cycle time for processing the applications was achieved by reducing the exceptions and the need to go back to the applicant for more details. Goal alignment, which is one of the critical success factors of a BPO relationship, is about ensuring that both the

BPO vendor and the client are able to decide on mutually agreeable targets in line with the organizational needs of each party. The BPO should be able to balance the SLA's set by the client and its own business objectives.

4.4.2 Business Process Management Lifecycle

The BPM lifecycle covers all process and technology activities starting from process identification to analysis of the results.

Create (Identify, Define and Improve Processes)

The process selection in an outsourcing relationship is usually done by the client organization with defined process performance measures in the form of SLAs, with the BPO being involved in some of these cases. The process outsourced is usually a segment of the end-to-end business process of the client, but could also be the entire process. The outsourced processes execution involves the task of execution, quality check, escalation, consolidation, and communication. The process re-engineering capability of the BPO along with technology exploitation and integration is a critical requirement for the success of the outsourced process execution.

The BPO organization does its own assessment of the SLAs and process scope during the discovery and transition phase, and this helps to identify the exact start and end points of the process along with the process details and the commitments that can be made to the client. It is also critical for setting up the delivery architecture and technology infrastructure. As in the case of Alpha and Beta, the process starts at the point at which the files had to be accessed from the client location, which required access to client servers and infrastructure for secure transfer. The Ops group in IBPO also looks at process optimization before transitioning the work; this could involve redesign of the process as in the case of Beta where the batches were restructured before processing. The TSG group looks at process optimization using technology which involves using BPM platforms, automation, and usage of specific technology capabilities such as OCR, etc. The Ops and TSG need to work together along with the client to ensure an optimized process. The shortened process discovery phase which did not allow for proper understanding of the process by IBPO in the Gamma case hindered the efficient transition of the process to IBPO. The BPO organization needs to superimpose the project management activities like case creation, task allocation, shift handling, and quality checks on the outsourced process flow. A typical BPO process to handle an outsourced process is given is Fig. 4. All these activities are supported by a workflow or BPM engine.

IBPO accepted the targets imposed by the client on resource utilization, turn-around times and throughput based on the experience of the people involved in transition. IBPO could have contested the very stringent TATs Alpha expected right at the beginning by using simulation. Similarly, the reallocation of the European

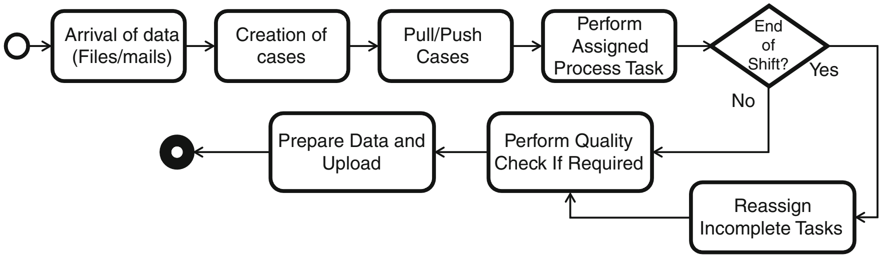

Fig. 4 A typical BPO process

language work to China and improving resource utilization could have been verified for performance requirements using process simulation. In the case of Gamma, the resource allocation for the voice-based helpdesk and the splitting of work into six streams could also have been verified using this approach. While most of the BPO processes are human centric, the sequencing of tasks, usage of technology, scheduling, and allocation of resources can be simulated to verify the outcomes before making any commitments. BPOs can use process simulation and what–if analysis for identifying process bottlenecks, deciding on capacity planning and process redesign decisions, which will help in negotiating the SLAs in the initial stages of the outsourcing relationship.

While IBPO uses Six Sigma principles, we find that other process improvement and optimization methods like lean principles (Womack and Jones 2003), application of process patterns (Reijers and Mansar 2005) are also visible in the three case studies. We have tried to identify some of the important process improvement patterns that are visible in the case studies. The KM solution implemented in Alpha and Gamma cases reducing the need to contact the customers is a case of "*contact reduction*" pattern. In the Beta relationship, getting the data from the postal system address database for validating the address fields is a typical example of "*trusted party*" pattern. The "*Integral Business Process Technology*," "*Flexible allocation*," and "*task automation*" are patterns which are used in all the three cases. In Gamma the *Specialization–Generalization* pattern is visible where IBPO initially tried generalization to improve the HR Helpdesk utilization. On realizing that the effort required to sustain quality with generalized resources was extremely high, they switched back to regular ways, still managing some generalization by training candidates in at least two streams. In the Beta relationship, data validations were introduced at the time of data entry into the field, unlike most web-based forms where validation happens at the time of submitting the form. This is an example of the usage of the Lean principle wherein checks should be as near as possible to the occurrence of error, in space and time. Bringing address validation from the Manage Exceptions stage to the keying-in stage is another example of the usage of Lean Principles. Eliminating the switching between windows, thus reducing some motion, which was used in Alpha and Beta, is another example of Jidoka, one of the Lean principles.

Align (Link Processes to IT Systems)

The linkage between process and IT is very strong in BPO executions. IBPO has interfaced wherever possible with the client's IT systems and external data providers to leverage the services offered (access to Alpha's terminals to resolve escalations, data from postal systems in the case of Beta) and also integrated technology-based process improvements into its BPM platform. But a strong example of BPO technology platform using business services and functionality available on the client's systems is not showcased in the above cases. Such a possibility exists in the Gamma relationship; if IBPO can seamlessly integrate the OEMS, their operations management system with Gamma's mail system and SAP system, this would enable IBPO to execute the entire process on the OEMS while invoking the business and technical services on Gamma's systems.

Execute (Process Operations, Monitoring and Control)

The BPM platform-based applications in Alpha and Beta ensure that process orchestration happens through the BPM engine using features such as automatic task creation and allocation, handoffs, issue escalations, etc. The measurements and monitoring of critical performance parameters such as TAT, SLAs, throughput, defects, cycle time, etc., are handled by the same applications. The dashboards being built by TSG provides real-time visibility even to the clients on various process parameters. The process data captured by the BPM platforms is used by Ops to analyze the process further and identify improvement opportunities.

4.4.3 Business Process Management Enablers

The BPM lifecycle activities are enabled by following established standards, methodologies, and technologies within the organization. These form a part of the ecosystem that supports the BPM lifecycle.

IBPO has established the standards, methodologies, and technologies to be used for managing its outsourcing relationships. The Ops group has defined the four-stage outsourcing methodology with standards and guidelines for different activities. Six Sigma techniques are used for process improvements. Process modeling guidelines and modeling tools are decided by Ops. TSG sets the standards for the technologies and the technology architecture to be used, including the security requirements. For example, the BPM platform along with most of the other applications within IBPO are .net based and hence technical resource availability will not be an issue.

4.4.4 Business Process Management Governance, People, and Infrastructure

Another critical part of the BPM lifecycle support ecosystem is the BPM governance covering roadmap, governance structure, ownership, and implementation.[2]

Business Process Management Roadmap and Strategy

IBPO has a roadmap and strategy for technology deployment for each BPO relationship as can be seen from the Alpha relationship. While there has been some evidence seen, there is an opportunity for a deeper, joint partnering between IBPO and the client (including business and IT groups) to create a long-term BPM strategy spanning the relationship and not just a single process. This would call for long-term commitments from the client organizations with incentives to IBPO to offset the reduced billing due to the improvements.

Business Process Management Ownership

Most of the outsourcing relationships are led by the business in the client organizations. The involvement of the IT group in the transition phase is critical for defining the SLAs and improvement objectives of the business process (Tornbohm and Kyte 2008). As can be seen in all the three cases, IBPO requires the data and interface to the client's IT systems to bring in the efficiencies and innovation required in the processes. Hence, the client's business and IT group need to be involved in the governance of the relationship. The process ownership was clearly distributed between Ops and TSG in IBPO and both groups worked on ensuring success of the relationship by focusing on their core competencies. Each relationship has a defined team structure with team leads, process executors, auditors, and managers which ensures the implementation of the defined processes and standards. The client commitment and involvement was also clearly visible in the cases of Alpha and Beta.

People Aspects

The transition and parallel-run stages of the outsourcing methodology provides for handling the training and change management aspects for the IBPO employees in the outsourcing relationship. Many of the process improvements by IBPO resulted in reducing/removing the mechanical tasks of the employees and improving the job

[2] For a general introduction into BPM governance, refer Markus and Jacobson (2014), Spanyi (2014) and Rosemann (2014).

Table 1 Comparison of the critical success factors across the cases

BPO relationship critical success factors	Covered under the BizPAD framework element	Alpha	Beta	Gamma
Process re-engineering	Create	Strong	Strong	Good
Technology exploitation/IT integration	Align	Good	Good	Weak
Project/program management	Implementation and governance management/change management	Strong	Strong	Good
Client involvement and commitment	BPM ownership	Strong	Strong	Weak
Goal alignment	Strategic objectives/BPM strategy and roadmap	Weak (initially) Good (later)	Weak (initially) Good (later)	Not visible
Governance	Defining standards/ governance management	Not analyzed	Not analyzed	Not analyzed
Organization structure	BPM ownership	Strong	Strong	Good
Cultural integration	People elements	Not analyzed	Not analyzed	Not analyzed

content, thus improving motivation. This contributes to reducing attrition which is a challenge for most BPOs.

Process and Technology Infrastructure

The technology and process infrastructure forms the backbone of the entire BPO relationship and needs special focus. The TSG and Ops group work with other departments within the BPO to provide and enable this infrastructure.

The critical success factors of a BPO relationship are addressed through the various elements under BPM. Table 1 provides a summary of the critical success factors of a BPO relationship, the BPM framework element that covers them and a comparison[3] of the three IBPO cases.

Another dimension of analysis of the three relationships can be from the maturity of the BPO relationship. Carnegie Mellon University has developed eSCM-SP, a best practices model for service providers in IT-enabled sourcing and eSCM-CL, for client organizations seeking to improve their sourcing capabilities and relationships (CMU 2006). While the eSCM can be used to assess the maturity of BPO vendors on their IT-based process services capabilities, it is not suited for assessing the maturity of the BPO relationship. From the three cases, we find that the relationships are at differing levels of BPO relationship maturity based

[3] For rating the relationships we use the following scale: Strong, Good, Fair, Weak, Absent/Not Visible/Not Analyzed.

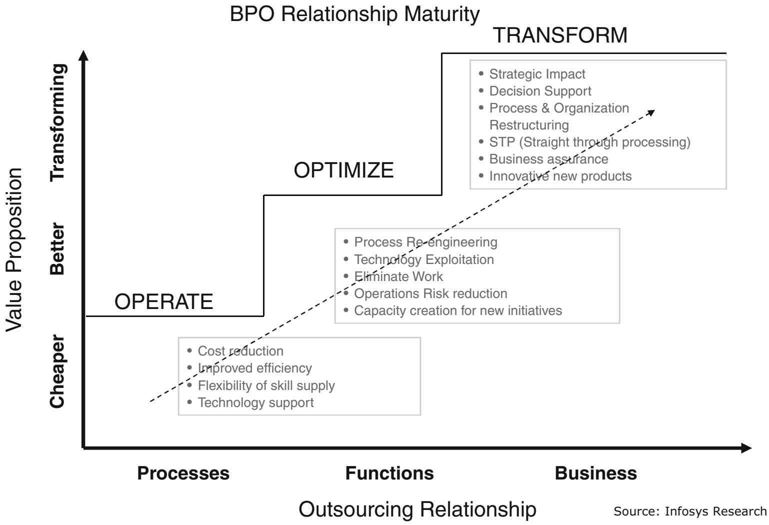

Fig. 5 Proposed BPO relationship maturity model

on the value proposition of the relationship to the client. While the value proposition may also depend on the type of outsourcing relationship (single process, multiple process or multiple functions and domains), the BPO vendor capabilities and BPO success factors play an important role in the BPO relationship maturity. A BPO relationship maturity model can be developed based on the value proposition of the relationship and the type of outsourcing relationship. We propose a BPO relationship maturity model in Fig. 5 based on our experience and analysis of the BPO relationships we studied. The critical success factors discussed above, along with the BPO vendor capabilities and the client's commitment to the outsourcing relationship, determine the maturity of the BPO relationship. These parameters can be mapped to the maturity levels to create a detailed maturity model. BPM maturity models would also serve as a good input to create such a model as BPO relationships' critical success factors can be mapped on to a BPM Framework.

The Alpha relationship began at the "Operate" level and has subsequently matured into a substantially higher level in the "Optimize" space and currently provides newer capabilities to the client. Similarly, Beta relationship started at Operate level and has matured into a level comparable to Alpha. The Gamma relationship is fairly new and, after initial hiccups, is stabilizing at the Operate level.

We have analyzed BPO relationships from the different requirements of BPM covering the BPM lifecycle activities and elements of governance. We find that adoption of the different BPM elements will help BPO vendors and clients mature their BPO relationship to provide higher value proposition.

5 Conclusions

BPO providers can take their relationships with clients to a higher level of maturity, improve their value proposition and enable further growth by adopting BPM principles. BPOs apply process improvements and technology solutions based on an individual's experience and expertise and achieve reasonable benefits, but a structured approach using BPM will provide for transformational benefits and impact. The process modeling, optimization, and simulation methods of BPM act as enablers for BPO. The critical needs of BPO are related to agility and flexibility, process routing, multi-site execution, human centric workflows, process visibility, etc. which have a good fit with the promise of BPM technology. While BPOs enable the process execution through BPM technologies, the full benefit is not realized until the BPM platform is completely integrated into the client's systems. A seamless integration would provide client managers with higher visibility into the details of the process execution and alerts and escalation on noncompliance to policies and performance requirements. The governance structure and ownership with involvement from all stakeholders is critical for the success of the BPO relationship. We found that the BPO relationship's critical success factors can be mapped on to the various BPM requirements. While we analyzed BPOs from a BPM point of view, further research and analysis needs to be done on the specific needs of BPO providers from BPM methodologies and frameworks. Our research indicates that the BPO can uncover significant insights for improving the way it approaches its relationships. We encountered a relative vacuum in terms of academic literature in the BPO space from the viewpoint of the service provider. Specifically, we see considerable value in further research on how the BPM Framework can be leveraged to take the BPO relationship to higher levels of maturity. We also propose a BPO relationship maturity model that can be developed with inputs from existing BPM maturity models.

Acknowledgments We would like to thank Satish Nair, Bipin Nambiar, Alex Joseph, Sudhir Chandran and Yogesh Jagga of Infosys BPO for providing the required information and data on the different case studies. We also thank Shivi Mithal from the BPM Research Group at Infosys for his inputs and comments.

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Toward a Global Process Management System: The ThyssenKrupp Presta Case

Stefan Novotny and Nicholas Rohmann

Abstract This case provides experiences from ThyssenKrupp Presta, an automotive supplier company that provides steering systems for carmakers worldwide. Process orientation has been a focus for years and has had influence on the organizational structure already about 15 years ago. In 2005, the formation of a BPM organization was targeted to realize process harmonization in post-merger projects, canalize the application of IT systems for process automation and take process orientation to a higher grade of maturity using state-of-the art process modeling systems. This chapter presents a summary of experiences out of the work of this BPM organization, which leads process harmonization and process improvement projects worldwide within Presta. Our experiences show that process management needs a good organizational, structural and technical (BPM-tool) foundation, and also relies on the involvement of the affected people and a process organization that consists of the key players in the operation devices of the company. At Presta, a sustainable process definition, process implementation, and continuous improvement had to be supported and governed by the corporate BPM organization. Presta considers the most important role to be the process owner who – across all locations – releases a process and decides on the necessity and size of changes and improvements.

1 Introduction

Automotive supplier companies today are faced with intensive external pressure of providing new, energy-saving technologies and at the same time outdoing their competitors pricewise in new projects as well as providing annual rationales for their customers on running products. In recent years, the focus in ThyssenKrupp Presta – as in many others of the branch – often lay on the optimization of processes

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_20,

in production and close to production to bring down the costs and master these market challenges. In the meanwhile, production processes are very near to maximized optimization while there are still high potentials to be realized in the business processes of development and other indirect business areas.

2 The Case Organization ThyssenKrupp Presta

The authors have gained experiences in global BPM projects at ThyssenKrupp Presta, an automotive supplier company that provides steering systems for carmakers worldwide. With over 4,000 employees in 16 locations worldwide, Presta produces steering shafts, steering columns as well as hydraulically or electrically power-assisted steering gears generating a turnover of more than 1,000 Mio €. Customers are many of the big passenger car OEMs, including the Volkswagen Group, Ford Group and others. Presta has their own strong technology and R&D departments providing the latest steering technology to OEMs worldwide. Product development is done in customer-driven projects often including complete platforms. While most part of the development work is done in the headquarters in Eschen, Principality of Liechtenstein, there are development sites in Germany, Hungary, USA and China, creating the need for international collaboration in R&D projects. Business processes have to provide continuous and flawless collaboration and information flow through these development sites as well as to and from the production sites.

In 2005, a global initiative was started, founded on a team of 5–10 people, involving 11 of the 16 locations worldwide in the first step (making for approximately 70% of the more than 4,000 employees) and targeting on, including all locations, toward 2015. The key objectives for the involved projects were

- Post-merger integration of an acquired OEM division
- Clarification and optimization of interfaces across divisions and locations
- Reduction of involved IT systems and establishment of common databases
- Setup of a global process landscape and management system

In the following, lessons learnt from these projects are reported. While the source of knowledge mainly stems from internal experiences complemented by talks to experts from both academia and business, the authors are convinced that these findings may well be transferable to other settings.

3 Strategic Alignment of the Business-Driven Approach

The main objective of the automotive supplier company ThyssenKrupp Presta is to focus on their business excellence in the indirect processes to strengthen its success factors (Fig. 1) identified as synergy, transparency, quality, speed and sustainability.

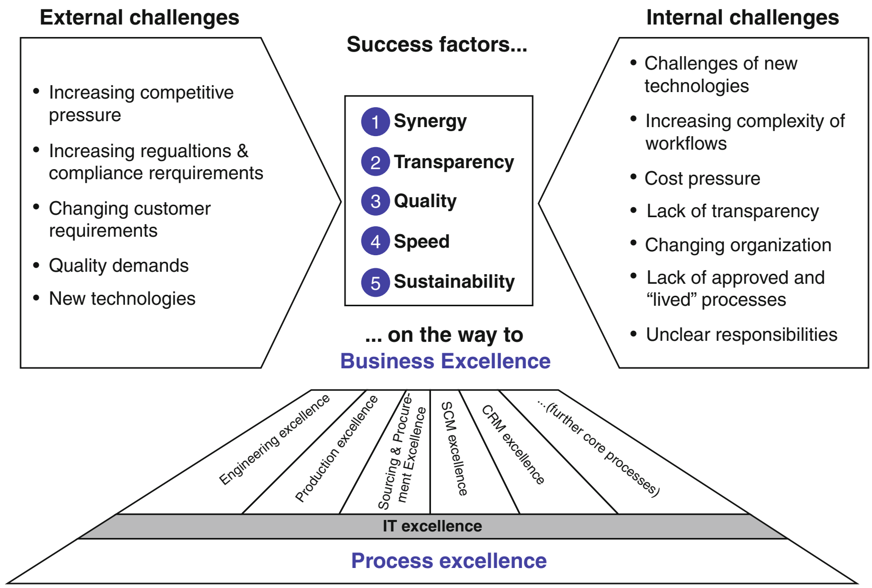

Fig. 1 Internal and external challenges require worldwide acting companies to have a strong process orientation and a continuous corporate management system

Other challenges are

- Still rising levels of quality are required from the start of production on
- Rising demands for compliance to international standards (ISO 16949, etc.) vda qmc (2002)
- Rising governmental and customer restrictions to be considered in new projects
- More complex products due to higher functionality in modules and systems and due to more electronics and software in products

For the Presta, this means to concentrate on the effectiveness and efficiency of indirectly productive processes – the ones that "are manufacturing information" instead of touchable products. To improve these processes and their performance is the motivation and objective of our corporate process management system (PMS).

Derived from the company vision, the vision of process management in the considered company was to bring the whole organization to a higher level of maturity by driving

- Process definition and standardization
- Process documentation (sustainable knowledge management)
- Process (and sometimes IT system) governance
- Process culture and sustainable implementation of a process improvement organization within the operation divisions (Fig. 2)

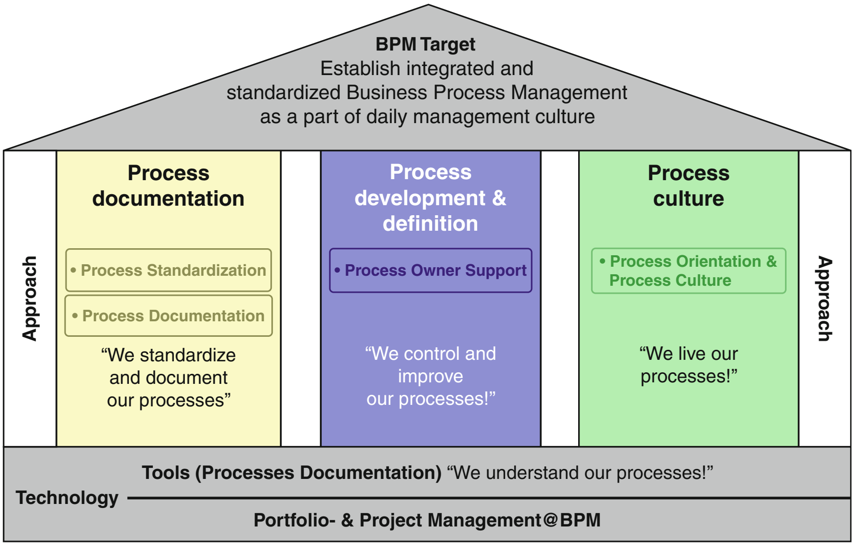

Fig. 2 The vision of Business Process Management means development, definition and implementation of processes and the respective culture

To initiate and drive such a vision, a Business Process Management (BPM) has been established in Presta. This BPM organization was successfully targeted on a vision explicitly broader than mere fulfillment of compliances such as ISO 9001 or ISO 15504. In the author's view, these standards are good references for process management basics; however, there is a high risk of artificially copying them into the company instead of using the processes grown on the company's strengths and step by step altering their maturity.

Depending on the maturity level of the organization, the authors consider the responsibilities of the BPM organization as

- Implementation of the process documentation system including the respective system governance. Presta decided to use a combination of the document management system "Xeri" by Plato and the graphic process modeling tool "Income" by Synlogic
- Building up a process culture
- Building up a process organization
- Supporting the process definition in the line organizations
- Describe requirements for the IT system that shall be used for the process
- Drive process improvement in the line organizations
- Provide services like process modeling or template layout

Even though the BPM organization at Presta has proven to be needed for initiation and strategic process management (see Fig. 3), it was the strategic goal to implement process management roles in the operating divisions of the company as soon as possible (Figs. 3 and 4). As the term "process management" already

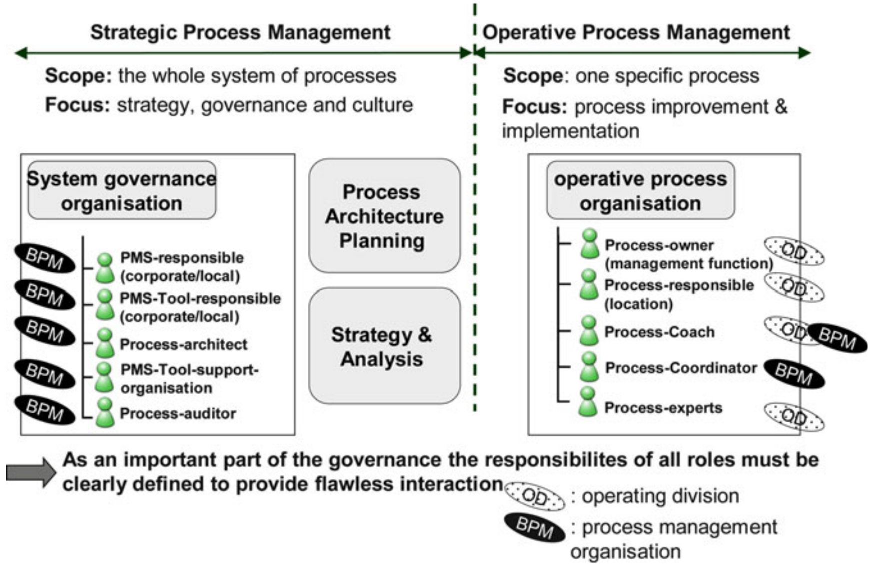

Fig. 3 Process organization comprises roles with strategic responsibility for the whole system as well as roles for operative process improvement, located in both the BPM organization and the operating divisions (OD)

suggests, design, implementation and improvement must be one of the most important responsibilities of each person in a management function.

For better understanding of the different responsibilities and activities, roles in strategic and operative process management were defined. According to Presta's

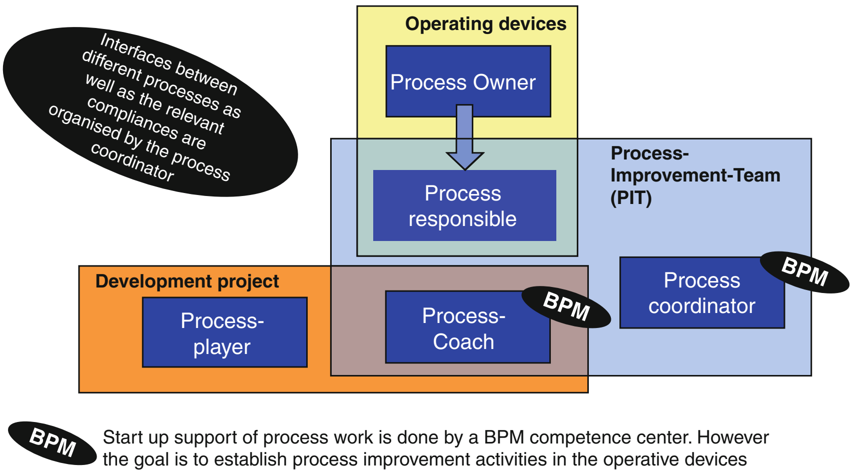

Fig. 4 Different roles are defined for process work and cooperate in the functionally oriented process organization. It has proven to be good to have only few of them located in the central BPM organization

definition, strategic process management is needed to implement and run the PMS corporate-wide as well as locally in each plant/location of a worldwide distributed group. This means to control and structure the contents of the management system (done by the PMS-responsible) but also provide the infrastructure of the PMS-tool. A process architect was needed to define the rules of process structuring, especially in the chosen graphic modeling system that provide language-independent process information. The process auditor has to check both the adherence of the respective devices to the defined processes as well as the compliance of the implemented processes to the applicable standards, laws and other requirements. With these roles, the strategic process management provides a well-defined framework for the process culture and sustainably drives process improvement by setting targets for the process owners, and measuring and tracking the implementation status, maturity and improvement potentials of all processes. The roles of strategic process management have been successfully implemented in the central BPM division at Presta.

While strategic process management focuses on governance of the whole system of processes, the operative process management comprises the actions and responsibilities targeting at one specific process or process group. At ThyssenKrupp Presta, it has been proven to be efficient for good process implementation to take the roles of the operative process management organization as much as possible by operative business (operative devices). By this, process definition was no longer considered the responsibility of the BPM organization but the duty of operative business and especially the process owners. At Presta, the process owner's responsibility for a process is corporate-wide. He has to make sure that the process is defined, released and published, implemented, measured and controlled. In the Presta Group, this role is taken by 40–50 people, mostly from upper management functions. These process owners typically delegate most of the operative work involved to the process team (process responsibles, experts, coaches) but keep to themselves the management part of setting the goals, controlling the business relevance of process descriptions, and releasing the process and driving its implementation. To complement the global role of the process owner, the process responsible is installed to manage the process locally or in a branch of the company. Taken from daily local experience the process responsible suggests improvements and localisations of the process to the owner. Process coaches are needed especially when major changes to a process are done or several new processes have to be implemented e.g. due to major technology changes. They may be from the process improvement team or may as well come from operative business and help the "process players" to live the defined process by face-to-face training. Having coaching functions means additional resource effort, but considerably shortens the time for the change of the organization from old to new processes. In Presta, it was possible to jump up one "SPICE-Level" (according to ISO 15504) (Hörmann et al. 2006) in process maturity in just one year by installing coaches for the concerned processes. Process coaches may first be installed in the BPM organization but soon should move to operative business. The authors are of the opinion that the right place or time for the organizational switch depends on the process culture of the company, e.g. measured by process maturity models, e.g. (http://www.sei.cmu.edu/cmmi, http://www.omg.org/spec/BPMM/), etc.

The process coordinator in Presta functions as moderator for process improvement workshops and provides the project management for improvement projects. He has to make sure that applicable standards are available and respected for the respective process and also takes care that processes are defined lean and not too detailed. Even though this is no more than a support role, experience at Presta shows that the coordinator role is just as important as the process owner's. This role controls the effectiveness of process management by managing workshops, coaching process orientations and explaining targets and steps of process definition as well as its efficiency by keeping the focus on a beneficial level of detail in the process descriptions and on the business orientation of used process names and other terms. This role of operative process management at Presta is mostly provided by the BPM organization. Process experts are taken from the operating division to provide their expertise and experience for the to-be-defined processes.

4 Technical and Organizational Issues Involved in Using a Corporate Process Modeling and Documentation System

Operative optimization of single processes using the operative process management organization as described earlier at ThyssenKrupp Presta:

- Sampling the business demands arising from internal or external audits, from enhanced or new compliance requirements, from company strategy or from process player feedbacks and deriving the improvement goals (preparation phase)
- Driving the process improvement by obtaining the process owner's project order, setting up the team and timeline, inviting and moderating workshops, etc. (process improvement phase)
- Getting the process released by all relevant stakeholders, especially by the process owner and support in the implementation by piloting and rollout, enhancement of the involved IT-tools, training and coaching (rollout phase)

Taking these steps of operative process management at Presta led to better solutions for the affected processes, and thereby saved cost. Examples of projects carried out according to this scheme in the considered company are

- Process and IT-system harmonization in an acquired part of the company (four additional locations with approximately 2,000 employees). Using a budget of more than 2 Mio € within 15 months, this harmonization has reduced the IT landscape by three larger IT systems (PLM, ERP and BPM software) including several interfaces with high maintenance costs. It enabled certification at production plants, including their interfaces to the development sites as well as their inclusion in the group-wide management reporting. The savings in personnel costs by reducing process interfaces, enabling reuse of articles and synchronizing the product industrialization process with the rest of the company are not possible to measure (the measurement of these, often indirect, savings seems to be a general problem of company-wide process improvement). However, it can be estimated that with 500 engineering and production planning people involved, the savings are in the range of 10,000 person days per year.

- Realization of a company-wide change management process for technical changes, providing clear responsibilities and a workflow system for electronic information flow and feasibility documentation. Information quality in product version information was roughly doubled (measured by the number of products with information slacks between engineering and production). However, this project also showed that electronic workflows on the one hand make information flow and documentation easier, but on the other hand tend to reduce the direct personal contact between the affected workers in engineering, purchasing, quality, production planning, and manufacturing. These shortcomings had to be reduced by additional training and "process player" support.
- Systematization and transparency for the project lifecycle in engineering, building the backbone of most processes in an automotive supplier company that exclusively provides customer-specific high-volume products. In a 10-month activity, the definitions of project classes, project status and rough resource allocations were developed. The corresponding processes were supported by a simple database solution that now serves as the basis for reporting, detailed project planning, and budgeting as well as resource planning in manufacturing and the prototype and testing shops.
- Building up of a group-wide process modeling system enabling all locations to use the same information base for process documentation. The benefits of this still ongoing projects are the global availability of process information, providing the different retrieval paths as shown in Fig. 6. Local IT systems were replaced by one web-based tool using a company license. Compliance requirements asking for group-wide responsibility charts are possible to cover. The main benefit, however, is seen in the building of a group-wide "process corporate identity" driving a continuous process culture and providing a standardization and improvement platform. With growing process standardization as well, the respective certification audits can now be reduced, saving internal as well as external efforts.

The latter mentioned project was targeted to have all other process improvement actions embedded into a company-wide framework, thus providing sustainability and company-wide process availability and reuse. By this, the PMS (sometimes still called "quality management system") for Presta is the central tool of knowledge management. This framework as the singe "source of truth" is available in all locations of the company (Fig. 5). In Presta, as a worldwide operating automotive supplier company, the variety of locations and processes involved made this system grow very soon to a size of thousands of process artifacts (templates, guidelines, descriptions, etc.). A state-of-the-art database and model-based solution was the choice of the system since mere document-based systems tend to be hard to manage

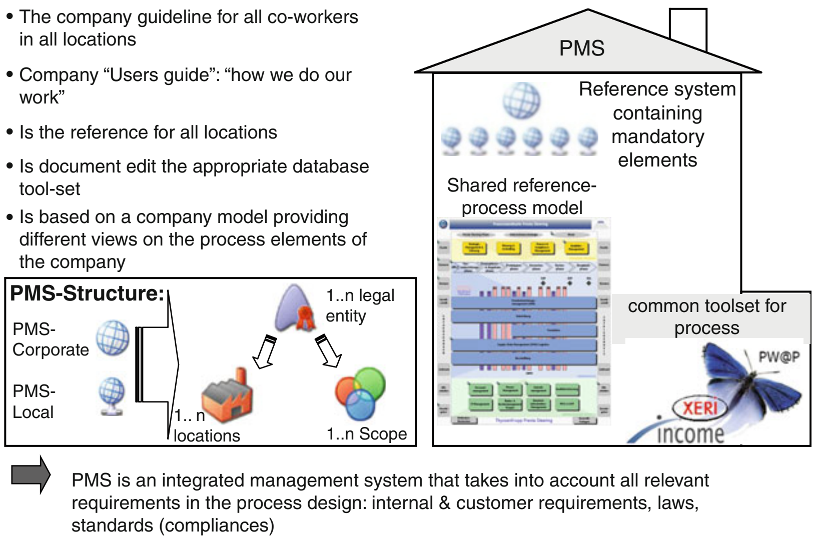

Fig. 5 The model-based process management system (PMS) is targeted to be the process-oriented knowledge platform for all coworkers worldwide

and also bear the risk that the contained information gets inconsistent in interfaces and contains redundant information. Keyword-based search functions may be a help to find relevant information but reach their limits if the terminology is not standardized company-wide.

Strategic process management in the globally active Presta group therefore provides a manageable process information and management system PMS as a database- and web-based system and tool. Besides basic document management functions (storing, releasing, versioning, etc.), it provides the process information as structured as possible [petri net logic (Baumgarten 1996)]. In Presta, it was found that this is best supported by graphical structuring in a hierarchical process map. Consistency and nonredundancy can be provided if the system is model based. The model requires consistent interfaces between processes by using so-called "work products" that are exchanged between the processes. It also means that process information can be looked at and retrieved from different starting points, for example, the process view as well as the role-based view (see Fig. 6).

5 Governmental Issues of Setting the Right Structures

In Presta, the PMS had to be set up by a specialized BPM group providing the theoretical foundation and services such as tool evaluation and implementation, trainings, and role definitions. However, Presta management found it mandatory that the operative process organization be involved as much as possible in the

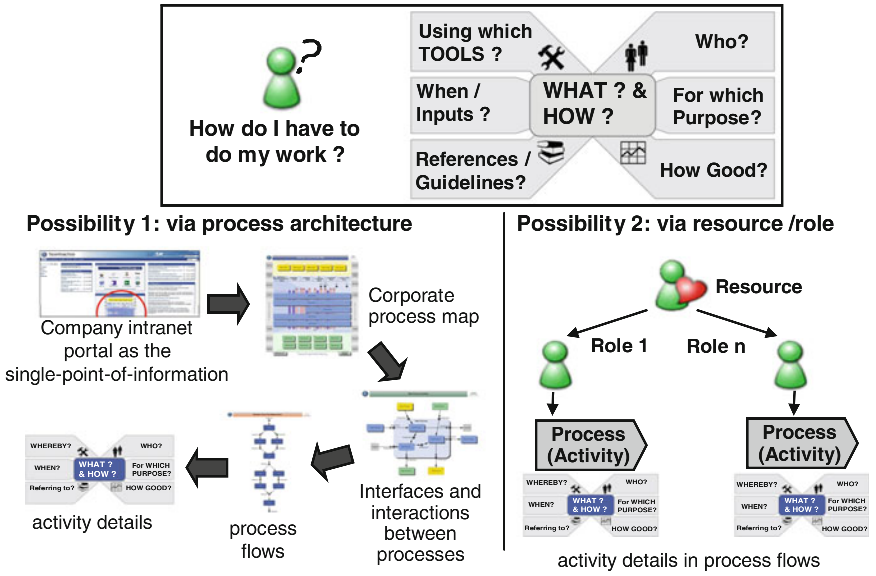

Fig. 6 Storing process information in a database model provides the opportunity to retrieve the needed information on how to do the work on different paths

architecture definition of the process model. Therefore, most if not all members of the company's management have a role as a process owner and they must be the ones to name and define their processes from a management point of view (sometimes called "the eagle's view"). It is tempting to have this definition rather done by "process specialists" and reduce the involvement of the process owners to confirmation and release. However, this requires a high level of process maturity and a thorough understanding of the process owner's role which was not present in Presta from start. Earlier, process definition projects had their shortfalls, especially in the area of management involvement, and suffered a lack of sustainability afterward. Therefore, asking the process owners to define their processes themselves seemed the only sustainable way at Presta to define a PMS that is meant to be a real management tool after definition.

To support the structure of Presta's worldwide distributed company, it seemed helpful to define a corresponding system structure of the PMS. Therefore, process modeling at Presta first meant building up a layered structure of all company processes starting from the process map. This was started as a corporate approach but still leaves room for enhancements as locations join the process step by step. Processes defined in the corporate process map are "inherited" into the locations, especially on the upper layers of the process pyramid (Fig. 7). Locations may add processes they use to this corporate map in accordance with the (corporate) process owners. On the more detailed levels of the process structure, local enhancements or adaptations must be allowed because of local requirements for example by law or culture.

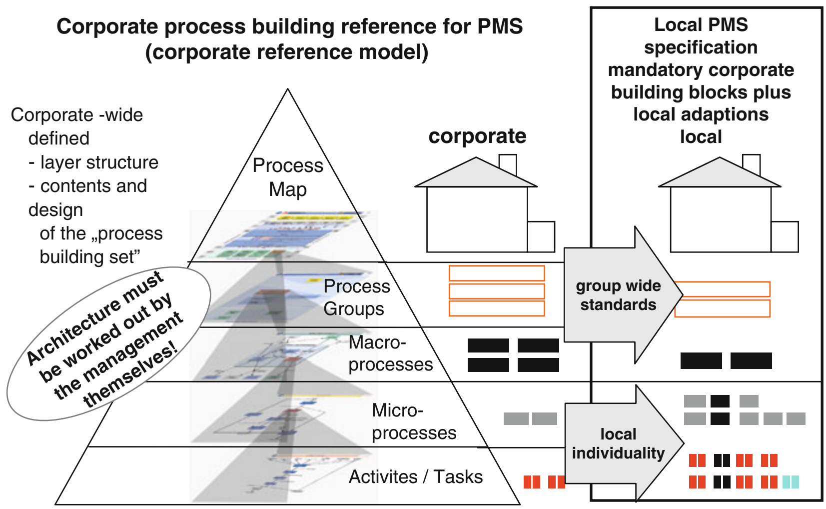

Fig. 7 The reference process model is the corporate building set from which all local process management systems can be built up

6 Finding a Stepwise Approach to Process Improvement

At ThyssenKrupp Presta, it was defined that process implementation should follow a stepwise approach, mainly due to two reasons: first, the organizational level of process orientation (process culture) needed to follow the degree of process implementation. Changes in culture are time-dependent processes which suggested a step-by-step approach. Secondly, the organization was not (yet) organized according to the processes but mostly according to functions (sometimes called "silos"). Therefore, the changes in processes at a certain maturity level (step) had to be accompanied by changes in the organizational structure as well as in the culture of the company.

At Presta, the stepwise approach shown in Fig. 8 was chosen, starting from building up the BPM organization and framework. It was and still is one of the major challenges to prevent process documentation from being carried out too detailed once it gets done. Especially from the management perspective, it was helpful to focus on the process structure (process map and its layers) as well as the inputs, outputs, goals, and responsibilities of all processes. It proved to be of less importance to describe the steps of the process flow in too much detail (which we found is one of the potential pitfalls of process documentation, often leading to a high consumption of resources and hence must be avoided by the process coordinator). Process documentation, however, at Presta was the important precondition to sustainable process monitoring and it provides the required transparency on processes needed by the business.

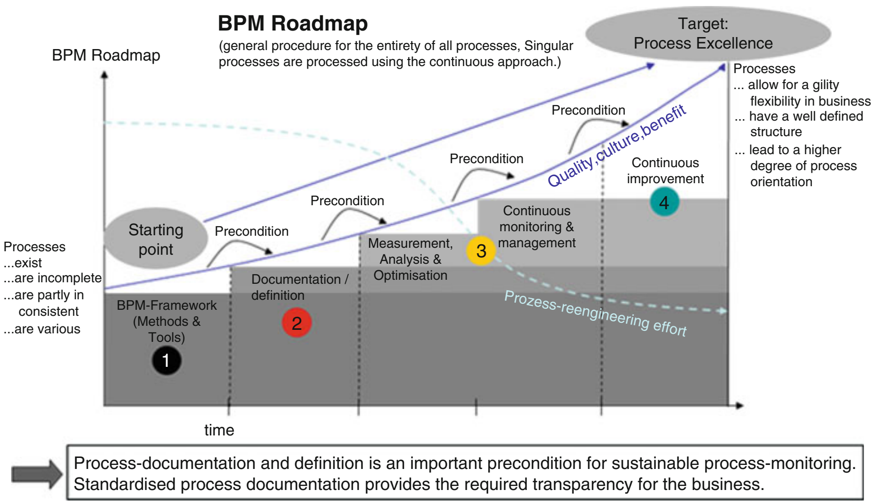

Fig. 8 The BPM roadmap provided an idea of our stepwise approach, starting at the very base of process definition and documentation to "speak the same language"

One major prerequisite for the sustainable and successful implementation of process management in the Presta organization is the strong request by and the full support of the top management. In our case, it was helpful that at least one member of the company board had a deep understanding and a full commitment for process orientation and process management. Presta management was convinced that it is definitely not enough to do it "because others do it also." Constant attention to the process improvement program is secured by planning and achieving step-by-step benefits ("low-hanging fruits") which should be as far as possible measurable in cash-like cost improvements or higher possible turnover with the same effort. However, the measurement of the benefits of process improvement at Presta seems to be one of the major challenges in this field, since process costs are seldom measured correctly and the effects of strategic process management such as more transparency and a common understanding of processes and interfaces are basic but hard-to-measure values of a company.

At the beginning of the projects, the Presta organization tended to underestimate the effort needed to communicate the vision, objectives, and benefits of process definition, process documentation, and process management. It has proven to be beneficial that as many as possible persons in Presta should understand why all this effort is being done to gain acceptance of the reached solutions and high degree of implementation of the defined processes.

Today, Presta emphasizes that the process specialists in the organization involved in the process definition and modeling always must be aware that the main objective of the process modeling system is to provide fast, easy, and under-standable information to the process "players" (the people that shall "live" the processes). Even though it should provide information on the sometimes very complex interaction of processes, the BPM tool must not be just the tool for the expert in Presta. Otherwise, the effort needed for bringing the process information into the tool, especially for the ongoing actualization, will not match the benefits for the organization. The people that know the processes and their interaction in detail will not give this information away without having a benefit for themselves and/or their coworkers.

7 Summary and Outlook

ThyssenKrupp Presta has experienced that a process-oriented company considerably raises its cost efficiency and especially uses the still-existing big cost-saving potentials of the business processes. This benefit relies on an appropriate process organization targeting on the strategic aspects of process improvement as well as on the operational ones. Process work at Presta must not be done for and by process specialists. It also must not focus more than absolutely necessary on "technical aspects of process management," such as process models, BPM tool features, or the "theoretically optimal process." In Presta, BPM must support the needs of all members of the company and build a common process culture by involving as many of the affected persons as possible. Especially, the members of Presta's company management have to get into the driver's seat and must not only actively define the processes but also be examples for employees as well as define process objectives for their staff (reward process improvement work and process adherence).

It was helpful to have measurable benefits alongside the company goals of defined and used processes must be identified and constantly communicated throughout the organization. At Presta, the communication effort may consume as much as 40% of a process improvement program. A stepwise process management approach that is strongly supported and exemplified by upper management for Presta was mandatory for beneficial model-based process management in the globally acting company.

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Business Process Maturity in Public Administrations

Peter Fettke, Jörg Zwicker, and Peter Loos

Abstract Business Process Management (BPM) increasingly provides an important contribution to public administration modernization. Besides providing the potentials for the improvement of efficiency and effectiveness of public administration, BPM approaches also enable the improvement of service orientation. One building block of service orientation is the response time of public authorities between the application of a public service and the provision of service result. Based on specifics of the public administration domain, in this chapter, a domain-specific BPM maturity model for the fulfillment of a 48-h-service promise is proposed. Using the maturity model, a BPM for government processes can be established realizing a response time of 48 h for public authorities. The model is based on and adapts existing BPM maturity models. The chapter outlines the features and describes the evaluation of the model.

1 Challenges of Public Administration Modernization

In the last few years, public administration had to experience national and international transformation processes. There arose new requirements out of internal and external challenges. Increasing service orientation is one of the major aims of public administration to align government actions with the desires of the public administration customers. This shall contribute to the satisfaction of stakeholders from politics, public administration, citizenship, and enterprises. For efforts such as, for example, the reduction of the response time of public authorities between the application of a public service and the provision of service results, approaches, and experiences from the private sector can be applied. However, these can only be

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_21,

successful within the public sector if they are adapted to the domain-specific requirements.

Several of these service improvement efforts and modernization approaches influence the organizational structure and the government process within public authorities. Assuming that successful processes will be reflected in higher public administration success, the government processes have to be improved. Moreover, for improving the service orientation in public administration through improving the processes, certain means for the management and improvement of the government processes are required. In this regard, an increasingly important contribution to public administration modernization is to be made by applying private sector BPM approaches [e.g. (Becker et al. 2007; Hunziker 1999)]. Besides the contribution to the improvement of efficiency and effectiveness of public administration, BPM approaches also enable the improvement of service orientation. However, experiences regarding BPM within the private sector have shown that a global answer concerning the process orientation of a company is not reasonable: it is rather meaningful to distinguish several maturity levels regarding process orientation. Such an approach in terms of a maturity model provides various potentials in the respective public administration (Rosemann et al. 2006):

- *Descriptive view*: It is possible to determine differentiated strengths and weaknesses of public administration regarding BPM.
- *Prescriptive view*: It is possible to provide information for improving the administration's capability to manage processes.
- *Comparative view*: It is possible to compare the capabilities of different public authorities.

Besides the general importance of BPM for the design and implementation of public administration as well as service orientation, the systematic improvement of all activities of BPM is important. Maturity models for BPM support, at the same time, the improvement of BPM. However, known maturity models do not consider the particularities of public administration. Therefore, it is necessary to design and evaluate a domain-specific maturity model before applying it in the area of public administration (OMG 2008, p. 69).

Based on the specifics of the public administration domain, in this chapter, a domain-specific BPM maturity model for the fulfillment of a 48-h-service promise in the public administration domain is proposed. Using this maturity model, a BPM for government processes can be established realizing a response time of 48 h for public authorities. By introducing this 48-h-service promise, incoming requests or applications to public authorities shall be responded within 48 h by a confirmation of receipt or an official notification, at the latest. Herewith, the customers of the respective public authorities shall be provided with reliable first information about the state of their application or request without a high expense.

In summary, the main objective of this chapter is three-folded:

1. The application of BPM maturity models for the fulfillment of a 48-h-service promise in public administrations is being motivated.

Table 1 Structure of this chapter

Section	Results
#1	Problem description
#2	Description of objectives
#3	Description of related work
#4	Maturity model
#5	Results obtained by descriptive evaluation
	Results obtained by case study
#6	Summary and outlook

2. Based on prior maturity models, a domain-specific BPM maturity model for the fulfillment of a 48-h-service promise in public administrations is being developed.
3. Using a descriptive evaluation and a case study approach, the developed BPM maturity model is being demonstrated and validated.

Our research is based on a design science approach. Design science is to be seen as a complement to the behavioral science approach that dominates the field of Information Systems research. It "focuses on creating and evaluating innovative IT artifacts that enable organizations to address important information-related tasks" (Hevner et al. 2004, p. 98). The ultimate goal of this research is to design a BPM maturity model which is useful for developing and implementing BPM in public administrations. Our understanding of design science is very broad because the design artifact proposed in this chapter is not part of a software system but of an organizational system. The developed maturity model can be seen as an organizational tool, which can be used for BPM in public administrations. In other words, our idea of design science is not only to design software systems but also to design organizations. This chapter unfolds as presented in Table 1.

2 Define Objectives of a Solution

2.1 Preliminary Considerations

Improving the service orientation in public administrations can be addressed by several, different objectives and be realized by different actions. In regard to the context described in Sect. 1, the implementation of a 48-h-service promise within public authorities, actions are necessary for the following:

1. *Built-time of the 48-h-service promise*: actions for the planning, design, organization, and implementation of the 48-h-service promise within a public authority including actions for the organizational and technological implementation,
2. *Run-time of the 48-h-service promise*: actions for managing (plan, organize, monitor, and control) the 48-h-service promise as well as actions for the operational execution of the 48-h-service promise.

Considering the aforementioned actions, a comprehensive management approach is necessary which enables and implements the planning, organization, execution, monitoring, and control of the 48-h-service promise within public authorities. Further, based on the application context, the public administration domain, the management approach has to consider the following requirements:

- The approach has to be applicable for the public administration domain. That is, the approach has to consider requirements which arise from this domain.
- Because of the high amount of different public services which are provided by public administrations, the approach has to be applicable and valid for the different public services.
- The heterogeneity of the numerous internal and external stakeholders of the public administration including their different objectives in regard to the 48-h-service promise has to be considered by the approach.

Considering all the named requirements, BPM as a comprehensive management approach is proposed in the following. This is to be justified in Sect. 2.2 based on an example of producing a public service. Using the means of BPM, an appropriate solution for the implementation and realization of the 48-h-service promise can be provided.

2.2 BPM in the Context of the 48-h-Service Promise

Subjects of the administrative work are public services executed by public authorities. The execution in terms of the production and provision of a public service can be realized by several administrative units or positions within a public authority. Despite the shared service execution, the administrative tasks for producing and providing the service constitute one or several sequences of activities. Thus, the entirety of activities can be considered as a government process. Hence, performing a public service can be comprehended as realizing a government process. Following this thought, introduction and implementation of the 48-h-service promise through sending a confirmation of receipt or by official notification have to be realized by changing activities within the process or by changing the whole process.

In order to fulfill the 48-h-service promise respecting the 48-h-service deadline, three alternatives exist. Table 2 depicts these alternatives and their influence on the government process.

In the majority of public services and their processes, the fulfillment of the 48-h-service promise will exclusively be reached through alternative three. The reason is that the most government processes overrun 48 h, and the optimization of the processes (alternative two) achieves processing times less than 48 h in few cases only. Nevertheless, the optimization is still necessary to achieve the objectives of modernization efforts in public administrations. Moreover, also in the case of alternative three, the revision of government processes is necessary which can, at the same time, be analyzed and optimized. Due to the limited amount of space in

Table 2 Alternatives for the fulfillment of the 48-h-service promise

#	Alternative	Application condition	Influence on the government process
1	No change	If the processing time of the whole government process for the public service is already under 48 h	No influence
2	Reduction of processing time of the government process under 48 h	If the processing time of the whole government process for the public service overruns 48 h	Reorganization of whole operational government process
			Implementation or reorganization of management processes
		If the processing time of the whole process can be reduced under 48 h	Employees have to adapt to new processes etc.
3	Sending a confirmation of receipt within 48 h after the incoming of the application	If the processing time of the whole government process for the public service overruns 48 h	Extending – sometimes reorganizing – the government process with activities for creating and sending the confirmation of receipt
			Implementation or reorganization of corresponding management processes
			Employees have to adapt to new processes etc.

this chapter, alternative three is focused in the following, but alternative two is further on considered within the context of realizing the third alternative.

Based on a basic process management model after Rummler and Brache (1995), according to Harmon (2004), Fig. 1 exemplarily illustrates a section of producing a public service, namely a severely handicapped pass. The production of the public service, starting from the incoming of an application until the sending of an official notification, is realized through a multitude of sequential activities confirming a government process. The incoming application for the severely handicapped pass initiates the application processing within the public authority. The process consists of several, sequential sub- processes, which are operated by different employees. The process and each of its sub-processes are managed by different process owners or process managers (i.e., by different heads of division or heads of department). The planning, organizing, implementing as well as the controlling tasks of the process owner or process manager can be divided into two classes of management processes. The persons in charge are responsible for setting plans and resources, planning the processing or activities, providing personal and technical resources, and controlling the results.

In order to introduce and implement the 48-h-service promise through sending a confirmation of receipt for an application, it has to be defined during which sub-process and at which time the confirmation has to be created and sent. Moreover, the responsible persons/positions for managing the 48-h-service promise as well as

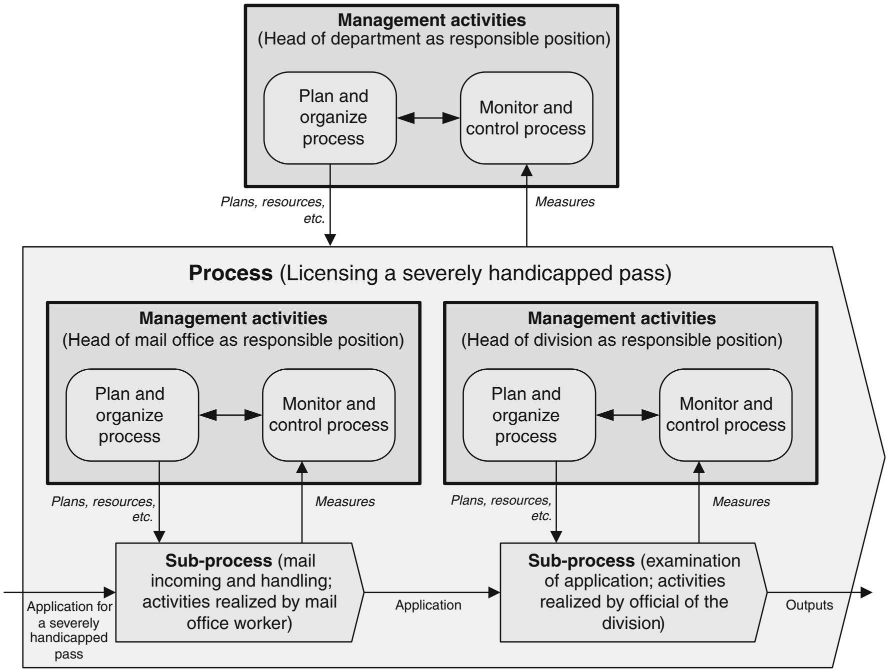

Fig. 1 Section of an exemplary process of an application for a severely handicapped pass [according to the BPM model of Harmon (2004), based on Rummler and Brache (1995)]

the persons/positions in charge of creating and sending the confirmation have to be defined.

A simplified illustration of the process architecture of Figs. 1 and 2 shows the transmission of an application (incoming object) of a public administration customer (sender) to an organizational unit within the public authority (addressee). The sender uses a communication channel (incoming communication channel) for the transmission of the application. The incoming application initiates a process within the public authority. During the processes or at the end of one of the sub-processes, a response in terms of a confirmation of receipt (outgoing object) will be transmitted from the addressee to the sender. The addressee also uses a special communication channel (outgoing communication channel).

The introduction and the fulfillment of the 48-h-service promise depend on the elements of the depicted interaction of Fig. 2. For the 48-h-service promise, the elements can be variously configured. Based on this consideration, the following aspects have to be fulfilled for realizing the 48-h-service promise, among other things:

- Activating conditions for the release of a 48-h-service promise measurement have to be specified (form of application, kind of incoming communication channel, etc.).

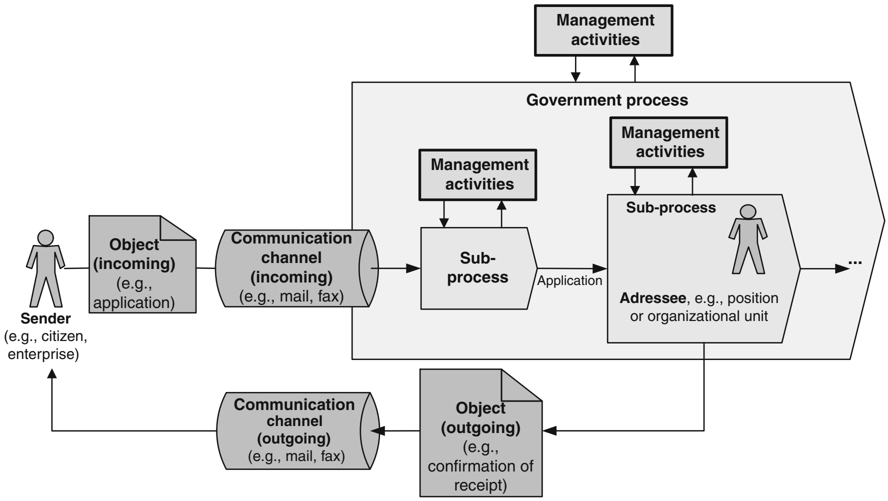

Fig. 2 Communication scenario

- Conditions which enable a sufficient response in terms of the 48-h-service promise have to be specified (content of the response, outgoing communication channel, etc.).
- To create and transmit the notification or the confirmation of receipt, specific actions have to be defined and realized.
- The process, sub-processes, and their relationships among each other must be known and transparent.
- Processes for planning, organizing, implementing, and controlling the 48-h-service promise have to be established and the 48-h-service deadline to be determined.
- Roles and responsibilities for the management and the execution of the 48-h-service promise have to be determined.
- Process measures for examining the adherence to the 48-h-service deadline have to be defined and carried out.

In summary, the aforementioned example reveals that realizing a 48-h-service promise during the application processing within the public authority requires adequate management and implementation of the government processes as well as the 48-h-service promise. BPM, as the established and integrated approach of managing, organizing, implementing, controlling, and improving business processes, shall therefore be applied realizing the 48-h-service promise.

2.3 BPM Maturity for the Fulfillment of the 48-h-Service Promise

It has been broadly established that BPM comprises several activities which can exemplarily be classified into a cycle of phases: business process planning, business process design, business process implementation, and business process controlling. Numerous means, such as, for example, methods, modeling languages, or tools for implementing and supporting the several BPM activities are proposed from research and practice (Becker et al. 2003). They can be divided into two types of means: means with a comprehensive support of the whole BPM cycle and means considering facets or phases of the BPM cycle. Based on the considerations of Sects. 2.1 and 2.2, fulfilling the 48-h-service promise necessitates BPM means with a comprehensive view.

The generic aim of public administration's modernization is to meet external challenges, such as, for example, service expectations, as well as internal challenges, such as, for example, inefficient organizational structures and process organization. The underlying assumption is that public administration success in regard to these challenges is to be realized by modernization efforts. Several of those efforts significantly influence government processes. Assuming that successful processes in terms of mature processes will be reflected in higher public administration success, means for improving the maturity of government processes are necessary. Moreover, improving the service orientation in public administration through the 48-h-service promise, certain means for the fulfillment of the service promise are required. By reason that the success and maturity of processes depend on the management of these processes, a further assumption is that a higher maturity of BPM will be reflected in higher process maturity. The BPM has simultaneously a positive impact on the fulfillment of the 48-h-service promise. Figure 4 shows the underlying assumptions regarding the dependencies between BPM maturity and public administration success. See for analogous considerations (Rosemann and de Bruin 2005; Rosemann et al. 2006; Rosemann and vom Brocke 2014).

As described in Sect. 2.1, introduction and implementation of the 48-h-service promise have to be realized by changing activities within the process or by changing the whole process. In other words, the fulfillment of the 48-h-service promise or service improvement in general can be seen as part of process maturity which is influenced by the BPM maturity. Hence, the 48-h-service promise is also impacted by process maturity and vice versa. However, they are separately depicted in Fig. 3 for a better illustration of the relationship between BPM maturity and process maturity.

Means for the assessment and improvement of BPM maturity can be subsumed under several terms, such as process-oriented quality management, Total Quality Management (TQM), process benchmarking, and process audit. A comprehensive approach which explicitly addresses the assessment and improvement of the whole BPM is proposed by BPM maturity models. A BPM maturity model describes

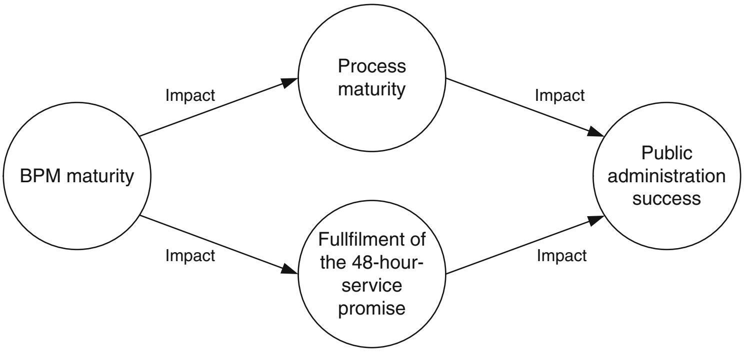

Fig. 3 Underlying assumptions

different maturity levels for the assessment of BPM regarding the fulfillment of defined BPM requirements. Each maturity level is defined as an amount of attributes BPM has to fulfill as well as an amount of actions necessary to achieve that level. Numerous maturity models for BPM have been proposed.

Despite the multitude of means, maturity models are considered in the following as the instrument for implementing and realizing the 48-h-service promise. Considering the requirements for a 48-h-service promise solution from Sect. 2.1, the question arises whether using a generic BPM maturity model is reasonable. Most of the existing models seem to be designed for the use in private sector organizations. Therefore, the differences of BPM between public and private sector are discussed in the following section before the existing maturity models are analyzed.

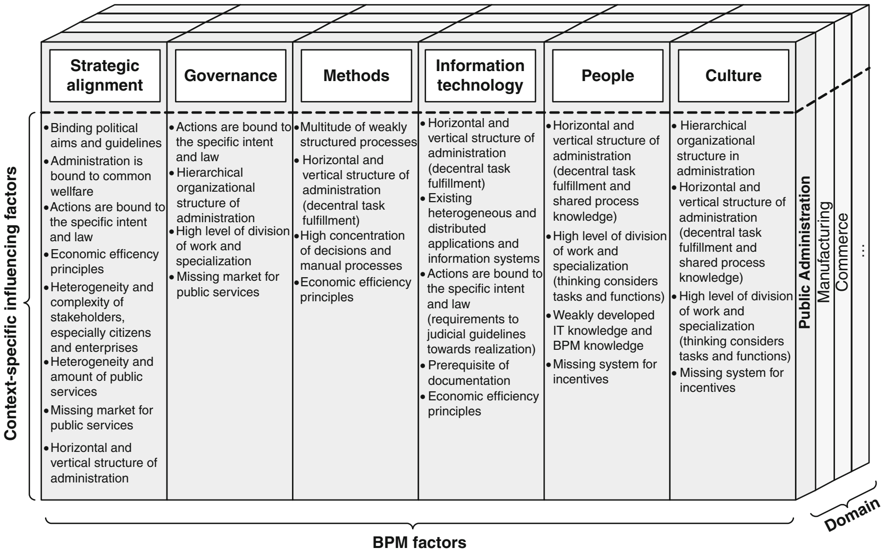

Fig. 4 Context-specific influencing factors on BPM

Table 3 Differences between organizations operating in private sector and public sector; partly based on (Becker et al. 2007; Gisler 2001)

	Private sector	Public sector
Aim	Profit maximization	Public task fulfillment (binding to welfare and economic principles)
Lawfulness of actions	Actions are primarily unbounded but aligned to the organization's visions and objectives	Actions are primarily bound to laws and regulations (principle of lawfulness)
Control	Economical market organization	Political legitimization
Market position	Competitive environment	No competition (monopoly character)
Organization structure	No established structure; individual to the organization	Strict hierarchical structure possessing clear line of authority
Documentation requirements	No explicit documentation requirements	All decisions and occurrences have to be documented for control purposes
Customer segment	Mostly heterogeneous	Heterogeneous
Product range	Mostly heterogeneous	Heterogeneous

2.4 *Specifics of Business Process Management in Public Administration*

The main difference between the public administrations and private sector are the bureaucratic principles of administrative actions (Becker et al. 2007; Güngöz 2007) which directly affect government processes. Table 3 shows a selection of those principles and several further characteristics of the public sector in comparison to the private sector.

The principles and characteristics which are valid for the public sector constitute special conditions for task fulfillment in public authorities in comparison to private sector organizations (Lenk et al. 2002). Thus, an economically inefficient action cannot be seen as a deficit of the task fulfillment or the management within the public authorities because the public services and actions are defined by binding political aims and are legally regulated. Moreover, for recommendations for the implementation or improvement of the production and provision of public services, the government processes need to consider the binding of actions to specific intents, laws, and welfare. In summary, the several specifics in public administrations (cp. Table 3) seem to influence the implementation of BPM within public authorities. Hence, these specifics are discussed in the following based on the six core elements of BPM (Rosemann and vom Brocke (2014) provide a comprehensive discussion of these elements). Figure 5 summarizes important influencing factors on the core elements of BPM. In addition, the figure depicts that other domains such as manufacturing and commerce reveal further domain-specific influencing factors on BPM.

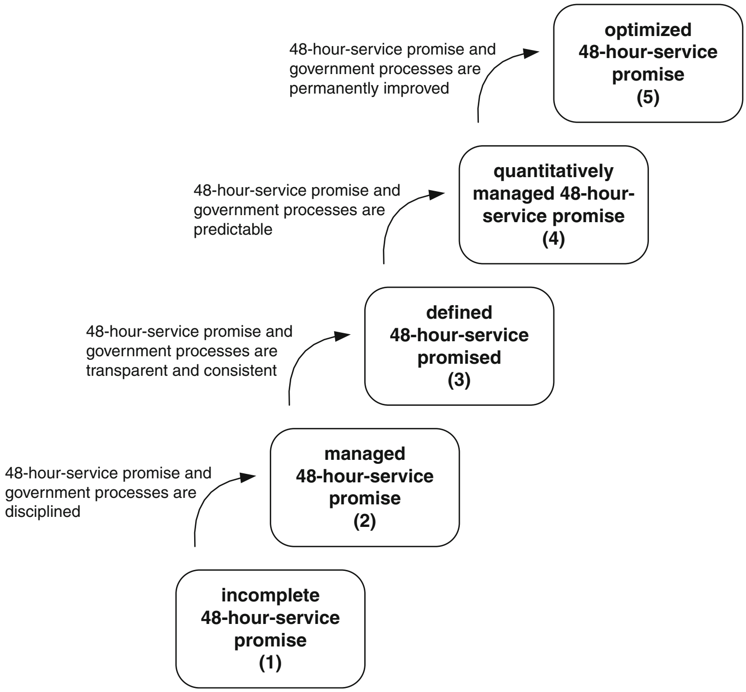

Fig. 5 Maturity levels for the 48-h-service promise

The general, domain-neutral description of the six core elements in the following is based on publications of Rosemann et al. (Rosemann and de Bruin 2005; Rosemann et al. 2006; Rosemann and vom Brocke 2014).

2.4.1 Factor: Strategic Alignment

Strategic alignment establishes a relation between the strategy of an organization and the business processes. It supports the operative alignment of government processes toward strategic objectives of the administration. Thus, the strategic alignment is especially influenced by political aims and the binding of actions to specific intents, laws, and welfare. Strategies and objectives in public administration are deductions of political aims and, at the same time, bound to common welfare. The definition of processes needs to be in line with politically legitimated guidelines and needs to follow the laws, instructions, and regulations of the administration.

As a reason of the increasing pursuit of service orientation, legal regulations as well as the multitude and heterogeneous stakeholders of administrations, especially citizens and enterprises with their different interests, need to be considered during the process design. In addition, the heterogeneity of the service portfolio and the fact that an organization is horizontally and vertically segmented require a case-by-case alignment of the processes toward the aims, as all services and organizational units cannot be analyzed or grasped by a single general approach.

Furthermore, guidelines are occasionally provided for the design of strategies. The European Union service directive (directive 2006/123/EC) (Fontelles and Pekkarinen 2006), for instance, defines some special requirements for the European Union member states concerning the design of administrative processes and management. But state authorities can also determine some propositions for local administrations in certain fields.

To evaluate the strategy and achievement of objectives, the results need to be measured. Frequently, measuring process results in public administrations is difficult as there are no commonly accepted indicators. The lack of a market for public services does not alleviate the problem of assessing process results according to economic principles. Measurements as they were done for the private sector are inadequate, as they aim at profit maximization of an organization and do not consider to welfare maximization.

2.4.2 Factor: Governance

Governance means a systematic leadership and control of BPM through established and relevant decision guidance and processes. As a result of the legal guidelines and the hierarchical structure of the public administration, this factor possesses exceptionally high requirements. Assigning roles and responsibilities often follows clear guidelines due to legal rules and suppresses a wide flexibility. For example, there are special regulations in Germany for data privacy in the social sector, which allows only responsible officials to access certain personal data. Hence, changes in the organization of the BPM are problematic.

To provide standards for the BPM, administrative rules have to be considered. The monitoring of the abidance to rules in BPM by responsible persons is a challenge. Identifying suitable metrics is often a problem. They have to ensure a measurement of BPM capability according to BPM standards, and, furthermore, they have to value the abidance to rules and further conditions.

Decisions for a systematic leadership and control of the BPM need to be bound to central roles and responsible persons in the government hierarchy. On the one hand, this is necessary because of the hierarchy, while on the other hand, there exists a decentralized organization of task fulfillment as a reason of the high level of division of work. Accordingly, super-ordinate instances for systematic leadership and control are necessary.

2.4.3 Factor: Methods

The literature describes a multitude of methods for realizing and supporting BPM in general. Nevertheless, several methods are especially aligned to public administration or e-Government. During the conception of a process, legal rules can easily be used to reason design decisions. Likewise, the high complexity of government processes and organizational structures in public administrations necessitates special methods and tools for modeling the processes (Palkovits and Wimmer 2003).

Methods for the transfer of process concepts to electronic implementations in the case of e-Government have to consider infrastructural conditions (cp. information technology). The high concentration of decisions in public administration requires the continuance of manual processes. An electronic implementation of the processes often has to be reduced to an electronic support of manual processes. Furthermore, the necessity of documentation of all decisions and occurrences (principle of documentation requirements) during the process implementation through corresponding techniques and systems has to be considered.

2.4.4 Factor: Information Technology

Information technology is necessary to realize the approaches of BPM. In the context of public administration, there result several particularities as the information technology frequently presents itself as heterogeneous and outdated. Accordingly, there result special requirements on information technologies which have a high importance concerning the maturity measurement.

Besides, particularities result from fragmented infrastructures because of the separation of administrative authorities in federal states. The current administration and the accompanying decentralized organization are not motivated by information technological causes, but solely result from the historical development. Therefore, special information technological requirements arise for the management of processes, which have to be executed across the states, administrative levels, and authorities.

Furthermore, there results a multitude of information technological requirements from political requirements or legal guidelines. This is exemplified by the German DOMEA approach (DOMEA: document management and electronical archiving in IT-supported business processes) (KBSt -Koordinierungs- und Beratungsstelle der Bundesregierung für Informationstechnik in der Bundesverwaltung 2005). This standard raises requirements for the implementation of tools and systems for BPM like, for instance, content or document management system.

2.4.5 Factor: People

People represent an important component when realizing an efficient BPM. In public administration, there often exists a high level of division of work and specialization, so that process knowledge is often concentrated in just a few employees. This implies the following consequences: First, approaches to survey the process knowledge require a significantly higher involvement of employees in order to determine the process steps in detail; otherwise, real "as-is" processes in administration can hardly be determined. Second, actions for reorganization are often strictly limited or require special coaching because of a lack of necessary competencies. New "to-be" processes cannot be successfully implemented. Third, it is often difficult to identify appropriate responsible persons for such processes, which is due to the decentralized organization in public administration.

Because of the structures in public administration so far, the knowledge of methods and technologies for BPM is hardly developed. Hence, in comparison to the private sector, intensive methods for developing necessary knowledge regarding BPM have to be introduced (for a study on the skill set required for BPM please see Müller et al. 2014). The implementation of a process organization in public administration is complicated by the fact that the responsible persons have to be convinced that a higher level of process orientation would be useful.

2.4.6 Factor: Culture

This factor comprises the responsiveness to process changes, process values, and beliefs, as well as the strength of leadership in respect of BPM. Regarding this aspect, there are hardly any particularities in the public sector in comparison to the private sector.

However, the organizational culture is seen as a whole: organizational culture is considered as an amount of assumptions shared by a group of people, which has been invented, detected, or developed by them for solving problems based on the division of work (Schein 1984). Accordingly, hierarchy culture, market culture, clan culture, and adhocracy culture can be distinguished. The organizational culture in public administration is especially affected by a hierarchy culture. Because of the hierarchical organizational structure, it can be assumed that the maturity of the organizational culture in public administration is generally rather low, in this respect. Hence, methods for improving the process maturity as far as the organizational culture is concerned should be considered notably (see vom Brocke et al. 2014; Schmiedel et al. 2014).

BPM maturity models were considered as means for implementing and realizing the 48-h-service promise in public administration. For this purpose, they have to consider the requirements for a 48-h-service promise solution. According to the high amount of specifics of BPM in public administration, they have additionally to consider the particular requirements which arise from the public administration domain (OMG 2008, p. 69). However, most of the existing BPM maturity models seem to be proposed for the application within the private sector. Therefore, Sect. 3 analyzes known maturity models for BPM and public administration.

3 Known Maturity Models for BPM and Public Administration

Numerous maturity models for BPM have been proposed which can be divided into two types of models: models with a comprehensive view on BPM [e.g., (OMG 2008)] and models considering facets of BPM [e.g., (Luftman 2000, 2014)] [cp. here and in the following also (Rosemann and de Bruin 2005; Rosemann et al. 2006)]. The majority of these models are provided as instruments for the assessment of the capability of BPM. Recommendations shall contribute to an improvement of the maturity of BPM and, accordingly, to a higher quality of processes. The main target is to raise the company's success by an improvement of business processes. Additionally, some authors provide generic tool support for using maturity models (Krivograd and Fettke 2012).

A common basis of various BPM maturity models is the *Capability Maturity Model* (CMM) (Paulk et al. 1993; Rosemann and de Bruin 2005). It is based on the assumption that the maturity level of software development within an organization can be valued at assessed development processes. The CMM defines five sequent maturity levels. Based on these maturity levels, Harmon (Harmon 2004) proposes a more elementary maturity model. More effort was necessary for designing the *Business Process Maturity Model* (OMG 2008) of the *Object Management Group* (OMG). Currently, it represents the largest CMM-based BPM maturity model. Fisher (2004) also proposes a model with five maturity levels. However, he defined different levels as used by CMM and combined his levels with five BPM-critical success factors. A promising approach is the *Business Process Management Maturity Model* of Rosemann and de Bruin (2005). They enlarge the CMM model to three dimensions and consider the six core factors of BPM (Rosemann and vom Brocke 2014). Hereby, the current state of knowledge about crucial factors shall be regarded to a greater extent than in existing models. A more popular model is the *Process and Enterprise Maturity Model* of Hammer (2007). His BPM maturity model consists of two parts, one for assessing process enablers and the other for assessing enterprise capabilities.

A comparison of the mentioned BPM maturity models is provided in Table 4. The definition of the five comparison criteria is based on Hüffner (2004):

- The *scope* criterion distinguishes the application of the maturity model on whole organizations, a business unit or a process.
- The specialization of the model is captured by the *focus* criterion. Therewith, it is being stated that the application of the maturity model can be either general or focused on a specific domain, like, e.g., the public administration.
- Regarding the *comprehensiveness* criterion, it is being distinguished whether the maturity model is designed to measure the "as-is" situation, to determine a "to-be" maturity level, or to recommend actions for achieving a "to-be" level.
- The criterion *maturity level representation* distinguishes between a staged and a continuous representation of the maturity levels. The former describes the fact

Table 4 Comparison of BPM maturity models

	Hammer (2007)	Rosemann and de Bruin (2005), Rosemann et al. (2006)	OMG (2008)	Fisher (2004)	Harmon (2004)
Scope	Processes organization	Organization business units	Processes organization	Organization	Processes organization
Focus	General	General	General	General	General
Comprehensiveness	Measure	Measure	Measure, improve	Measure	Measure
Maturity level representation	Continuous	Staged, continuous	Staged	Staged	Staged

that only one organization-wide or process-wide maturity level can be estimated using the model. For the continuous representation, in contrast, a number of maturity levels can be calculated by independently assessing different maturity model factors.

Table 4 shows that BPM maturity models are primarily designed for BPM in general. Domain specifics or particular application contexts are hardly considered. Furthermore, only few models exist which comprise recommendations for the improvement. However, there exist special maturity models for the public administration without a foundation on the CMM model or BPM maturity models. They do not focus on BPM, but on the assessment and improvement of electronic public services. Because of the concentration on technological aid, those models are known as e-Government maturity models or e-Government stage models.

E-Government maturity models can be divided into models with an academic background [e.g., (Esteves and Joseph 2008; Lam 2004; Stamoulis et al. 2001)] and models developed in practice [e.g., (United Nations and ASPA 2002)]. Most of them present themselves as tools for the improvement of electronic public services. They distinguish several maturity levels of access to these services via electronic media (Shackleton et al. 2004). For example, Layne and Lee (2001) differentiate four maturity stages starting with a simple Internet presence of an administration (catalog), through online-based services and forms as well as assistance for transaction (transaction), to vertical Integrated information systems (vertical integration) and overall cross-functional integrated systems (horizontal integration). The majority of the models concentrate on the evaluation of the electronic interface between administration and external stakeholders (focus on interfaces and front end). In most of the cases, to identify a maturity level, the level of technological assistance during the provision of public services has to be valued (focus on technology). Advice and recommendations for raising the maturity level are limited to aspects like the depth of transaction or integration. There are approaches which try to avoid that strong focus on technology, for example, the model of Anderson and Henriksen (2006), but they hardly expand their focus.

In summary, regardless of the multitude of maturity models, the authors do not mention a use case of a BPM maturity model which is adapted to the needs of public administrations in general and the case of 48-h-service promise in particular. However, e-Government maturity models consider the particularities of the public administration domain. Nevertheless, they do not address the BPM within public authorities. Therefore, the following sections introduce a domain-specific BPM maturity model that eliminates the lack of process orientation in existing e-Government maturity models and that considers the particularities of public administration as well as the 48-h-service promise.

4 Design and Development

Based on the mentioned prior work on maturity models, we developed a BPM maturity model for the fulfillment of the 48-h-serivce promise. This maturity model consists of five maturity levels which reflect the degree of fulfillment of the 48-h-service promise (cp. Fig. 5):

- *Level 1*: “incomplete 48-h-service promise”; no particular actions are defined to fulfill the 48-h-service promise.
- *Level 2*: “managed 48-h-service promise”; some basic actions for the fulfillment of the 48-h-service promise are established.
- *Level 3*: “defined 48-h-service promise”; all necessary actions for the fulfillment of the 48-h-service promise are defined.
- *Level 4*: “quantitatively managed 48-h-service promise”; actions for the fulfillment of the 48-service promise are quantitatively planned, controlled, and monitored.
- *Level 5*: “optimized 48-h-service promise”; all actions for the fulfillment of the 48-h-service promise are permanently and systematically improved.

In order to measure the maturity of a 48-h-service promise of an organization, the proposed maturity model contains five main factors which cover relevant actions and characteristics of the 48-h-service promise:

- *Main factor “Strategy of the 48-h-service promise”*: This main factor consists of aspects which are relevant for a long term plan of action designed to achieve the 48-h-service promise.
- *Main factor “Design of the 48-h-service promise”*: All aspects relevant for the definition and documentation of the implementation of the 48-h-service promise are grouped by this factor.
- *Main factor “Implementation of the 48-h-service promise”*: This factor addresses the realization of the 48-h-service promise.
- *Main factor “Controlling of the 48-h-service promise”*: This main factor includes setting standards, measuring actual performance, and taking corrective action for the implementation of the 48-h-service promise.
- *Main factor “People and culture”*: The people’s knowledge, competency, and willingness for implementing the 48-h-service promise are addressed by this factor.

The utilization of these five factors is based on design decisions during the development process of the maturity model (cp. Sect. 5). The five main factors are further operationalized by 18 factors. Table 5 explains these factors in more detail.

The maturity model defines different objectives, which have to be attained to achieve a particular maturity level for all the factors. By definition, every organization has reached maturity level 1. Table 6 introduces the particular objectives, which have to be achieved to reach maturity level 2.

Table 5 Factors of the maturity model

Main factor	Factor	Explanation
Strategy of the 48-h-service promise	Definition of objective	Definition and communication of the 48-h-service promise as a strategic objective
	Definition of objective values	Definition and communication of measures for the 48-h-service promise
Design of the 48-h-service promise	Process documentation	Process survey and documentation of relevant government processes
	Definition of basic parameters	Identification and definition of relevant basic parameters for the implementation of the 48-h-service promise
	Definition of actions	Definition of operational actions for the fulfillment of the 48-h-service promise
	Definition of roles and responsibilities	Definition of responsible and operational organizational units for the 48-h-service promise
	Information systems for design	Use of information systems for the design of the 48-h-service promise
Implementation of the 48-h-service promise	Resource planning and allocation	Planning and allocation of all necessary employees and material resources for the 48-h-service promise
	Management enforcement	Responsible organizational units enforce necessary managements actions
	Implementation of actions	Responsible organizational units implement all defined actions to fulfill 48-h-service promise
	Implementation of cooperation and communication	Cooperation and communication between all organizational units involved in the implementation of the 48-h-service promise
	Information systems for implementation	Use of information systems for the implementation of the 48-h-service promise
Controlling of the 48-h-service promise	Definition of measures	Definition of measures for the implementation of 48-h-service promise
	Use of measures	Use of measures for the implementation of the 48-h-service promise
	Information systems for controlling	Use of information systems for the controlling of the 48-h-service promise
People and culture	Knowledge and competencies of operational organizational units	Guarantee that operational organizational units responsible for the implementation of the 48-h-service promise possess necessary knowledge and competencies
	Knowledge and competencies of responsible organizational units	Guarantee that organizational units responsible for the management of the 48-h-service promise possess necessary knowledgeand competencies
	Willingness to implement 48-h-service promise	Guarantee that all organizational units accept and adopt the 48-h-service promise

Table 6 Overview of objectives of maturity level 2

Main factor	Factor	Objectives
Strategy of the 48-h-service promise	Definition of objective	48-h-service promise is defined as a strategic objective
	Definition of objective values	Measures for the 48-h-service promise are defined
Design of the 48-h-service promise	Process documentation	Sub-processes of the relevant administration process are identified
	Definition of basic parameters	Relevant basic parameters for the implementation of the 48-h-service promise are identified
	Definition of actions	Rough operational actions for the fulfillment of the 48-h-service promise are established
	Definition of roles and responsibilities	Responsible and operational organizational units for the 48-h-service promise are appointed
	Information systems for design	–
Implementation of the 48-h-service promise	Resource planning and allocation	–
	Management enforcement	Responsible organizational units submit proposals for the enforcement of necessary managements actions
	Implementation of actions	Rough operational actions for the fulfillment of 48-h-service promise are implemented in at least 80 % of all cases
	Implementation of cooperation and communication	–
	Information systems for implementation	–
Controlling of the 48-h-service promise	Definition of measures	–
	Use of measures	–
	Information systems or controlling	–
People and culture	Knowledge and competencies of operational organizational units	Organizational units responsible for the implementation of the 48-h-service promise understand defined objectives and actions and obtain necessary knowledge and competencies for the implementation
	Knowledge and competencies of responsible organizational units	Organizational units responsible for the management of the 48-h-service promise possess basic knowledge of BPM
	Willingness to implement 48-h-service promise	–

For each factor, several actions are proposed for implementation, which improves the 48-h-service promise of an organization. For example, the main factor "Design of the 48-h-service promise" contains the factor "Definition of roles and responsibilities". To achieve the second maturity level of this factor, the objective says that the roles and responsibilities of the management and the implementation of the 48-h-service promise must be defined. The maturity model proposes two actions to achieve this objective:

1. The organizational units responsible for the management of the 48-h-service promise must be defined within the relevant government process.
2. The leading organizational units responsible for the execution of necessary actions to fulfill the 48-h-service promise must be defined.

Additionally, the description of the maturity model contains a deeper explanation for why it is necessary to define the roles and responsibilities of different organizational units for the management and implementation of the 48-h-service promise.

To assess the maturity of a public authority, each factor of the maturity model has to be measured. The first maturity level of each factor is achieved by definition. To achieve the second maturity level of a factor, the first maturity level of this factor has to be achieved and all objectives assigned to this factor on the second maturity level have to be accomplished and so forth.

Typically, a radar chart can be used to visualize the results of a maturity assessment. Such a radar chart consists of 18 axes each representing one factor of the maturity model. Figure 7 depicts an exemplary radar chart visualizing the results of a fictitious maturity assessment.

Please note, because of space limitations, this chapter just overviews some important parts of the maturity model as an example. It is planned to publish the complete maturity model on the Web page http://www.e-government-cc.org/. In the meantime, please contact the first author to obtain a copy of the complete maturity model (Fig. 6).

Compared to known BPM maturity models, our proposed maturity model can be characterized by some important features:

- *Public administration focus*: The proposed model explicitly focuses on the need for BPM in the area of public administration.
- *Purpose-oriented*: The proposed model defines some particular actions and levels for BPM in the context of the purpose of the fulfillment of the 48-h-service promise.

Because of these aspects, we characterize the proposed maturity model as a domain-specific BPM maturity model.

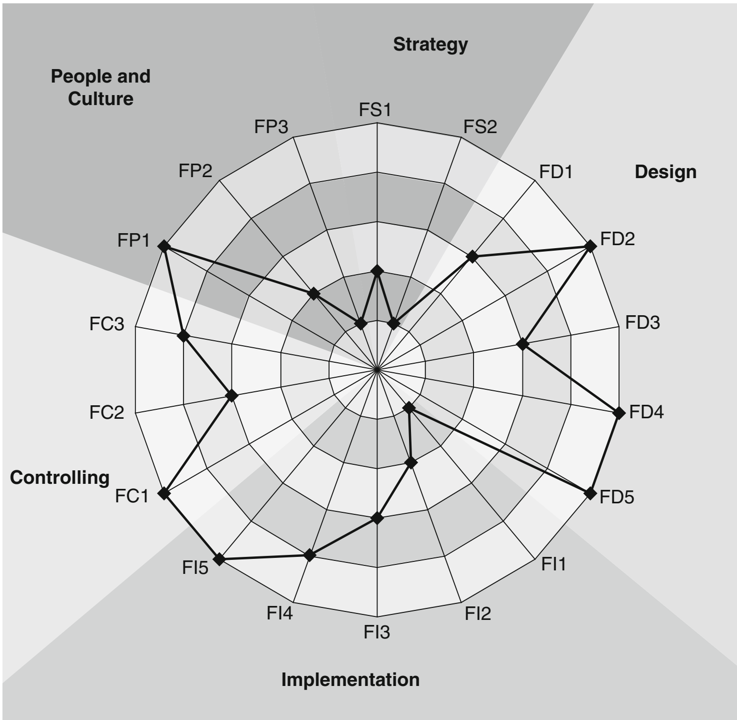

Fig. 6 Exemplary results of an assessment

5 Demonstration and Evaluation

After developing the proposed maturity model, the usability and quality of the maturity model have to be demonstrated via well-known evaluation methods. The public administration environment described in Sect. 2 establishes the requirements which the maturity model must be tested against. Thus, the evaluation comprises the application of the maturity model within the environment offered by public authorities.

Hevner et al. (2004) distinguish five different design evaluation methods, namely observational, analytical, experimental, testing, and descriptive. We used observational and descriptive evaluation methods for the demonstration of the usability and quality of the proposed maturity model.

A descriptive evaluation is typically less rigorous but can be applied during all phases of the development cycle of a research artifact. We used a descriptive evaluation method during the development phase of the maturity model. The designing of innovative artifacts in general and a maturity model in particular is

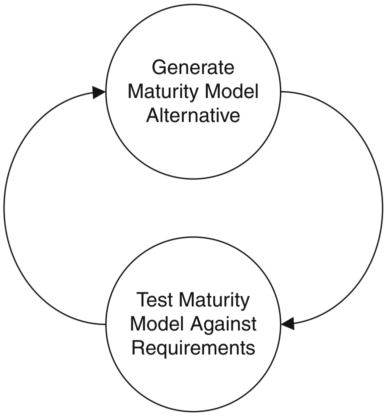

Fig. 7 Generate and test cycle; based on Simon (1996) and Hevner et al. (2004)

an inherently iterative process (Fig. 7). During this process, we developed several design alternatives and tested these alternatives against the requirements mentioned in Sect. 2.

During the development process, we used two approaches in particular:

- *Expert feedback*: We discussed developed design alternatives with several experts from the domain of BPM as well as practitioners responsible for the modernization of public administration processes and fulfillment of 48-h-service promise.
- *Scenario development*: The aim of the scenario development was the analysis of selected real-world public services in a German state administration in order to estimate the state of the art of fulfilling the 48-h-service promise and to acquire possible means and activities for realizing the service promise. For this purpose, a special public authority that provides social services for citizens of the German state was selected. Within this authority, four of the most requested services were selected for surveying their production and provision processes. The processes were documented in survey forms and event-driven process chains (EPC). The analysis of the processes identified several necessary activities and resources for the implementation and fulfillment of the 48-h-service promise which were analyzed according to the background of the maturity model.

The described evaluation approaches were already applied during the development of the BPM maturity model. Such a "Design to Quality" approach significantly supports the usability and quality of the developed maturity model. However, to further assure and assess the usefulness, we employed a case study as an observational evaluation method.

The already presented maturity model was applied in the context of a project which was to increase the service orientation in a German state administration. This state administration has been continuously improving the quality of their services

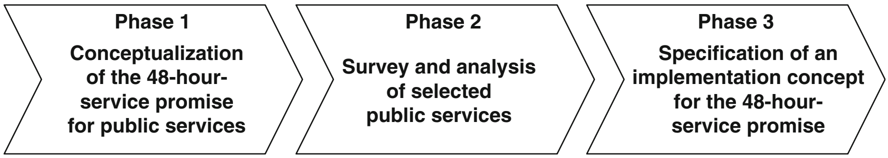

Fig. 8 Project phases

for citizens and enterprises. One building block is a faster communication between applicants and public authorities. The aim of the project is to improve the customer orientation as well as service orientation by introducing a 48-h-service promise. Figure 8 unfolds the procedure and the main phases of the project. Main activities of the first phase were concentrated on the conceptualization of the 48-h-service promise. For this purpose, the configuration parameter for a response in terms of a 48-h-service promise was specified. Moreover, while defining the time frame for the 48-h-service deadline influencing factors for releasing the start-event and end-event were specified. Therefore, several activating conditions for the release of a 48-h-service promise measurement as well as conditions which fulfill a sufficient response in terms of the 48-h-service promise were determined and specified during this project phase.

The aim of the second project phase was the analysis of selected real-world public services in the German state administration in order to estimate the state of the art of fulfilling the 48-h-service promise and to acquire possible means and activities for realizing the service promise based on real-world scenarios. This analysis was based on the developed BPM maturity model for 48-h-service promise.

The results of the preceding two project phases were used in the third phase for specifying an implementation concept for the service promise. Based on the consideration that public services and their processes as well as their activities can be managed using the BPM approach, the 48-h-service promise as a new part with special means and activities within these processes can be realized by an adequate BPM. For the purpose of introducing, managing, and improving the 48-h-service promise for the public services of the German state administration, the proposed maturity model was used. Therefore, the maturity model was applied and typical areas for process improvements were identified.

Our experience in using the maturity model shows the following advantages:

- The maturity model helps bridge the gap between domain expert's view of BPM and its implementation.
- It is suited for communication with users in the domain.
- Because of a focused scope, the application of the maturity model is less challenging.
- The maturity model provides a better support for one particular BPM purpose, namely the fulfillment of the 48-h-service promise in public administrations.

To conclude, according to our findings, a domain-specific BPM maturity model has major advantages compared to domain-neutral BPM maturity models. These experiences are similar to experiences acquired in the context of domain specific modeling (France and Rumpe 2005, p. 1).

In general, it might be argued that the domain-specific development of the proposed maturity model does not make sense because this model might be useful only in one particular organization. However, this argumentation ignores the fact that the developed maturity model is based on requirements gathered at all authorities of a German state. Hence, the model is useful for BPM not only in one particular authority but also in a large class of authorities.

Because of the development process of the maturity model, it can be argued that the model can effectively and efficiently applied by authorities of a German state. According to our experiences and knowledge of particularities of the public administration system in Germany, it will not be difficult to adapt the proposed maturity model to requirements of authorities of other states in Germany. However, today, it is not sure to what extent the developed model can be generalized to the needs of authorities in other countries. From the perspective of BPM, the proposed model does not introduce some particular actions which are typically for Germany. But there may be some national laws in other countries which must be taken into account if the application domain of the proposed maturity model is to be extended.

6 Summary and Outlook

BPM has gained tremendous importance in many industries. In the last few years, public administrations have successfully adopted the idea of BPM as a means for modernization. BPM approaches have much potential for the improvement of efficiency and effectiveness as well as the service orientation of public administrations. One important aspect of service orientation is a 48-h-service promise which was particularly focused in this chapter.

Against this background, there is a need for a maturity model for BPM in public administrations which take into account the fulfillment of a 48-h-service promise. In this chapter, we first analyzed particularities of the domain "public administration" compared to the private sector. Because of important differences between the private sector and public administrations, we proposed that existing maturity models for BPM need to be adapted appropriately to the need of the fulfillment of a 48-h-service promise in the public administration domain. A new proposal was developed which takes into account the fulfillment of a 48-h- service promise in public administrations. Furthermore, the utilization of the model was tested in the context of a project within a particular German state whose authorities want to improve their service orientation in general and to introduce a 48-h-service promise in particular.

We characterize our proposed maturity model as domain-specific because it is adapted to the particular requirements of the fulfillment of a 48-h-service promise in public administrations. Our experiences in applying the domain-oriented maturity model are very promising. For example, we realized that the domain-specific model helps bridge the gap between domain expert's view of BPM and its implementation and is suited for better communication with users in the domain.

Even though the experiences of the application are very encouraging, there are further questions that have to be answered by future research:

- Experiences concerning the utilization of the maturity model in public administration by authorities of one particular German state are available so far. In the context of further applications, additional experiences need to be collected to improve the utilization and practicability of the model.
- As in the case of other known maturity models, the proposed model is based on the assumption that an improvement of the maturity degree is fundamentally positive for success. Hence, in the future, it is necessary to intensively investigate whether a higher maturity level always results in a better success of a public administration or whether there are some circumstances, which, in this respect, have a negative impact on success.
- The developed maturity model addresses the fulfillment of a 48-h-service promise in public administrations. A 48-h-service promise is one aspect of a general service promise that today's public administrations wish to achieve. Therefore, it will be necessary to extend the proposed maturity model accordingly.

Acknowledgment This paper presents results from the research project "Prozessorientiertes Verwaltungshandeln durch innovative E-Government-Lösungen" (innoGov, "Using innovative E-Government solutions for process-oriented public administrations") funded by the European Union (EFRE), Ministerium für Wirtschaft und Wissenschaft des Saarlandes ("Saarland Ministry for Economic and Science") and the IT-Innovationszentrum Saarland ("Saarland IT Innovation Center").

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Part III
People and Culture

While information technology is often the enabler of required process changes, the success of BPM initiatives depends heavily on the contributions, active support, and engagement of all stakeholders. This section divides the human aspect of BPM into (a) the experiences and skills related to processes and process management (people), and (b) overall leadership and the organizational and individual acceptance of BPM (culture).

In this context, questions arise concerning how we can ensure that involved employees proactively initiate and drive process change and accept the proposed process changes, what is the BPM body of knowledge covering the skills required by BPM professionals, what is needed on the human side to enable a process change in the most effective and efficient manner, and what leadership skills are required to ensure that culture becomes an enabler and not an inhibitor of process change. This part of the BPM Handbook explores the role of the human factor in BPM from a variety of viewpoints.

The first two papers in this section focus on the competencies required in order to apply BPM successfully in an organization. In the first chapter, Alexandra Kokkonen and Wasana Bandara introduce the field of expertise in BPM, presenting a comprehensive model of expertise in the context of BPM that consolidates existing theories and related work. In the second chapter, Yvonne Lederer-Antonucci takes a closer look at the design of BPM course curricula. Since many organizations have assigned process-transformation leadership to business analysts, Lederer-Antonucci reviews the role of a business analyst in the context of BPM practice and suggests a curriculum designed to cultivate the skills required to fill the emerging role of the business process analyst.

In addition to skills, various factors resulting from the human perspective must be considered when managing change in business processes. These factors are considered in the next set of chapters. First, Keith Harrison-Broninski introduces human-driven processes, presenting an approach to analyzing and describing processes with a focus on human interactions that facilitates the management of teams, communication, knowledge, time, and plans by taking the role of human collaboration in BPM into account. Interactions and how they can be modeled is the focus of the chapter contributed by Albert Fleischmann, Werner Schmidt and Christian Stary. Subject-oriented BPM (S-BPM) follows a communication-oriented paradigm and by this presents an alternative to the common activity-centered proposals. The concepts of S-BPM are explained using an exemplary process. The approach is discussed in the context of social BPM and insights into the actual application of S-BPM are provided. In the next chapter Dimitris Karagiannis and Robert Woitsch focus on the critical role of "knowledge" and the intersection between BPM and "knowledge engineering," contributing to the increasingly important domain of knowledge-sensitive BPM. The authors show how knowledge engineering can be incorporated into BPM, with a particular focus on frameworks, management methods, and deployment initiatives.

Culture is also a crucial element in the relationship between human capital and BPM. In the opening chapter of this section, Theresa Schmiedel, Jan vom Brocke, and Jan Recker introduce this emerging field of BPM research, reporting on three major research projects and providing an overview of the multi-faceted role of culture in BPM. Against the background of a conceptual framework, the BPM-culture model, the authors identify four values essential for BPM initiatives and present a BPM-culture tool with which to measure how well specific organizational cultures support BPM. In order to incorporate cultural effects, change management initiatives supporting BPM need to be considered. This is the focus by Ulrike Baumöl, whose contribution on cultural change in BPM provides an engineering perspective on how to implement change in an organization. The section continues with Jan vom Brocke, Martin Petry, Theresa Schmiedel, and Christian Sonnenberg's real-life case of the Hilti Corporation, which analyzes the intersection of corporate culture and BPM success. The authors reveal that a cultural development initiative was instrumental in Hilti's success with a global BPM project.

Both knowledge and culture contribute to the overall creativity of an organization. The phenomenon of the growing competitive relevance of BPM is discussed by Stefan Seidel, Katherine Shortland, David Court, and Didier Elzinga in the next chapter. Drawing from observations made at a leading postproduction studio, Rising Sun Pictures, the authors show how creativity impacts business processes and derive guidelines for management of the creativity-intensive processes that are of major importance to a wide range of industries today.

We conclude the section with two case studies on the role of people and culture in BPM. First, a case study of an Australian transport provider demonstrates the various interdependences among the six core components of BPM structuring the BPM Handbook. In their case Tonia de Bruin and Gaby Doebeli once more highlight the importance of understanding BPM as an organizational approach. Then the chapter by Hugh Peterken and Wasana Bandara reports on BPM in the International Federation of Red Cross and Red Crescent Societies. The case demonstrates the tremendous challenges of BPM in international humanitarian aid organizations but also its significant contributions. The chapter illustrates how the six core elements of BPM must be integrated and aligned with respect to the specific context of the organization's internal and external environments.

Expertise in Business Process Management

Alexandra Kokkonen and Wasana Bandara

Abstract Business Process Management (BPM) is evolving and organizations are becoming more process oriented. Hence, the need for expertise in BPM amongst practitioners has increased. Existing role descriptions are revised and entire new business process-related roles emerge. Proactively managing Expertise in BPM is essential to unlock the potential of BPM as a management paradigm and competitive advantage. Whilst great attention is being paid by the BPM community to the technological aspect of Business Process Management (BPM), relatively little work has been done concerning the people factor of BPM and the specification of expertise in the context of BPM. To close this gap, this chapter presents a comprehensive model of expertise in the context of BPM, which consolidates existing theories and related work. This model describes the key attributes characterizing "expertise in the illustrative context of BPM" and outlines their structure, dynamics, and interrelationships. Understanding expertise in the context of BPM expertise is a predecessor to being able to develop and apply expertise in BPM effectively. This is the cornerstone of leadership, human capital management, and human resource development in BPM.

1 Introduction and Background

> People are at the heart of processes
> (Jeston and Nelis 2010, p. 5)

With the rapidly growing emphasis and focus on process improvement activities across the globe, many organizations ask the following questions: What do we know about expertise in the context of Business Process Management (BPM)?

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_22,

What does our understanding (or lack of understanding) of expertise in the context of BPM mean to the BPM arena?

BPM has emerged in recent years as a management philosophy and discipline centered around business processes, and is continuing to rapidly evolve (Gartner 2008; Rosemann and vom Brocke 2014). Preceding related disciplines included Total Quality Management (TQM) in the 1980s, followed by Business Process Reengineering (BPR) in the early 1990s, and in the mid and later 1990s Enterprise Resource Planning (ERP) (Koch 2001; Jeston and Nelis 2008). In essence, BPM is an old discipline (Verner 2004).

"BPM is considered as an organizational management philosophy; a holistic approach which focuses on the organizational (BPM) capability required to optimize process management practices within the organization" (Rosemann and de Bruin 2005). As such, this approach encompasses the integration, coordination, and management of BPM practices as they are applied across and within key end-to-end processes and the lower level processes that go to support them (Rosemann and de Bruin 2005). Thus, BPM goes beyond mere automation of business processes, or solving business problems; BPM creates value through competitive advantage by responding to consumer changes, market(s), and regulatory requirements faster and more effectively or efficiently than competitors respond.

As BPM has evolved and organizations are becoming more business process oriented, the need for BPM expertise and experience has increased (Rosemann and vom Brocke 2014). Roles, which recognize this requirement, are being introduced in organizations [such as; Business process director; Business process consultant; Business process architect; Business process analyst (Melenovsky and Hill 2006) to name a few]. While great attention is being paid by the BPM community to the technological aspect of BPM [such as van der Aalst et al. (2003)], relatively little research or work has been done concerning the people factor (Rosemann and de Bruin 2005), and expertise and experience component of BPM (BPM Basics 2007; Harris 2007).

The dynamic, complex, and interdependent nature of the business process environment means that business process roles require a breadth of various expertise and experience, ranging from the business itself to the technology concerned. These roles are sometimes referred to as business process expert roles; however, there is little common understanding of what such roles are and the associated expertise. The deficit in focus and research on the people component of BPM (Rosemann et al. 2005, 2007) has resulted in poor understanding of what the term "expertise in BPM" means in practice, its manifestation and application within organizations, or in the implications of the manifestation and application.

The people element, defined as "the individuals and groups who continually enhance and apply their process skills and knowledge to improve business performance" (following Rosemann et al. 2005), is considered a key factor of BPM; as evidenced by the many BPM critical success factor studies (e.g., Raymond et al. 1995; Amoroso 1998; Grover et al. 1998) that specifically state the role of people for the success and failure of BPM. One of the few BPM studies that discuss the people factor in BPM in detail is the Rosemann and de Bruin (2005) and de Bruin's (2008) model of

Business Process Management Maturity (BPMM). The "people factor" refers to one of the six BPM capability areas identified by de Bruin (2008) in the (BPMM), and it one of the six core elements of BPM considered in this handbook (Rosemann and vom Brocke 2014). A deficit in any one of the six component areas will affect other areas of BPM to some extent, as none of the components operate in isolation. Thus, any deficit in the people factor will invariably affect the other BPM components to a greater or lesser extent. Other BPM-related models that emphasize the people component are Zachman's Enterprise Architecture framework (Zachman 2007), the Enterprise Business Process Architecture model (BPMEnterprise.com) as well as the study on the skill-set of BPM professionals by (Müller et al. 2014) analyzing a collection of 1,507 BPM-related job advertisements.[1,2]

While it is widely agreed that experience and expertise in BPM are required at different organizational levels, from operational to executive management levels, there is no common framework in existence, describing the fundamental elements characterizing expertise in the context of BPM. This has resulted in a poor understanding of what expertise in BPM is, and poor understanding of the implications of the dynamics and interrelationships of the elements of expertise in BPM for an organization. This knowledge deficit has contributed to the void in the understanding and managing the implications of expertise in BPM in different organizational areas, and its development. Attempting to address process issues through technology, architecture, data, and processes alone, independent of (or ignoring) the people involved and their expertise, is like "doctors trying to treat humans by only looking at their feet" (Vestey 2006, p. 60).

> Even if the organization has their structure optimized, people are the ones who execute the processes and make things happen. Without them you have nothing.
> (Jeston and Nelis 2006, p. 169)

BPM guidelines for success often provide advice such as: "Establish a robust governance framework that identifies process ownership," "Appoint a business process analyst to work on each major business process," "Create a BPM center of excellence," "Select an experienced person to head the BPM center of excellence (e.g., Hill et al. 2006; Olding and Rosser 2007)." People cannot be appointed to fulfill BPM expertise roles successfully, or create governance around the deployment and management of BPM expertise, or establish a center of excellence consolidating BPM expertise, without first knowing what BPM expertise is meant to be.

[1] The other componennts are Strategic Alignment, Governance, Technology, Methods and Culture (Rosemann et al. 2007).

[2] Whilst these are enterprise architecture (EA) models, BPM plays a central role in EA (Pieterse 2005); the two fields may even merge in future (Zsambok and Klein 1997; Stevens 2007). Zachman's framework considers people to be the "who" component of enterprise architecture, while organizational aspects – people, roles, and functions — are one of the seven components of the Enterprise Business Process Architecture model (BPM Enterprise.com).

This study aims to develop a deeper understanding of what expertise in the context of BPM is, and what the key attributes and dynamics characterizing expertise in BPM are. The focus of this study is expertise in the context of BPM as a holistic concept. This is different in scope from "process expertise" or a "business process expert"; each of these is considered a subset of expertise in BPM. Thus, the term "expertise in BPM" encompasses all forms of knowledge and experience relating to business processes, including the management and architecture of business processes, characteristics of the person(s) involved in the expertise, the level of expertise, and the context in which the BPM expertise is situated. This chapter presents an a-priori model of expertise in the context of BPM, which is the first attempt to characterize the concept of expertise in the context of BPM. The model is a first step toward defining and understanding expertise in a BPM context at both organizational and individual levels. In doing so the improvement of several BPM areas is facilitated.

2 Model of Expertise in the Context of Business Process Management

This chapter is from an overall study that aims to essentially build theory, establishing a meta-theoretical perspective of expertise in the illustrative context of BPM. Theories embody generalization and bring order to a vast array of disparate phenomena, encapsulating the most secure of our knowledge claims (diSessa and Cobb 2004). Expertise is fundamentally concerned with the state of 'being' of the entity deemed to exhibit that expertise. This study aims to characterize this 'state of being' in the illustrative context of BPM, requiring an innovative approach. The result is an ontology of a meta-model describing the theory of expertise in the context of BPM (Fig. 1).

This ontology of expertise in the illustrative context of BPM, represents a viewpoint on a set of possible domain theories, and may have meaning and application beyond the BPM domain. Several theories, concepts, frameworks and

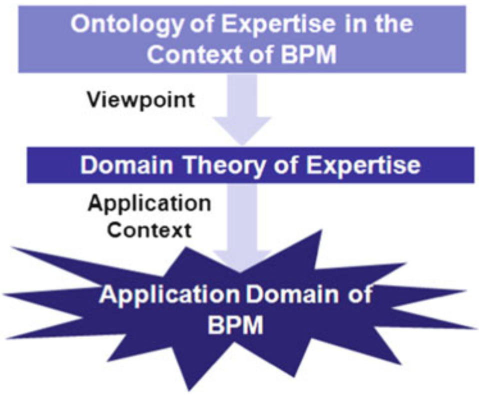

Fig. 1 Ontology as a meta-model describing the domain theory of expertise in the illustrative context of BPM (Adapted from Schreiber et al. 1995, p. 161)

models were required to adequately illustrate the model components, referred to as ‘constructs’. No one theory could adequately describe all the model components and examples required, resulting in the use of multiple theories, and the instigation of ‘theoretical pluralism’. The initial candidate constructs and sub-constructs established from the background literature review, and supported by the study contextualization phase, directed the theoretical scope under review for model building. The actual conduct of multilevel theoretical research is challenging due to the volume of data analysis and collection. Research standards need to recognize the tradeoffs necessary when research work begins in a new area such as expertise in BPM. Finally, multilevel theory development requires clear and precise specification of model constructs. It is acknowledged these construct levels are creations by the researcher, and that the stability of levels of theory can potentially shift over time (Dansereau and Alutto et al. 1984; Dansereau and Yammarino et al. 1999; Klein and Tosi et al. 1999). The model developed in this study characterizing expertise in BPM, is an explanatory type of theory. Explanation of expertise in the context of BPM is provided, though no predictions concerning expertise in the context of BPM are made, nor are there any testable propositions beyond the existence of the constructs and primary sub-constructs of the model itself. The model is essentially an ontology as a meta-model, i.e. a meta-level theory for understanding, used as a high level ‘sensitizing device’ concerning expertise in BPM. This is “theory as enlightenment” (Gregor 2006, p. 624), providing “a set of categories and domain assumptions aimed at clearing away conventional notions to make room for artful and exciting insights” (DiMaggio 1995, p. 391). The model developed is represented via words, diagrams and figures, using constructs to articulate the various key features of expertise in BPM. Statements of relationship are high level and qualitative only, concerning the existence of interaction between model constructs, and their sub-constructs.

The primary goal of the study was to develop high-level characteristics of expertise in the context of BPM referred to as ‘constructs’. Additional characteristics, ‘sub-constructs’ and illustrative examples, were also developed and considered key to establishing the importance and relevance of the model, and enabling an enhanced understanding of expertise in the context of BPM. The initial background literature review explained the importance and relevance of the research focus, including the business background, need for management understanding of expertise in the context of BPM, and hence the overall motivation, aim and goal of the study. It is important to acknowledge at this point the multidisciplinary nature of Expertise in the context of BPM. The ‘total systems approach’ of Information Systems (of which Expertise in the context of BPM is a part), means that no single discipline is adequate to understand issues in the field of Information Systems. “Knowledge and tools from at least computer science and engineering, psychology and sociology, management and anthropology could possibly each contribute when addressing problems in the information systems field.” (Roode 2007). This approach acknowledges the inherently social nature of expertise in BPM (Roode 2007).

A deductive approach (referred to informally as a “top-down” approach) was used to derive the model of expertise in BPM, as an a-priori attempt. An a-priori is defined as “prior to or independent of experience; contrasted with ‘a posteriori’ (empirical)” (Audi 2001, p. 35). A-priori approach marks a distinct epistemic justification and derivative approach as well as a kind of proposition, knowledge, and argument, that is, the way the concept is acquired (Audi 2001). An a-priori model-building phase was necessary to establish, and enable communication of a thorough understanding of the constituent parts of expertise in BPM, their interrelationships and dynamics. Such a model helps to describe and conceptualize a theory in a structured, holistic manner, aiding the analysis of data. The model building phase was done via literature (Eisenhardt 1989; Chau 1997). Literature “implicitly assumes that there is a true model for a given set of data” (Chatfield 2006). Model building is iterative (Chatfield 2006), hence the model was evolved iteratively as further literature was encountered, and evolved further during the a-priori model confirmatory phase. It is acknowledged that the model developed through this study can be developed further with further research recommended.

The initial topic of interest was identified based on the research topic (i.e., the experience, knowledge, abilities, and aptitude required in BPM). Theories, frameworks, and models related to the research topic were searched across analogous domains, and those that were related were borrowed and adapted in the derivation of the model presented in this paper. The primary literature disciplines chosen initially, as representative of the core aspects of a-priori model-building are as per Table 1.

The literature domains, and why they were selected, are briefly described below. The constructs these descriptions refer to are introduced and described in the next section.

Autopoiesis: “This body of theory concerns the dynamics of living systems, purporting to answer the question “what is the characteristic organization of living systems?” The process of Autopoiesis lies at the heart of the answer” (Department of Computer Science University College London 2008). Autopoiesis was selected as it was considered to describe the living system construct, which was designed to capture the living nature of BPM expertise comprehensively; there is no other comparable theory.

Developmental Management: This domain covers literature relating to developmental management, which was chosen for the creation of the context of the individual person (I-PER-C) primary sub-construct as this provided a comprehensive view of the complete context of the person in a contextual setting. The context of the person cannot be separated from his/her professional context (BPM); therefore, this was a critical area to cover.

Organizational Management: this domain covers literature relating to organizational management, and was chosen to develop the external context of the organization (I-ORG-EC) secondary sub-construct, plus the Living System – Organization primary sub-construct. BPM cannot be separated from the organizational context in which it resides in, hence this is a critical area to include.

Experience and Expertise: this domain covers literature pertaining to experience and expertise, and was selected as expertise is at the core of the research problem, that is, to characterize BPM expertise.

Table 1 Mapping of literature domains to model constructs

BPM expertise model construct	BPM expertise primary sub-construct	Corresponding literature domain
Living system	Living system-person (l-PER)	Autopoiesis
	Living system-organization (l-ORG)	Autopoiesis organizational Management
Knowledge	Explicit knowledge	Experience and expertise
	Tacit knowledge	Experience and expertise
Behavioral characteristics	Mind	Applied social science (counceling) experience and expertise
	Behavioral system	Applied social science (counceling) experience and expertise
	Spirit	Applied social science (counceling) naturalistic decision making
Context	Context of the person (l-PER-C)	Developmental management
	Context of the organization (l-ORG-C)	BPM organizational management
Decision making	Situation awareness decision action feedback	Naturalistic decision making

Applied Social Science (Counseling): this domain covers literature relating to applied social science in the counseling field. The "contextualization of self" material was selected to develop the behavioral characteristics construct, as this was considered the most comprehensive approach to this part of the BPM expertise model.

Naturalistic Decision-Making (NDM): This domain covers material related to NDM, including situation awareness and mental model-building. This domain was chosen to develop the decision-making construct of the model, as it reflects the real world nature of decision making in the BPM environment.

BPM: this domain covers literature pertaining specifically to the context of BPM, and was selected because BPM is at the core of the research problem, that is, to characterize expertise in BPM, and was used to develop the context of the organization (I-ORG-C) construct.

These key literature domains themselves were established upon identification of the research focus, and through review of associated literature areas. Hence, each element within the model of expertise in BPM originated from established theory from related disciplines, where they were iteratively integrated into the model, the goal being to build a model of expertise in BPM that was as complete and justifiable as possible.

The next sections present the elements of the model. The derived model of expertise in BPM is complex in nature, having a number of elements, which are represented and discussed throughout the remainder of this paper. First, it is

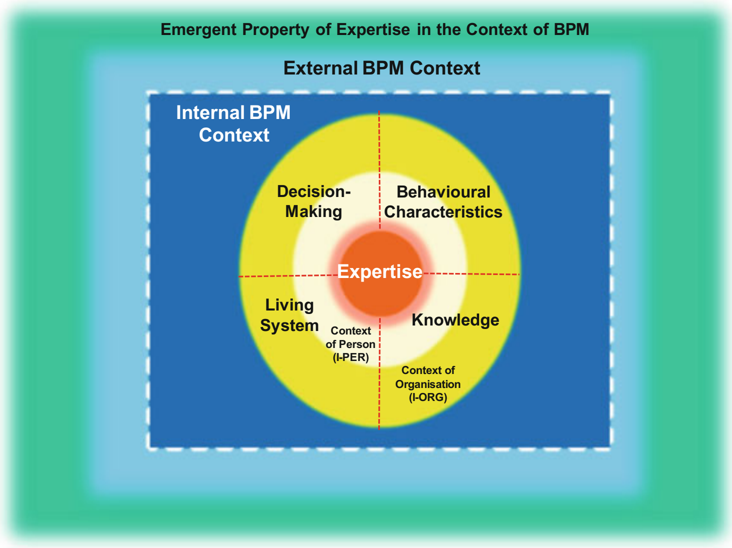

Fig. 2 Summary of model constructs

important to introduce the terms used to depict these different model elements. The main elements (see Fig. 2) are referred to as "constructs." The secondary elements relating to the constructs are referred to as sub-constructs; these decompose the main constructs. A construct is a variable in a theory (adopted from Analytic Technologies 2008), a "higher-level abstraction from things that cannot be observed or illustrated by specific objects or events" (Ohio State University 2008). It is defined as "an abstract or general idea inferred or derived from specific instances" (Webster's Revised Unabridged Dictionary 1913a; Princeton University 2008c). A sub-construct in this a-priori model is defined as "a part of the referenced construct" (Webster's Revised Unabridged Dictionary 1913b).

2.1 *Constructs of the Model*

The model of expertise in the context of BPM is depicted in Fig. 2 and its primary elements, the living system, knowledge, behavioral characteristics, context, knowledge flows, and decision-making are presented below. Figure 2 depicts the model constructs, and their respective primary sub-constructs [for example, the primary sub-constructs of the living system construct, are the organization (I-ORG) and person (I-PER)]. Expertise in BPM exists throughout the organization, going beyond mere technical or functional IT knowledge, or just business knowledge; knowledge itself is only one part of the concept; thus it is a multi-dimensional concept.

2.1.1 Living System Construct

The living system is considered self-organizing, having the special characteristics of life and interacting with its environment (Miller 2008). It is defined in this context as "a composite unity whose organization can be described as a closed network of productions of components that through their interactions constitute the network of productions that produce them, and specify the networks extension by constituting boundaries in their domain of existence" (Maula 2006, p. 229). It is considered to be an autopoietic entity, and is a special case of organizationally closed autonomous systems. The living system construct is made up of two primary sub-constructs; the individual person (I-PER) and individual organization (I-ORG).

Expertise in BPM exists at both the individual person and individual organization level. The concept of collective expertise in BPM, as it relates to the organization, is akin to that of "collective mind" (Hakkarainen et al. 2004). Collective mind is "an approach that emphasizes how highly trained and experienced teams function as if of one single mind. This kind of collective mind has systemic characteristics that cannot be reduced to the sum of individual minds" (Hakkarainen et al. 2004, p. 242). Likewise collective expertise in BPM cannot be reduced to the sum of individual minds and must be recognized at the organizational, as well as personal level.

The Living System – Person (I-PER) primary sub-construct represents the individual person as the entity where expertise resides. Expertise resides in people (Bereiter and Scardamalia 1993), each person being an autopoietic entity (Maturana et al. 1992; Maula 2006).

The Living System – Organization (I-ORG) primary sub-construct represents the individual organization deploying BPM. The organization is also considered to be an autopoietic entity (Maula 2006), though it consists of many individual people which are also autopoietic entities in their own right. The organizational qualities arise or emerge as a result of the ongoing autopoiesis of the living system's biological components (people) of the organization (Department of Computer Science University College London 2008).

The living system concept is important to expertise in BPM as it reflects aspects of the holistic entity deploying a BPM philosophy. An example is the ability of the organization to sense its surrounding environment and be aware of change in relevant contextual areas such as the task, industry, and macro environment (including economic, technical and social) aspects affecting BPM. Task environment items may include changes in the customer base and activities the specific organization carries out. Interactive processes and communication with the surrounding environment, both internal and external are crucial to disseminate BPM strategy and ensure that governance is occurring and effective, and that processes are optimal. Internal standards are important for BPM governance to be effective. Other aspects concerned with the living system entity from an organizational perspective include experimentation often necessary in BPM to develop new processes and ways of doing things, and information and communication systems.

The living system also reflects the individual person working in the BPM environment; examples of individual people in BPM include employees, contractors, vendors, or customers. Prior relevant BPM experience in areas such as technology, process, governance, industry, and functional area are necessary to varying extents and are also reflected in the living system construct along with personal history relevant to BPM; it is considered to take 10 years on an average to become an expert in any domain. How the person functions overall as a living system affects his/her ability to function in the BPM environment; experience and knowing affect knowledge, interactions affect behavior as do behavioral domains, and language affects communication: an important aspect of BPM given positioning between the business and IT; these aspects are also reflected via the living system construct. The vital role of communication skills in BPM education has been further investigated by Bergener et al. 2012.

2.1.2 Knowledge Construct

Knowledge is defined in this context as "a blend of experience, values, information in context, and insight that forms a basis on which to build new experiences and information, or to achieve specific goals. It refers to the process of comprehending, comparing, judging, remembering, and reasoning. . . . is the uniquely human capability of interpreting and extracting meaning" (quantumiii 2008). Knowledge plays a central role in expertise (Bereiter and Scardamalia 1993), regardless of the specific domain of expertise (Charness 1991; Bereiter and Scardamalia 1993; Selinger and Crease 2006; Chi 2007). Knowledge is considered a key characteristic for two main reasons. Firstly, many other factors may contribute to expertise in BPM but are not essential. Secondly, the behavioral characteristics only explain in part, how knowledge is acquired. "Knowledge is about beliefs and commitment, action, and meaning. Information and knowledge are context-specific and relational; they depend on situations and are created dynamically in social interaction among people" (Maula 2006, p. 66). "The conventional view of knowledge is not only limited as to what knowledge includes but it is also limited in its conception of how knowledge is acquired and how it works" (Bereiter and Scardamalia 1993, p. 45). The knowledge construct of the a-priori model is considered to comprise two primary sub-constructs, explicit knowledge and tacit knowledge (Audi 2001) as depicted in Fig. 2.

Within each of these primary sub-constructs are illustrative secondary sub-constructs. Explicit knowledge is considered to be made up of the three illustrative secondary sub-constructs of declarative knowledge (Bereiter and Scardamalia 1993) which is concerned with "knowing about," explanatory knowledge (Kim 1994) which is concerned with "knowing why," and procedural knowledge (Cianciolo et al. 2007) which is concerned with "knowing how" (Bereiter and Scardamalia 1993).

Declarative examples include formal knowledge considered to be "negotiable" knowledge in the sense that it arises through processes similar to negotiation, is something people can negotiate about, and "is negotiable in the sense that it can be transferred, exchanged, even purchased for money" (Bereiter and Scardamalia 1993), plus "domain knowledge" which is the content of a particular field of knowledge.

Examples relating to procedural knowledge are skills and habit. Skills are the "ability to do something well, usually gained through training or experience," or "something that requires training and experience to do well, e.g., an art or trade" (Encarta.msn.com 2008c). Habit refers to a regularly repeated behavior pattern "an action or pattern of behavior that is repeated so often that it becomes typical of somebody, although he or she may be unaware of it." (Encarta.msn.com 2008a, b, c). In the BPM domain, these may be technical or process management skills and habits.

Explanatory knowledge is essentially metaphysics or science according to Aristotle, and is defined as "knowledge of why things are as they are" (Politis 2004, p. 33). It is concerned with "knowing why" (KRII 2008).

Explanatory knowledge samples include the work-domain knowledge type, which is necessary to understand increasingly complex phenomena in the background of modern society, to provide "a scientific understanding of the world (Beckham 1999). It appears to constitute the core of work-domain knowledge (Vicente 1999) that has an essential role in mastering complex socio-technical systems." (Hakkarainen et al. 2004, p. 21). It is knowledge that pertains directly to performing primary work such as a design engineers engineering knowledge, knowledge of systems, and procedures for performing design work.

Tacit knowledge is considered to be made up of informal knowledge (Bereiter and Scardamalia 1993) such as common sense and promisingness, impressionistic knowledge such as judgment, trust (Platts and Leong 2006), and intuition (Bereiter and Scardamalia 1993), and self regulatory knowledge such as self- knowledge, beliefs (Zimmerman 2007), and values.

Samples related to informal knowledge are common sense, which refers to "sound and prudent judgment based on a simple perception of the situation or facts" (Merriam Webster 2008a), and promisingness which refers to "a kind of judgment" (Bereiter and Scardamalia 1993, p. 58), and depends on impressionistic knowledge, distinguishing creative from non-creative expertise (Bereiter and Scardamalia 1993). According to Bereiter and Scardamalia (1993), knowledge of promisingness can only come from "deep and long immersion in progressive problem solving within a domain" (Bereiter and Scardamalia 1993, p. 235). Impressionistic knowledge samples are "judgment," which refers to a knowledgeable opinion (Merriam Webster 2008d), trust, which is concerned with reliance "based on past experience" and faith (wordreference.com 2008), and finally intuition, which is defined as "quick and ready insight; the power or faculty of attaining to direct knowledge or cognition without evident rational thought or inference" (Merriam Webster 2008c).

Self-knowledge refers to "knowledge of one's self, or of one's own character, powers, limitations" (selfknowledge.com 2008). A belief is considered to be a known in the subconscious, hence the relationship between belief and knowledge is subtle (wikipedia.org 2008) and is defined as "any cognitive content held as true"

(Princeton 2008a, b, c, d, e). While believers in a claim often state they "know" something, philosophers distinguish between belief and knowledge. Values refers to "beliefs of a person or social group in which they have an emotional investment (either for or against something)" (Princeton 2008a, b, c, d, e), while "self-efficacy" refers *to* "perceptions about ones capabilities to organize and implement actions necessary to attain designated performance of skill for specific tasks." (Zimmerman 1989, p. 2)

Explicit knowledge of the internal and external context of the organization, as well as the individual people, in BPM is both essential and broad because of the inherent complexity of the BPM domain. Hence, explicit knowledge of many areas is required to varying extents. Explicit knowledge of the organization includes, but is not limited to the business itself (what is does) and includes geography, industry, company, all aspects of governance (including compliance and regulatory frameworks and procedures), business processes, associated technology such as ERP and BI systems, various business strategies plus the alignment and integration of those strategies, industry strategic direction, functional strategic direction such as key direction in the supply chain/logistics environment, plus the people that constitute the organization. Explicit knowledge of relevant external influences such as political, economic, technical, and socio-cultural is also necessary, as these have a direct bearing on the organization and the people working in the BPM environment. Explicit knowledge alone, however, does not make an expert; tacit knowledge is key to expertise in any domain delineating experts from non-experts, and hence tacit knowledge of all the afore-mentioned areas is also necessary to varying extents in expertise in BPM. Each type of explicit knowledge has a role to play in expertise in BPM; declarative knowledge is concerned with knowing about aspects of BPM such as specific processes, governance, or associated technology. Explanatory knowledge is concerned with knowing why certain external organizational events are occurring, such as changes in economic circumstances, and how they will impact various aspects of the business and strategy. Procedural knowledge is concerned with knowing how, for example how specific technology works and the benefits it can yield for the business through process improvement. All aspects of tacit knowledge also have a role to play in expertise in BPM. Informal knowledge of BPM areas such as processes and technology are no less important than formal knowledge of such areas. Impressions can be a valuable source of knowledge concerning less tangible aspects of BPM such as process attitudes, or values and beliefs. Self-regulatory knowledge is essential for anyone in the BPM field to manage themselves and therefore contribute in an optimal way to the organization and BPM field.

2.1.3 Behavioral Characteristics Construct

Behavior, is defined as "action or reaction of something under specified circumstances, the way a person behaves toward other people, the aggregate of the responses or reactions or movements made by an organism in any situation and

[the] manner of acting or controlling yourself" (Princeton University 2008a, b, c, d, e) in this context. It too plays a central role in expertise regardless of the domain of expertise (Chi 2007; Feltovich et al. 2007; Hunt 2007). Expertise cannot be explained by knowledge alone. The behavioral characteristics component of expertise is key to understanding the utilization of knowledge and interaction with the environment in which the expertise occurs.

Thinking ability, practical sense (Cianciolo et al. 2007), and intuition (Haldin-Herrgard 2004) are key components of expertise (Bereiter and Scardamalia 1993), and must therefore be acknowledged and reflected in a model of expertise. Given the importance of the people factor in BPM (Rosemann et al. 2005), which is the context of the a-priori model, behavior is undoubtedly considered a key aspect of expertise in BPM, due to the behavioral characteristics of each person involved in expertise in BPM. The behavioral characteristics construct of the a-priori model is made up of three primary sub-constructs. These are mind, the behavioral system, and spirit (Huitt 2003a, b).

The Mind is "the functioning of the brain to process information and control action in a flexible and adaptive manner" (Farthing 1992, p. 5). The mind is not a filing cabinet; it is impossible to understand the criticality of knowledge to expertise if this "filing cabinet" view is retained, akin to a cook having a well-stocked pantry; it does not say anything about how the cook actually cooks; the pantry is not the cook, and likewise the filing cabinet is not the expert (Bereiter and Scardamalia 1993). The primary sub-construct mind is made up of the cognitive, conative, and affective secondary sub-constructs (Huitt 2001). Examples of the cognitive secondary sub-construct include thinking, knowing, understanding, problem solving, mental resources, and reasoning (Huitt 2006). Illustrative examples of the cognitive secondary sub-construct include volition, will, intention, reason, and persistence (Huitt 1999), whilst illustrative examples of the affective secondary sub-construct include attitude, emotion, predisposition, and feelings (Huitt 2003a, b).

Behavioral System refers to *the* "Overt action of organism (output of the individual)" (Huitt 2003a, b). The output of the behavioral system is action and displayed behavior. Behavioral system theory recognizes that there is a feedback loop between overt responses (or "behavior") and resulting stimuli from the environment (Huitt 2003a, b).

Spirit is concerned with "How we approach the unknowns of life, how we define and relate to the sacred" (Huitt 2003a, b). One's view of spirituality has an important influence on one's values and self-concept (Huitt 2000). In this regards, also consider the role of culture in BPM as discussed in one of the subsequent chapters of this section (Schmiedel et al. 2014; vom Brocke et al. 2014).

An understanding of the various aspects of BPM such as the business, business processes, industry, company, governance, technology, and external factors, such as political, economic, socio-cultural environment, and technical environment, in relation to the organization and people within it is essential to expertise in BPM. Thinking and problem-solving abilities are also required to deal with BPM challenges such as process design and implementation, or an appropriate governance approach and strategy for regulatory and compliance requirements such as

SOX, IFRS, and GAAP. Ability and mental resources for problem solving are essential in the BPM, given the inherent problem-solving involved in many BPM activities. Sufficient cognitive complexity to handle problems and issues in the BPM domain is also necessary because of the complex and dynamic nature of the domain. Examples are changes to business processes to accommodate internal management reporting, overlaid with technical system, funding, and time constraints; changes to governance requirements can be complex, requiring implementation in a specific and often short timeframe. In BPM, there are often significant changes occurring in parallel in multiple areas, for example, changes to strategy in different functions (invoice to cash, record to report, or procure to pay) which are not always congruent; at the same time, complex governance changes may need to be addressed and therefore have to be understood in relation to the respective strategies and associated technology and processes. Persistence, a further behavioral characteristic, with problem-solving can be difficult in BPM because of ongoing complexity. BPM can require diplomacy because of the "dual" role between IT and the business, hence the need for professionalism. The ability to reason is also essential as many issues in BPM are not straight forward, requiring strong reasoning ability, particularly where conflicts in strategy, technical approach, funding, or timing occur.

Affective elements of behavior are also very important (emotion, attitude, disposition) because of the need to interface with many people in many different business areas, internally and externally, often with varying levels of knowledge and understanding, conflicting views, and priorities in the BPM field. Learning facilitates self-regulation, and is an important aspect of being "expert." It is crucial in BPM, even at non-expert levels because of the constant change and new challenges and problems to be addressed, particularly in technology areas, and is therefore reflected in expertise in BPM. Spirit is concerned with how unknowns of life are approached, and is important in expertise in BPM as people working in BPM are constantly faced with unknowns and new situations; spirit relates to how these situations are approached. A person's view of spirituality has an important effect on his/her values and self-concept, which in turn affects how the person aligns with the BPM values of process and action orientation.

2.1.4 Context Construct

Context, is derived from the Latin term "contextere" meaning "weave together" (Brown 1993, p. 493; Encarta.msn.com 2008a) and refers to "ambient conditions; a set of circumstances" (Brown 1993, p. 493), and is concerned with the surrounding facts, situation, and structure (Merriam Webster 2008a) as determining behavior. It is defined in this study as "the circumstances or events that form the environment within which something exists or takes place" (Encarta.msn.com 2008a) including interrelated conditions (Merriam Webster 2008b), and is identified as an important aspect of expertise due to the context dependency of expertise (Bereiter and Scardamalia 1993; Chi 2007; Mieg 2007; Ward et al. 2007), along with other elements of expertise such as knowledge, behavioral characteristics, decision-making, knowledge flows, and the living system. These interrelated conditions, facts, and circumstances in which the expertise exists have a direct influence on the nature of the expertise. Hence explaining the context of the expertise (i.e., BPM) is crucial to the characterization of expertise in BPM, as it is the circumstance and condition, (i.e., context), of the expertise being characterized.

Contextualism is also a necessary consideration in the development of the model due to the context-dependent nature of expertise; expertise is domain specific (Feltovich et al. 1997; LaFrance 1997; Sonnentag et al. 2007) and the influence of the BPM context. Context is concerned with the relationship between the entity, subject to the context, and the context itself. In the BPM expertise model, this "entity" is referred to, and represented by the living system construct, which resides in the BPM context. In order to understand the relationship between the living system and the context, it is first necessary to outline the context. For this purpose, the BPM context is described from two perspectives. The context construct is made up of two primary sub-constructs, the context of the organization and the context of the person, each of which is further divided into two secondary sub-constructs; the internal context of the organization (I-ORG-IC), the external context of the organization (I-ORG-EC), the internal context of the person (I-PER-IC), and the external context of the person (I-PER-EC).

The internal context of the living system describes the internal conditions, circumstances, and factors affecting the living system. In general, these factors are considered to be at least partially controllable by the living system itself as they are within the boundary of the living system, that is, the boundary of the organization (I-ORG) and the boundary of the person (I-PER). Different internal context factors are applicable to the Individual – Organization (I-ORG) and Individual – Person (I-PER), which describe the domain specific aspects of BPM for the organization and person respectively. Examples of factors affecting the internal context of the organization are strategic alignment, governance, technology, process methods, people, and culture (Rosemann et al. 2007). Examples of factors affecting the internal context of the person deployed in BPM include his/her consciousness, neurosensory system, mind, body, and emotion (Parikh 1999).

The external context describes the external factors affecting the living system. These factors are considered to be largely beyond the control of the living system, and are outside of the living system boundary. As with the internal context, different external context factors are applicable to the Individual – Organization (I-ORG) and Individual – Person (I-PER). Examples of factors affecting the external context of the organization include the task, industry, and macro environments (Morrison 1992) such as political factors, changes to the economy such as interest, taxation, and inflation rates, all of which affect BPM strategy. The external context of the person is affected by the external factors in which he is immersed, such as, the BPM organizational environment, societal, managerial, such as how the persons role is structured and position within the BPM organization, personal, and existential (Parikh 1999) factors.

2.1.5 Decision-Making Construct

Decision-Making is a core construct of the model characterizing expertise in BPM, and is based on naturalistic decision-making (NDM) theory. Decisions are inherent in BPM, for example, strategic, operational and business decisions, and process event and rules decisions, (Goldberg 2008; Taylor and Raden 2008; Goldberg 2009; Greene 2009; Stucky 2009; von Halle 2011). Decision-making is acknowledged as linked to problem-solving, situation awareness and the establishment and maintenance of expertise overall (Salas and Klein 2001). Decision-making is therefore a primary element and inherent part of expertise in BPM, where problem-solving and situation awareness are ongoing activities (Yielder 2001, 2009). The decision-making construct recognizes the complex and volatile nature of decision-making in the real-world BPM domain involving several elements. These elements, include situational awareness and mental model building, which are also recognized as key aspects of expertise (Bereiter and Scardamalia 1993, Endsley 2007; Yates and Tschirhart 2007; Ross and Shafer et al. 2007). A key feature of naturalistic decision-making (NDM) is the contribution to understanding how people handle complex tasks and environments, considering the decision-making phenomena "in the context of the situations where they are found" (Salas and Klein 2001, p. 3). Given its appreciation and focus on complex environments, NDM is highly appropriate to the BPM domain, which is recognized as being particularly complex and dynamic. Decisions in BPM are rarely 'one-shot' with many decisions, requiring iterative discussion and consensus-driven agreement particularly where large investments are required, and in large organizations where multiple stakeholders are involved (Goldberg 2008; Krohn 2011). Time stress is also prevalent in BPM with many decisions executed under time pressure and with direct consequences for the decision-maker (Hill 2007; Owen 2007; Turturici 2010).

The decision-making construct of the a-priori model is made up of four primary sub-constructs. These are situation awareness, decision, action and the feedback loop.

Situation Awareness describes the BPM practitioner's (decision-maker) situation awareness, and is further categorised into three 'levels' as illustrative secondary sub-constructs. Illustrative examples of the situation awareness primary sub-construct are level 1: perception of the elements in a situation, level 2: comprehension of the current situation, and level 3: projection of the future state i.e. mental model building. Decision describes the decision itself in the BPM decision-making process. Decisions are based on inputs received from the BPM decision-maker's situation awareness. Several types of BPM decision are recognized and represented in the model as illustrative Secondary Sub-constructs of decision-making. Illustrative examples of decision include choices, acceptances and rejections, evaluations and constructions. Action refers to action undertaken in the decision-making process resulting from decision(s) made by the BPM practitioner (decision-maker). Feedback Loop describes the feedback loop in the BPM decision-making process, taking its input from the prior action(s) executed resulting from the BPM decision-makers decision(s), providing input resulting from those actions back into the BPM decision-maker's situation awareness. Learning is an illustrative example of the feedback loop.

2.1.6 Knowledge Flows

Through knowledge, we relate to ourselves and to our context. There is no "self" existing separate from our knowledge. "Past experience has made you what you are, and knowledge is an aspect of who you are." (Bereiter and Scardamalia 1993, pp. 45–46). In recognizing expertise as a process, there is recognition of transactional activity and movement involved. Knowledge flows are applicable to both the person (I-PER) and organization (I-ORG). As a person draws on his/her sensing and perception of his/her environment plus his/her memory to draw knowledge and bring it to the person's decision making process, so does an organization through the collective sensing and memory of its constituent people (see Fig. 3).

In BPM, sensing helps the living system, whether an organization or person, to acquire, create, and improve knowledge in relevant areas such as process management and governance, and coordinates the person or organization (living system) with their internal and external environment. For example, sensing aids the coordination of the organization and its external economic factors such as exchange rate fluctuations or changes in industry direction. Both the individual person and organization have memory, comprising shared beliefs and norms affecting the BPM culture, memory of procedures such as BPM methods and processes, plus routines, scripts, and artifacts.

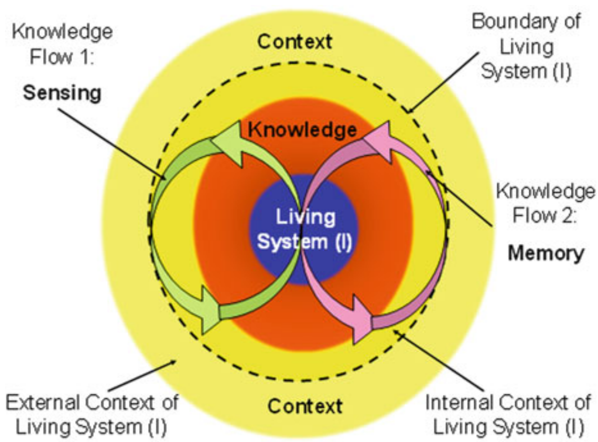

Fig. 3 Overview of relationship of model constructs and knowledge flows of sensing and memory in a living system (I)

2.2 Emergent Property of Expertise in the Context of BPM

The term ‘emergent property’ has been established for the model characterizing expertise in the context of BPM, to describe the emergent property of the complete system of expertise in the illustrative context of BPM. The emergent property of a system is a recognized concept in systems theory. Expertise in the context of BPM is considered to be a system in this study, with an emergent property (EP). Key aspects of the EP identified in literature are the Dynamic Nature of the Constructs and Construct Interactions, Flow, Levels of Expertise in BPM, and Learning. These apply to both the Person (I-PER) and Organization (I-ORG) recognizing the multilevel nature of the model and unit of analysis. The key aspects of the EP identified initially were (1) dynamic nature of the model constructs and construct interactions, (2) levels of expertise, (3) flow, and (4) learning. These components are in constant motion, resulting in a continually changed state of expertise in BPM. Through the study confirmatory phase several further aspects of the EP were identified resulting respecification of the emergent property of the model.

2.2.1 Dynamic Nature of the Model Constructs and Construct Interactions

The recognition of the dynamic nature of the constructs of the model characterizing expertise in the context of BPM is important, due to the inherently dynamic nature of expertise itself (Bereiter and Scardamalia 1993; Gasson 2005). The dynamic nature of each construct and its reciprocal interaction with the other constructs are also acknowledged. This study does not aim to complete an exhaustive study of the interactions between every combination of constructs; however, it does provide an overview of the dynamic nature of the constructs and their interactions identified in expertise in BPM. Each model construct identified (Living System, Knowledge, Behavioral Characteristics, Context, Knowledge Flows and Decision-Making) is constantly changing. They are continually in motion and are not at any point completely static. In the case of the Living System, each sub-construct is in motion, whether a person (I-PER) or an organization (I-ORG). For example, where a person’s BPM experience is constantly changing and evolving, their nervous system and cognition also evolves. Likewise, the organizations identity constantly changes as the organization’s perception of its environment changes. The organization’s overall knowledge changes as the knowledge of each constituent person changes. The model constructs interact with each other continually, compounding the change occurring in expertise in BPM. This is demonstrated in the model through examination of the illustrative secondary sub-constructs, where areas of relatedness are apparent. For example knowledge, is a construct itself, also appearing as an illustrative secondary sub-construct of the Living System person primary sub-construct. Procedural learning and pattern learning are examples of the illustrative secondary sub-construct of Knowledge, Procedural Knowledge. The illustrative secondary sub-construct of Knowledge, Self-Regulatory Knowledge is closely linked to the Behavioral Characteristics secondary sub-construct of 'feed-back loop', which involves feedback of behavior to the regulatory system reflected in the Behavioral Characteristics construct and facilitates learning. The Behavioral Characteristics construct is closely aligned to the Context illustrative secondary sub-construct internal context (I-PER-IC), with all three primary sub-constructs having direct alignment to the internal context of the person. At a higher level of abstraction, the Living System construct is related to its context, by knowledge (Cianciolo and Matthew et al. 2007) which is demonstrated in the a-priori model by the Knowledge construct. The constructs continually interact with each other generating mutual reciprocal change, resulting in a change in the state of Expertise in BPM.

2.2.2 Levels of Expertise

The concept of 'levels of expertise' is concerned with the proficiency of expertise (Dreyfus 1997, 2006; Chi 2007). Knowledge penetrates all aspects of expert functioning, and is not just a mental library that the expert consults. The level of proficiency of expertise is considered to change over time as the overall degree of expertise increases, usually through increased practice and experience. However, the level of expertise can also decrease as knowledge in a domain moves, or the domain itself fundamentally changes; expertise has to constantly adapt and change. The concept of 'levels of expertise' is relative; expertise is not an absolute state. Nor is it a fixed or irreversible state. Expertise in BPM is complex with many variable components, each one of which is constantly changing. Therefore the overall level of expertise in BPM of the BPM practitioner and organization changes continually. As a result, over time, a person's level of expertise in BPM may change. For example, their explicit knowledge becomes outdated. This potentially affects all aspects of the BPM domain, particularly contextual areas such as technology which changes relatively rapidly. In expertise in BPM the overall level of expertise is multi-dimensional, with each model constructs varying. Like-wise, the congruency of the interaction of the constructs varies, also affecting the overall level of expertise in BPM. Whilst experts in the BPM domain may be considered the 'best' at a particular point in time, this status of 'best' may be short term, unless the expert constantly changes and evolves. Experts are considered to spend a proportionately high amount of time performing qualitative analysis; in the BPM domain time is often limited for analysis and decision-making due to the nature of the BPM environment, thus the qualitative analysis aspect of expertise may not be particularly prevalent in expertise in BPM.

2.2.3 Flow

Flow is an important concept in expertise in BPM concerning the overall state of the person (I-PER), and in turn the BPM Organization (I-ORG) composed of people. The 'flow' concept is "a metaphorical description of the rare mental state associated with feelings of optimal satisfaction and fulfillment" (The American Academy of Political and Social Science 2005). Flow is an "ecstatic state" (Farmer 1999) experienced by those who have attained a level of expertise (Hakkarainen and Palonen et al. 2004), (Bereiter and Scardamalia 1993). The key implication of 'flow' for expertise in BPM is the recognition that people need to be in an optimal emotional state to experience flow. If people are struggling with anxiety, boredom, worry or apathy in their work, they are unlikely to achieve a state of flow, not reaching their full potential output for the organization creatively or practically. This doesn't mean that if the BPM practitioner is not in a state of 'flow', that they will not produce meaningful output, it means that output is not likely to be the best possible that the practitioner could produce. The correct and optimal placing of employees in BPM roles is important for both the employees and the organization, requiring an appropriate employee recruitment and placement program. Human resource development (HRD) and human capital management (HCM) are therefore important potential use of the model. Succession planning of BPM roles is also important to ensure people with the appropriate expertise in BPM attributes are developed and placed correctly to meet foreseen organizational needs. The recognition of people with a natural tendency towards a 'flow' state in the BPM domain can point to appropriate placements and succession planning paths. Flow, whilst an abstract and qualitative concept, is important and potentially valuable as it helps point to psychological attributes the person needs to exhibit working in the BPM domain, if they are to be or attain what would be described as an expert level of expertise in BPM.

2.2.4 Learning

Learning refers to "the cognitive process of acquiring skill or knowledge" (Princeton University 2008d); "(1) the process of acquiring knowledge, attitudes, or skills from study, instruction, or experience. (2) the knowledge, attitudes, or skills acquired" (Australian Government; Department of Education 2008), and can be defined as "a change in the state of knowledge" (Maula 2006, p. 14) of either a person or an organization. It is based on the codification and diffusion of knowledge about objective reality, and is dependent on the continuous creation of conflicts between old and new knowledge (Maula 2006). Learning is an important concept in expertise (Bereiter and Scardamalia 1993; Hakkarainen and Palonen et al. 2004) in any domain. The emphasis in expertise in BPM is on knowledge and a change of state of that knowledge. As the knowledge construct interacts with the other model constructs, change is considered to occur in each of the other constructs resulting in a change in the overall state of expertise in BPM.

Management and innovation literature considers learning to be an attempt to retain and improve competitiveness, productivity, and innovativeness. Overall learning for organizations is an integrative concept unifying various organizational levels of analysis: individual, group, and corporate (Maula 2006). "Learning is a dynamic concept that emphasizes the continually changing nature of organizations" (Maula 2006, p. 13). For both the person and the organization, learning can be regarded as a cyclic action starting from experience, and continuing through reflective observation, abstract conceptualization, and experimentation. However, the learning process itself is different at the individual person and organization levels (Maula 2006), as an organization is made up of several individual people each person undergoing his/her own learning process.

Each of the model constructs identified (living system, knowledge, behavioral characteristics, context, decision-making and knowledge flows) are constantly changing; they are in motion to some degree and are not at any point completely static. The constructs also all interact with each other continually, thus compounding the overall degree of change in expertise in BPM occurring.

2.2.5 Respecification of the Emergent Property

The additional aspects of the emergent property identified during the study confirmatory phase are Authority and Empowerment, Business Partnering and Relationship Management, Change, Experience, Creativity and Innovation, Ownership and Accountability, Self-Regulation and Timing.

Authority is recognised in literature as an important aspect of expertise (Brewer 2006; Collins and Evans 2006; Goldman 2006), whilst empowerment is recognized as an important element for BPM practitioners (Miers 2010; Harrison-Broninski 2011). Authority and empowerment was identified as a crucial aspect of Expertise in BPM. That is, those individuals with expertise in BPM must have the appropriate level(s) of authority and empowerment to exercise their expertise in the BPM environment to be effective. Relationship management is recognized as an important aspect of professional expertise (Yielder 2001, 2009) and essential in BPM (Behara and Mahajani et al. 2010; Sharp 2010; Tregear 2014, Vincenti 2010). Business partnering creates a rationale form of "mechanic solidarity" (Durkheim 1997), taking a new approach to achieving business objectives, potentially increasing competitive advantage (Porter 1985) through cooperation. Business partnering has gained momentum in global businesses as "a medium for achieving significant revenue growth" (Doz and Hamel 1998). Partnering in BPM requires all BPM partners to transform their businesses in terms of relationships, behaviors, processes, communications and leadership; no participant can succeed without the other. Experience is recognized in literature as a critical as a critical component of expertise in any domain (Seifert and Patalano et al. 1997; Sonnentag 2000; Ericsson 2007), and notably in professional expertise (Yielder 2001; Hakkarainen and Palonen et al. 2004; Butterworth 2007; Kellog 2007; Yielder 2009) as found in BPMCreativity is recognized in literature as a personal characteristic and as essential to expertise. Experience was addressed as part of the ontological foundation of the study. Innovation is recognized as essential to BPM (Howard 2009; Miers 2010), and enables creativity in BPM (Tregear 2014; Harrison-Broninski 2011). Creativity and innovation in BPM are driven by BPM social networks (Fingar 2010). Ownership refers to "the state or fact of being an owner" (Princeton University 2010b) inferring the owner 'has' and 'controls' that which they own. Accountability refers to "responsibility to someone or for some activity" (Princeton University 2010a, b) and is an important aspect of governance as well as professional expertise (Yielder 2001, 2004, 2009). Ownership and accountability also addresses all ownership influences on expertise in BPM such as process ownership and accountability as identified in the Context construct of the model. The context of expertise in BPM directly affects that expertise, therefore all constructs and sub-constructs of the Context construct contain elements which require proactive ownership. Time is an aspect of the overarching theory of the model, systems theory, and an underpinning theoretical concept of the Emergent Property. Time is also recognized as an important aspect of professional expertise (Yielder 2001, 2009), particularly in the BPM field (Webb 2011).

3 Model Applicability

The primary proposed applications of the model of expertise in the context of BPM are professional education and development, human capital and talent management, business integration, and leadership and business decision making. In the field of professional education and development, the model can assist with developing an alternative understanding of learning in BPM, and as a comprehensive framework to aid the development of BPM curricula to specific scenarios ensuring all aspects of expertise in BPM are considered and addressed appropriately. It can assist to understand what knowledge is required in certain BPM scenarios; by applying the detailed description of the knowledge construct (as per the BPM model presented). This provides both a high-level manageable view and a detailed, granular view of the actual knowledge required. As a comprehensive framework the model can provide a base to consider the skill sets required for BPM professionals in different scenarios and roles. The model can also be used to develop a greater understanding of what people do in their roles through explicit characterization of the BPM expertise involved and required, and will need to be developed ongoing. The approach to professional development in BPM must be continuous and integrated ongoing, opposed to ad hoc isolated training events. Expertise in BPM is a form of human capital and therefore of real value to the organization. It is an asset and must be managed as such; this can be achieved significantly more effectively through detailed characterization and management of the BPM expertise components required. The characterization of expertise in BPM is also directly applicable to recruitment, employee placement, succession planning, and organizational restructuring where a deeper understanding of expertise in BPM is required to manage these functions and processes effectively. Business integration, as in the case of mergers and acquisitions, involves the coming together of two or more organizations, and the combination of the BPM expertise of those organizations. In order to manage the transitional process, a deep understanding of the expertise in BPM of the organizations pre- and post-integration is required, to develop transitional strategies and roadmaps. Business integration can occur internally too with the same detailed understanding of BPM expertise required, for example where companies are globalizing and merging organizations internally. Business integration, whether internal, or external through mergers and acquisitions, has horizontal as well as vertical structural implications, as the boundaries of operational, tactical, and strategic management layers are shifted in the formation of the end state BPM organization.

4 Summary

No known or published work has been done to establish the attributes characterizing expertise in the context of Business Process Management. This study's aim is to understand how the attributes of expertise in the context of BPM are described and defined, and to show in principle, how such details can be applied in practice for better BPM skills development, deployment, and overall BPM project success.

This chapter presents an a-priori model of expertise in the context of BPM, which is the first attempt to characterize the concept of expertise in the context of BPM. This a-priori model consists of six primary elements, namely living system, knowledge, behavioral characteristics, context, and decision-making, plus an overall emergent property (EP). The model is a first step toward defining and understanding expertise in a BPM context at both organizational and individual levels. In doing so several the improvements of several BPM areas is facilitated. In particular, improved BPM education and ongoing development, enhanced human capital and talent management in BPM, more effective business integration such as acquisitions and mergers, and improved BPM leadership and decision making.

The presented a-priori model is not without its limitations. The study domain is essentially new, and primarily theory based. Research in expertise in BPM is particularly immature; hence, there is not much to build on, but to borrow from analogous domains. This does not mean the study has no theoretical foundation; to the contrary it has a large theoretical foundation and has used a range of established frameworks, to derive and support the presented model. This study aims to characterize expertise in BPM and validate that characterization, drawing heavily on referent domains to establish the initial set of candidate attributes and the dynamics and interrelationships thereof. The primary data collection, analysis, and synthesis were conducted by a single researcher, which can be prone to researcher bias. One of the potential limitations is the researcher's search for all possible pieces of literature related to the research focus. This can easily be influenced by the researchers' prior preconception and background. The range and volume of available literature available are vast and constantly changing. A review of literature of this nature can only be deemed complete, at a given point in time.

A number of further research tasks has already been planned to address these limitations and to extend the current research results. As explained earlier, this chapter is the preliminary results of the first phase, among a study design of three phases. This literature based a-priori model will be extended with further theories and concepts that capture the multilayered, dynamic nature of expertise in the context of BPM. The second phase of the study will validate the model with empirical evidence from case organizations, further re-specifying the model. In the final phase, detailed guidelines will be derived on how to apply the demystified concept of BPM expertise for the progress of BPM projects and tasks in organizations.

Practitioners can apply the study results across many contexts: professional education and development in BPM, human capital and talent management in BPM (and also for human resource strategy change), business discipline and governance development and deployment, and business integration, to name a few. Academia can apply this a-priori model for future research related to expertise in BPM and expertise in general. The overall study outcomes can help derive a detailed research agenda for future research on expertise in BPM which can assist in addressing some of the current gaps in the discipline. Further operationalizing the model of expertise in BPM; testing the relationships between the different constructs in the model and how they interact; testing the causality with other constructs and expertise in BPM [as an independent variable (i.e., the relationship with BPM success) and a dependent variable (i.e., the relationship with constructs like effective training, employee motivation, and self-regulation)]; and deriving means of achieving expertise in BPM are some examples of further research that can occur using the results of this study.

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Business Process Management Curriculum

Yvonne Lederer Antonucci

Abstract As organizations continue to focus on improving and managing business processes, the ability to acquire and cultivate the appropriate skilled workforce has remained a challenge. While Business Process Management (BPM) was once defined in terms of tools and technologies, it has emerged as a discipline encompassing a broad spectrum of organizational practices. As a result, the skill-sets for BPM endeavors of today's organizations have gone beyond the automation of processes to encompass a wide variety of strategic, technical, and people skills that are difficult to find in today's professionals. Many organizations have assigned the process transformation leadership to existing business analysts who find that they require additional training and education. This chapter reviews the role of a business analyst within the context of BPM practice and suggests a curriculum designed to cultivate skills for the emerging business process (BP) analyst.

1 Introduction

Business Process Management (BPM) practices continue to gain attention and adoption by organizations worldwide (Palmberg 2010; Wolf and Harmon 2010). The focus on well-defined processes across entire value chains marks the beginning of organizational success. However, the key to sustaining that success lies in the ability to create value through effectively managing, orchestrating, communicating, and transforming business processes across the organization. These efforts require a plethora of skills and abilities (see Müller et al. 2014) that many organizations find difficult to fill and cultivate (Antonucci 2006; Hadfield 2007; Hill et al. 2006; McCoy et al. 2010). Current needs and predictions for process-related skills and capabilities continues to intensify (McCoy et al. 2010). In fact recent surveys

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_23,

indicate that the lack of BPM training and professional development has a correlation to the inability of organizations to successfully accomplish enterprise objectives (McCoy et al. 2010). The broad BPM skill requirements needed for successful BPM deployment remains the barrier in this correlation (McCoy et al. 2010). This continues to give rise to interest in and need for a BPM curriculum that addresses the cultivation of the business process (BP) professional.

In response to the shortage of BPM training and education, offerings of BPM certifications from professional organizations, such as ABPMP, BPTrends, The BPM Council, OMG, AIIM and BPMInstitute, along with several companies, such as SAP AG, have continued to emerge (aiim.org; sap.bpx.com; abpmp.org; bptrends.org; bpminstitute.org; bpmcouncil.org; omg.org). In the year 2008, ABPMP introduced a general model curriculum for BPM professionals representing the first attempt to define comprehensive education requirements for the BPM practice (ABPMP Education 2008) with an update in 2009 (ABPMP 2009). As the BP discipline continues to change, the need for effective BP professionals has intensified. Consequently, in an effort to respond to industry interests and needs, an increase in BPM corporate training, certificates and university education programs continue to emerge with variations of business and information technology (IT) focus and coverage (Bandara et al. 2010; Recker 2012; vom Brocke 2011). A majority of the current BPM training and education offerings are now available in several modes such as online, on-site or are deployed using a blend of online methods with prearranged "face-to-face" meetings either on-site or via online meetings.

While BPM was once defined in terms of tools and technologies, it now is widely accepted as a discipline encompassing a broad spectrum of holistic end-to-end organizational practices (Hill et al. 2006; Niehaves et al. 2012; vom Brocke and Sinnl 2011). The current practices of BPM have broadened in scope from the business process reengineering (BPR) initial goals of achieving performance breakthroughs through eliminating non-value added operational process steps (Khalil 1997) to a more complex continuous optimization of end-to-end business processes involving the integration of both IT and business practices (Hill et al. 2006; vom Brocke and Sinnl 2011). BPM success now requires the roles of traditional IT to be more business and process focused and for business roles to be more technology savvy (McDonald 2007). This extends to BPM curriculum where narrow focused course offerings on specific areas such as IT architectures or automation of business processes, do not represent the holistic view of planning for, leading and managing end-to-end business processes that require attention to specific organizational capabilities such as culture, governance, change management issues, process, measurement and technology (Hammer 2007; Rosemann and deBruin 2005; Vaanholt 2008). Therefore BPM curriculum and training needs to include broad BPM knowledge and business expertise combined with IT skills (Antonucci and Goeke 2011; Seethamraju 2012; vom Brocke 2011).

In recent years there has been increased pressure for business professionals to produce faster and more informed business decisions, resulting in the need to extend BPM activities to include increased intelligence and analytics (McCoy et al. 2010). Furthermore we are seeing the convergence of technologies such as cloud, mobile, big data, and social media (Howard et al. 2012) which has also impacted BPM practices such as the emergence of social BPM and cloud-enabled BPM Platforms (McCoy et al. 2010). Just as BPM practices continue to evolve it is important for BPM curriculum to adjust in order to meet the skill demands of the changing BPM environment.

A few years ago a global effort to define BPM certification requirements based on current practices of BPM emerged with joint efforts and partnerships between industry professional groups and universities. Several of these efforts have resulted in the deployment of a common BPM training (BPTrends.org, butrain.com, BPMInstitute.org, OMG.org), providing some direction toward BPM certification and education. The academic community has recently recognized BPM as important for inclusion in both business and IS curricula as noted by the AACSB, an accrediting body for business schools (AACSB.edu) and by education arms of AIS (Association for Information Systems) and ACM (Association for Computing Machinery) in their joint curriculum guidelines for IS curriculum (Topi et al. 2010). While there has been an increase in BPM topics within university curricula (Recker 2012), the deployment of these topics have been largely integrated within a limited number of courses, with others merely adding process topics to existing information systems courses or attempting to cover many BPM topics in one course, thereby not addressing the holistic discipline of BPM. Very few universities offer a comprehensive curriculum coverage of holistic BPM practices from both the business and IT perspectives that embody the wide variety of strategic, technical, and people skills required for BPM success (Fingar 2006; Bandara et al. 2014; Seethamraju 2012; vom Brocke 2011). The BPM academic community has recognized a deficiency in unified and comprehensive BPM offerings and therefore have organized initiatives to further clarify and share BPM academic knowledge and offerings. As such recent collaboration initiatives among various educators have emerged such as the BPM Academic Initiative (http://www.signavio.com/en/academic.html) and the Process Knowledge Initiative (http://www.processknowledge.org) (Recker 2012).

As organizations continue to focus on improving and managing business processes, the ability to acquire and cultivate the appropriate skilled workforce has remained a challenge. Consequently, several organizations have assigned the process transformation leadership to existing business analysts expecting that these analysts would have the required BPM knowledge[1] (Bandara et al. 2007). Recent findings indicate that business analyst competencies form a foundation for BPM deployments (Sonteya and Seymour 2012), however there is evidence that the responsibilities of a business analyst in the context of BPM differ, requiring additional training and education (Mathiesen et al. 2011). While this chapter's focus is upon the business process analyst skills and curriculum, it is important for the BPA to understand the end-to-end skills and responsibilities needed for

[1] Kokkonen and Bandara (2014) delve into this topic by exploring what it takes to develop BPM expertise.

successful organization wide BPM in order to effectively facilitate between business and IT (Sonteya and Seymour 2012). If we define BPM as a discipline focusing on end-to-end business processes, we must also examine related holistic end-to-end skills otherwise we are perpetuating silo based thinking and operations. As such, an examination of end-to-end BPM skills and related positions will be discussed first followed by an overview of a related holistic curriculum. The role of a business analyst within the context of BPM practice is highlighted with a curriculum outline designed to cultivate skills for the emerging BP analyst. The objective for this curriculum is to provide a guideline for both individuals interested in furthering their BPM knowledge, and for program designers to develop a basic common body of knowledge for BPM. This curriculum is based on industry practices and skill needs of BPM professionals (Melenovsky and Hill 2006), the efforts of ABPMP (2008), and several current offerings of BPM curriculum by both industry (BPMInstitute.org; BPTrends.org) and universities (Bandara et al. 2014; bentley.edu; gsu.edu; bpm-education.org; howe.stevens.edu; QUT.edu.au; widener.edu; wu.ac.at). Individuals may use this to help them identify appropriate BPM training and education offerings. This will also benefit educational institutions and industry training programs by providing a standard for developing their own curriculum.

The required skill-set for BPM practice includes a wide variety of strategic, technical, and people skills that encompasses both business and IT knowledge. Before an organization can obtain or develop a skilled BP workforce, they must understand the required activities for BPM success, followed by the identification and alignment of appropriate roles and positions. The next section identifies the current tasks and roles associated with BPM practice highlighting tasks of BP analysts engaged in that practice. Using these identified tasks, a BPM curriculum is presented.

2 Understanding the Roles in Current Business Process Management Practice

There have been many attempts to categorize the tasks associated with BPM practices (Paim et al. 2008). Most of these studies are based on the activities and transformation practices required in BPM practice. Several recognized variations of BPM practice life-cycles exist with a majority including (1) process planning and strategy used to direct (2) analysis, design, and modeling of business processes, that drives the (3) configuration of business processes, leading to the implementation of processes and (4) process execution, creating processes instances that can then be (5) monitored and controlled, providing (6) feedback for process refinement and continued process performance analysis, leading to additional (7) analysis, design, modeling, and so forth as depicted in Fig. 1 (Scheer et al 2004; Vaanholt 2008; OMG 2008). In addition, studies have identified successful BPM practices that need to be supported by simultaneous management activities throughout the life-cycle

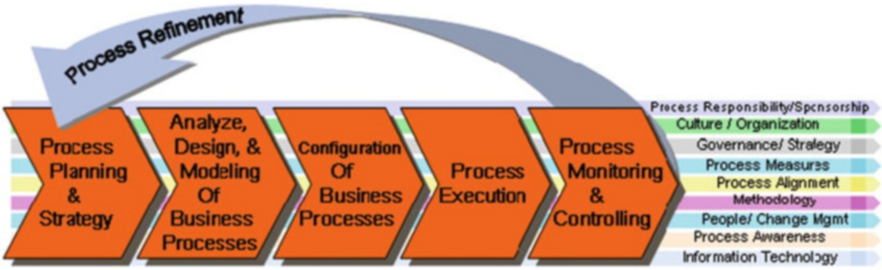

Fig. 1 BPM practice life-cycle and threaded success factors

while maintaining balance and integration of process initiatives between business and IT (DeFee and Harmon 2004; Dreiling et al. 2005; Fisher 2004; Hammer 2007; Rummler and Brache 2004). Figure 1 illustrates some of these management activities such as establishing appropriate process responsibility, sponsorship, governance, and process measures.[2] This broad integration of business and IT in successful BPM activities is further delineated by the integration of processes focused on what the organization does and how to efficiently and effectively accomplish them as illustrated in Fig. 2 (Antonucci and Goeke 2011). Appropriately defined BP positions are needed to correspond to these interacting practices and activities.

The most comprehensive effort at identifying BP positions and tasks has been led by practitioners. Melenovsky and Hill (2006) defined BP positions and their associated tasks for both business and IT. Based on the best industrial practices of four leading organizations, they defined four key BP positions: (1) BP director; (2) BP consultant; (3) BP architect; and (4) BP analyst. Each of these positions was further described and associated with primary tasks and titles (roles) (Melenovsky and Hill 2006). The validity of these role definitions and reported activities of each role are in question as the study only involved four organizations. A recent study was able to validate these tasks and positions, finding significant agreement from 111 BP professionals in addition to verifying that the reported activities were assigned to the appropriate positions (Antonucci and Goeke 2011). Furthermore it was found that although there was large agreement of the four BPM positions, there were some variations in agreement with the BP analyst responsibilities among middle managers yet executives and staff agreed with the BP analyst responsibilities (Antonucci and Goeke 2011). Other studies have also indicated differences in specific BP analyst responsibilities (Mathiesen et al. 2011; Sonteya and Seymour

[2] Hammer (2014) provides a general discussion on what Business Process Management is about and what BPM activities should be generally considered. Burlton (2014) provides a methodological framework and demonstrates how these high-level activities should be broken down into more fine-grained BPM activities in order to successfully implement business strategies by means of BPM. To account for the governance aspects of BPM, Markus and Jacobson (2014) and Spanyi (2010, 2014) provide a general introduction into governance in BPM. vom Brocke et al. 2014 present 10 principles of good BPM.

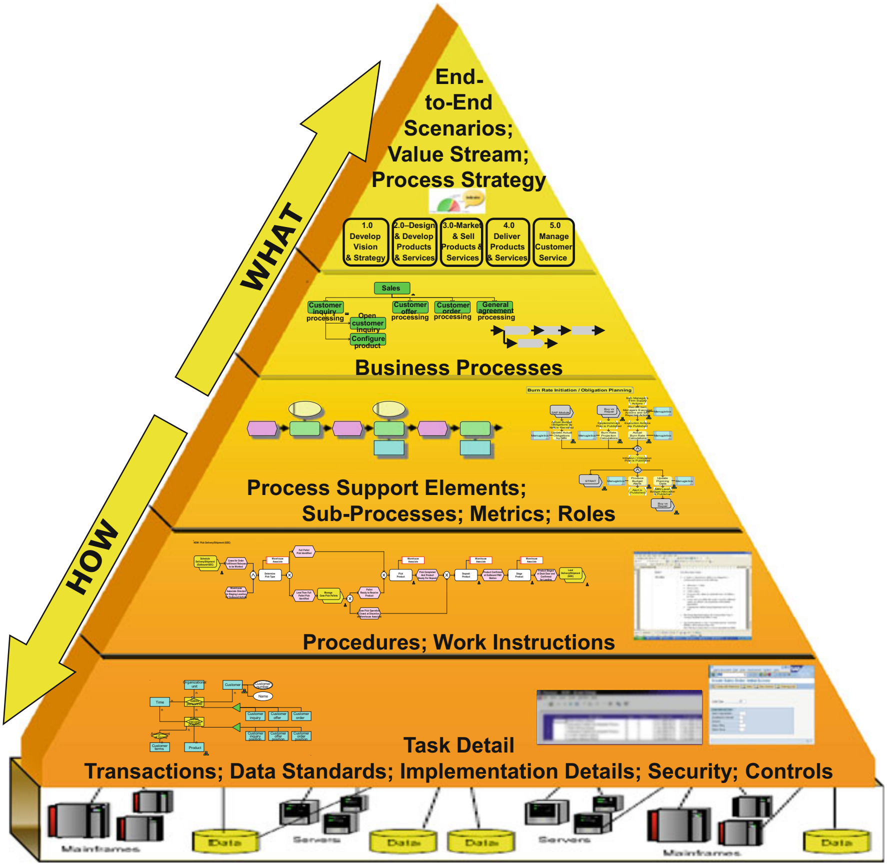

Fig. 2 Process levels: integration of what to how (Adapted from Antonucci and Goeke 2011)

2012) with a common finding that the BP analyst needs to have an understanding of both the what and how of BPM in order to communicate, lead and integrate between business and IT and between process levels in the organization.

While there still needs to be further studies to identify and verify the appropriate activities for BP positions, these roles and activities are used as a basis for the proposed curriculum.

According to Melenovsky and Hill (2006), the BP director, BP architect, and BP consultant are higher-level positions primarily supporting strategic activities, whereas the BP analyst has an operational focus relating closely to the daily support of BPM practices. Table 1 summarizes the position descriptions and activities of the BP director, BP architect, and BP consultant as noted by Melenovsky and Hill (2006). Table 2 summarizes the BP analyst position description and activities, listing the current titles in columns 1 and 2 as noted by Melenovsky and Hill (2006). Further analysis of the BP analyst position description and activities

Table 1 BP director, BP architect, and BP consultant position and activity summary

Process positions	Process activities
Business Process Director: a senior level position who builds and sustains a process-managed organization	Gains consensus on new process concepts
	Builds coalitions to move process improvement forward
	Presents a vision to organization including benefits and challenges of being process driven
	Identifies the business performance and incentive metrics, ensures continuous sustained improvement across the organization
	Establishes process related policies, standards, governance and methodologies. Adopts a process culture
Business Process Consultant: a mid- or high-level position who helps process owners better understand opportunities for process improvement and business transformation	Builds a business case for process orientation and continuous process Improvements
	Good at gaining consensus among diverse groups of process stakeholders, good at facilitating resolution across functional areas
	Responsible for change and project management
	Makes recommendations to process stakeholders regarding correct approach to achieve process improvement objectives
	Understands methodologies, such as lean and six Sigma
Business Process Architect: a mid-level or high-level position who helps develop principals and descriptions of high-level future states and guidelines for creating business processes	Supports senior leadership with process strategies
	Conducts research to keep abreast of process trends and makes recommendations when to adopt emerging process standards
	Part of enterprise planning
	Understands business strategy
	Ensures standardization on process definitions, notations and communications

identified in process maturity studies (Hammer 2007) revealed skills and knowledge areas required for each activity as indicated in column 3 of Table 2.

These activities indicate that the BP analyst does in fact require a plethora of skills. These skills involve both management and IT knowledge as they relate to business processes with significant communication ability. Although the BP analyst role is more operational, this role is very central to the success of BPM in an organization. The BP analyst must possess the abilities to communicate, lead and champion the BPM efforts within the organization (Sonteya and Seymour 2012) and as such needs to understand and integrate with other BPM roles. The requirements in terms of communication skills are further examined by (Bergener et al. 2012). In total, the curriculum for the BP analyst needs to encompass a

Table 2 BP analyst position required skills and knowledge areas summary

Business process analyst		Knowledge area indicates need
Position description	Deals with tactical day-to-day aspects of discovering, validating, documenting, and communicating business process-related knowledge through modeling, simulating, and analyzing current and future states	To understand business
		To communicate to both business and IT -level personnel
		To model end-to-end processes
		To communicate end-to-end processes
		To analyze business processes
		To be able to assign appropriate measures to processes
	Ensures that changes to process environment are carried out;	To work with IT to ensure that technology infra-structure is aligned for process changes [technical knowledge]
		To communicate with business and IT areas of organization the process changes and reasons for the change [relationship management, communication]
		To help business process participants understand and accept changes
		To understand how to deploy effective change man-agement and change implementation methods
	Reports to process owner and IT development department	For communication skills
		For IT knowledge
		To understand business relationships
		To understand the integration of IT and business
Activities	Document business processes through modeling	To understand process modeling techniques
		To have ability to document end-to-end processes

	Demonstrate to process owner the opportunities for best in class process orchestration and control	To understand end-to-end process integration
		To identify potential improvements to business processes
		To identify and design process controls
		For communication ability of process and technical knowledge to both technical and nontechnical managers
	Liaison or relationship manager between business community and departments	For collaboration and negotiation ability concerning the communication of business process potential and operations across the organization
		To be able to work in and with teams
	Perform continuous reviews to align process orchestration with changing business conditions	For understanding of end-to-end business processes
		To monitor, control, and change business processes
		For ability to identify when processes need changing and propose improvements
	Maintain and share process knowledge	To understand how to maintain a process repository
		To understand how to communicate business processes across the organization
		To understand how to make business processes visible across the organization
		To cultivate and maintain a shared vision and understanding of business processes across the organization
	Show process stakeholders how to identify and solve process challenges, analyze performance metrics	To understand how to measure and analyze business processes
		To identify key metrics of processes for performance analysis
		To transform business processes using process performance techniques

(continued)

Table 2 (continued)

Business process analyst		Knowledge area indicates need
	Ensure coordination between IT organization and process owners	To understand how to model and communicate various views of business processes to include both business and IT views
		To understand the integration of IT and business within a business process
Current titles	Business analyst	
	Process and data manager	
	Analyst	
	Systems analyst	
	Process engineer	
	Process developer	
	Process analyst	
	Lead analyst	
	Senior advisor	
	Process designer	

broad perspective of BPM. As a result, the following section suggests a BPM curriculum designed to cultivate an effective BP analyst for the twenty-first century.

3 Business Process Analyst Curriculum Description

The following proposed curriculum is designed to cultivate the skills and activities required of BP analysts during BPM practice as depicted in Fig. 1. While the model BPM curriculum efforts of ABPMP (2008) provided an initial framework for this curriculum, research findings of BP analyst roles and positions along with several current offerings of BPM curriculum by both industry and universities were used to identify the resulting curriculum. It is recognized that the BP analyst is a central role to BPM needing an understanding of both the what and how of BPM as depicted in Fig. 2 in order to facilitate and integrate appropriately between business and IT and between process levels in the organization. The BP analyst does not operate in a silo, knowing how to collaborate with other BP positions is paramount for BPM success. Therefore the BP analyst needs an understanding of the skills and responsibilities of typical organizational roles related to BPM. As such the proposed curriculum includes a broad spectrum of courses that not only focus on BP analyst related activities but also on the overview of other BP position activities with the goal of providing the BP analyst with a holistic BPM education.

This curriculum provides assistance to organizations in developing an educated staff that understands the holistic nature of BPM for successful BP transformation. Individuals from both business and technical areas of the organization can use this curriculum to identify skills needed to strengthen their knowledge of BPM practices. Colleges and universities have a consistent challenge of remaining competitive in light of business practice changes; this curriculum serves as a framework to help develop comprehensive BPM programs.

Figure 3 represents a depiction of the general courses and a suggested sequence. The first course in the curriculum, BPM foundations (BP00), is recommended for all participants whether they are in an industry training program or college course. Regardless of the program scope, this first course should be a prerequisite for all other courses. The next level of courses represents the primary practices of the BPM life-cycle; this includes process planning, strategy, and governance (BP01); process analysis (BP03); process modeling (BP02); process design (BP04); process implementation (BP05); and process analytics, measurement, control, and compliance (BP06). BP01 is included as a core course due to its importance for BPM practice success. The recent emphasis on process analytics and process change management throughout the BPM life-cycle is the primary reason for a core course to include analytics as it relates to BPM (BP06) and additional course content to expand on implementation needs of change management methods (BP07). It is recommended that the BP analyst understands how to accomplish and manage the activities of this life- cycle. For this reason, these courses are recommended as core courses for the BPM curriculum. The third level of courses described in Fig. 3 represents advanced topics for both IT and management related to the deployment and management of BPM. These courses include business process systems and architectures (BP11);

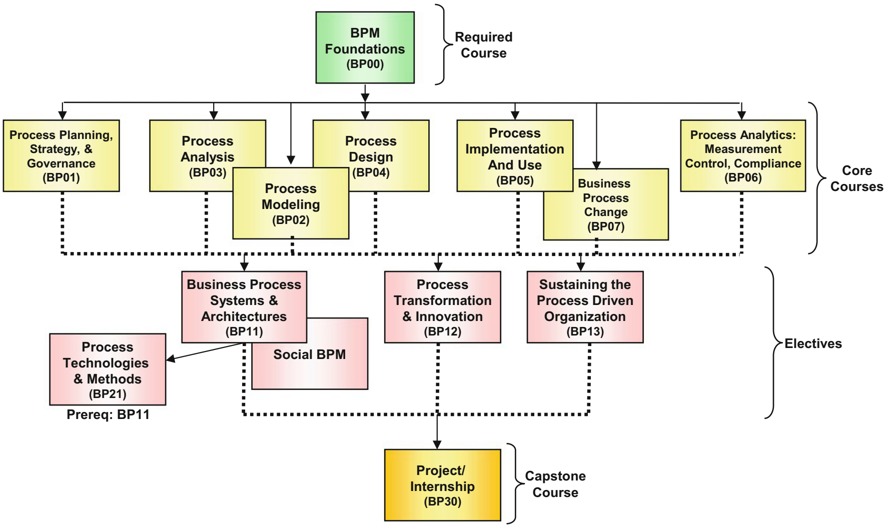

Fig. 3 General BPM course sequence

process transformation and innovation (BP12); and sustaining the process-driven organization (BP13). While these three courses involve activities typically carried out by higher-level BP positions (as in BP12 and BP13) or more technical positions (as in BP11), it is recommended that the BP analysts further their knowledge in these areas. For this reason, these courses are recommended as electives. Similar to the ABPMP BPM model curriculum, the project or internship course (BP30) is recommended as a capstone course to allow the participants opportunity to apply their newly obtained knowledge of BPM practice. There are several other advanced courses that can be added to the list of electives such as the one depicted in Fig. 3, that is, process technologies and methods (BP21). These advanced courses can be a continuation of other courses listed such as advanced process modeling. The following section provides a detailed list of these courses, their descriptions, learning objectives, and suggested topics.

The integration of business and IT practices that are embedded into this proposed curriculum has merit for enhancing existing MBA or graduate programs. Several of these courses could be extracted to create a BPM track with the existing graduate degree program. Similarly an undergraduate program could adopt portions of this proposed curriculum to enhance their existing curriculum.

3.1 Course Descriptions

The course descriptions in this section are intended as a guide to be used by individuals tasked with developing BPM curriculum. The scope and emphasis of coverage will vary among organizations based on their strengths and desired focus.

Table 3 Suggested learning objectives and topics – business process management foundations: general overview and principles

Learning objectives	Suggested topics
Understand the principles of a process and various process types	Introduction and overview of BPM: understanding BPM topics, terms, and issues
Understand the basic concepts and issues of BPM	What is a process? Process versus function
Understand the criticality and centrality of BPs as a value driver	What is a BP?
Understand a distinction between process-oriented, process-centric, and process-driven organizations	What is BPM?
Understand the roles process management, strategy, change management, process analysis, process redesign, process improvement, process architectures, and BPM systems in BPM practices	What is the value of BPM to an organization? Benefits?
Understand BPM best practices and methodologies	What is a BPM system?
Understand the principles of process management	Who are the BPM players in the market?
Understand the BPM maturity factors and levels	What is meant by "a Process-Centric Organization"?
Understand basic BPM management and measurement techniques	What is business process automation?
Understand the issues, risks, and success factors of BPM practices	What are business rules?
	What are the management issues and success factors involved with BPM?
	Examination of process performance controls and metrics
	Introduction to BPM practices and success factors
	Where do you start? Understanding the BPM practice
	Identifying end-to-end processes in an organization
	Levels of BPM maturity and factors
	What is a process audit and how is it used?
	Principles of process management
	What is involved in developing a BPM strategy – an overview
	Identifying stakeholders and process owners
	The role of a process governance system
	The importance of change management in BPM – people issues
	Process management and project management
	Process implementation issues
	Risk factors in BPM
	Standards

(continued)

Table 3 (continued)

Learning objectives	Suggested topics
	Developing frameworks for BPM
	Introduction to systems, architectures, tools, and trends
	Implementation issues
	Overview of organizational roles and responsibilities involved in BPM

Table 4 Suggested learning objectives and topics – process planning, strategy, and governance

Learning objectives	Suggested topics
Understand the process-driven organization; strategy, leadership, management, and governance structure	Overview of BPM strategic issues
Identify how the strategy, structure, culture, governance system, human resource management system, and the IT need to be aligned	Understanding process management value
Understand how to align processes with corporate strategy	Understanding and developing a process-centric organization; formulating a process vision
Identify and understand the need for a BPM Governance Board to oversee the process transition	Business process strategy formulation
Understand the fundamental differences between managing functions and managing processes	Considerations of a process-based approach to BP change management
Develop the process vision	Strategic, tactical, and operational considerations in a BPM framework
Align business and IT goals	How to plan for cross-organization acceptance and implementation
Fundamentals of team building and leadership for process teams. Specific communication, coordination, and collaboration issues are addressed	Process management frameworks
Identify and deploy appropriate project management methods for managing process initiatives	Partnerships and business process outsourcing
Understand the organizational issues in BPM	The process-oriented organization
Understand the customer focused process	Process ownership and stewardship
Understand how to link corporate strategy to business processes	Process-oriented roles and responsibilities
Understand how to develop a business case for BPM deployment	Leadership and communication skills for the process manager
	Strategic planning for process change
	Understanding process improvement
	Six Sigma, scorecard, and other techniques
	Understanding and planning for BPM Key Performance Indicator (KPIs) (knowing what and where to measure)

BP00 – Business Process Management Foundations: General Overview and Principles

This course is an introduction and overview of BPM. The concepts, fundamentals, methods, and strategies required for managing holistic end-to-end business processes are introduced.

This course provides a foundation for concepts, terminology, and issues related to the practice and sustainment of BPM, providing a common language for subsequent courses. Suggested learning objectives and topics for this course are detailed in Table 3. It is recommended for those who are new to BPM or have had little exposure to BPM practices in recent years.

BP01 – Process Planning, Strategy, and Governance

Organizations strive to create value for its customers through optimal performance of end-to-end business processes. These processes determine how the organization designs, makes, sells, delivers, and services its products and services. This course overviews strategies and methods of managing and governing business processes.

The topics in this course directly relate to the activities of the BP director, BP consultant, and BP architect positions as noted by Melenovsky and Hill (2006) as their primary activity is supporting strategic activities. However the BP analyst should have the knowledge of the topics in this course in order to effectively design and deploy processes within the strategic framework of the organization.

Many organizations struggle with obtaining leadership buy-in to end-to-end BPM (Spanyi 2010). As a result several organizations have approached Business process initiatives on a small scale, working 'middle-out' or applying BP analysis, modeling, and improvement efforts to one process or within one area of the organization. Success with these smaller initiatives can then be used to obtain attention of organizational leadership. In this type of 'middle-out' strategy of BPM deployment the BP analyst role is extremely valuable in communicating the progress of these small-scale BPM initiatives to leadership and assisting their understanding of BPM value. Making processes explicit, focused on end-to-end business processes with the approval of leadership and strategic direction is the key to successful BPM. The role of the BP analyst is central, one of integration and communication. Appropriate BPM education and training is needed to assist in the cultivation of leadership and communication skills needed in BPM positions (Goeke and Antonucci 2011). In this regard, Bergner et al have suggested a course design for training communication skills in BPM education (Bergener et al. 2012). They present design principles on how to train agile communication skills in global virtual settings.

As the central role in BPM deployments, the BP analyst needs to collaborate with other BP roles and operationalize the strategic objectives. Suggested learning objectives and topics are included in Table 4.

3.1.1 Business Process Modeling, Analysis, and Design

The development of successful end-to-end business processes involves techniques of analyzing and designing processes supported by BP modeling methods. As such,

Table 5 Suggested learning objectives and topics – process modeling

Learning objectives	Suggested topics
Recognize the importance and benefits of process modeling	What is BP modeling?
Understand how to develop a common language for describing business processes	What is a model? What are the benefits to modeling?
How to model business processes using BPMN notation for analyzing current processes and designing an improved process	What does it represent?
Understand other process modeling methods such as Swimlanes and Event Driven Process Chains (EPC)	Physical/logical/essential models
Understand how to model the Enterprise Business Architecture using methods of process decomposition and mapping to include several sub-process levels and various organizational views, including the business, process, technology, and data models	Process modeling techniques and methods
	BPMN
	Swimlanes
	EPC
	Developing a common language throughout the organization
	Types of process model views: business, IT, and data
	Levels of process models
	Process decomposition and process mapping

the following three courses can be combined into one or two courses depending on the focus of the desired program. If the courses are combined, it is recommended that an advanced process analysis, modeling, and design course be added to the curriculum to dive deeper into the techniques. The process analysis, design and modeling of business processes are key activities to the overall success of BPM in that the knowledge and understanding of organizational business processes helps advance business process initiatives throughout the organization from identifying process bottlenecks, implementing process improvements, assisting in process communication and training to evaluating strategic focus and assisting in transformation and innovation endeavors. Therefore the following courses are highly recommended for the BP analyst and their respective suggested learning objectives and topics can be found in Tables 5, 6, and 7.

GP02 – Process Modeling

Process modeling should occur at various stages of the BPM practice cycle and also at various levels of detail. This course introduces current BP modeling methods and techniques practiced today. Models for both the business and IT professional are presented and explained. There is an emphasis on graphical models to document existing and renewed processes. Several popular modeling techniques are explained and used including Business Process Modeling Notation (BPMN).

Table 6 Suggested learning objectives and topics – process analysis

Learning objectives	Suggested topics
Recognize the importance and benefits of process modeling	Process discovery
Understand to identify how related business activities are classified as processes	Process and project scoping
Understand and utilize process analysis methods and activities that evaluate end-to-end enterprise processes	Process efficiency and effectiveness
Understand and utilize available best practices for identifying processes along with understanding the value of reference models as process blueprints for assisting with a process definition	Role of process metrics in process analysis
Build a business case	Process thinking and reengineering
Develop the ability to analyze business processes	Mapping existing process understanding
	Understanding process modeling techniques for analysis
	Concept of decomposition models
	Architecting your processes and aligning them to organizational strategy
	Designing the AS-IS process model for analysis
	Building a business case for process improvement

Table 7 Suggested learning objectives and topics – process design

Learning objectives	Suggested topics
Design and model the renewed process	Understanding various process modeling tools and techniques in the market
Develop an improved process model to implementation level that includes all views of the enterprise architecture	Benchmarking processes
Consider the integration of business rules with the renewed process	Understanding process modeling techniques for design and implementation
	Designing and modeling the renewed process (TO-BE)

This course is recommended for anyone desiring to model and/or document business processes and is a primary activity of the BP analyst.

BP03 – Process Analysis

This course is an introduction to the skills and techniques required to analyze current business processes and identify improvement potentials for effective and efficient processes. There is an emphasis on the process analysis techniques and tools required to improve process performance. This involves the documentation of the current process in order to identify opportunities for process change and utilize measurement techniques for evaluating outcomes. This course overviews various

Table 8 Suggested learning objectives and topics – process implementation

Learning objectives	Suggested topics
Understand the basic information systems and technologies required to enable a BPM implementation	Understanding the implementation phase
Understand the process automation techniques and practices	Deploying BPM
Develop knowledge regarding process automation	Process automation
Understand how to link a process design to process execution	Enterprise systems in BPM
Utilize a workflow management system or BPM system to implement the renewed process	Understand BPM best practices and methodologies
Understand the management issues associated with process automation	BPM reporting and monitoring
Understand the role of enterprise systems in BPM	Preparing for business testing
	Developing rollout plans
	Implementing changes
	Managing BP change

process analysis methods for all levels of the organization. Appropriate process modeling techniques are explained and aligned with process analyses.

This course is recommended for those who want to learn how to analyze and discover organizational processes.

BP04 – Process Design

This course is an introduction to the skills and techniques required to design new processes or to redesign and improve existing processes. There is an emphasis on BP design techniques and methods required to improve performance. Modeling methods are used to scope and document the renewed process.

BP05 – Process Implementation and Use

BP implementation is the bridge between design and execution. This course is designed to help the participant understand the issues and procedures necessary to implement a renewed process design into a set of documented, tested, and operational sub-processes and workflows. Various enabling technologies for BPM are introduced along with the techniques for process automation. Management issues associated with process automation are examined such as change management.

While there are many challenges of implementing business processes, the challenge involving change management has received intense attention in recent years and as such should be emphasized in implementation topics (vom Brocke 2011). Therefore the topic of change management and leadership as it applies to BPM can be expanded into a separate course (Table 8).

BP06 – Process Analytics: Measurement, Control, and Compliance

The monitoring, controlling, and compliance of automated processes are critical to process improvement. In addition, the appropriate use and understanding of real-time analytics can significantly improve and dynamically manage business processes. This course explores performance monitoring and analyzes methods of business processes in order to uncover potential problems, making continuous process improvement and regulatory compliance possible. The goals of adaptability and agility can only be attained if processes and products are measured, monitored, and analyzed. Various types and methods of analytics are emphasized.

There has been an increased need to extend BPM activities to include increased intelligence and analytics in order to assist in faster decisions for all levels of management (McCoy et al. 2010). The ability to develop and operationalize process metrics for the purposes of monitoring, controlling and predicting is emphasized in this course. An advanced course in process intelligence may be added as an elective to focus on specific methods related to process intelligence and process agility (Table 9).

BP11 – Business Process Systems and Architectures

Several BPM technologies, systems, and tools have emerged in the market in recent years. This course examines these various BPM technologies, information technologies, systems, tools, and architectures in supporting business processes.

The BP analyst will benefit from this course by gleaning the understanding and knowledge of technology infrastructures designed to not only implement end-to-end processes but also to align business strategy to IT within a process framework. Furthermore the recent advancement of Social BPM introduces an important addition to this course in terms of understanding the type of social media systems utilized and new implications of BPM deployment. Social BPM could be introduced as an additional elective course depending on the depth and breadth of topics desired (Table 10).

BP12 – Process Transformation and Innovation

The primary focus of the course is on the integration of BP-based knowledge and skills for creating a holistic understanding and application of process innovation strategy and methods for organizational process transformation. This course aims to equip students with the state-of-the-art theory and techniques in business process strategy and innovation in order to increase successful participation in transforming traditional business processes into innovative business processes and managing it.

This course is highly recommended for the BP analyst in order to further their understanding of the alignment between strategy and process improvement (Table 11).

BP13 – Sustaining the Process-Driven Organization

Once the organization has been able to achieve process transformation, the organization faces the challenge of sustaining the process-driven state. The key to long-term benefits from BPM is the ability to build a process-awareness culture coupled with long-term transformation practices in order to sustain the competitive advantage of a process-driven organization. This course introduces the methods, strategies, and techniques currently used in successful BPM practices for sustainment.

Table 9 Suggested learning objectives and topics – process analytics: measurement, control, and compliance

Learning objectives	Suggested topics
Identify types of process metrics	Overview of the importance of process performance measurement in formulating and attaining operational and strategic goals
Understand and deploy the alignment of process metrics with process strategy and models	Deploying a process improvement strategy
Understand methods of metrics analysis	Performance measurement and management techniques
Identify relevant reference models	Use of reference models for best practices and KPIs: Supply Chain Operation Reference-Model (SCOR), American Productivity & Quality Center (APQC), Capability Maturity Model Integration (CMMI)
Understand balanced scorecards	Measuring process maturity – the process audit
Understand business activity monitoring (BAM) techniques	Types of quantitative and statistical techniques in business intelligence, simulation, and forecasting
Understand methods of measuring process maturity	Operational metrics for business processes
Design and utilize dashboards and mash-ups as reporting tools	The link to strategic key performance indicators
Understand how to use business intelligence as the basis for reporting and analysis of business processes	Issues involved in measuring, monitoring, and controlling inter-organizational processes
Understand methods of process control	Measuring performance and designing of a performance management system
Understand the role of process monitoring in compliance with regulations	Designing and implementing BPM key performance indicators
	Process managing and monitoring
	Understanding and developing balanced scorecards
	BAM
	Measurement, diagnosis, and improvement
	Technologies for process analytics
	Dash boards and mash-ups
	Types of analytics
	Reporting or business analytics – utilization of historical information for reporting
	Data mining analytics – data trend analysis
	Predictive analytics – determining future decisions and actions based on trend analysis
	Business rules and process analytics

The focus of this course is on the ability to create an organizational culture of process centric activities. The methods in this course are highly recommended for the BP analyst since their role would be included in many of these activities but also be responsible to communicate the requirements of these activities to various members of the organizational community (Table 12).

Table 10 Suggested learning objectives and topics – business process systems and architectures

Learning objectives	Suggested topics
Have a basic understanding the types of BPM systems	Evaluate BPM software and BPM suites
Understand integration and interoperability issues among intra- and inter- organizational business processes	Overviews of the types of BPM systems
Develop an understanding of workflow management systems	BPMS and workflow management systems
Understand the current BPM technology architectures and standards	Process-as-a-service
Understand the role of enterprise services architecture and service-oriented architecture for BPM enablement	Cloud based BPM
	Social BPM
	Integration and interoperability of intra- and inter-organizational processes
	Introduction to the BPM technology architectures and standards
	The role of enterprise services architecture and service-oriented architecture for BPM enablement
	BPM tools and trends

Project or Internship

A BP project or internship is recommended after a student has completed the BPM coursework in order to apply and practice his/her newly acquired BPM practice knowledge.

3.1.2 Additional Advanced Courses and Proposed Tracks

The proposed curriculum strives to integrate the business and technology aspects of BPM practices. Depending on the focus and emphasis of the desired program,

Table 11 Suggested learning objectives and topics – process transformation and innovation

Learning objectives	Suggested topics
Be able to apply continuous improvement techniques such a Lean and Six Sigma to process initiatives	Continuous improvement techniques for process transformation Lean, SixSigma
Understand and apply simulation techniques to process transformation	Process simulation
Understand the role of BPM innovation in achieving organizational strategy	BPM innovation methods Organizational strategy achievement through process innovation
Be able to analyze current organizational BPM maturity, identify maturity state goals of organization, and develop a transition plan for achievement	Develop a process transition plan for improvement

Table 12 Suggested learning objectives and topics – sustaining the process-driven organization

Learning objectives	Suggested topics
Understand the critical aspects an organization needs to sustain the benefits of BPM over time	Reviewing success and risk factors in BPM practices, implications for sustainment
Understand the role of process agility in sustainment	Building organizational communities of practice
Be able to analyze and deploy appropriate change management methods – people in the process	Deploying change management practices
Understand techniques and strategies for building a process-awareness culture	Methods for building a process-awareness culture
Understand how to achieve business process communities of practice throughout the organization	Preparing and implementing process change methods for enabling technologies and systems
Understand methods for technology change implementations	How do you know when you have achieved process agility?
Identify the potential for business process outsourcing	Understanding and identifying the potential for BP outsourcing to improve process performance
Understand methods and techniques to develop and cultivate appropriate process skills and positions	Developing and cultivating appropriate process skills and positions
	Development of a process sustainment plan

advanced courses and additional courses may be included in the curriculum. One area for advanced course work would be in the area of technologies and methods as described in the following paragraphs. The addition of an advanced process analysis, design, and modeling course would be a consideration of a program designed to enforce these practices. Additional business focused courses related to BPM practices could include change management or project management as they apply to BPM.

BP21 – Process Technologies and Methods (Advanced Course)

This is an advanced course that investigates process technologies, systems, and methods in more depth. This course focuses on the technical and implementation aspects of BPM in order to develop process-awareness information systems. It includes an examination of process intelligence enabling technologies and support of business rules by technology. Attention is paid to process interoperability integration within and between organizations.

While this course has a technical focus, the BP analyst can benefit from this course by gleaning a deeper knowledge of technologies available that enable BPM (Table 13).

4 Limitations and Discussion

The proposed BPM curriculum addresses the need for a holistic and cross-functional business process orientation (Seethamraju 2012). The question of how to structure curriculum to address this need remains. Despite the fact that many

Table 13 Suggested learning objectives and topics – process technologies and methods

Learning objectives	Suggested topics
Explore and understand advanced technologies that enable BP deployment	Investigate advanced technologies that enable BP deployment
Understand service-enabled process management and interoperability	Service-enabled process management and interoperability
Obtain an in-depth understanding and use of Enterprise Resource Planning (ERP) systems for process implementation	In-depth analysis and use of Enterprise Resource Planning (ERP) systems as an enabler of process implementation
Understand technologies required to develop process intelligence	Analysis and use of process automation technologies
Understand technologies available to support business rules	Process intelligence systems
Understand the technologies and issues of process integration and interoperability in intra- and inter-organizational environments	Business rules engines
	BPM cloud platforms
	Mobile BPM
	Process integration and interoperability in intra- and inter-organizational environments

business schools have begun to integrate BPM topics into their courses, a need for comprehensive curriculum to address the BPM practice and skills shortages persists (McCoy et al 2010; Seethamraju 2012). Many colleges and universities have focused on ERP, process modeling and systems architecture as they relate to BPM however have not addressed other areas of BPM such as process governance, leadership and culture. Therefore their curriculum has only included portions of the BPM discipline, perpetuating a narrow discipline focus (AACSB.edu) and missing the broad BPM focus of holistic capabilities and enablers of BPM (Rosemann and deBruin 2005; Hammer 2014). The emphasis on process analysis, design, modeling and monitoring continues to be central to BPM providing the knowledge necessary for not only efficient operations but also organizational improvements, agility and efficient strategies (Seethamraju 2012). Curriculum that is focused on 'how to do' BPM at the operational level tends to include utilization of ERP systems, process modeling, analysis and mapping. It is important to recognize BPM as a discipline and as such needs to include 'how to lead and sustain' a process oriented organization. Therefore a BPM curriculum focus needs to be expanded from an emphasis on process analysis and modeling to holistic process management (Seethamraju 2012).

The proposed curriculum was based on the combination of BP analyst role definition research and several existing BPM courses, curriculum, and training programs from various universities, executive education institutions, and professional organizations. As BPM is an evolving discipline, there is a lack of consensus on the content in the available BPM curriculum. In addition, process skills and associated positions vary in organizations, typically favoring either the business view or IT view of an organization with a lack of available research that identifies and verifies the role and activities required for holistic end-to-end BPM practices (Antonucci and Goeke 2011). These issues of existing limited BPM curriculum and lack of content consensus contribute to the main limitations of this curriculum proposal.

The primary goal of this curriculum is to integrate business and IT practices needed to develop and cultivate BP analysts. The typical MBA or business school curriculum currently lacks this integration (Fingar 2006). It can be debated on whether to have more emphasis on business or on technology depending on the outcomes desired by the organization. As such, there could be variations of this curriculum. For example, a more technical college or university may opt to include advanced courses in technology and implementation. Similarly, executive training can tailor this curriculum to a desired level of emphasis. Deployment of this curriculum is recommended to be either on-site or a scheduled on-line meeting time. Several of the proposed courses require a high level of interaction between participants to enforce concepts and learning, making a self-paced on-demand e-learning method difficult.

Organizations will ultimately benefit from a holistic end-to-end BPM curriculum with educated and knowledgeable BP analysts. Executive training, universities, and colleges can use this curriculum as a foundation for planning and deploying comprehensive BPM programs designed to cultivate skills for the emerging BP analyst.

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Dealing with Human-Driven Processes

Keith Harrison-Broninski

Abstract Current BPM deployments focus on routine work and low level knowledge work, lacking integration with higher level knowledge work such as research and development, marketing, complex sales, services delivery, complex problem resolution, organizational change, new initiatives and other strategic management activities. To gain full benefit from operational improvement via a process approach, higher level knowledge work must also be brought under process control and integrated with lower level operations (For a report on the evolution of BPM also see Harmon (2014) in the first volume of this Handbook). However, this requires a new approach to process management – one that not only has the right balance of structure and flexibility, but that also allows collaboration across internal and external organizational boundaries. As a solution, this paper presents a means of describing adaptive, collaborative human-driven processes, and supporting them with software, that streamlines interactions between colleagues to reduce costs, focuses on goals to be more effective, and improves organizational memory by tracking work, keeping the knowledge and re-using best practices. The approach is based on the theory of Human Interaction Management (HIM), which facilitates the management of teams, communication, knowledge, time, and plans. HIM also shows how to automate processes involving human collaboration across organizational boundaries of any kind. HIM can be introduced into the enterprise, and integrated with both organizational strategy and mainstream BPM, via supporting Human Interaction Management System (HIMS) technology and an associated change management methodology, Goal-Oriented Organization Design (GOOD).

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_24,

1 Introduction

Current mainstream BPM practice derives from techniques developed throughout the twentieth century to improve business operations, starting in the 1910s with Scientific Management (Taylor 1911), then continuing in the 1930s with Statistical Quality Control (Shewhart 1931), developing in the 1950s and 1960s into Total Quality Management (Deming 1950; Ishikawa 1968), and resulting by the 1980s in Lean Manufacturing (Ohno 1988) and Six Sigma (Harry 1988), which were subsequently combined into a unified methodology Lean Six Sigma (George 2002).[1] All these techniques were designed for the improvement of routine and repetitive work, typically production processes such as manufacturing.

This background is reflected by the notations developed to support process analysis, of which the latest, and the current de facto standard in everyday practice, is BPMN (Object Management Group 2011). All such notations assume that a process is essentially a set of operations that control the movement of inputs from one state to another until they result in outputs, typified by the assembly of a product in a factory or the handling of an insurance claim by low level knowledge workers. Modern process notations allow parts of the process to take place in parallel, and elements of the process to be grouped together, resulting in the formal treatment of a process as a concurrent, hierarchical, finite state machine.

While it may appear to be possible to adapt such techniques and notations to handle collaborative, adaptive human work, there are serious limitations that become apparent very quickly. Higher level knowledge work such as research and development, marketing, complex sales, services delivery, complex problem resolution, organizational change, new initiatives and other senior management activities not only requires the right balance of structure and flexibility, but also must allow collaboration across internal and external organizational boundaries. These requirements introduce new dimensions that are not catered for by mainstream BPM notations. Consider, for example, the following questions, which someone might ask when presented with a BPMN diagram describing a collaborative, adaptive process in which they are expected to play a part.

What are my goals and responsibilities? A swim lane is simply a grouping of activities – it is not an organizational role, with associated contextual information. Fundamental aspects of knowledge work (acceptance of responsibility, capabilities, personal characteristics, and so on) are quite literally out of the picture. This is a particular problem with regard to delegation of assigned work.

How do I know what is required from my deliverables? With only a task description to go from, a knowledge worker has no idea on what basis their work will be reviewed, or even by whom, meaning they cannot understand the criteria

[1] As to he relation between Process Management for Knowledge Work also see the chapter of Davenport (2014) in the first volume of this handbook. The role of people is also highlighted by Hammer (2014) and further conceptualized by Rosemann and vom Brocke (2014) in the first volume.

that will be applied to approve it. Similarly, a diagram shows no indication of the policies, regulations and other constraints to which their work must conform.

Does everyone in this process have appropriate skills, experience, and personality type? A diagram provides no information about who is involved, so gives the false impression that collaborative work is somehow independent of the people carrying out the activities and of their interactions.

What if I need help? If producing specific deliverables turn out to be too much work in the time available, the assigned person may need to work with someone else – but a diagram offers no means to achieve this. For example, there is no way to add more players of a certain role in a BPMN process, or more generally, adjust the resource levels assigned to a work package. It is hard even to imagine how the notation could be extended to support the notion, as the formal principles on which BPMN is based do not support such a concept. Yet human resource planning is fundamental to the management of collaborative work.

What if I need to discuss matters with colleagues? To prepare deliverables a worker may need to discuss them with colleagues prior to submission, in a structured way – but a process diagram does not allow the depiction of interactive, multiparty communication channels (only one-off messages sent from one pool to another as part of a workflow). Message flow in BPMN, for example, is limited to a single, one-way sending from one pool to another. The sending can be repeated if the appropriate looping constructs are used, but it is very hard to depict message flow between more than two parties, and any attempt to reproduce the flexible manner in which people exchange messages is doomed to failure. Mainstream Business Process Management System (BPMS) software typically deals with this limitation by treating message exchange between colleagues as outside the work process itself – i.e., as an ad-hoc activity on which no structure can (or needs to) be placed. In other words, what is perhaps the most fundamental aspect of knowledge work – human interactions – is relegated to floating around under the organizational radar, in an unmanageable backwater.

What if work additional to that shown is necessary to prepare my deliverables? A deliverable is often just the tip of the iceberg compared to the research, evaluation, and analysis that underpin it, and such associated activities tend to be hard to predict in advance – a process diagram does not allow these activities to be created and adjusted, or recognition to be gained for the mental work involved in carrying them out. This not only hinders but also demotivates knowledge workers.

What supporting information do I need, and where can I get it? Knowledge work typically relies on a variety of associated reference materials, but a process diagram shows only activity inputs and outputs – meaning that knowledge workers struggle to identify the necessary resources, to determine what form they are in, where to find them, and how to access them (e.g., to obtain the account details for their organization's subscription to a technical journal containing relevant articles).

These are only examples of the sort of questions that mainstream BPM notations fail to answer. The result of this failure is that critical processes involving collaborative, adaptive human work are poorly managed by many organizations, as shown in Fig. 1.

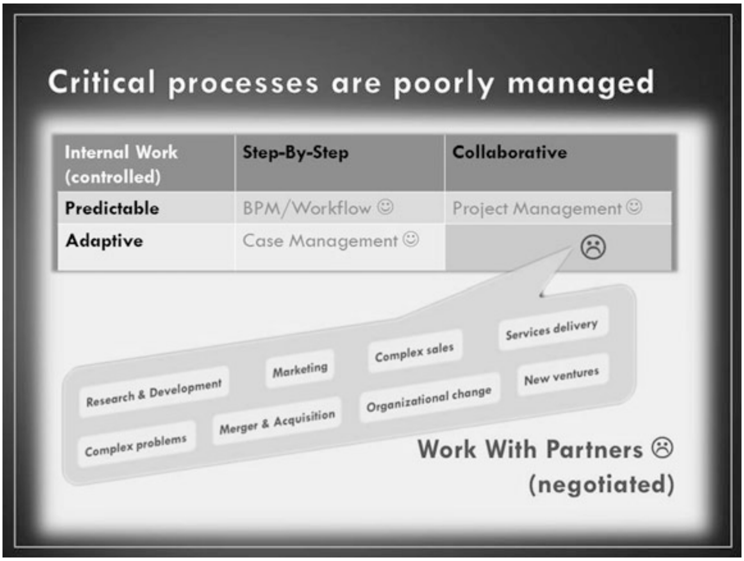

Fig. 1 The process gap

At the top of Fig. 1 is a grid of the different process types within a single organization, showing the technique appropriate to support each process type:

- Step-by-step work in which the sequence of steps can be predicted – for example, manufacturing, licensing or order fulfilment – is generally described using a flowchart-based notation (such as BPMN) and supported using **Business Process Management** or **Workflow** systems.
- Step-by-step work in which the steps and their sequence adapt to the situation at hand – for example, claim processing, medical diagnosis or invoice discrepancy handling – is generally described again using a flowchart-based notation but this time supported using **Case Management** systems.
- Work in which deliverables are provided through collaboration rather than each person carrying out steps individually, but is nevertheless predictable – for example, laying an oil pipeline or building a power station – is generally described using a Work Breakdown Structure and supported by **Project Management** systems.
- Work that is both collaborative and adaptive – which may in fact represent a very large proportion of organizational activity, since it includes areas such as research & development, marketing, complex sales, services delivery, complex problem resolution, merger & acquisition, and organizational change – is generally not described in any formal way but rather using documents and illustrative diagrams. As a result, it is not supported by specific systems, but rather left to fend for itself in a minefield of workplace technologies such as email and content management systems.

Figure 1 shows how this problem and the resulting technology support gap exist not only for collaborative, adaptive processes within a single organization, but for collaborative, adaptive processes that cross organizational boundaries – as they typically do.

To remedy the situation, the theory of Human Interaction Management (HIM) was developed to streamline interactions between colleagues to reduce costs, allow focus on goals to be more effective, and improve organizational memory by tracking work, keeping the knowledge and re-using best practices (Harrison-Broninski 2005a "Human Interactions – The Heart And Soul Of Business Process Management"). A HIM "Plan template" – i.e., a set of Stages in which people play Roles to provide deliverables – is a natural, intuitive way to structure adaptive, collaborative work. Further, if a process is implemented as a HIM "Plan" via a Human Interaction Management System (HIMS), its participants can use different HIMS servers – or even regular email – to work together in a structured, manageable way across professional, geographical and organizational boundaries.

However, for many people it is hard to distinguish the different types of work process. Where exactly should one apply each type of process description technique, and use each type of technology? It can be particularly difficult to separate adaptive work processes into step-by-step and collaborative, since even adaptive processes that are step-by-step typically involve multiple people (each carrying out their own set of steps).

A simple solution is to use an analogy to classify "adaptive" processes as either "step-by-step" or "collaborative". Consider what happens when you build a Lego model as compared to what happens when you cook a stew. When you've completed a Lego model, you can still see the parts – and each part is the same as it was when you took it out of the box. With a stew, you can detect (most of) the ingredients by tasting it – or even just looking at it – but you cannot disassemble the stew into its components.

In other words, the constituents of the stew have been changed by the process of cooking, into something new – something that is quintessentially to do with that particular stew, and the chemical reactions that took place during cooking. A sea change has taken place, into something rich and strange. It may or may not be possible to repeat the sea change on future occasions – and the ability to do so is part of the learning curve a chef goes through. But one thing is sure – you cannot undo the sea change for a specific stew, and isolate each ingredient in its original form. Making an analogy with human work, collaboration between the people (typically members of a virtual team) who carry out an adaptive process changes the original elements of that process irrevocably.

So this is how to tell the type of an adaptive work process: once it is complete, can you look back and identify what took place as being exact sequences of steps copied from standard templates? Or have the virtual team members used the original template processes as illustrative guides rather than prescriptive instructions – changing, repeating, adding and omitting steps as required by the situation at the time, based on their skills, experience and collective judgement? If the step sequences are identical to their original templates, your adaptive process is "step-by-step", and you could consider using a BPM or Case Management system to support it – as long as it all takes place within a single organization, that is. If on the other hand your process changes the template steps – or involves multiple organizations – then you are in the territory of HIM and its supporting technology the HIMS.

In a HIM process, as John Seely Brown said, "processes don't do work, people do" (Brown and Gray 2005). BPM, Case Management and Project Management are about tasks. HIM is about virtual teams – and, depending on the scale, often about what might be thought of as virtual enterprises. Many projects, programmes, initiatives, ventures, or other collaborative efforts involve people from multiple organizations, with multiple professions, in multiple locations. Effectively, each such effort results in the creation of a dedicated **virtual enterprise** – and the management structures required to ensure that a virtual enterprise achieves its desired goals are non-trivial.

The UK healthcare advisory organization The King's Fund (www.kingsfund.org.uk) provides a useful discussion of the issues associated with such a virtual enterprise, which it terms an "extended enterprise", in its analysis of 12 pilot projects between 2008 and 2011 to introduce new technology into UK health and social care ("the WSDAN sites"). In particular, the authors explain how the issues are not simply those of *communication* (i.e., data sharing) but more widely of *collaboration* (i.e., purposeful interaction):

> When organizational and, by implication, individual goals are different, how can they be brought into equilibrium? It is not enough to settle on standards; what is needed is a different way of conceptualizing the combined services so that data could flow from one service sector to another (possibly incorporating user-held data), and be used to the benefit of users, patients, and other stakeholders. One approach might be to view integrated social and health care as an example of an extended enterprise – a loosely coupled, self-organizing network of organisations that combine their services to provide new products or services to a specific market (Ross et al. 2006). This, perhaps, largely describes the current relationship between telehealth and telecare projects and their commercial partners and collaborators at the 12 WSDAN sites – it certainly describes those sites that are involved in forming social enterprises, trading arms and other service configurations. This arrangement, however, lacks the ability to answer the questions, 'What should the objective function of this enterprise be? Who is responsible for delivering quality of outcomes and for managing budgets? How can such responsibilities be enforced?'
>
> It is not uncommon to ask the first two questions, but the third is often neglected. The third question, however, is critical, and should be asked before any telehealth/telecare equipment is deployed in someone's home, because its answer leads to the programme's governance structure. In their landmark paper on the theory of the firm, Jensen and Meckling (1976) view the organisation as nothing more than a nexus of contracting (both implicit and explicit) relationships that, among other things, control individuals and help to ensure that individual and group activities meet the needs of stakeholders. The contractual relationships are important because they make explicit who the stakeholders are, and the limits and types of individual and groups activities that serve stakeholder interest.
>
> Jensen and Meckling write that this view of the firm is not limited to corporations, but to any organisation:
>
> *This includes firms, non-profit institutions such as universities, hospitals, and foundations, mutual organisations such as mutual savings banks and insurance companies and co-operatives, some private clubs, and even governmental bodies such as cities, states, and*

> *the federal government, government enterprises such as . . . the Post Office, transit systems, and so forth.*
>
> So, the data management problems that the WSDAN sites face highlight a larger problem concerning the overall governance of their programmes.
>
> (Giordano et al. 2011)

This governance problem is not limited to healthcare, or to the public sector. It applies in all walks of life. Whether you are organizing a small town festival, laying an oil pipeline, or sending a rocket to Mars, you need to "make explicit who the stakeholders are, and the limits and types of individual and groups activities that serve stakeholder interest." In other words, you must find a way to show **who is involved** and **what each person is responsible for**. Until you do this, there is little chance that the responsibilities will be enforced appropriately and hence that people will deliver what is required of them in order to meet the goals of the effort.

This is a process-related question, but not one that can be solved using traditional BPM or case management techniques. Stakeholder responsibilities cannot be helpfully described or managed using flowchart notations or by assigning tasks in isolation. Rather, it is necessary to depict in a simple way:

1. The overall goal and sub-goals of the collaborative effort
2. The stakeholders in each sub-goal (i.e., those with an interest in achieving it)
3. The nature of each stakeholder's involvement – in RACI terms, whether they are Responsible, Accountable, Consulted or Informed

In the Human Interaction Management approach to collaborative work, these items become a **Plan** containing **Stages**, **Roles**, **Activities** and **Deliverables**:

1. A **Plan** represents a collaborative activity with shared high-level goals.
2. A **Stage** represents a sub-goal of the **Plan**. If you are included in a Stage, then you have an interest in achieving it, so you will receive its outputs and be on in its messaging channel. The current status of each Stage represents its progress ("Not Started", "Started", "Completed", "Cancelled", "Issue Raised", and so on).
3. A **Role** is a Plan-specific job title. The Roles assigned to you define your responsibilities in each Stage that you are included in. You use a Role to contribute to the work of each such Stage, or simply influence Stage progress via messaging.
4. An **Activity** is how a Role contributes **Deliverables** to a Stage. An Activity may have inputs, such as the outputs (i.e., deliverables) of other Activities or reference materials to support its execution. If an Activity is just for review purposes, there may be no outputs as such – review comments can be submitted via Stage-specific messaging.

The Stages, Roles and Activities may well change during the life of a Plan, as the Plan owner responds to circumstances by adjusting the way the work is to be carried out, often in response to advice and suggestions from other Plan members. A Plan is typically made from a standard template, and then evolves throughout its life – and the final version of the Plan can then be re-used as a template if desired.

In the remainder of this paper, we show how to introduce HIM into the enterprise, and integrate it with both organizational strategy and mainstream BPM via an associated methodology, Goal-Oriented Organization Design (GOOD). The following sections present:

- Some example HIM Plan templates;
- An overview of HIM theory;
- Description of the supporting HIMS technology;
- The supporting change management methodology, Goal-Oriented Organization Design (GOOD);
- A case study of enterprise HIM usage;
- Conclusions drawn.

2 Example HIM Plan Templates

Figure 2 shows an example Plan template illustrating how the HIM approach can be used to run a transformation programme for a local authority via the Agile methodology Scrum:

As captioned on the screenshot, on the left hand side you can see the various Stages (sub-goals) of the work. The first two Stages are Scrum-specific, and run throughout – to manage the Product and Spring Backlogs respectively (i.e., the work required overall and in the current Sprint). Each of the other Stages is specific to a service area of the local authority, and contains artefacts relating to that specific aspect of the overall change programme.

Also as captioned on the screenshot, on the right hand side you can see the Roles involved in the currently selected Stage – in this case, Manage Sprint Backlog. In this Stage, only the Scrum Master has work to do:

- “Prepare Next Sprint”, which delivers the Sprint Backlog
- “Manage Burn Down Chart”, which delivers the Burn Down Chart (the work remaining in the current Sprint).

The other Roles in this Stage are the Product Owner (typically the executive with responsibility for the change programme), the Programme Office (the administrator for the change programme) and people with responsibility for different aspects of the change programme (planning, risks, issues, change, finance and configuration). None of these have work to do in the selected Stage, but are included in it so that they have visibility of the Sprint Backlog and Burn Down Chart, and can contribute to the Stage by receiving and sending messages on its channel.

The other Stages have specific Roles and Activities of their own, out of scope here due to space restrictions.

Figure 3 shows an example Plan template illustrating how the Human Interaction Management approach can be used to streamline a commercial Sales Bid – typically a pressurized undertaking with a tight timescale:

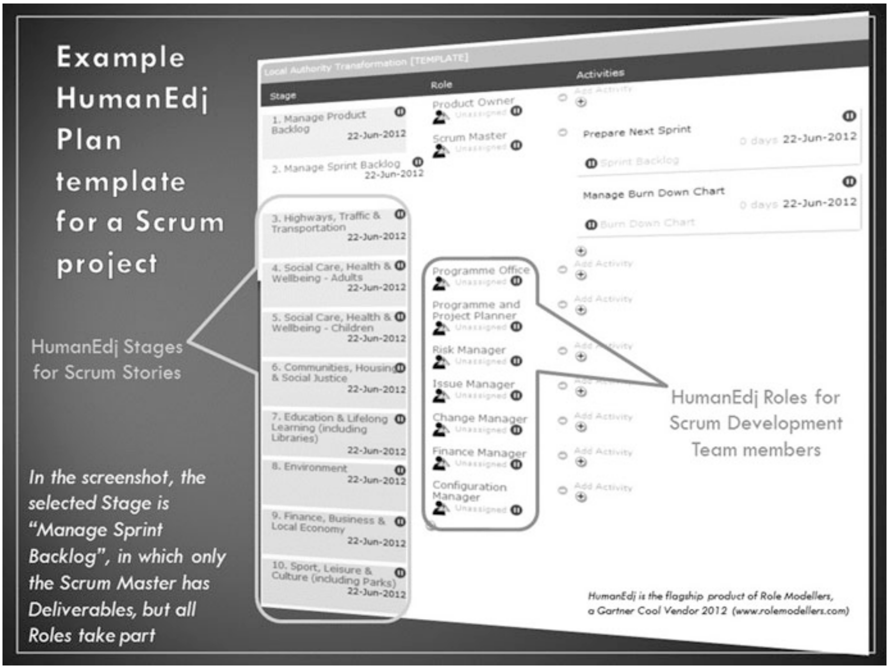

Fig. 2 Plan template for a Scrum project

Here the selected Stage is "Create Opportunity". At this point, the lead has been qualified as worth pursuing, and the Nominated Sales Lead has the responsibilities to assess the client, arrange a follow-up meeting and record progress on the CRM system.

The Lead Owner has no deliverables in this Stage, but will follow progress closely and may contribute advice throughout the Stage.

There are other Roles in this Plan – Sales Manager, Technical Expert, Commercial Authority, and so on – but none of these are included in the Stage "Create Opportunity". The responsibilities of these Roles are specific to other aspects of the work (i.e., other sub-goals) so they only see what is of interest to them. In other words, they are not deluged with unnecessary messaging in the usual way.

Returning to the public sector, Fig. 4 shows an example Plan template for managing the case of a Youth Offender. This work typically involves many different parties, and is subject to rigorous legal and ethical constraints, which means it must be managed with great care:

The screenshot shows the work required to supervise a disqualification order, which has deliverables from the Case Manager and Crown Prosecution Service Liaison, with the Youth Offending Team Manager involved only in a supervisory capacity. In order for the CPS Liaison to do their work, they use the deliverable from the Case Manager, the "Concerns About Breach".

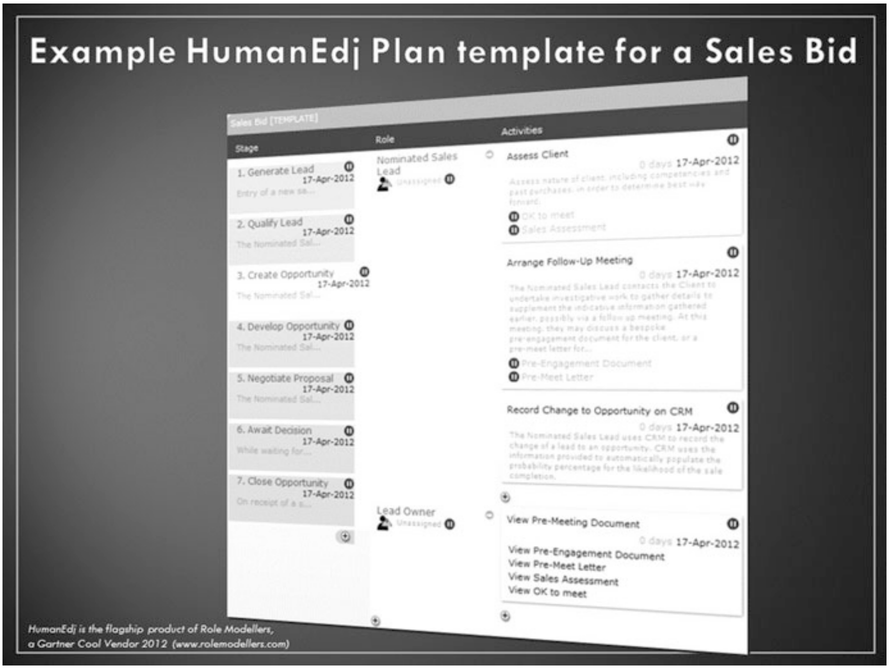

Fig. 3 Plan template for a Sales Bid

At the start of the case it will not be known whether or not this Stage is necessary at all, but by default all Stages in a Plan are optional, as are all Activities and production of all deliverables. The Plan *indicates* rather than *prescribes* the work required to meet the goals of the effort overall. As the work progresses, it will become clear exactly what should be done, and the best way in which to do it.

A Human Interaction Management approach guides those involved to work in a structured way that is amenable to management, while allowing them to use their skills and experience to determine the most efficient and effective route through the work.

3 Human Interaction Management Theory

HIM is a formal theory of processes that extends, alters and re-frames ideas originally developed in the early 1980s (Holt et al. 1983) and subsequently associated with Role Activity Diagrams (Warboys 1989; Ould 1995; Warboys et al. 1999). The mathematical foundation of HIM draws on and unifies petri nets and the pi-calculus (Harrison-Broninski 2005b "Managing Process Change? Easy as Pi (and Petri)").

The theory of HIM shows how to describe processes so as to facilitate effective, efficient management of *teams*, *communication*, *knowledge*, *time*, and *plans* (the "5 Principles of HIM").

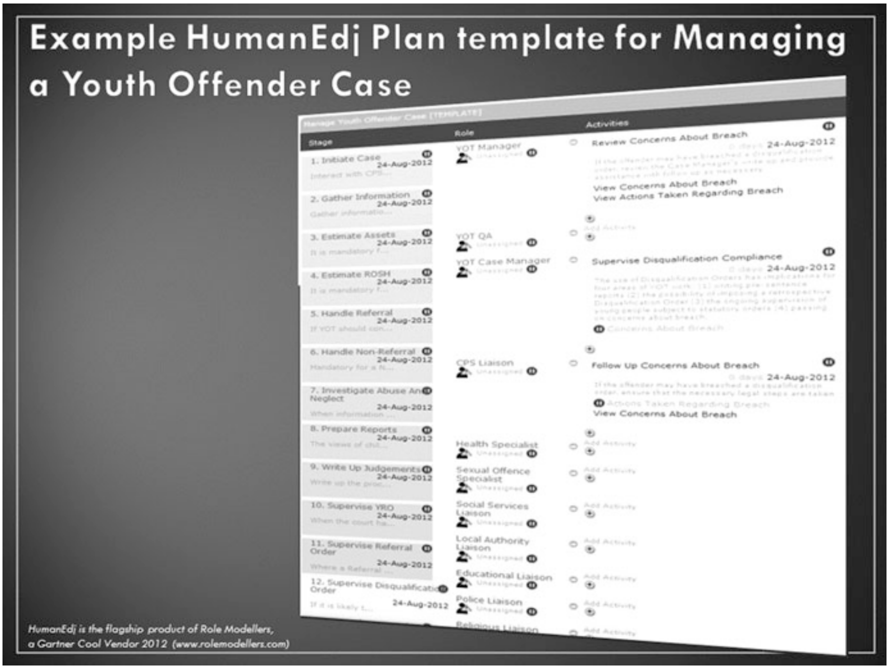

Fig. 4 Plan template for managing a Youth Offender Case

A further concern of HIM is to provide software support for processes involving human collaboration, including those that *cross organizational boundaries*, which it does via the definition of a new kind of software system – a Human Interaction Management System (HIMS). A HIMS is not a centralized server managing the progress of concurrent, hierarchical, finite state machines (like current mainstream BPM software), but rather a means to manage distributed objects. A HIM process is a set of objects (known collectively as a "Plan"), of which copies are owned by each player in the process. Each player does work in the process using their own HIMS, which uses messaging to ensure that their own copy of the Plan is synchronized with the copies held by their peers.

Note that it is possible to take part in an HIM process without using a HIMS – as long as one player is using an HIMS, the others can collaborate via email, for example, and the sole HIMS instance will still ensure that the work is structured according to the Plan definition for all players.

3.1 The 5 Principles of HIM

HIM analyses collaborative work processes in terms of their inner structure rather than from their external manifestation in terms of particular communications. Rather than being based on a specific aspect of human collaboration such as messaging or document sharing, HIM is based on five fundamental features of human-driven processes, the “5 Principles of Human Interaction Management”. As an organization is effectively a manifestation of long-term human collaboration, the “5 Principles of HIM” apply equally to organizations and to any other form of project or venture. The five principles are discussed below, along with their implications for any modelling framework that aims to capture human collaboration.

(1) *Team building*: To create effective teams, it must be clear who is involved in a particular process, and what each person brings to the table. As a starting point, the identity, skills, experience, and personal characteristics of each person must be captured. It is then necessary to define each individual’s responsibilities, and negotiate his/her commitment to accepting these responsibilities.

   A modeling framework for collaborative, adaptive human activity must contain Role and User objects, both as types and as instances of those types.

(2) *Communication*: If people are to manage their interactions with others better, their communications must be structured and goal-directed. Within a process, there must be specific channels of communication for different purposes, each of which unifies messages transmitted via a variety of means (email, text message, FAX, voice-over-IP, etc.).

   A modeling framework for collaborative, adaptive human activity must contain Interaction objects representing interactive, multi-party communication channels.

(3) *Knowledge*: Organizations must learn to manage the time and mental effort their staff members invest in researching, comparing, considering, deciding, and generally turning information into knowledge and ideas. The people responsible for creating and managing this knowledge must be able to control its usage and distribution.

   A modeling framework for collaborative, adaptive human activity must contain Entity objects that can be created, versioned, and shared in a structured way.

(4) *Empowered time management*: Humans may not sequence their activities in the manner of a software program, but there is always structure to human work, which must be understood and institutionalized so that it can be managed and improved. This means empowering people to choose and/or create their own work activities from an appropriate range, guided by understanding of organizational context (so that they can aim to deliver maximum value) and restricted by business rules that prevent contravention of applicable policies and standards.

   A modeling framework for collaborative, adaptive human activity must contain Activity objects that can be marked up to enable validation and control.

(5) *Collaborative, real-time planning*: Human activities are concerned often with solving problems, or making something happen. Such activities routinely start in the same fashion – by establishing a way of proceeding. Before you can design your new widget, or develop your marketing plan, you need to work out

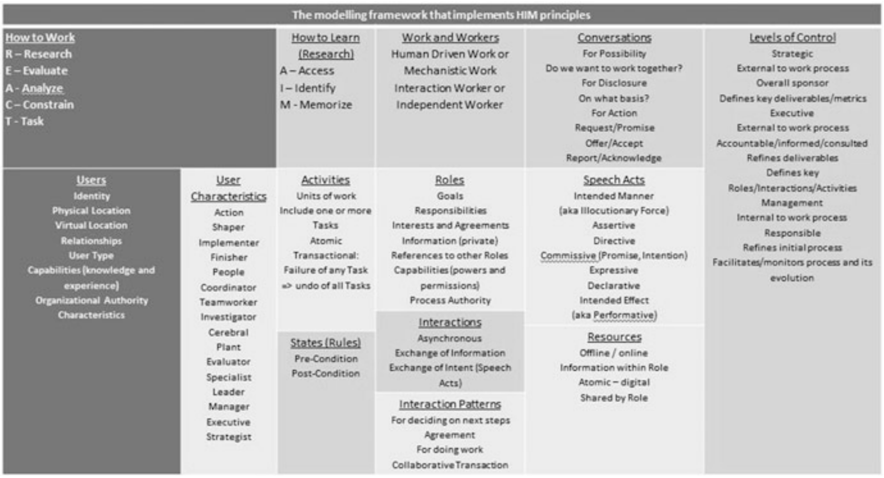

Fig. 5 HIM modelling framework

how you are going to do so – which methodology to use, which tools are required, which people should be consulted, and so on. In other words, process definition is an intrinsic part of the process itself. It takes place via negotiation between all involved parties, and is not a one-time thing but happens continually throughout the life of the process.

A modeling framework for collaborative, adaptive human activity must support creation, update and deletion of objects and their user interfaces as part of the work process itself.

The HIM modelling framework includes objects of over 30 different types, and provides a diagrammatic notation to depict them, as shown in Fig. 5.

However, most HIM users never use this object model or even know of its existence. Rather, they create, use and manage Plan templates in a simple, intuitive way by dealing with Stages, Roles, Activities and Deliverables.

HIM also provides guidelines on use of the approach, by identifying a number of patterns resulting from the five principles. Some of these patterns are described in following sub-sections.

3.2 REACT and AIM

The REACT and AIM patterns shown in Fig. 6 underlie any form of human activity (collaborative or not) – taken together, the REACT and AIM patterns describe all human working behavior. The patterns capture the way that people respond to assignments, fulfill responsibilities, achieve goals – the way they “react” to the work they take on. REACT and AIM help simplify complex situations, as the

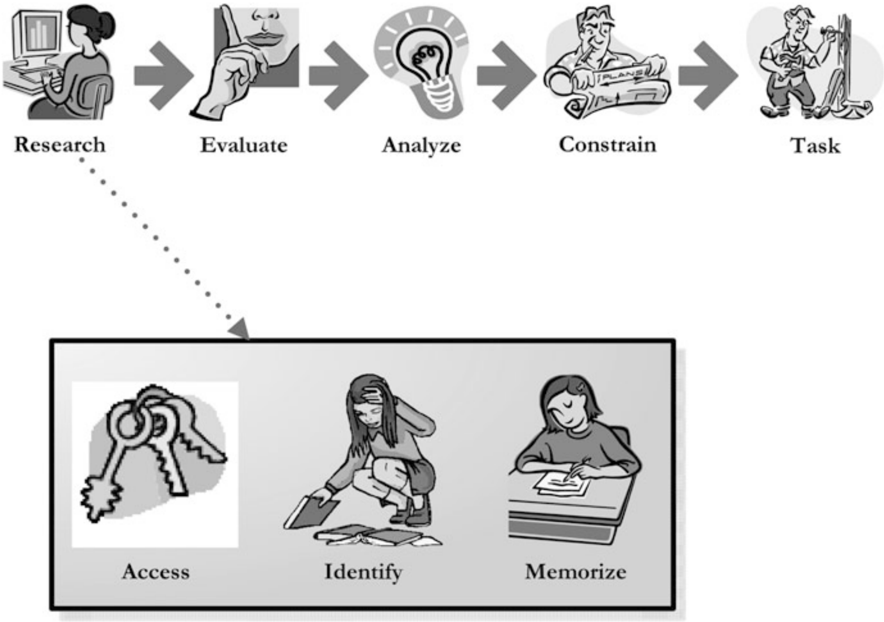

Fig. 6 REACT and AIM

patterns can be repeated, overlapped, and nested in order to reduce any work assignment to the same fundamental elements.

REACT has five elements:

(1) *Research*: Map out the terrain, investigate the principles, talk to those in the know, locate potential threats, and so on, in order to gain information from external sources, and turn it into personal knowledge. The external sources may be close at hand – members of a "community of practice," for example. Alternatively, information may be acquired from an impartial expert in the field, a textbook, or a search on the Web. The details are different every time, but the principle is the same. Before you can start to work on something, it is only common sense to find out what you are getting yourself into.

(2) *Evaluate*: Step back and consider the knowledge thus acquired. Internalize it, in a sense, by making connections between different opinions or facts. Once you have discovered the general lay of the land, you need to familiarize yourself with it. You may need to carefully read a pile of papers on your desk, or to mull over some advice that you do not yet understand. This element of REACT may take minutes or years, but it is crucial – there is no point doing an investigation unless you make an effort to take on board the information you gathered.

(3) *Analyze*: On the basis of your new-found understanding, decide on an approach to the problem. In general, the approach you settle on may result partly from applying logic to reduce the problem to more manageable sub-problems – and

partly from an intuitive judgment on what feels “right”. The balance varies both with the type of problem and with the type of person trying to solve it. However, you arrive at a conclusion, though the decisions made at this point are not necessarily a final say on the matter – they are simply a way forward for now; enough to let you proceed further with the work in hand. Sometimes it is hard to be sure whether you are doing the right thing, so you might choose a way forward that hedges our bets – following multiple paths at the same time, in the hope that at least one will work – or decide only on the first few steps, and leave decisions about other steps for later. But you have to make some kind of decision at this point, at least on how to start.

(4) *Constrain*: Divide the work into separate chunks, and organize them. This may be simply a matter of deciding an approximate order to do them in, or it may be a huge task involving all the techniques of project planning: dependency and impact analysis, critical path definition, resource allocation, budgeting, contingency planning, and so on. However, you are dealing with human-driven processes here – in which people rarely do things in the order laid down, and rightly see it as part of their work to determine how things should proceed. So, this part of the REACT pattern is not about defining workflows, in the sense of ordering activities into strict sequence – rather, it is about chunking the work into separate Stages, each with its own sub-goal.

(5) *Task*: You have determined how to break the work into Stages, put Roles in each Stage with Activities and Deliverables, and assigned the Roles to appropriate people (typically including yourself), so now all those concerned can get on with the tasks at hand. For a large programme, doing the work may involve many different people and organizations working together to deliver a complex product or service.

The first part of REACT, *Research*, can be further broken down into a sub-pattern AIM, which describes any research activity. Similarly to the way REACT describes human work in general, AIM describes the particular activities of information discovery.

(1) *Access* discovery services: Decide where you will go to obtain information, and obtain any necessary authorization. This might be permission to contact someone, login details for a database, or funds to use some kind of finder agency.

(2) *Identify* resources required: From the above-mentioned service(s), choose resources likely to be of interest. At this point, you will have only cursory understanding of their content – what matters is that they seem likely to be useful.

(3) *Memorize* information obtained from particular resources: It is important to focus on committing information to memory, even if the information is only the outline of an idea you will use later on. Unless you have memorized information gathered during this first element of REACT, it is no use in the following element, *Evaluate* – you cannot synthesize ideas you have forgotten, or need to look up in order to understand. This element of AIM is all about internalizing the ideas in question.

3.3 Stage

A “Stage” (originally known in HIM theory as a “Collaborative Transaction”) is an archetypal structure for describing a phase of collaborative work. The structure includes two separate interactions, one for discussion about the work of the Stage and one for controlling the status of the Stage. A Stage includes Activities divided among several Roles. Stages can be nested, may run in parallel and their status is controlled ultimately by the Plan owner (although other Plan members can make provisional changes of certain kinds to the status of a Stage).

3.4 Levels of Control

Levels of Control refers to a natural division of responsibility and authority between strategic, executive, and managerial Roles. In brief, strategic control is about identifying goals and measures; executive control is about identifying key roles and interactions; management control is about constructing, implementing, supporting, and reporting on an executable process.

4 The Human Interaction Management System

Implementation of HIM in an enterprise environment (i.e., design, execution and management of business processes according to HIM principles) is facilitated by software support from a Human Interaction Management System (HIMS), for which the reference implementation is HumanEdj (Role Modellers 2012b “HumanEdj User Guide”). The aim of a HIMS is to facilitate collaborative, adaptive human work without forcing people to follow a set of predetermined steps rigidly. By bringing human collaboration into a unified and supportive process context, the HIMS promises to make knowledge work genuinely more effective. Integration of a HIMS into enterprise architecture is shown in Fig. 7.

4.1 Speech Acts

A HIMS helps people to see the bigger picture of a process and understand their responsibilities within it. This calls for suggestive rather than prescriptive process description and support: a HIMS provides support and enforces basic control on behalf of the organization, providing an indication to people of what they are expected to do then letting them learn collaboratively how best to meet their assigned goals.

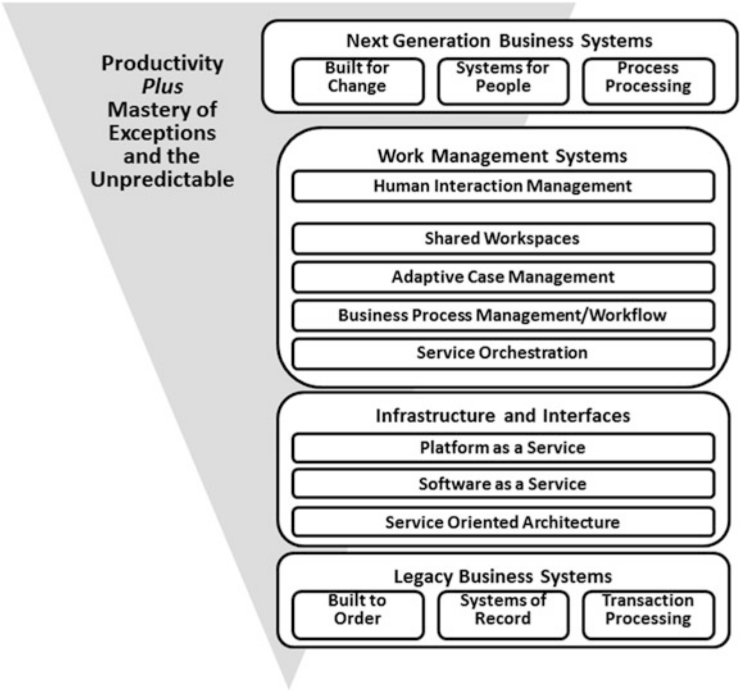

Fig. 7 Modern business systems

A key aspect of this collaborative learning derives from autopoietic theory (Maturana and Varela 1973), which asserts that communication is founded not on transmission of information but rather on transmission of intent. Research in biology shows that the purpose of animal communication is largely about synchronizing the behavior of parties. This understanding has been adopted in business via the classic "Conversation for Action" (CfA) pattern (Winograd and Flores 1990), in which communication between people and organizations is structured in terms of a small set of request/response pairs – request/promise, offer/acceptance, and report/acknowledgement.

However, many business people have found the traditional use of speech acts in CfA too rigid for practical use. Hence, HIM generalizes the approach by allowing a much broader and less restrictive set of structured communications. HumanEdj, for instance, provides full support for speech act theory (Austin 1962; Searle 1969), according to which a communication act is not only composed of content but also, and at least as importantly, of an intention. HumanEdj permits business people not only to share data and documents, but also to make a wide range of assertions about the status of Deliverables and Stages. For example, the creator of a Deliverable can specify its intended usage as a draft for review, as a submission for approval, as having known issues that need to be addressed, or as having one of various other statuses.

In general, a HIMS suggests actions rather than prescribes them, allows not only for communication but also for action, does not assume that all communication is direct and does not prevent tangential discussion – i.e., unexpected interactions that go beyond the conversation originally expected. This permits processes to evolve via a collaborative learning process. The HIMS provides helpful structure by modelling work formally as a process, but retains a light touch by allowing people to work according to their judgement at the time.

4.2 Cross-Boundary Processes

A key aspect of human collaborative work is the common necessity to include people from multiple organizations, location and disciplines. Hence a HIMS such as HumanEdj has a distributed peer-to-peer architecture, more akin to a Multi-Agent System than to a workflow or BPMS engine. Participants in a Plan may belong to different organizations and use different HIMS servers, since each HIMS automatically synchronizes the Plan states for its users via a messaging technology such as email. This also makes it possible to participate in a Plan using only a standard email client.

Plans may also generate sub-Plans, for instance in order to carry out the details of a public process as distinct private processes.

4.3 Continuous Improvement of Collaborative Work

Plan templates are used to generate Plans for projects, initiatives, ventures, etc. – i.e. executable business processes that may cross organizational boundaries. Each Plan is configured appropriately for the requirements of the situation, and the participants themselves adjust the configuration throughout its life, as they collaborate to evolve the definition of the Plan instance in response to external circumstances and internal progress.

Hence a Plan acts not only as a mechanism for learning but, once complete, as a source of learning materials. Plan instances from a repository show how other people dealt with problems of a certain type, and new Plan templates may be created from successful Plan instances (or parts thereof).

With regard to assessment of learning results, Plan instances are self-monitoring – they include automatic feedback mechanisms both within the Plan and across Plans to higher management levels. Taking part in a Plan instance in itself both measures and provides evidence of achievement. Plans may also use external services to provide:

- Learning materials customized for the Plan instance
- Standardized evaluation of learning progress
- Trusted competency assessment
- User profiles

4.4 Semantic Mark-up

Information within a Plan instance automatically has semantic mark-up, as do all communications between participants. This mark-up can be sent to external services to help streamline data harvesting and analysis.

5 Goal-Oriented Organization Design

Each key element in a HIM process has a direct equivalent in the Business Layer of the ArchiMate® 2.0 Architectural Framework (Open Group 2012; Role Modellers 2012a "HumanEdj FAQ"). However, this alone is not enough to ensure full integration of HIM processes into enterprise architecture, which requires a structured, manageable approach. Hence introduction of HIM into the enterprise, and its integration with both organizational strategy and mainstream BPM, is facilitated by an associated methodology, Goal-Oriented Organization Design (GOOD) (Harrison-Broninski 2009, 2011). GOOD differs from mainstream BPM methodologies in being derived formally from an underpinning set of consistent principles, i.e., those of HIM.

GOOD supplies a step-by-step method for applying HIM patterns to human work, by starting from a basic observation – that the primary value delivered by humans to an organization lies in their ability to collaborate, adapt, and innovate as required to deal with changing and unexpected circumstances. As described earlier, human-driven processes are not precisely repetitive – rather, they typically evolve during usage, as the participants repeatedly collaborate to agree on next steps.

Hence, GOOD emphasizes *effectiveness* over *efficiency*. Human work should not be managed using the measures of waste and cycle time typically applied for improvement of production processes. Rather, people at all levels of an organizational hierarchy must have some leeway to judge for themselves the most effective actions according to circumstances. Hence, GOOD focuses on enabling structured partial decentralization of management authority while ensuring continued alignment with strategic organizational goals.

In particular, GOOD supports process and service development, maintenance, and improvement via governance processes – human-driven processes defined using HIM notation, and inter-related via HIM levels of control. GOOD governance processes apply quality techniques drawn from HIM principles – metrics and

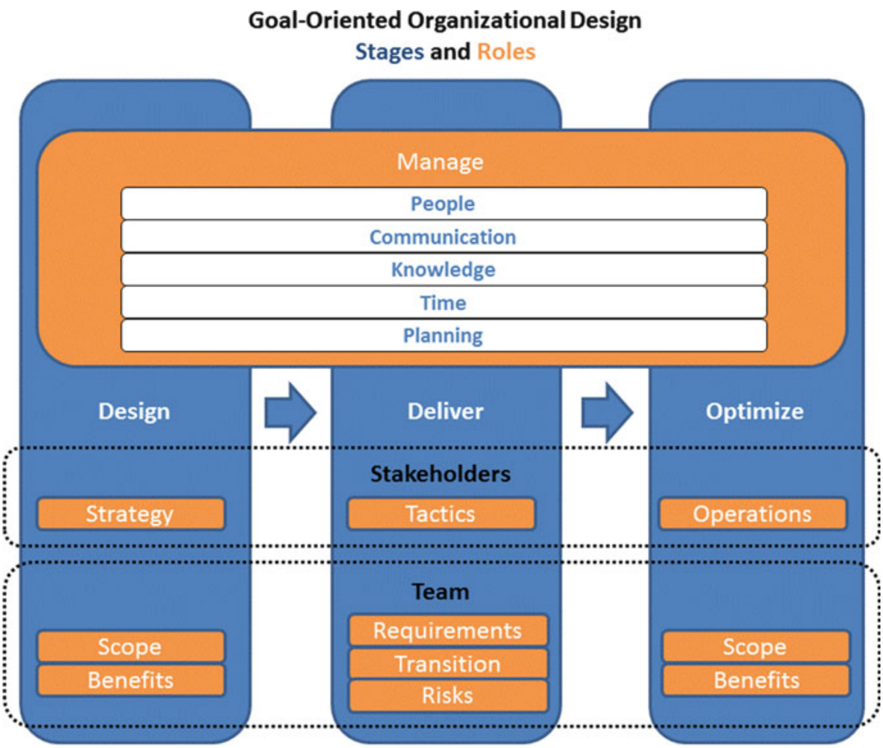

Fig. 8 Goal-Oriented Organization Design – high-level roles

indicators that measure the effectiveness of a process by tracking how well it makes use of the humans involved.

Full description of the GOOD methodology is out of scope for this paper, but an overview is provided in Fig. 8.

6 Human Interaction Management Case Study

To illustrate how HIM supports adaptive, collaborative processes, considered below is an innovative company whose products are improvement programmes that it delivers to public sector organizations. The management structure is flat and staff members are encouraged to propose, seek internal funding for, and implement new improvement programmes on a regular basis. While the culture has resulted in innovations beneficial to their customers, and consequently in growth, the company struggled to make its operations profitable. It was not possible to optimize or even obtain the cost of sales, given the complex way in which improvement programmes were created, sold, and delivered. It became necessary to standardize and monitor customer-facing operations.

The company expected to continue its previous success with standardizing back-office administrative processes using traditional workflow techniques. However, standardization of customer-facing operational processes met with resistance from staff, who were accustomed to using their skills, experience and judgement to adapt their working approach to each customer engagement. Hence, there remained wide variance across the organization in the way that core customer-facing and internal processes were carried out.

The solution required a means of process standardization that provided indicative rather than prescriptive processes (i.e. processes that could be adapted flexibly during execution), and that supported the harvesting of innovative ideas into new products (i.e. improvement programmes). The company used HIM to develop Plan templates for core operational processes including:

- *Sales Funnel*. Developing a sales lead into a new customer engagement.
- *Product Delivery*. Implementing an improvement programme for a customer.
- *Non-Standard Product Development*. Developing a custom improvement programme for a customer.
- *Standard Product Development*. Turning a custom improvement programme into a standard off-the-shelf product offered to all customers.

Shown in Fig. 9 below is a HumanEdj "Grid view" of the Plan template for the Sales Funnel process. Across the top are the Roles in the process, which in an actual Plan would be assigned to named people. Down the side are the Stages in the Plan template. The numbering is only suggestive, since the Stages may be carried out in any order, and they often run concurrently. HumanEdj Stages are used to represent sets of related goals, helping to ensure that people focus on objectives and thus work effectively.

During the lifetime of a Plan, the Stages are assigned statuses by the Plan owner, such as "Started", "Completed", "Cancelled", and so on. Different Roles belong to different sets of Stages. Any documents, data or messages created in a Stage are visible to all the Roles in that Stage and only to those roles. Here we see the emphasis on mental work that is critical to learning (and a core principle of HIM), via deliverables identified and recognized as a natural part of Plan execution.

Two Activities in particular are to be noted:

1. "Initiate Non-Standard Product Development" in Stage "Develop Opportunity", which involves the creation of a new sub-Plan for developing a custom improvement programme, if required. The sub-Plan will be based on a standard Plan template, adapted as required. If the standard Plan template is adapted, the new version may itself become a standard Plan template for use by others. The creation of the sub-Plan not only draws on organizational knowledge about custom improvement programme creation, but may well contribute to it by addition of a new special case. Here we see how the creation of a particular

	Somerset GP Service Q4 2011 :: 31-Oct-2011 14:05:29.390					
Stage	Nominated Sales Lead	Lead Owner	Lead Creator	Client	Solutions Team	Product Specialist
1. Generate Lead	View Lead in CRM (-17 days, due 04-Nov-2011)	View Lead in CRM (-14 days, due 09-Nov-2011)	Maintain Lead in CRM	Not in Stage		Not in Stage
2. Qualify Lead	Qualify Lead	View Qualified Lead (-8 days, due 17-Nov-2011)	View Qualified Lead	Not in Stage	View Qualified Lead	Not in Stage
3. Create Opportunity	Assess Client Arrange Follow-Up Meeting Record Change to Opportunity on CRM	View Pre-Meeting Document	Not in Stage	Not in Stage	Not in Stage	Not in Stage
4. Develop Opportunity	Proposal Formal tender Submit Proposal	Approve Proposal Submission	Not in Stage	Not in Stage	Not in Stage	Review Non-Standard Product Offering Initiate Non-Standard Product Development
5. Negotiate Proposal	Send Proposal to Client			Review Proposal		Not in Stage
6. Await Decision	Prepare for Delivery Initiate Delivery Plan		Not in Stage	Not in Stage	Not in Stage	Not in Stage
7. Close Opportunity	Create Contract Close Opportunity in CRM Initiate Resources Allocation For Delivery	View Opportunity Status	View Opportunity Status	Not in Stage	Not in Stage	Not in Stage

Fig. 9 Excerpt from HumanEdj grid view in tabular format of plan template for sales of improvement programmes

sales proposal contributes to evolving organizational structure, since the way in which it was done is automatically made part of enterprise knowledge management.

2. "Initiate Delivery Plan" in Stage "Await Decision", which involves the creation of a new sub-Plan for delivering the improvement programme. The Plan template used for this is created as part of the proposal and adapted for each customer engagement. As above, creation of a sub-Plan for a particular Delivery may well result in an adapted Plan template that can be re-used for future Deliveries of the same type. This creation of one Plan from another is typical of HIM, and can be used at any level in an organization to align operations with strategy.

Statistics from the Delivery sub-Plan are used together with statistics from the Sales Funnel Plan itself (shown for an example template in Fig. 10) and any sub-Plan for Non-Standard Product Development to generate accurate total cost for provision of the improvement programme to the customer, and hence to create a price that ensures the engagement returns a profit (or a deliberate loss).

					Work To Do	Effort Days	Effort Cost - Total	Effort Cost - Remaining Work	Earliest Activity Start Date	Latest Activity Deadline	Latest Activity Expected Finish Date	Minimum Activity Expected Margin Days
Plan	Somerset GP Service Q4 2011 :: 31-Oct-2011 14:05:29.390				TRUE	11	4,230	4,230	01-Nov-11	17-Nov-11	28-Nov-11	-17
Description	Instances of this Plan template are created via an Intranet form that anyone can use. The form enters client details into CRM, then starts the Plan pre-populated with: 1. A link to the client page in CRM; 2. A Solutions Area Director assigned to the Lead Owner Role - this Role may be re-assigned during the Plan if necessary.											
ROLE	DAY RATE	OVERHEAD PERCENTAGE	DAY RATE USED	DESCRIPTION								
Nominated Sales Lead	0	0	402									
Lead Owner	0	0	402	*All unqualified leads should be assigned to relevant Solutions team Area Director as the lead owner. The Lead Owner Role may be re-assigned during life of the Plan if necessary.*								
Lead Creator	200	0	230	*New sales leads that have been generated that are not yet qualified as being a genuine lead are referred to as unqualified leads. These are expressions interest for our products/services from a variety of sources e.g. simple conversation, email, enquiry in response to marketing/website etc. These leads can be generated and logged by all individuals in the business in this early stage. In some instances the solutions team may ask these individuals to maintain that early relationship and link, until it is appropriate for the solutions team to get involved from a sales perspective. We must be careful that they are leads and not support queries that we log.*								
Client	50	0	57									
Solutions Team	0	0	402									
Regional Sales Support	0	0	402	*Supports Nominated Sales Lead in preparing the proposal*								
Central Sales Support	0	0	402									
Product Specialist	0	0	402									
Area Co-ordinator	500	0	575									
Business Development Manager	500	0	575									
Defaults	350		15	*Defaults are used where not set specifically for a Role*								
Stage	Role	Activity	Deliverables	Resources	Work To Do	Effort Days	Effort Cost - Total	Effort Cost - Remaining Work	Start Date	Deadline	Expected Finish Date	Expected Margin Days
1. Generate Lead	**Nominated Sales Lead**				TRUE	0.4	126.4	126.4	01-Nov-11	09-Nov-11	28-Nov-11	-17

Fig. 10 Excerpt from HumanEdj summary view in tabular format of Plan template for sales of improvement programmes

By explicitly associating the different aspects of customer engagement with one another, the organization is making its customer-facing operations and their internal relations visible. This means not only that senior management can learn to manage the processes as a unified whole (and hence improve the way in which the organization operates), but also that new staff can learn what the organization actually does and how they fit into it. These means of learning are fundamental enablers as the organization grows, since geographical expansion means that teams are increasingly virtual and operational staff includes more and more sub-contractors rather than employees.

Further opportunities include passing on the benefits of HIM to client organizations in the form of Plan templates that support their resulting change management initiatives and help to develop their future strategy. The company has effectively started the latter already, by creating Bottom-Up Plan templates for core operations. Next steps include building a Process Architecture to represent their domain of interest, defining vision and mission at multiple levels via a Business Motivation

Model, developing understanding of their stakeholders, and creating Benefits Profiles for the changes that they plan.

7 Conclusions

The current inexorable trends toward outsourcing, partnering, and subcontracting as the fundamental means of doing business in a globalized economy mean that it is critical to support decentralized, cross-boundary processes in which humans collaborate to reach shared goals, adapting en route in order to meet complex, changing business needs.

To deal with such processes, a new analysis paradigm is required for high level knowledge work – one that is based not on state machines in which the process is a clockwork mechanism that moves from stage to stage, controlled centrally by a single engine, but rather on object models where a process is a set of objects in different domains, whose interaction and synchronization are controlled collaboratively by agents acting on behalf of each player. This new paradigm is what HIM notation and the underpinning HIM semantics provide.

On an everyday level, the different types of knowledge work process can be understood by means of an analogy – comparing Lego and cooking. Both may involve multiple model-makers or chefs. The critical difference lies in the interaction between constituent elements (bricks and ingredients, respectively):

1. A Lego model is always exactly the sum of its original bricks – it can be disassembled at any time, since the bricks remain unchanged by usage.
2. Cooking fuses ingredients into something more than the sum of their parts – into new flavors and textures, generated by a non-reversible chemical process.

Similarly, flexible, innovative business processes ("adaptive" processes) are of two kinds:

1. A process amenable to analysis via BPM or Case Management techniques is a collection of pre-defined fragments – in exactly the same way that a modern software application is a bundle of pre-built components and/or services.
2. A process required a HIM approach, on the other hand, uses fragments only as a starting point – as the process unfolds, the participants shape the collection of fragments into something uniquely and holistically suited to the situation at hand.

Case studies (Harrison-Broninski 2011) make it clear not only that BPM and Case Management practitioners who deal with knowledge work focus exclusively on the first kind of process, but also that many such people only *see* processes of the first kind. Processes of the second kind are the elephant in the room – the hidden bulk of the iceberg, unsupported by mainstream techniques and tools. This hidden bulk conceals a huge amount of business-critical knowledge work, as shown in Fig. 1.

A HIMS meets the need for software support of collaborative, adaptive human work by having a basis in what Gartner Inc. calls “design-by-doing”. In its BPM Cool Vendors 2012 report, Gartner Inc. said that “design-by-doing” exemplifies the trend towards social BPM, noting that the ability to “do, then plan” – that is, to alter plans quickly and easily as time progresses and the overall goal evolves, and then reuse plans as new templates – will be useful to teams that need to collaborate on the fly, and then learn from their successes and failures (Cantara et al. 2012)

Flexible, innovative processes are currently high on many organizations’ radar. So it is worth understanding the difference between Lego and cooking, and applying the analogy to adaptive work processes. Buildings are made of bricks, but organizations are made by teams – and modern teams are usually virtual. To support collaborative, adaptive human work across a virtual enterprise, new techniques and new tools are required – HIM and the HIMS.

A key benefit from taking the HIM approach to a virtual enterprise is that it requires no training, process skills, or technical aptitude in order to understand what is going on and take part effectively. The simple intuitive approach makes it immediately clear to everyone involved what their own responsibilities are – and if they are interested, what the responsibilities of other people are. As the Plan evolves, and responsibilities change along with circumstances, the updated Stages, Roles and Activities ensure that everyone stays on the same page.

Further, it is not necessary to use specialized software. A Plan must be created via a Web browser by its owner (usually by customizing a standard template in a HIMS), but can then be used by others via standard email. The invitation message to join shows the outline of the Plan, and after that deliverables and messages can be sent and received via email messages in the usual way. Even if no-one but the owner ever uses a Web browser to do work, all deliverables and messages will be stored in the correct Stage via the owner’s copy of the Plan, and in due course will be archived when the owner marks the Plan complete.

In effect, taking a HIM approach to collaborative work allows virtual enterprises to be created and managed with close to zero technical or administrative overhead.

The global economy is undergoing a sea change. To operate efficiently and effectively in a globalized economy based on an explosive proliferation of niches, one must abandon the hopeful notion that all business processes can be defined once then run thousands of times with only minor change. One must create an operational environment in which change is not only possible, but structured, encouraged, and aligned with strategic objectives.

This means taking a much richer view of “process” – a view in which people, communication channels, knowledge, time, and plans are all managed along with the activities that are more easily visible – across multiple domains that include not only you and all your trading partners but also your customers. Bottom–up empowerment is not enough. Top–down control is not enough. Organizations need an enterprise management framework that supports both, at the same time, using the same approach.

In the twenty-first century, improving routine processes using current mainstream BPM and Case Management techniques only brings you up to the level of your competitors. To stay ahead, and stay in the game, you need to improve the human- driven processes that cannot be fully planned in advance – and do it on enterprise scale. This requires a new approach – HIM, the HIMS, and GOOD.

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Subject-Oriented Business Process Management

Albert Fleischmann, Werner Schmidt, and Christian Stary

Abstract Business is increasingly characterized by interactions among responsive stakeholders rather than the functional decomposition of work. The subject-oriented approach to BPM (S-BPM) is considering this requirement by sending and receiving messages enveloping functional task accomplishment. Subjects represent the information processing entities in a business process. They communicate with each other in order to coordinate their work by exchanging information which is contained in so called business objects.

Subjects are embedded into some organizational and technical environment. Agents assigned to subjects (people or technical equipment) execute the actions defined in the subject specification. Business objects can be implemented as information containers or any tangible goods which are transported between agents. This separation of logical model and its implementation increases the flexibility of business processes management, as revealed by several academic and industrial S-BPM projects. Finally, the structuring of processes models as interacting entities facilitates coordinating business process management activities.

1 Introduction

The hidden paradigm behind modeling business processes in an enterprise is based on Ford's and Taylor's idea of sequencing activities and taking the best in class approaches (Taylor 1911; Ford and Crowther 1922). It has once proven to be suitable for the mass production of goods. While the paradigm is still the basic design assumption for shaping business processes, the environmental and social basis for enterprises has changed significantly. Business has moved from mass good production to massive personalized services and goods, where customers can place

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_25,

unpredicted change requests nearly at any time. The fact that such events occur unpredicted does not mean they occur rarely. Research on principles of good BPM has therefore identified the context-awareness (as the ability to be sensitive towards the nature of different business areas) as a key principle for BPM (vom Brocke et al. 2014). In volatile environments, as given in the current situation of the economy, the exception to the 'ideal path' is likely to become basically the routine. How the reaction to such unpredicted events looks like is shown by the inflationary usage of emails, instant messages, phone calls and meetings. It seems that communication is about to become the new paradigm (Fleischmann et al. 2013d).

Putting massively personalized services on top of complex products asks for new architectural structures. Ford's hidden paradigm fails to master the resulting architectural complexity due to the lack of the concept of "communication". Rather, Luhmann's sociological understanding of systems as communicating entities has the potential to become the novel perspective on business operation (Berghaus 2011). Luhmann considers an organization as comprised of communication, the smallest organization being the communication between two information processing entities. Such a perspective is grounded on abstracting from concrete actors in the first step, while putting them into their particular context when detailing communication acts. Hence, it allows a stakeholder perspective while preserving coherent organizational behavior (systemic perspective).

Subject-oriented business process management (S-BPM) follows this kind of communication-oriented paradigm: Each functional step in task accomplishment is framed by communication acts including relevant business objects. This concept allows overcoming several deficiencies of traditional, activity-based Business Process Management (BPM) approaches in a business world which is increasingly characterized by unpredictable events.

The S-BPM approach has been evaluated in several industrial projects and application domains, among them:

- IT-service management: FI-TS, an IT service provider with around 500 employees in the banking area, has specified its service order and delivery process in S-BPM. In order to implement that process they have used an existing tool suite (Konjack 2010). With the solution automatically generated from the process specification several hundred process instances are handled a month. FI-TS estimates that they could reduce their execution time by more than 20 %.
- Customer knowledge management: NEC has developed a detailed methodology for BPM based on S-BPM which allows managing the development and maintenance of very complex processes in large organizations (Nakamura et al. 2011). NEC estimates that could reduce their execution time for several processes by more than 70 %.
- Incident management: The Swiss Telecom has implemented several processes with S-BPM. An incident management process is used by several partners of Swiss Telecom. In Walke et al. (2013) details can be found about an iPhone order process. This solution allows customers to order on their own and without the assistance of a contact center agent of Swisscoms hotline. The process was modeled with a S-BPM modeling tool, out of that modell a workflow is

generated automatically, access to various data bases is added manually and some adaptions were made to the user interface. For monitoring the data recorded by the workflow engine are used and to create some reports ARIS PPM is used. Some much more details can be found on the presentation recorded at the S-BPM ONE 2013 which is available on Youtube (see Walke et al. 2013).

Beyond that, S-BPM is also in the production and evaluation phase at several German car manufacturers,[1] and service providers, among them TILAK, an Austrian health care provider. In the latter case, S-BPM has been embedded prototypically into a systemic approach to organizational development (Augl 2012). When transforming existing patterns of communication to contextual collaboration different professionals within (health) expert organizations need to negotiate and agree on interactions empowering the organization for high-quality patient care.

Essentially, S-BPM subjects serve as "boundary objects" for the coordination, translation and creation of shared meaning. In this way, models become accessible to discussion, validation, negotiation, and change, finally, shortening traditional BPM life-cycles and leading to an open BPM life cycle (Fleischmann et al. 2013c). However, the active participation of actors needs to be ensured. In the Austrian health care project, members of a special care unit managed to develop novel communication patterns for daily scheduling of physicians. The newly established processes contribute significantly to increased performance of the special clinic and the entire health care organization. Although the complexity has been enriched enlarging the scope of planning (now including teaching duties of staff), timely access to relevant data has been established and overall transparency of the planning process has be increased. In the following sections we introduce the S-BPM approach along some fundamental business requirements. In Sect. 2 we motivate the paradigm change from activity/function-oriented approaches to communication-oriented ones, as it enables a more flexible approach to modeling, and thus to BPM. In Sect. 3 we focus on the core activity in BPM, namely targeted modeling. S-BPM supports starting either from scratch (like in function-oriented approaches), or from a generic multi-party scheme by restricting general behavior sequences to task-specific behavior specifications. The latter bridges the gap to executing business process models, as the generic scheme provides complete, i.e. ready-to-execute behavior models. Executable subjects represent agents encapsulating subject behavior. Consequently, in Sect. 4, we address architectural implementation issues. S-BPM decouples modeling from organizational and technical implementation while preserving a coherent process execution scheme. In the second part of this section we tackle handling instances of business models in concrete organizational settings. Both, decoupling organizational and technical implementation from modeling, demonstrate the effectiveness and efficiency of S-BPM implementations, and lead to a clarification of roles in BPM (cf. Fleischmann et al. 2012a). In Sect. 5 we conclude the chapter by wrapping up the introduced concepts, and sketching current and future research activities.

[1] Because of company internal reasons it is not possible to mention the companies, the projects and results.

2 Business as Dynamic Collaborative Communication Processes

In this section we lay ground for S-BPM by discussing the cooperation and communication pattern between the involved parties and corresponding IT and communication systems. In addition, we address agility with respect to behavior – processes need to be defined in a flexible way to give people executing these processes some autonomy in their decision making. We elaborate the concept of S-BPM and its features using an example illustrating the most important capabilities. Further features like multi-subjects, process networks etc. are described in (Fleischmann et.al. 2012b).

2.1 *Subject-Driven Business Processes*

Subjects represent the behavior of an active entity. A specification of a subject does not say anything about the technology used to execute the described behavior. This is different to other encapsulation approaches, such as multi-agent systems.

Subjects communicate with each other by exchanging messages. Messages have a name and a payload. The name should express the meaning of a message informally and the payloads are the data (business objects) transported. Internally, subjects execute local activities such as calculating a price, storing an address etc.

A subject sends messages to other subjects, expects messages from other subjects, and executes internal actions. All these activities are done in sequences which are defined in a subject's behavior specification.

Subject-oriented process specifications are embedded in a context. A context is defined by the business organization and the technology by which a business process is executed.

Subject-oriented system development integrates established theories and concepts. It has been inspired by various process algebras (see e.g. Hoare 1985; Milner 1989, 1999), by the basic structure of nearly all natural languages (Subject, Predicate, Object) and the systemic sociology developed by Niklas Luhmann (an introduction can be found in Berghaus 2011). According to the organizational theory developed by Luhmann the smallest organization consists of communication executed between at least two information processing entities (Berghaus 2011). The integrated concepts have been enhanced and adapted to organizational stakeholder requirements, such as providing a simple graphical notation, as detailed in the following sections.

2.2 Subject Interaction and Behavior

We introduce the basic concepts of process modeling in S-BPM using a simple order process. A customer sends an order to the order handling department of a supplier. He is going to receive an order confirmation and the ordered product by the shipment company. Figure 1 shows the communication structure of that process. The involved subjects and the messages they exchange can easily be grasped.

Each subject has a so-called input pool which is its mail box for receiving messages. This input pool can be structured according to the business requirements at hand. The modeler can define how many messages of which type and/or from which sender can be deposited and what the reaction is if these restrictions are violated. This means the synchronization through message exchange can be specified for each subject individually.

Messages have an intuitive meaning expressed by their name. A formal semantic is given by their use and the data which are transported with a message. This means in S-BPM there is only the concept message in contrary to speech act theory. In speech act theory messages can have a basic semantic like request, response etc. For instance, the FIPA-ACL Communicative Act library consists of 22 communication acts or performatives (e.g. see Billifemine et al. (2007), p. 19). Moreover, these communication acts can be emulated by the basic messages used in S-BPM. In a layer below the communication structure, according to the interaction behavior of each subject, is described. Figure 2 depicts the behavior of the subjects “customer” and “order handling”.

In the first state of its behavior the subject “customer” executes the internal function “Prepare order”. When this function is finished the transition “order prepared” follows. In the succeeding state “send order” the message “order” is sent to the subject “order handling”. After this message is sent (deposited in the input pool of subject “order handling”), the subject “Customer” goes into the state “wait for confirmation”. If this message is not in the input pool the subject stops its execution, until the corresponding message arrives in the input pool. On arrival the subject removes the message from the input pool and follows the transition into state “Wait for product” and so on.

The subject “Order Handling” waits for the message “order” from the subject “customer”. If this message is in the input pool it is removed and the succeeding function “check order” is executed and so on.

The behavior of each subject describes in which order it sends messages, expects (receives) messages and performs internal functions. Messages transport data from the sending to the receiving subject, and internal functions operate on internal data of a subject. These data aspects of a subject are described in Sect. 2.3. In a dynamic and fast changing world, processes need to be able to capture known but unpredictable events. In our example let us assume that a customer can change an order. This means the subject “customer” may send the message “Change order” at any time. Figure 3 shows the corresponding communication structure, which now contains the message “change order”.

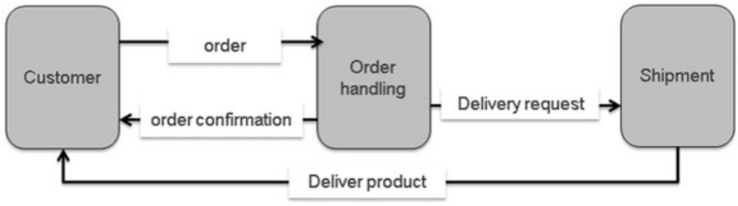

Fig. 1 The communication structure in the order process

Due to this unpredictable event the behavior of the involved subjects needs also to be adapted. Figure 4 illustrates the respective behavior of the customer.

The subject "customer" may have the idea to change its order in the state "wait for confirmation" or in the state "wait for product". The flags in these states indicate that there is a so-called behavior extension described by a so-called nondeterministic event guard (Fleischmann et al. 2013a, d). The non-deterministic event created in the subject is the idea "change order". If this idea comes up, the current states, either "wait for confirmation" or "wait for product", are left, and the subject "customer" jumps into state "change order" in the guard behavior. In this state the message "change order" is sent and the subject waits in state "wait for reaction". In this state the answer can either be "order change accepted" or "order change rejected". Independently of the received message the subject "customer" moves to the state "wait for product". The message "order change accepted" is considered as confirmation, if a confirmation has not arrived yet (state "wait for confirmation").

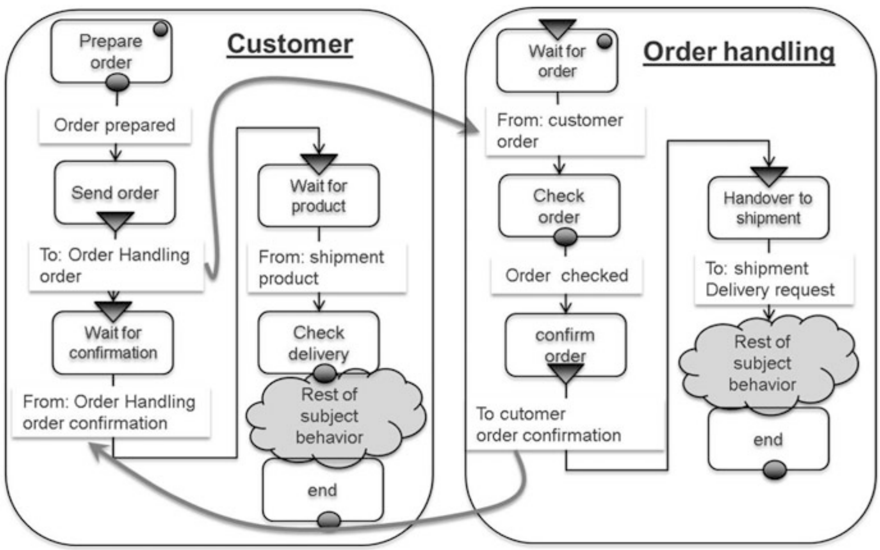

Fig. 2 The behavior of subjects

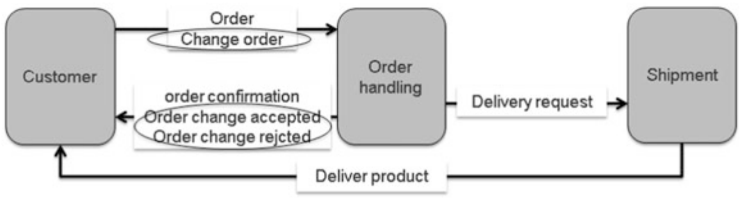

Fig. 3 The communication structure with change message

If the change is rejected the customer has to wait for the product(s) he/she has ordered originally.

Similar to the behavior of the subject "customer" the behavior of the subject "order handling" has to be adapted.

We have only captured the basic elements of S-BPM in this section. In order to model complex process systems, processes can be connected with each other in order to build networks. Describing these networks is a straightforward task, since the message mechanism as explained above can be used on the network layer, too. A precise and complete definition of the semantics of all S-BPM modeling elements can be found in the attachment of (Fleischmann et al. 2012a). The complete formal semantic specification as an abstract state machine (Börger and Stärk 2003) has only 9 pages. Due to this precise and formal specification, S-BPM models can be automatically converted in executable code (see Sect. 4).

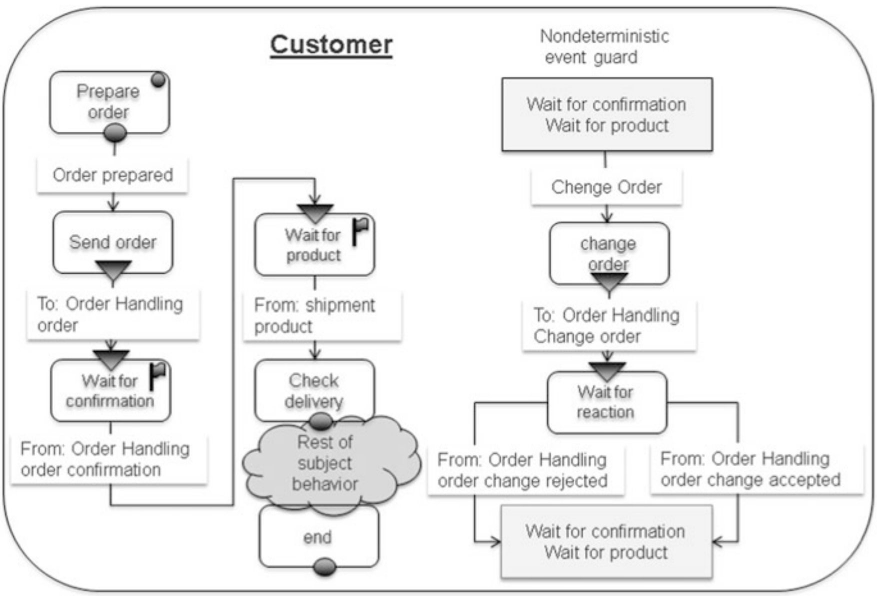

Fig. 4 Customer is allowed to change orders

2.3 *Subjects and Objects*

Up to now we did not mention data or the objects with their predicates, in order to get complete sentences comprising subject, predicate, and object. Figure 5 displays how subjects and objects are connected. The internal function "prepare order" uses internal data to prepare the data for the order message. This order data is sent as payload of the message "order".

The internal functions in a subject can be realized as methods of an object or functions implemented in a service, if a service-oriented architecture is available. These objects have an additional method for each message. If a message is sent, the method allows receiving data values sent with the message, and if a message is received the corresponding method is used to store the received data in the object (Fleischmann et al. 2013d). This means either subjects are the entities which use synchronous services as implementation of functions or asynchronous services are implemented through subjects or even through complex processes consisting of several subjects. Consequently, the concept Service Oriented Architecture (SOA) is complementary to S-BPM: Subjects are the entities which use the services offered by SOAs (cf. Sneed et al. 2012).

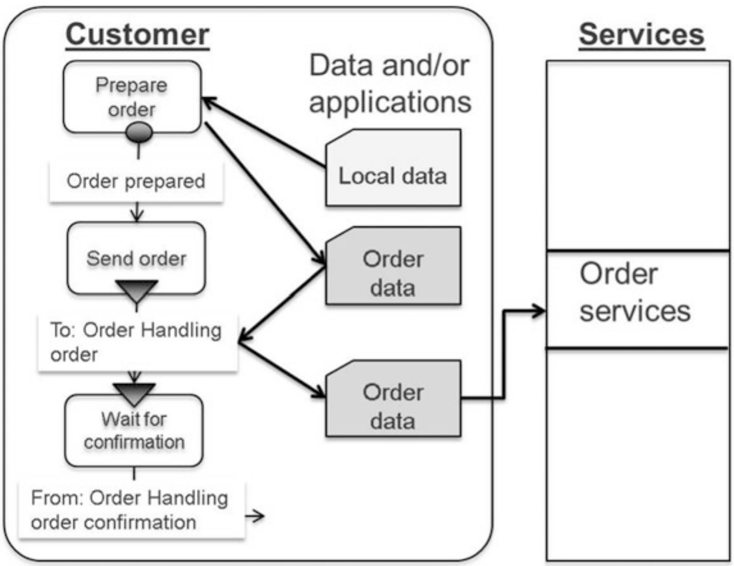

Fig. 5 Subjects and objects

3 Targeted Modeling Through Natural Language and 5-Symbol Articulation

This section motivates and details the use of standard-sentence semantics for the representation of business processes, either starting from scratch (constructing models), or from generic interaction patterns (restricting interactions according the organization of work). S-BPM originates also from the observation that humans, when structuring and describing their observed reality, use subjects, predicates, and objects. Each of them can be mapped to natural language entities. As already indicated above, the subject represents the active element, the predicate the action and the object is the entity on which the action is executed. Natural language supports human communication effectively, both in written and oral form. As humans use natural language structures as primary means to ensure mutual understanding (Börger and Stärk 2003), model descriptions for formal modeling could make use of it, in order to facilitate understanding models. In order to ensure coherence of specifications, the exchange of messages determines the flow of control (in contrast to function-oriented approaches).

The S-BPM modeling language captures the above mentioned constituent elements of natural language sentences. Models describe structural properties and behavioral alternatives, including the interaction occurring in the technical and/or organizational environment. S-BPM models can be transformed step by step into an executable application in a seamless way.

Modeling means to represent parts of the observed reality in terms of languages. In case of S-BPM natural language terms are used, as they allow for universal use and are familiar to stakeholders through daily communication. S-BPM uses the standard semantics for sentences, comprising subject, predicate and object:

- A subject is the starting point for describing a situation or events,
- activities denoted by predicates, whereas
- an object is the target of an activity (denoted by a predicate).

Existing modeling approaches tend to focus on predicates or objects, adding the subject for natural language explanations of the represented information (cf. identifying function trees before specifying eEPCs in ARIS (Scheer 2001)). For a more detailed discussion of S-BPM in the context of traditional approaches see Fleischmann et al. (2012a, p. 269).

Models address both, individual work tasks, and organizationally relevant ones. In the course of accomplishing their tasks, stakeholders receive work inputs and pass on results. Hence, interaction and communication, either direct or indirect, are to be considered as an essential activity for subject-oriented modeling.

Figure 6 contains the natural language description of a customer order process. It is the initial version of the order process we have also used above.

This simple order process can be modelled following two different approaches (Fleischmann et al. 2012b). They differ by the starting point of building a process specification. The traditional approach (modeling through construction) starts from

Order Process:

A customer orders some goods. He/She sends an order to the purchaser. He/she is then going to receive an order confirmation after the order has been checked. Once the order is checked, the order is handed over to the shipment department where the delivery is prepared and executed.

Fig. 6 Natural language description of a customer order process

the scratch ('empty sheet'), and the process model is constructed step by step. Task-relevant actors or systems need to be identified as the process specification evolves, and the lines of interaction need to be included as required for task accomplishment. The other approach (modeling through restriction) is only available in S-BPM. It starts with a generic process model which is restricted step by step. The generic process can be compared with the behaviour when each involved stakeholder uses e-mail: Each stakeholder can communicate with another stakeholder he or she is linked to. A process is derived from such a completely networked structure by removing communication lines step by step that are not relevant for business achievements. In the course of modelling the lines of interaction between subjects are adapted to those required for task accomplishment.

In the following both approaches will be explained in detail. In Sect. 3.1 the stepwise construction of a communication-based process model is detailed. In Sect. 3.2 the stepwise reduction of interaction between actors or acting components is explained. In either cases, actual or envisioned business processes need to be represented in a transparent and traceable way. Finally, in Sect. 3.3 we refer to tangible tools facilitating work knowledge elicitation and its subject-oriented representation.

3.1 Modeling by Construction

Subject-oriented modeling of processes applying the construction approach includes the following major activities:

- the subjects involved in a process,
- interactions they are part of,
- the messages they send or receive through each interaction, and
- the behavior of each subject encapsulating functions and interactions

In the following we detail them according to major modeling concerns.

3.1.1 Who Am I and Who Needs to Be Involved? Subjects and Their Interactions

As already mentioned subjects are abstract resources representing the parties involved in a process the modeling process might start with identifying the involved subjects the messages they exchange. The result of that step is the Subject Interaction Diagram (SID) or communication diagram as it is already shown in Fig. 1.

After that step the behavior of each subject is defined.

3.1.2 How Do I Operate? Subject Behavior, States and State Transitions

Subject behavior is described by three states (send, receive, internal function) and transitions between these states. These states represent predicates (operations), which means, that they are active elements of the subject description. Services are being used to implement the states and state transitions necessary to exchange and manipulate business objects. When specifying the behavior of each subject, as shown in Fig. 3 for the customer and order handling, a sequence of sending and receiving messages, and activities to be set for task accomplishment need to be represented.

3.1.3 Which Objects Do I Have to Manipulate? Services and Business Objects

The description of a subject defines the sequence of sending and receiving messages, or the processing of internal functions, respectively. In this way, a subject specification contains the sequence of predicates. Predicates can be of the type “send”, “receive” or “internal function”, the latter dealing with specific objects, such as required when a customer orders some products. As a consequence at least one operation needs to be assigned to each state. Detailing the operations is not necessary at the modeling stage. It is a matter of an abstract object specification or of the integration of an existing application. As an example the operation could be represented by a transaction of an ERP system related to the regarded object, for instance the update of an order master data record. Figure 5 shows how the predicates of a subject are defined by means of objects.

As we abstract from implementation details in the course of modeling, it seems suitable to replace the term ‘operation’ by the more general term ‘service’. A service is assigned to a state and thus triggered and processed if the state is reached. The name of the states and the names of the assigned services can be different as shown in Fig. 5 because in a state several services can be used in order to define the required functionality executed in a state. The end conditions correspond to links leaving the state. Each result link of a sending state is assigned to a named service. Before sending this a service is triggered to identify the content or parameters of a message. This service determines the values of the message parameters transferred by the message. Similarly, each output link of a receiving state is assigned to a named service. When accepting a message in this state that service is triggered to identify the parameters of the received message. The service determines the values of the parameters transferred by the message and provides them for further processing. All services are triggered in a synchronous way, i.e. a subject only reaches its subsequent state once all services called in a certain state have been completed.

3.2 Modeling by Restriction

The restriction approach in S-BPM starts with an overall generic process model. This generic model represents some kind of chaotic process: Everybody communicates with everybody whenever he or she wants. The first modeling task is therefore to restrict the number of participants. This means modelers have to decide how many subjects are involved in the process to be described. In a scenario everybody is communicating with everybody the behavior of the involved subjects is identical. However, starting with generic process templates that are only defined by the number of involved parties a process can become more concrete step by step. The procedure requires several restriction steps:

1. Specify a generic template according to the number of parties involved in handling a certain business case (cf. Fig. 8)
2. Name the subjects accordingly
3. Remove message connections between subjects which are not necessary
4. Name messages and introduce message types accordingly
5. Adapt specification to actual subject behavior
6. Refine the structure of the business objects transmitted by the various messages

In the following subsection these steps are exemplified.

3.2.1 Who Needs to Be Involved? Generic Process Model

Figure 7 shows a generic subject-oriented process model with three involved parties. It fits to the number of subjects we expect for the customer order process. This means a modeler needs to identify the number of subjects in a process initially. This is the only information he/she needs for the first step. Each of the parties exchange messages with another party. We want to show how this generic process is restricted step by step in order to get a process specification for the customer order process as described in Figs. 7 and 8.

Each subject can send messages with the name “Message” to any other subject any time. Figure 8 shows the behavior of the subject with the name “Subject1”.

In the select state a subject decides whether it wants to send or to receive a message. To start a workflow it does not make sense to receive a message because all the other subjects are waiting for messages. This means the start subject will start with sending messages and the message exchange can begin. Choosing the send transition the subject goes into the state “prepare message and select address” and fills out the business object that is transmitted by the message “message” (see end of

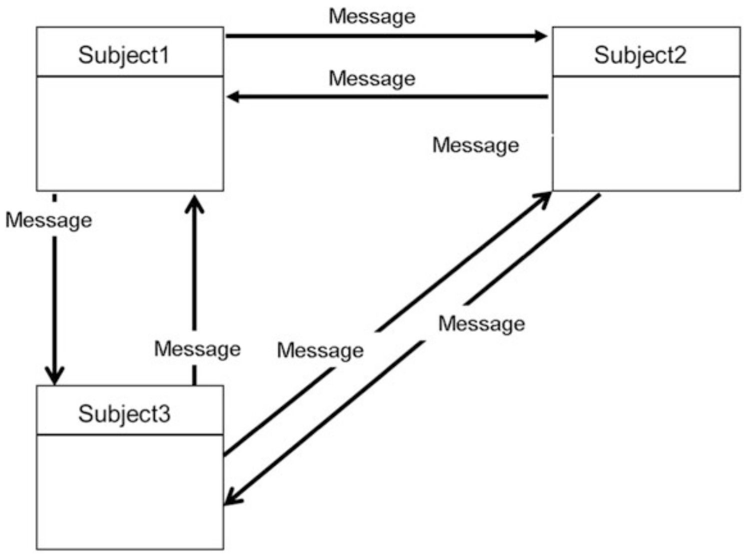

Fig. 7 Subject-oriented representation scheme for a 3-party-process

this section). After that the subject decides to which other subject the message with the business object as content will be sent.

In the select state a subject can also decide whether it wants to receive a message.[2] If there is a message for the subject available it can be accepted and a follow up action can be executed. It is not specified what the follow up action is. This is like receiving an e-mail. The receiver can interpret the content of an e-mail and knows what the corresponding follow up action is. The abort transitions back to the select state enable to step back in case a subject has made the improper choice.

The representation scheme can be easily created for any number of participants, following the same principles as shown for 3 parties. The behavior of each subject has to be adapted to the number of subjects in a process. In the send area transitions are required to send a message to every single new subject, and the same is necessary for the receive area. With that extension scheme the behavior for each type of multi-party process can be generated automatically.

Utilizing the message "Message" a business object is sent. The structure of this business object corresponds to the structure of a traditional e-mail with extensions like subject (attention: here the word "subject" has a different meaning. It can mean topic, issue, theme etc.), keywords and signature. Figure 9 depicts the specification of the business object "Message" in an XSD notation (XML Schema Definition).

[2] This choice can make sense for a start subject, from the second time on it goes into the select state.

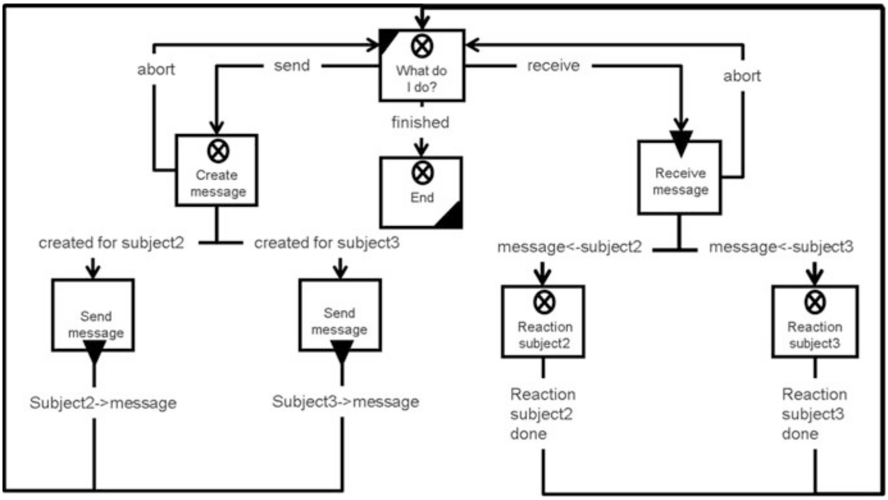

Fig. 8 Generic behavior of the subject "subject1"

3.2.2 How Do the Stakeholders Need to Interact? Adaption of Generic Scheme

Following the restriction steps in Sect. 3.2 a process specification is developed corresponding to the business requirements. In our example these steps result in a communication structure as shown in Fig. 10 and a behavior specification of the subject "customer" as shown in Fig. 11.

A comparison of Figs. 11 with 2 shows that modeling by restriction and construction does not necessarily result in identical models. Nevertheless both models need to deliver the requested business results.

With each restriction step the guidance for the subject holders is becoming more stringent to their actual task accomplishment. In this way, a subject-oriented system specification can guide the parties in a process for organizational development.

Fig. 9 Generic structure of the e-mail business object

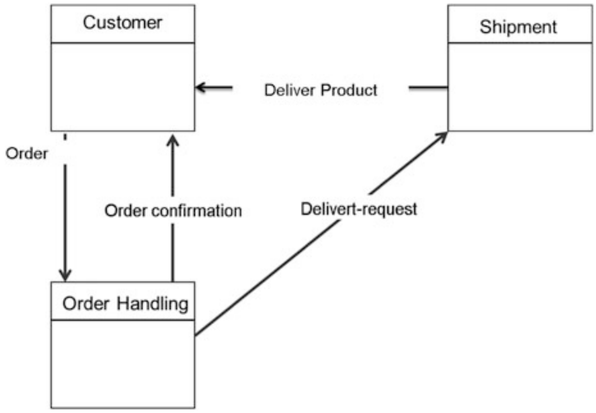

Fig. 10 Subjects and exchanged messages

3.3 Tangible Modeling Support

S-BPM modeling is currently supported by various tools. Besides traditional computer-based 2D-modelling tools there exist modelling tools with tangible interfaces. These interfaces have been developed for supporting people who are not familiar with process modelling to capture their process knowledge. The tools help people to participate in creating models of those processes they work in, without forcing them to learn how to handle complex modelling tools (Fleischmann et al. 2013c, 2014a) – see Fig. 12.

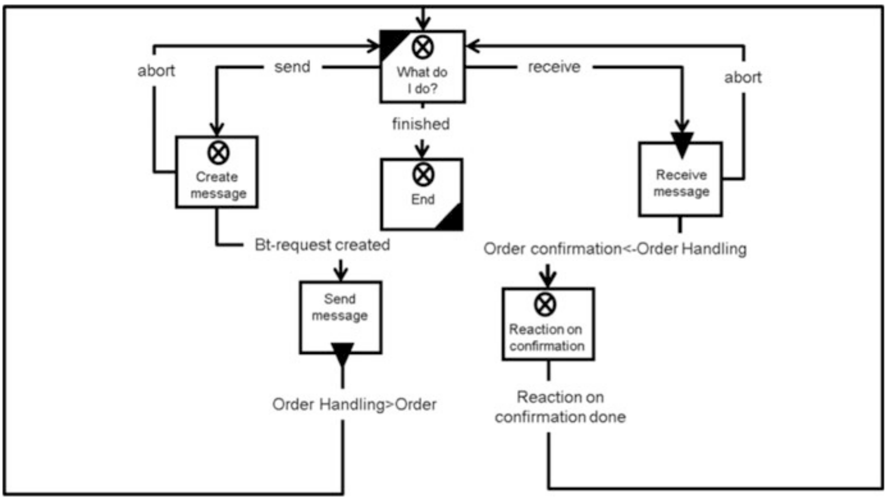

Fig. 11 Instantiated behavior of the subject "customer"

Fig. 12 Metasonic touch: tangible modeling support

Metasonic touch is a table on which the behavior of a subject can be described. Each activity type (Receive, Send, Do) is represented by a block with a different colour: Red for send, green for receive and yellow for doing. The lines between the states are drawn that the states which should be connected short are brought in contact with each other. The model created on the table is directly stored in a PC and can later changed by a common modeling tool. People who are involved in a process and have to define their behavior can stay around a modeling table and cooperate in a natural way to describe their subject behavior. The table produces a very communicative work atmosphere.

The experience with the modelling table are motivating for further research with tangible interfaces. One prerequisite for tangible interfaces are a very restricted number of symbols because of the number of clear colours and forms.

4 Implementation

In this section we first detail the benefits of decoupling (subject-oriented) business process models from implementation details while designing their organizational embodiment (Sect. 4.1). Then we discuss the capability of S-BPM model representations to be executed after validation without further transformations (Sect. 4.2).

4.1 Architecture Definition: Subject, Roles, and Agents

A set of subjects compose a business process. As already shown subjects can execute three different types of actions: Sending messages to other subjects, receiving messages from other subjects, and performing local actions on business objects. Business objects are transported via messages from the sending subject to the receiving subject. Local actions executed on a business object, such as creating, deleting or changing the object, can be considered as method invocations as known from object-oriented software development (see Fig. 13).

Agents are entities which are capable to execute actions. Each agent can be involved in several processes, where the same agent can enact different subjects

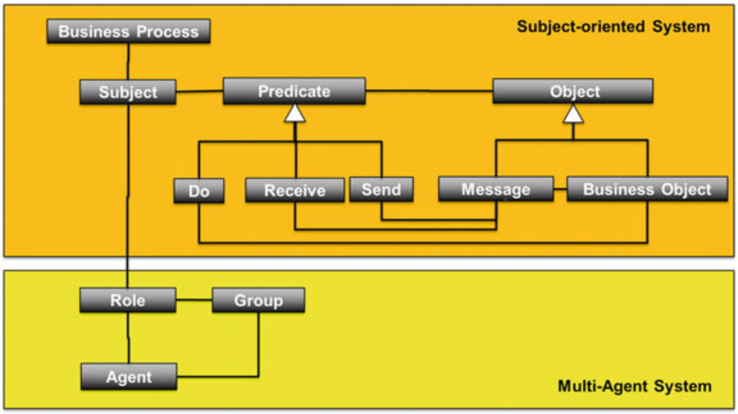

Fig. 13 Metamodel of S-BPM

across different processes. In turn, the same subject can be enacted by a single agent in one process or by a group of agents in another process. Roles are generalized combinations of subjects from different processes, cast into functional positions within the agent organization.

Roles are assigned to specific agents that execute the actions defined in subject descriptions. Agents can be people, software programs, robots etc. As a result, subjects may be enacted by heterogeneous groups consisting of different agent types. For instance, an "Order handling" subject may be enacted by a group of two interacting agents: software controlling the order handling workflow, and a human user entering required data.

Processes can be executed in different parts of an organization. The role "warehouse worker" acting in various processes exists in any subsidiary of a company. The role is the same but it is executed by different agents. A corresponding example is shown in Fig. 14.

In Fig. 14 two processes are shown: the ordering process, and a vacation application process. The role "Order handler" consists of the subjects "Order Handling" and "Employee", and the role "Warehouse worker" consists of the subjects "Employee" and "Shipment". The role "Order handler" is assigned to the group "Order Dept." and the role "Warehouse worker" to the group "Warehouse Dept.". The agents "Florian" and "Katrin" enact instances of the subjects "Order Handling" and "Employee", and the agents "Josef", "Christian" and "Thomas" enact instances of the subjects "Shipment" and "Employee".

The embedding of subjects into a socio-technical environment can be complex. As an example there might exist the rule that instances of the subject "shipment" has to be executed by agent "Josef" for a certain group of customers and by "Christian" for a different group etc. This means process models need to be embedded in their specific organizational setting, called process context or just context.

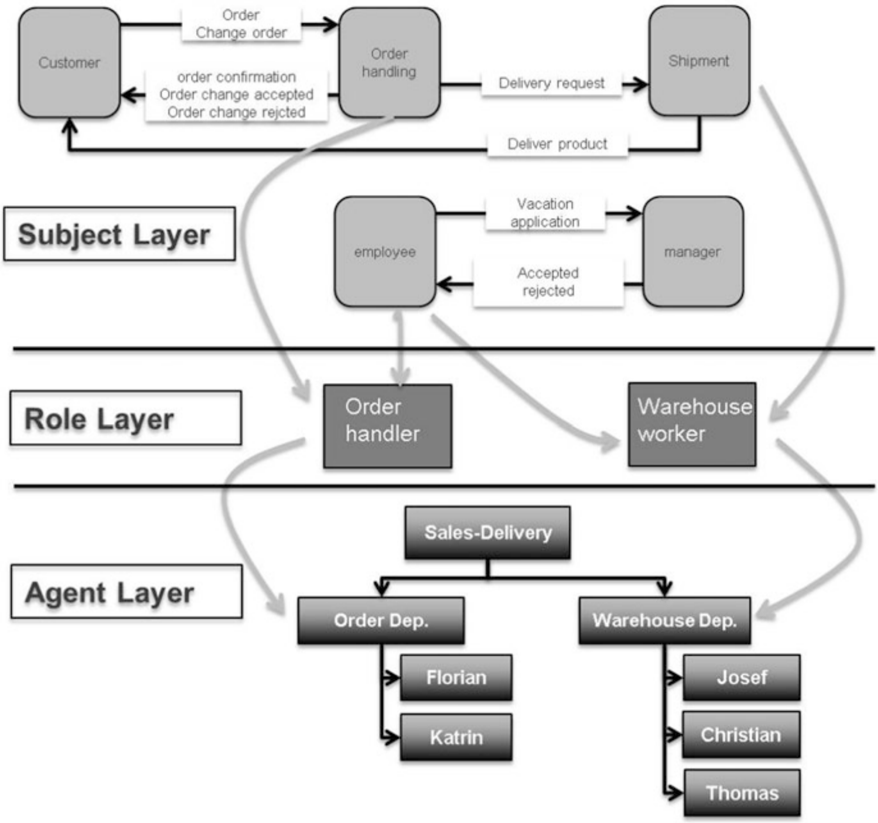

Fig. 14 Example of the subject, role, and agent relationship

A more detailed discussion about the relationship between subject-oriented processes and organizational aspects can be found in Fleischmann et al. (2012a, 2013e) and Lawall et al. (2013).

4.2 *Automating Execution: Instances of Processes and Subjects*

A process model including its embedding in its environment is only a pattern in order to properly react to certain business events. If the business event occurs, an instance of the process model in the corresponding environment is created in order to handle that business event. Such a business event can come from outside or inside of a process system. A business event from outside can be that a person wants to order some products. In order to handle that self-created event properly, an instance of the corresponding process model is generated. This can be implemented by using a defined order number which is on each related document (in BPMN this id is called correlation key).

In S-BPM an instance is a complete, executable copy of the corresponding process model in the environment to which the business event belongs. An order arriving in subsidiary A causes the creation of a process instance in the environment to which subsidiary A belongs. An order arriving at subsidiary B causes the creation of an instance in its respective environment. Using that copy the business event is handled.

The creation of a process instance is not only caused by humans. It can also be caused by certain data states, a timer or by instances of other processes belonging to the same process network. Process instances can be created by subjects in other process instances if they send a message to a subject of a connected process and there is no corresponding instance which is related to the sending process instance. Then a corresponding process instance is created and linked with the initiating process.

5 Conclusion

Changes in society and business require different paradigms in business process management. Most of the current BPM approaches are still based on Taylorism and Fordism. In the Post-Fordism era job enrichment, self-management and communication have become central issues. Parties involved in processes want or need to organize their work by themselves. In global, highly distributed business operations known but still unpredictable events have become routine. Therefore communication-based BPM approaches have to recognize also spontaneous communication activities. Unpredictable activities like changing orders need also to be covered by suitable specification elements. In this chapter we have described such an approach.

S-BPM requires stakeholders to take responsibility for organizational developments by getting skilled in specifying business processes. This task should not be too challenging, as S-BPM models utilize natural language constructs (subject, predicate, object) and e-mail-like communication patterns between actors (subjects). In this way, individual members of an organization are enabled to contribute to coherent and intelligible process specifications. Moreover, resulting specifications can be processed without further transformation after validation.

The current state-of-the-art in S-BPM is just the point of departure for further developments:

- S-BPM lays ground for integrating social media communication in business procedures. As its common ground is the exchange of messages, informal relations between stakeholders need to be researched, in order to understand

business operations better and to implement sophisticated concepts, such as highly interactive customer knowledge management.
- Individualization of task accomplishment could be enforced on the basis of normative business operations, also termed standard operational procedures: S-BPM-models allow describing how to achieve a work result in a variety of ways in a coherent and consistent way. The actor/role/system-specific encapsulation of behavior in S-BPM is the key enabler for allowing diversity.
- Coopetitive behavior can be implemented on a process level. Competitors joining (ad-hoc) networks for innovative biddings or service provisions can keep their organizational assets encapsulated, offering only communication interfaces while hiding operational details as part of their USP.

Each of the above mentioned issues represents a research topic that should enlarge the scope of applying BPM, as even private, but societally relevant processes require stakeholder-specific communication and interaction.

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Knowledge Engineering in Business Process Management

Dimitris Karagiannis and Robert Woitsch

Abstract Business Process Management (BPM) has become a commodity nowadays. It has undergone an evolution from the initial business process re-engineering in the 1980s to a well-established management approach, which is extensively discussed in this book (See introduction chapter of Harmon on the Scope and Evolution of Business Process Management). This chapter deals with the increasingly important domain of knowledge-sensitive BPM as a current challenge imposed from semantic web, the cloud, social networks or Web 2.0 not only to provide new technologies for BPM but also trigger a cultural change of people involved. Three aspects of knowledge sensitiveness in BPM are proposed. First, BPM can be seen as a domain itself focusing on BP-frameworks identifying basic concepts such as business model, domain, regulation, or model processing (See introduction chapters by Rosemann and vom Brocke on the Six Core Elements of BPM). Second, BPM needs to be applied using a management method such as the BPMS methodology. Third, BPM needs to be executed within an environment; hence, it is deployed. BPM can be seen as a basic concept for corporate knowledge leading to knowledge-sensitive BPM. Studying the knowledge-sensitiveness two forms of interpretation are distinguished: (1) knowledge engineering (KE) focusing on machine interpretable knowledge and (2) knowledge management (KM) relating to human interpretation of knowledge. In the following, the focus lies upon KE distinguishing three viewpoints: (a) KE is established in BP-frameworks as a realization within the used meta models for those frameworks; (b) knowledge-intensive actions within the BP method – which is typically performed by business process (BP) analysts – is supported by KE techniques; (c) deployment of BPM

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_26,

within a typical execution environment is likely including knowledge-based applications, hence those knowledge concepts need to be reflected. KE techniques are proposed for the areas above and empirical experiences as results of research projects are described. As a conclusion an outlook on the conceptual and technical integration summarizes the chapter.

1 Introduction

Business Process Management (BPM) is an established management approach, although there is a controversial interpretation among the different disciplines between information management, business informatics, or software engineering in computer science (see Hammer 2014; Harmon 2014; Rosemann and vom Brocke 2014).

The common understanding is to interpret working procedures as directed graphs, to map these working procedures of the real world into formal models, and to finally make them operational. In knowledge-intensive enterprises and especially those involving knowledge worker this original paradigm need to be adapted in order to introduce flexibility, although the aforementioned principle to impose a formal structure is the same.[1] The operational aspect is underlined by different deployment approaches as for social deployment, like but not limited to organizational regulations, space management, so-called pockets of creativity,[2] platform teams or incentives, or technical deployment like but not limited to workflow management systems (WfMS), service oriented architecture (SOA), semantic interoperability, Customer Relationship Management (CRMs), portals, or enterprise application integration and enterprise 2.0 solutions.

One of the current roles of BPM can be shown in the prominent sample of the business and IT alignment.[3] The importance of BPM is demonstrated, as business and IT alignment is no longer seen as a "nice to have," but as a "must-have" to ensure that IT infrastructure is aligned with business. This critical assessment of BPM is underlined by the provocative Gartner survey (Gartner 2006) that eight out of ten American dollars invested in IT are "Dead Money" as they are "…not contributing directly to business growth." European investments in IT are estimated to be EUR 315 billions per year.

The complexity of BPM is assessed by the observation that currently there is a shift from data-rich to information-rich to service-rich (http://complexsystems.lri.fr/Portal/tiki-index.php?page=SOS+Homepage&bl) structures in economies, business, and social communities. Through the rapid development of IT, new services that share resources and configure inter-organizational workflows, have been developed. These technologies are "moving up" the technology stack to influence

[1] See introduction chapter of Davenport (2014) on Process Management for Knowledge Work.

[2] See book chapter Seidel et al. (2014) on Managing Creativity-intensive Processes.

[3] See book chapter by Jerry Luftman (2014) on Strategic Alignment Maturity.

not only technical computation but also tasks that require human interaction. Developments such as service-oriented architecture (SOA), service-oriented knowledge utilities (SOKUs), software as a service (SaaS), virtualization, systems of systems[4] or currently the omnipresent cloud are influencing the way IT infrastructure and services are rendered for business processes (Karagiannis et al. 2008; vom Brocke 2007b).

BPM is a commodity today and is acting as a mediator between business models, regulations, application domains, and model processing, establishing the required performance as well as ensuring the required compliance. This means BPM needs to balance between assuring compliance and raising performance.

Knowledge engineering (KE) is a promising instrument to support BPM in order to support achieving this balance. In order to structure this chapter we propose three different viewpoints for KE in BPM:

1. BPM is interpreted as a domain on its own.[5] As BPM includes several aspects, such as realization approaches, tools, or modeling approaches, it is necessary to focus on the basic concepts that are BPM specific. Independent how BP-frameworks are structured, we argue that KE can always be applied in model processing, as conceptualization is commonly performed by model-based formalization. This is described in Sect. 2.
2. Each BPM approach requires a concrete instantiation in order to be based on organizational context. This is typically performed by applying management methods; therefore, Sect. 3 describes KE in supporting such BP management methods.
3. As BPM needs to be operational, it is deployed into the organizational/IT landscape, as the execution environment will likely consist of knowledge-based applications, we argue that the applied BPM approach also needs to be aware of the applied KE technologies. Section 4, therefore, reflects KE in BP-deployment.

Figure 1 introduces the structure of the chapter and visualizes how the two approaches - BP-frameworks and KE are linked. The so-called knowledge space represents a particular domain in which knowledge is provided – in this chapter the domain is "BPM support". Knowledge space can be structured, according to a number of dimensions, whereas we are concerned with the interpretation of the knowledge distinguishing between machine interpretation and human interpretation.

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[4] A system of systems (syn. hybrid computing system) is a system composed of (super-) computing resources of different architectures. They are tightly coupled, interconnected by high-speed network and are treated as a single system.

[5] See book chapter Hammer (2014) providing insights as to what the BPM domain is about.

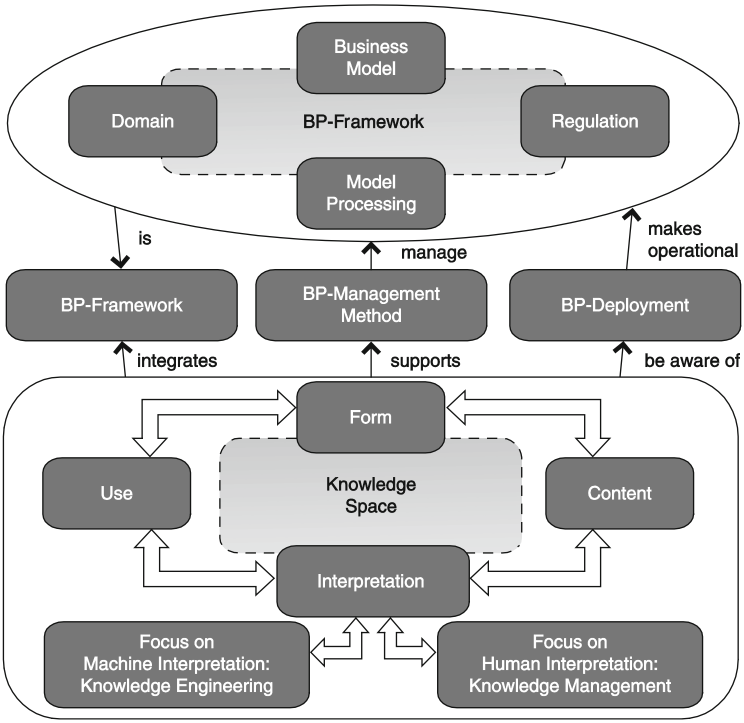

Fig. 1 BPM and KE alignment

Hence the knowledge space is represented either focusing on human interpretation – in case of knowledge management – or focusing on machine interpretation – in case of KE.[6]

2 Knowledge Engineering in BP-Framework

"The initial objective of Business Process Management is to capture the guidelines and business rules for an enterprise which govern the way it functions: how a task is processed, which jobs have to be performed, responsibilities and qualifications of actors, and so forth" (Karagiannis 1995).

These guidelines and business rules are usually very general and could be applied to different situations. Especially knowledge workers require a much

[6] Davenport (2014) explores a particular aspect of knowledge in BPM, i.e. how BPM can facilitate knowledge work. As opposed to the general knowledge engineering approach presented in this chapter, Davenport presents process-oriented approaches tailored to the specific requirements of autonomous knowledge workers.

more flexible form of conceptualization. BPM starts with this observation in order to capture the business process by applying various acquisition techniques, ranging from top down approaches either in form of pragmatic modeling or ethnographic surveys or bottom-up approaches in form of log, messages or event mining, are distinguished. Once business processes are captured, the aim is to transform the working procedures in appropriate formal representations (Junginger et al. 2000), thus enabling model processing.

In the following section we discuss the question how KE techniques can be used to enrich the BP-framework. First, possible elements of the BP-Framework are discussed and second, KE is introduced to conclude that both can be model-based resulting in the proposed meta model approach enabling KE in BP-frameworks. As a conclusion of this section solutions are presented that have been demonstrated in research projects.

2.1 BP-Framework

The BP-framework is seen as a set of assumptions, concepts, values, and practices that constitute a way of interpreting BPM. In order to approach the discussion on knowledge-sensitive BP-Frameworks a possible categorization is discussed in order to better stress possible injection of KE: (1) business models, (2) domain, (3) regulations and (4) model processing using a model-based approach. In the following, the concepts are briefly discussed in order to stress the possible conceptualization using models and to argue for relevant KE injection.

2.1.1 Business Models

There are several frameworks for describing a business model that are seen as "*. . . a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm*" (Osterwalder et al. 2005).

Independent from the selected business model framework, there are common artifacts of a business model such as but not limited to the external factors, - market situation, competition, regulations, and social and technical environment - as well as the internal factors, - business strategy, business organization, and technology.

Model-based approaches provide appropriate concepts and enable the conceptualization of business models. A recent prominent model-based approach is the business model canvas (http://www.businessmodelgeneration.com/canvas) by Osterwalder that provides generic concepts for business models.

2.1.2 Domain

Domain is understood as application domain for BP-frameworks, hence we do not focus on the domain of BP like bank or insurance sector, but on different management instruments applied on BP-frameworks. Based on the experience of a BPM consultancy, we distinguish: (1) process documentation, (2) process optimization, (3) process cost calculation, (4) process performance management, (5) capacity planning, (6) risk management, (7) quality management, (8) Six Sigma, (9) - Sarbanes-Oxley Act (SOX), (10) software requirement engineering, (11) service-oriented architecture, and (12) IT security management.

Typically the domain-specific usage of BPM requires certain behavior and constructs that are provided by modeling languages used for BPM. Usually common modeling languages for BPM support most of the aforementioned domains.

2.1.3 Regulation

Regulations define local dependencies to the application domain and to the BPM approach that can be divided into legal regulations, business regulation, or technological regulations (Karagiannis et al. 2007).

Business regulations are commonly agreed approaches and standards, technological regulations use technical frameworks to enable interoperability, whereas legal regulation frameworks in a given context are mandatory in a given context to be applied by organizations.

BP-models are typically used to support, implement or ensure compliance according to aforementioned regulations. Appropriate concepts describing the relevant aspects of the BP in sufficient detail are required. Selecting the correct modeling language is a challenging task as the BP-modeling language needs to cover all relevant aspects of required regulations.

2.1.4 Model Processing

Model processing is the entry point for KE in BPM-frameworks as the conceptual representation enables the use of KE approaches. Model processing in this context is a series of automated operations on models that retrieve, transform, or classify information for further use.

As the processing is independent of the previously mentioned sample categories like business models, domain, and regulations, it is reasonable to use model processing for KE in order to have a domain agnostic view on KE in BP-frameworks. Samples of KE in model processing are: (1) Business processes can be interpreted as ontologies, (2) Business rules and business processes are integrated in one modeling language or (3) Ontologies can be used to annotate business processes.

KE for model processing establishes a direct use of KE within model processing and an indirect use of KE for the whole BP-framework, as when instantiating the framework for a concrete case, all dimensions are represented in models.

2.2 *Knowledge Engineering for BP-Framework*

Before discussing different knowledge support, it is important to distinguish between KE that is prioritizing machine interpretable knowledge and knowledge management (KM) that is prioritizing human interpretable knowledge.

The history of KE started in the 1940s when the first attempts of artificial intelligence were made. After an initial hype, disillusionment, and first commercial success, KE can be found today in semantic technology (Karagiannis and Telesko 2001). A prominent vision is “Semantic Web” that is seen as the “upgrade” of the current content-driven web with linked data or agent based approaches.

KM, in contrast, evolved out of the KE community and has its origin in 1995. It is a holistic view on the knowledge space that considers human interpretation (Woitsch 2004; Mak 2005; vom Brocke 2007a).

In both cases, model-based approaches provide concepts for the formalization although the level of formalisms is different. Humans have the ability to interpret incomplete, partly corrupted models or intentionally unstructured process parts like standard operating procedures, guidelines, checklists or pockets of creativity. Machines require knowledge representations in a complete and correct manner like formally correct ontologies, goal models to configure agents or first order logic.

Both knowledge approaches use models to conceptualize. The knowledge space specifies the domain, encapsulates its content, and provides semantics for its interpretation. Hence, the knowledge space identifies KE for BP-framework.

2.2.1 Model-Based Representation of BP-Framework Knowledge

The knowledge space is described by four dimensions: (1) form, (2) content, (3) interpretation, and (4) use, which is introduced in Fig. 2.

Form: represents the syntax and semantic, such as a group of human experts, text documents, models, program code, mathematical forms, or statistics. In our sample applying KE for BP-model processing, the form is typically understood as modeling languages for BP-models. Nearly all models in BPM are of linguistic type that can be further distinguished in being realized with textual or graphical/diagrammatic languages (Kalfoglou and Schorlemmer 2003). Independent on the selected model representation, this representation needs a corresponding formalism in order to enable IT support.

Content: represents the domain, in which KE is applied. When applying KE for model processing, we interpret the concrete BPM approach that realizes the BP-framework as content in form of models.

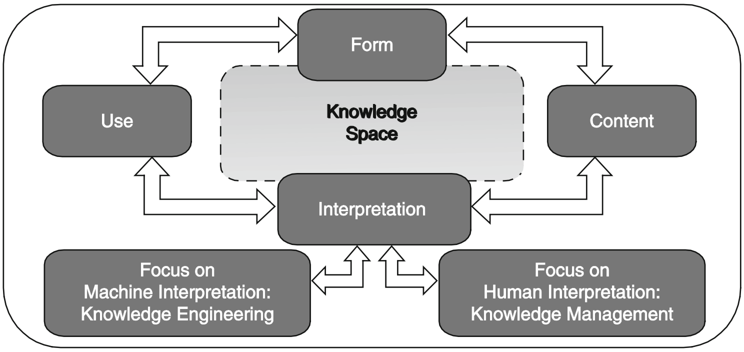

Fig. 2 Four dimensions of the knowledge space

Use: defines how KE is applied for model processing such as the mediation and mapping between modeling languages, the managing and evolution of models, the documentation, transformation, analysis, simulation, or similarity checks.

Interpretation: the representation of knowledge is either focused on machine interpretation – in terms of KE or on human interpretation – in terms of KM. KE in BP-frameworks focuses on machine interpretation, applying formalisms that represent knowledge for model processing. In the following, mechanisms and tools are discussed for KE in BP-frameworks.

2.2.2 Model-Based Approach for KE

Models enable the externalization of knowledge in a machine interpretable form. Originally, expressions of knowledge are based on symbols like rules, frames, logic, predicate logic, or concept maps to express static and dynamic knowledge. Fuzzy logic had been introduced enabling a transformation from natural text into fuzzy logic as aforementioned knowledge representations are difficult to be correctly applied by domain experts. For completeness reasons we state sub-symbolic approaches such as neuronal networks, which are an imitation of human brain.

Prominent samples for current applications are ontologies, bayesian networks, rule models as well as goal models for agent based approaches.

Consequently, KE in BP-frameworks can be applied using a model-based approach covering original approaches and applying currently used applications. Therefore, the challenge is how to conceptually link KE in BP-frameworks with models.

2.3 Conceptual Integration of KE and BP-Framework Using Models

Concept models are considered as an instrument to formally specify both (a) the BP-framework as well as (b) KE. Hence, a conceptual integration of BP-framework models with KE models can be established using a model-based approach.

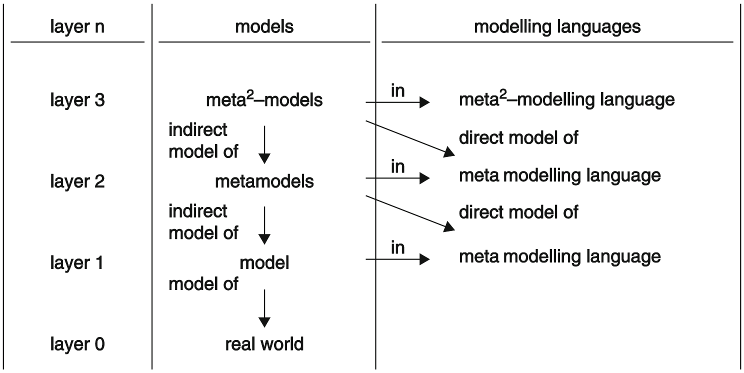

Fig. 3 Meta model layers (Based on Strahringer (1996) adapted by Karagiannis)

A solution is the application of a meta-model approach for the BP-framework as well as for KE to enable the integration of these two meta-models. The meta-model approach is introduced in Fig. 3 depicting the layered model stack by Strahringer, adapted by Karagiannis (Strahringer 1996; Karagiannis and Höfferer 2006).

Models are seen as "representation of either reality or vision" (Peters and Ozsu 1993), representing the real world in an agreed syntax and semantics. The modeling language is defined by syntax, semantics, and notation that provide the necessary modeling primitives in order to build the model. The concepts that describe the modeling language are defined in the meta-meta model language, which leads to the well-known model layers depicted in Fig. 3.

The meta-models are therefore seen as a modeling language that can be used to generate models. This enables the distinction between meta-models for BP- frameworks – such as BPs – and meta-models for KE – such as business rules. In case both model-based approaches are realized using meta-models, it is possible to integrate both model-based approaches.

2.3.1 Meta Model Frameworks

A prominent framework for BP-Framework-meta models is the ADOxx® meta^2-model, which has been researched at the University of Vienna, and implemented in the commercial tool ADONIS® (Bayer 2001; Junginger et al. 2000; Karagiannis et al. 1996; Karagiannis and Höfferer 2006).

This meta^2 model provides not only the basic meta-modeling classes that are necessary to define a modeling language such as class, attribute, and relation, but it also introduces several concepts for the specific BP-support, such as model types, views, attribute profiles, and predefined classes for directed graphs for business processes and non directed graphs for organizational structure. Information on how to develop meta models based on ADOxx® is provided by the Open Models Initiative Laboratory (www.omilab.org).

The commercial products ADOscore®, ADONIS®, ADOlog®, and ADOit® demonstrate the applicability of this approach.

Another prominent framework is MOF – meta object facilities (http://www.omg.org/mof/) – from which the ontology language OWL and the rule language SWRL can be deduced (http://www.w3.org/2007/OWL/wiki/OWL_Working_Group). MOF is a candidate for object-oriented enterprise modeling, and therefore, used for the object-oriented approach via ontologies. KE modeling languages such as semantic standards are often derived from MOF.

The challenge relates to the integration of meta models derived from MOF – which are used for KE representations – with meta models derived from ADOxx® – which are used for BP-framework representations and to enable syntactical and semantic linkage.

2.3.2 Integration of KE in BP-Framework Using the Meta Model Approach

The usage of meta-models for the BP-framework as well as for KE enables the transformation, exchange, reference, and integration of meta-models and other models (Kühn 2004; Kühn et al. 2003). Applying the meta-modeling approach for both the BP-framework and KE, it is possible to apply meta-modeling merging patterns to realize KE in BP-framework. The challenge of integration is on a concrete model level. There are different approaches like formal structure, formal behavior, semantic or model-based.[7] In the following relevant merging patterns are introduced to integrate BP-framework models with KE models.

Reference pattern: The reference pattern defines links that relate one element in the BP-framework meta model to one element in the KE meta model. A BP-framework, for example, can be further specified by providing links to an ontology to enable the semantic description of a BP object within an ontology.

Extension pattern: The extension pattern specifies how the BP-framework can be extended by concepts of KE. New concepts can be integrated, for example, in form of rules. This means that a rule model can be integrated in BP-models.

Transformation pattern: In the transformation pattern, part of KE models is created by parts of BP-framework models. In our domain this mechanism enables for example the generation of an ontology out of a business process.

Merge pattern: The merge pattern can be regarded as a specialization of the transformation pattern, where a merge rule generates a part of the KE model from two or more BP-framework models.

[7] See book chapter from Becker et al. (2014) Semantic Business Process Management.

2.4 Project Solutions for KE in BP-Framework

In the following, a number of project solutions are introduced that have been realized with ADOxx® and different KE scenarios.

1. *The reference of business processes to abstract services for an abstract workflow* has been applied in the LD-Cast (www.ldcastproject.com) project. The goal was to combine three different systems, one storing the business processes, one handling the ontology and a third one storing the annotation between business process tasks and services. In this setup, BP-framework has not been extended with ontology but a so-called "RDF-Tunnel" has been introduced that is responsible for the annotation management between the BP-framework of ADOxx® and the KE-framework with ATHOS. Both systems have been technically encapsulated using web services providing relevant interfaces and a third system called "RDF-Tunnel" managing the references between business processes, abstract services and aligning ontology concepts. This architecture is regarded as a complex integration of BP-frameworks and KE but provides full functionality for both, the model processing within the BP-framework and the knowledge processing within the KE.
2. *Extension of business process models with business rules* has been done in the FIT project (www.boc-group.com/research). The goal was to provide a process modeling framework for e-Government offering both (a) business process modeling as well as (b) business rule modeling environment. The ADOegov® business process modeling framework has been extended by three model types to offer business rule models and by one ontology model. These business rules follow the SWRL specification, and require ontology references for the term definition. Parts of the OWL specification have been implemented into the business process management framework. The extension enables the use of rules and ontology concepts within business processes.
3. Combining *extension and reference of business process models with full fletched ontologies* has been applied in the AsIsKnown (www.asisknown.org), project. The goal was to develop a workflow that acts as an online shop assistant providing assistance according to user profiles. Users on the web-shop for home textile were guided to questions to offer most appropriate products. The challenge was that a full fletched ontology was better maintained in the appropriate ontology management system (OMS) and hence a close – conceptual - linkage to the business process management system had to be developed. The solution was a combination of the "extension" and "reference" pattern. The business process model was extended by a so-called "transit model" that represents a copy of the relevant ontology concepts. This "transit model" had special behavior to ensure synchronization with the OMS. This "transit model" was referenced to the original OMS concepts, in case ontology feature were necessary. Functions such as the inference mechanisms have been performed by the OMS. Additionally a lexicon has been referenced out of the BP-models.

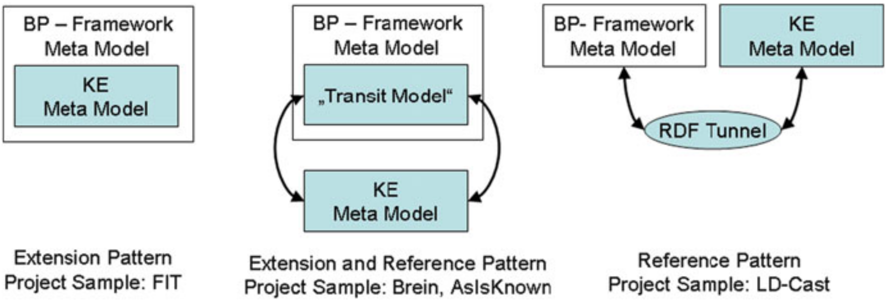

Fig. 4 Different approaches of KE in BP-framework

In this case the business process model acted as an orchestrator for the web-shop that was simple to maintain by the domain experts. In case inference was needed, the business process modeling tool automatically forwarded the request to the OMS using the references.

4. The *Transformation of business process models into ontologies* has been applied in BREIN project (www.eu-brein.com). The goal was to create an ontology using process models (Karagiannis et al. 2008). In order to use a semi-formal description of business process models to better involve domain experts, ADONIS® Community Edition (www.adonis-community.com/) has been used to model business processes. Mapping rules have been created to transform these business processes into domain ontologies. The challenge is the semantic enrichment of mapping rules as pure syntax transformation is insufficient.

   In case the semantic enrichment is insufficient continues evaluation and improvement needs to be performed by knowledge engineers. This leads to a complete domain conceptualization that has been applied for service discovery and agent-based SLA negotiation within a grid middleware.

   Currently a similar approach is applied in the BIVEE project (www.bivee.eu). Processes are modeled in BPMN notation and are transferred into an ontology representation. Here the ontology language BPAL (Missikoff et al. 2011) is used that provides additional concepts for business processes.

   Figure 4 stresses the different integration approaches of KE into BP-frameworks, whereas the white boxes represent the BP-meta model and the grey boxes represent the KE meta model.

3 Knowledge Engineering in the BP Management Method

This section discusses the second possibility to inject KE into BPM, by applying KE within the method to ground BPM into the organizational context.

3.1 *Organizational Context of BP-Framework*

Organizations have their history, terminology, organizational culture, and system environment that influence their BPM. Change management and cultural influence are important challenges that are reflected in the chapters in this book, grouped as people and culture. Participatory involvement of knowledge workers is essential and can by supported by KE.

3.1.1 The BP Method

Setting the BP-framework into a concrete organization requires a BP management method. We introduce Business Process Management Systems (BPMS) as a method that can be interpreted as a high-level life cycle consisting of five processes (Karagiannis et al. 1996):

1. *Strategic decision process* is triggered by strategic decision to select the appropriate approach, identify the process in question, and specify the required resources.
2. *Re-Engineering process* is concerned with a detailed insight of the selected processes and demonstrates all activities, their links and relationships, involved persons, and connections to the external environment. Typically this process deals with the conceptualization using business process models. The design part is concerned with the mapping of the real world in a modeling environment, whereas the modeling part is concerned with the change and adaptation of the models in order to achieve more efficiency.

   This phase is probably the most interesting one in order to decide if KE can be injected into a BP management method. Depending on the selected approach there are different possibilities to support knowledge engineering in the form of planning tools, animation tools, or simulation tools. The design and modeling phase allows also to a large extent include domain experts and knowledge workers to participate in the business process model conceptualization.
3. *Resource allocation process*: The main objective of the resource allocation is to align the business with concrete IT-infrastructure, in terms of IT-based deployment or with concrete organizational units, in terms of human-based deployment. This process became more important during the last few years, as the paradigm of a fixed IT-infrastructure changed dramatically. Model driven-architecture, service-oriented architecture, and software as a service, cloud, enterprise 2.0, social networks and public available collaboration platforms changed the nature and role of traditional workflows. They need to consider human involvement, collaboration and orchestration within virtual organizations. Semantic enrichment plays therefore a role in this phase.
4. *Execution process*: This process deals with the concrete execution of workflows or the concrete execution of business processes. As mentioned, BPM enables the social as well as the technical deployment (Karagiannis 1994). One of the

challenges is to interact with technical services in the same manner as with humans (http://download.boulder.ibm.com/ibmdl/pub/software/dw/specs/ws-bpel4people/BPEL4People_v1.pdf). The "virtualization" concept that has originally been used in the Grid community (http://www-fp.mcs.anl.gov/foster/Articles/WhatIsTheGrid.pdf) now finds its way to the cloud.

5. *Performance evaluation process*: This process collects concrete operational data about the execution of business processes and integrates them into different evaluation frameworks. Hard fact data collection is performed by logging of execution data to enable data mining, visual data mining, text mining or visual text mining. Current log, web, or social network mining tools extend semantic information to make the monitoring domain-specific. Additionally, soft facts can be acquired by questionnaires allowing an integrative cockpit to monitor and evaluate.

3.1.2 Knowledge Intensive Actions in the BP-Method

In the following, the focus is on the transformation from real world into formalisms. This phase can be categorized into five knowledge- intensive actions.

Figure 5 depicts the five knowledge-intensive actions, while conceptualizing the real world into a business process model.

Acquisition uses either quantitative acquisition methods, such as ethnographic studies, questionnaires, or mining techniques, or qualitative methods, such as interviews or workshops, to acquire information for the actual design.

Based on the collection of representation parts, the design produces a model of the real world, by taking the individual parts of the acquisition to form a complete and coherent representation as the "is-model." In the idealistic case, the analysis and modeling are two counterparts; while the analysis aims to identify weaknesses in the existing model, the modeling performs continuously changes in the model

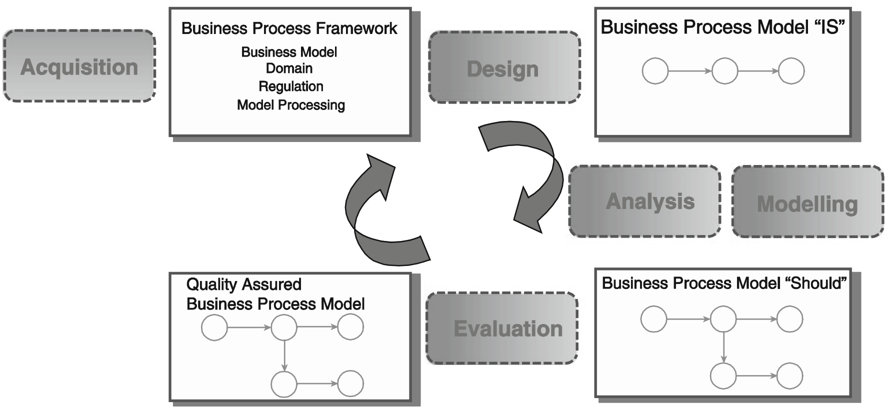

Fig. 5 Knowledge intensive actions in the re-engineering process

that need to be analyzed until the quality is sufficient in the form of a "should-be-model." Finally, the model passes the evaluation to check whether the model has been correctly generated. The result is a quality assured model.

The aforementioned actions strongly rely on the used modeling language, hence different level of expressiveness result in different possible knowledge support.

3.2 Project Solutions for KE in BP-Management Methods

KM and KE approaches are likely to be applied in combination (Telesko et al. 2001), hence in the following list, solutions for KE for BP-management method are discussed:

1. *Adaptive questionnaires* have been realised in the FIT project (http://www.boc-group.com/research). The goal was to support the acquisition and use KE in such a way that the sequence of questions can change according to the previously given answers. The idea is that answers are seen as objects that refer to questions. Therefore a so-called "loose coupling" is established between the sequence of questions and the sequence of possible answers. The question sequence is primarily executed by a workflow engine, whereas the referenced possible answers are treated similar to Web-services that are bound to the questions during execution. Applying mechanisms for adaptive workflows, it is then possible to hand over the control of the question sequence to a rule engine in case an adaptive question sequence has been reached. The previously given answers are then interpreted as facts and the engine tries to find new questions that match with already provided answers. A more detailed description on the cooperation between workflow engine and rule engine is provided in the smart process execution section. The result of the project was a smart questionnaire tool capable to provide questions according to previous answers.
2. *Knowledge-based designer* has been developed and applied in several projects, as a reference case, the AsIsKnown project is introduced as a sample (http://www.asisknown.org). The goal was to ensure homogeneous modeling from different domain experts with different implicit knowledge, cultures, and natural languages. In order to provide common term ontology for business process modeling, a common language has been created. The glossary is used to check the correct usage of terms in models and provides reports on the compliance of the used terms. In case the term is not found, it proposes terms available within the glossary. The domain expert is involved in the evolution of the glossary, as when unsatisfying suggestions are provided, there is the possibility of insisting on new terms. The glossary evolves on the basis of the negotiation between the ontology expert and the domain expert. The result was a homogeneous business process model although several experts from different organizations collaboratively modeled the process.

3. *Collaborative design of business processes* is applied in the Immigration Policy 2.0 project (http://www.immigrationpolicy2.eu/). The goal is to design processes relevant for legal residents and use collaboration tools as a design and feedback platform. Initial discussion started on the wiki pages and were collected and transformed into a business process model. The drafted business process model was displayed at the Wiki and legal residents were able to comment and propose changes. This interaction followed a protocol to result in harmonized business processes. Harmonization aspects were introduced as other public authorities were able to participate in this collaboration as well, and hence commonly participate in the BP design.

   In order to "hide" the conceptual complexity of the business process, the graphical notation of the business process was changed. Processes on the Wiki have an iconic style, where small drawings describe the business process instead of difficult understandable concept notations.

   The result is a collaborative modeling platform that respects to deal with inexperienced business process designers, and hence provide different medium in form of a Wiki and different graphical presentation in form of drawing instead of difficult interpretable concept icons.

   More detailed discussion on collaborative[8] and how Enterprise 2.0 meets BPM[9] are in previous chapters of the book.
4. *Domain-specific graphical representations of business processes* were developed and applied in the project plugIT (www.plug-it-project.eu). The idea was to dynamically align the graphical notation with respect to the content of attributes. A typical business process model was extended with a "grouping" concept that can group several activities. After comparing two business processes all tasks of the process that were sequentially and semantically equal were grouped and the color of that group was set to green; all tasks that were similar were grouped with yellow color and tasks that show a difference were grouped and highlighted with red color.

   The result was a color coded business process that showed the result of a sequential and semantic comparison.
5. *Knowledge-based reference* models have been developed in the plugIT project. The goal was to compare business processes with already existing business processes, using the color-code mechanism discussed before and to identify pre-defined IT-solutions. Business processes have been annotated with domain ontologies and exported using aforementioned transformation rules into ontologies. As reference solutions have been previously created with annotations, the created business process is able to be compared in order to indentify the most similar business process and therefore the most appropriate IT-solution.

[8] See book chapter from Lind et al. (2014) on Collaborative Process Modelling: The Intersport Case Study.

[9] See book chapter from Kemsley (2014) Business Process Management and the Social Enterprise.

The result is a reference repository of IT-solutions that is annotated with a domain ontology and every new business process, annotated with the same ontology, can be immediately compared to most suitable IT-solutions.

6. *Knowledge-based analysis of models* was realized in the project AsIsKnown. The goal was to provide enhanced search functionality (http://www.asisknown.org). Traditionally, a search interface is offered to enable the search for modeling constructs. In case the modeling language cannot provide a satisfactory answer, the request is translated term by term into OWL and passed to the domain ontology. An inference engine searches term by term, for example, parent-, children-, and sibling- concepts to enlarge the analysis features of the BP-models.

   The result is an extension of model search functionality by providing full fletched ontology features.
7. Graphical representation of semantically enriched data was developed and applied in plugIT (www.plug-it-project.eu). The goal was to design automatically a model based on a semantically enriched data set. The "graphical notation pipe" has been introduced that proceeded in three steps. First, the "notation discovery" compared each annotated data object with constructs of meta-models using the semantic annotation. In case appropriate concepts in the meta model have been found the "notation lay-outing" has been performed, by searching for the most appropriate notation in an abstract notation language that has a set of possible iconic representations and their semantic annotation. Last step is the notation generation that produces a graphical model, using the syntax of the detected meta-model, the detected notation and assimilated the concrete data into the model. Graphical models such as business processes where able to be created as a result of data queries from log files, databases or similar data sets.
8. *Knowledge-based evaluation* for quality assurance deals with the challenge that an expert and a novice modeler have different competences in modeling guidelines and the correct application of the modeling language. The aim is to make implicit knowledge of the experienced modeler explicit in order to enable checks of the model generated by novices that go beyond current model analysis. Examples for model checks that can be implemented are for instance tests that verify whether processes have exactly one start-object and heuristics that assess the quality of a model on the number of inter-model references in comparison with the number of objects in the model.

   Applying the BP-management method enables the binding of the BP-framework into a concrete organizational context using KE support when designing the concept models.

4 KE in BP-Deployment

BPM can be either technically deployed via workflow engines that interpret machine interpretable processes, or can be socially deployed via business processes or organizational order that provides human interpretable processes.

BP-deployment requires awareness of KE technologies used in the executive platform like Enterprise 2.0, Enterprise Content Management, Semantic Web or the cloud in order to provide the corresponding concepts. In the following, BP sample deployments that use KE techniques are introduced.

4.1 Project Solutions and Knowledge Techniques for BP-Deployment

In the following, solutions for KE in BP-deployment are discussed that basically use the concepts of the BP-framework and deploy them into system platforms.

1. *Smart process publishing* has been developed and applied in the project FIT. The goal was to tackle the challenge that business process models are designed by skilled modelers – usually familiar with concept/icon representation - while the process documentation, however, is designed for the none-experts. So the same model information is provided for two differently skilled roles. Currently available mechanisms implement a "one to many" publishing component that distributes the content differently towards separate target groups. This is seen as server-side content adaptation that requires large resources publishing the content for each of the user groups separately. Personalized content generation enforces a paradigm change to a client-side content adaptation, where the user interface at the client interprets the content differently depending on the context of the user. The idea has its origin from the Adaptive Web (Brusilovsky 2003) that creates a user model based on the navigation behavior of the user. Once the user model has been identified, there are active content elements that change their appearance on the basis of the user model.

   Originally this principle has been applied while developing a web page for a pilot enduser of the project. Click behavior of citizens have been observed in order to create a user model in form of an ontology. Based on that user model, the web page behaved differently e.g. enabling an experienced user to apply via email and an inexperienced to apply a form via post. The basic principle has been built into process documentation in order to realize filtering of business processes, filtering of attributes, selection of personalized graphical appearance, or textual representation of the processes, as well as process or presentation of different reports.
2. *Smart process execution* using adaptive workflows (Leutgeb et al. 2007) have been developed and applied in the FIT projects and using semantic service discovery (Catapano et al. 2008) have been developed and applied in the LD-CAST project. The goal was to introduce flexible workflows. The integration of the workflow engine and the business rule engine enables an adaptive and smart workflow engine that requires semantic concept. Technically two Web-Services are discussed, whereas the workflow engine executes the workflow template, in case a special node – the rule node – is reached, the

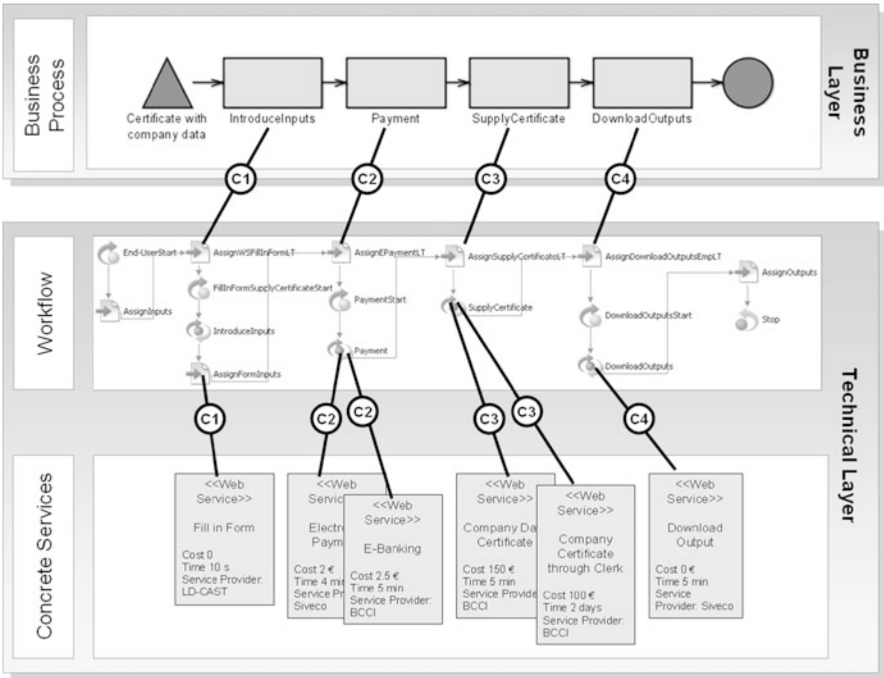

Fig. 6 Service delivery using semantic workflows

workflow engine invokes the rule engine in a similar way like any other web service. The business rule engine receives relevant data as well as the rule-set in form of a parameter that is modeled in the BP-model. The results of rule execution are provided in a specific format to the workflow engine. The so-called "Rule Enactor" transforms the application data of the workflow engine into a format for rule execution. This architecture reduces the complexity of the workflow- and the rule definition, as the Rule Enactor encapsulates the rule-engine as a Web-Service and takes care about the data interactions for a predefined set of invocation types.

There are different ways to realize semantic workflows. One possibility is by applying a semantic service discovery. The service ontology is used to map BPs to workflows. These workflows are defined as abstract, as up to the defined point in time they have no concrete services bound to their activities/tasks. In the second step, registered concrete services, which could be used to carry out one of the activities, are annotated with the same concept from the ontology.

Figure 6 shows the required concepts for the integration of BPs, abstract workflows, and concrete services, where respective items have been annotated with corresponding concepts from the ontology (C1–C4). Once all required items have been annotated, registered, and published, the abstract workflows is provided to the end users. If an abstract workflow is accessed, it has to be bound to a concrete workflow, where semantic service discovery offers different mechanisms for lazy or ambiguous bindings.

A more complex way to realize semantic workflows was developed in the plugIT project, where aforementioned simple annotations from task to service were exchanged by a service profile schema. Hence a service was not only described by an annotation but by a set of parameters. The match of all parameters allowed the workflow engine to select the according service.

3. *Smart allocation of IT-Infrastructure to business processes* was developed and applied in the project plugIT. The goal was to provide IT-infrastructure from an IT-service provider to a business process that was requested form a client. The IT-architecture model that has been designed after the requirement analysis of a business process depicted one possible solution of an IT system that fulfills the requirement of that particular business process. The challenge was to identify, if such an IT system is already available to serve the requesting client, or if this IT systems need to be timely deployed and installed. In the given complexity of several thousand IT-system configurations and several thousand clients, this decision is time and cost critical – thus becoming highly relevant in the current cloud age.

   The reference IT models were annotated with an ontology, and search requests to the CCMDB where also annotated. Hence freely modeled IT-systems that fulfill the business process requirements, where annotated and the most appropriate reference IT model was selected. It was ensured that for each reference model a corresponding search agent in the CCMD database was available, so the result set was assimilated in several copies of IT models, presenting the different concrete results in form of several concrete IT models.

   Typically such a search request resulted in several hundred possible concrete solutions, so heuristics needed to be applied in order to minimize the result set. The rule engine implemented such heuristics and reduced the original result set from the CCMDB to a manageable set of about 20 concrete IT models that fulfill the business process request. Finally the modeler selected the concrete solution if it was applicable or was confident in requesting a new IT configuration for the particular business process.

5 Outlooks on KE in BPM

This section gives an outlook on the conceptual and technical integration of KE and BPM introducing the next generation modeling framework. First, the conceptual integration and second, the technical integration is discussed by providing a reference architecture.

5.1 Conceptual Alignment

There are different approaches, where either semantic techniques using an ontology stack (Schacher and Grässle 2006) or meta modeling patterns (http://www.athena-ip.org/) are used to establish BPM alignment. This section argues for a hybrid approach, by applying the meta model patterns and realizing the transformation with the help of semantic. The Semantic Integration World Animation (SIWA) (Nissen and Jarke 1999) approach as an extension to MOF is seen as a promising multilevel modeling framework that enhances the meta modeling with additional semantic primitives. Well-known semantic lifting injects semantics in meta models (Kappel et al. 2006).

An ongoing challenge is to further investigate aforementioned approaches to semantically enrich meta models and models to enable a tight integration from BPM and KE. Figure 7 propose an enriched conceptual architecture introducing a common base for BPM- models and KE models.

As discussed at the beginning of the chapter, integration of BPM-models and KE-models can be realized differently. Following the merged approach, would mean that KE meta models and BPM meta models are combined into one holistic meta model. This approach is on the one side stable but on the other side inflexible. Today's requirements on flexibility like KE plug-ins are not compliant with the merge approach. Referencing KE meta-models, enable flexibility in plugging-KE

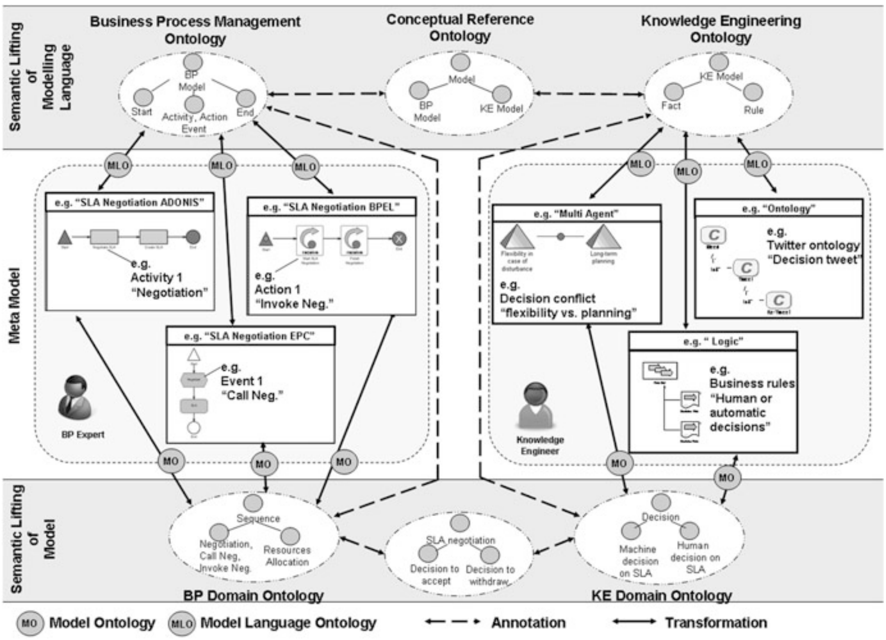

Fig. 7 Conceptual architecture for knowledge alignment

approaches, but are filigree. Further research is necessary to raise the maturity level of the current research approaches and make the use of KE technology inside BPM-framework end user friendly and less error prone.

Early project feedback showed that semantic lifting of meta models is insufficient, as reasonable semantic inferences are only possible when the concrete meaning of an object is specified. This leads to semantic lifting of each object within a BP model, which is usually seen as an additional burden. A pure referenced alignment permits the adaptation of the BP modeling languages, therefore uses full text strings for annotations. This is currently not end user friendly and to a high extend error prone. A more user friendly approach is to slightly adapt the BP modeling language, which is only possible with a limited number of modeling tools. In that case, features to annotate each object while modeling a BP can be provided. In both cases, the big challenge is to find appropriate domain ontologies, to annotate the models to. Once this has been solved, domain experts are mostly accepting this additional effort in annotation, when the user support is appropriate and they see the benefit of a semantically enriched BP-model.

A sound concept for conceptual alignment is therefore the use of libraries. Similar to software libraries, meta-model libraries can be combined and realize as a hybrid approach between the inflexible "extension" and the filigree "reference" approach. An open community is investigating to develop such meta-model libraries in the laboratory of the Open Models Initiative (www.omilab.org).

5.2 Technical Alignment

BP model editors of the future are expected to provide a flexible architecture, where plug-ins are able to be added, the modeling tool can be flexibly re-configured and made personalized as well as the user interface automatically adapts, whether the BPM tool is used on a computer, a smart phone or any other mobile device.

Instead of one fixed model editor, it is expected to have a plethora of editors in form of full fletched management tools, apps, plug-ins, add-ons or functional extensions. Similar to the conceptual integration, the technical integration needs to find mechanisms to "plug and play" KE functionality.

There is a large variety of modeling tools, ranging from informal, unstructured, and text-based to semi-structured and formal ones. Different tools are used for different purposes and it is quite common to encounter both unstructured and structured modeling methods. As most of the tools are already in use, the challenge is therefore not to exchange the existing modeling tools, but instead use a reference architecture that integrates existing modeling tools and make them interoperable to enable the alignment of BPM and KE.

The following high level reference architecture envisions a flexible service-oriented infrastructure to enable plug-ins. Here the service-oriented metaphor is used to demonstrate the technical challenges of such a system, by encapsulating functionality, sufficiently describe this functionality and compose the requested set of features. This does not necessarily mean that SOA is the only acceptable

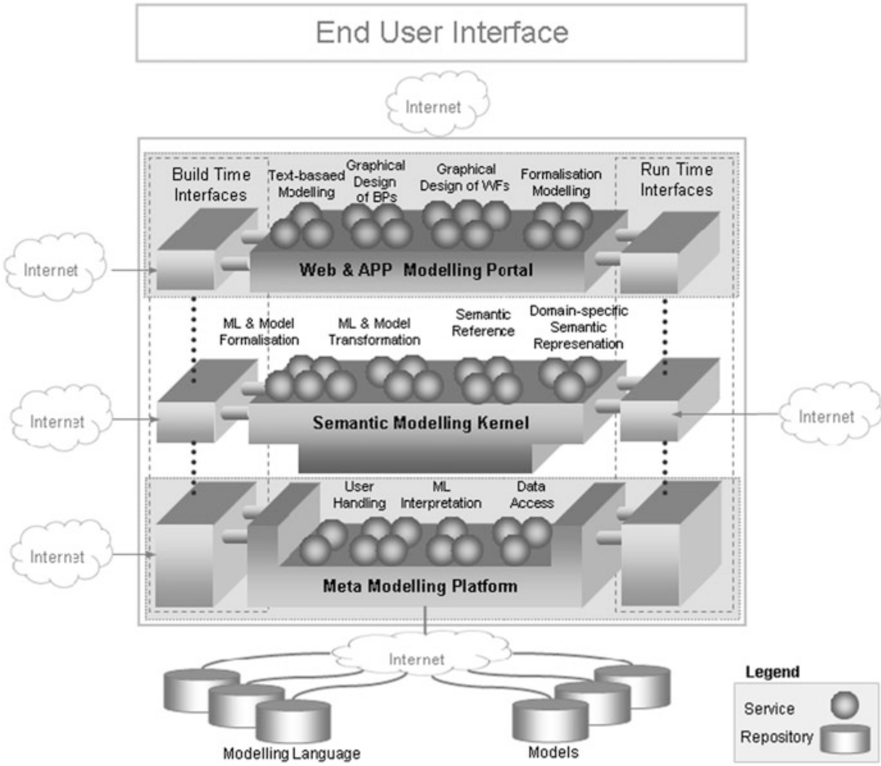

Fig. 8 Technical architecture for knowledge alignment

approach, as current component oriented solutions, Widgets and mash-ups or highly disconnected tools only sharing a common model base are currently realized by different prototypes.

Technically spoken, traditional three layer architecture of meta modeling tools (Junginger et al. 2000) needs to be enriched by a so-called "Semantic Modeling Kernel".

The high level reference architecture is depicted in Fig. 8, demonstrating the vision of the next generation modeling framework. The bottom layer is concerned with the transparent storage of models and modeling languages with the vision of an open model repository. The middleware framework provides the possibility to register, discover compose modeling functionality. Traditional user and security handling is typically expected here. The top layer is the user interaction portal, which provides user interfaces for web- or app-based modeling services.

The next generation modeling framework need to consider a new layer, the so-called semantic modeling kernel that is responsible for the realization of the aforementioned conceptual integration. This layer is responsible for the transformation of syntax, semantic, and context that enables the aforementioned integration of meta-models and semantics.

Project feedback showed that very flexible semantic modeling kernel – the project plugIT used a semantic workflow engine to orchestrate dynamically registered modeling components such as an ontology matcher – are very filigree and instable. Furthermore the discovery, negotiation and enactment of a complex semantic analysis of a BP-model took up to 10 min, which was not end user friendly. The project BIVEE (www.bivee.eu) now aims to develop a semantic modeling kernel via components that reduce the flexibility but introduce stability and raises the performance.

ADOxx (www.adoxx.org) provides the basic meta modeling platform and enables to an open community the implementation of plug-ins with the aim to approach aforementioned technical vision.

6 Summary

This chapter identified three aspects of KE support in BPM: First, BPM can be seen as a domain on its own, and hence, the basic BP-framework can be enriched with KE. As the BP-framework and KE can be represented by models; the integration of KE in BP-frameworks can be realized with the meta model approach. As the instantiation of a concrete BPM approach requires a management method that binds the BPM approach into the organizational context in order to enable the actual management, the BP-management method has been introduced. KE in BP-management method has been discussed focusing on the knowledge intensive actions.

Realizing BPM within a concrete organization, it is necessary to enable the execution within an environment. In case this environment uses KE, the BPM approach requires awareness of these concepts in the building phase. Hence, KE in BP- deployment is introduced to draw awareness to the fact that knowledge-sensitive BPM solutions during execution time require knowledge-sensitiveness in build time.

This chapter discussed approaches for KE in BPM. Considering also the human interpretation that is focused in KM, there are similarities for KM in BPM. The introduced approaches as well as the outlook considered a model-based approach for KE in BPM. As KM can also be realized using a model-based approach and the introduced mechanisms can be used for the more formal models in KE, it is possible to use the aforementioned mechanisms for the partly informal model used in KM.

The outlook discusses a conceptual and technical integration of KE and BPM enabling a discussion beyond the aforementioned solutions.

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Culture in Business Process Management: How Cultural Values Determine BPM Success

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Abstract There is consensus among practitioners and academics that culture is a critical factor that is able to determine success or failure of BPM initiatives. Yet, culture is a topic that seems difficult to grasp and manage. This may be the reason for the overall lack of guidance on how to address this topic in practice. We have conducted in-depth research for more than three years to examine why and how culture is relevant to BPM. In this chapter, we introduce a framework that explains the role of culture in BPM. We also present the relevant cultural values that compose a BPM culture, and we introduce a tool to examine the supportiveness of organizational cultures for BPM. Our research results provide the basis for further empirical analyses on the topic and support practitioners in the management of culture as an important factor in BPM initiatives.

1 Introduction

Bluntly put, BPM initiatives often fail for cultural reasons. Tremendous investments in business process analysis, modeling, and process-supporting IT still represent the core expenditures of many large scale BPM programs. This focus on methodological and technological aspects of BPM seems to be just as natural in BPM practice as the recognition that culture is often the reason for project failure (Attaran 2004; Rosemann and vom Brocke 2014). One of the major difficulties with the culture concept is the fact that it is hard to grasp. This blurriness of the concept may be the main cause for a lack of guidelines on how to manage the culture factor and which investments to make regarding the development of an organizational culture in a BPM context.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_27,

In our research, we have aimed at going beyond the statement that culture is an important factor in BPM. We were motivated to study and analyze culture in depth to create a concise understanding and specific normative advice for organizations on how to deal with culture in BPM projects. To that end, we conducted multiple studies with national and international companies, involving experts from academia as well as end-user organizations. In this chapter, we revisit the findings of three specific studies that help gaining an overview on the topic of culture and the findings from our research.

Particularly, we first report on a framework that explains the role of culture in BPM and that is grounded in a comprehensive literature review (vom Brocke and Sinnl 2011). We then present which cultural values determine the notion of BPM culture based on a global Delphi study with renowned thought leaders and experts in BPM (Schmiedel et al. 2013). Finally, we introduce an instrument which we developed recently on the basis of several studies with BPM experts worldwide and which serves to measure the supportiveness of organizational cultures for BPM (Schmiedel et al. 2014).

This chapter is structured as follows. First, we introduce the understanding of the two main concepts which are at the basis of our research, i.e., BPM and culture. Second, we present the findings of three core studies of our research, focusing on the results of the respective studies rather than a detailed presentation of the methodological procedure. Third, we discuss the implications of these findings for research and practice. Finally, we conclude the paper with an outlook on the research topic.

2 Background

2.1 Business Process Management

BPM refers to a management approach that focuses on a horizontal understanding of organizations in terms of business processes rather than a vertical perception in terms of functions. Two major objectives of organizational BPM approaches are the efficiency and effectiveness of business processes (DeToro and McCabe 1997; Hammer 2014; Smith and Fingar 2004). This means that organizations should both *execute business processes right* and *execute the right business processes*. Smith and Fingar (2004) argue that only mature business processes and mature BPM manifest themselves in highly efficient and effective business processes (see Fig. 1).

Originally, BPM research may have focused primarily on the efficiency objective as a strong emphasis on the role of IT can be recognized in early research. Since BPM’s emergence as a new management approach, technical aspects, such as the

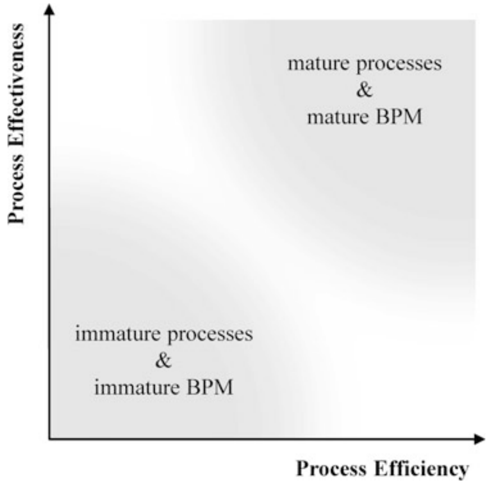

Fig. 1 Two major BPM objectives (based on Smith and Fingar (2004))

technological support of business processes and their design, were central to BPM (Reijers 2003; van der Aalst and Kumar 2003). The focus on workflow modeling and process automation may have been substantiated through numerous IT solutions that emerged along with the concept of BPM (Jeston and Nelis 2008). While it seems evident that IT is an essential driver of organizational change towards process-orientation (Davenport 1993), a pure focus on IT systems does not account for the comprehensive meaning of BPM.

We base our research on a holistic understanding of BPM as a management approach. That means we consider a comprehensive set of factors relevant to the success of BPM, e.g., strategic alignment, governance, people, and culture beyond methods and IT (Rosemann and vom Brocke 2014). While a holistic understanding more and more represents a new consensus among academics and practitioners in the field, many research projects and organizational initiatives still reflect a one-sided understanding of BPM through a sole focus on methodological and technological aspects of the management approach. Before going into details on how we approach culture as a factor in BPM, we introduce our understanding of the concept in the following.

2.2 Culture

Culture refers to the shared values of a group that become visible in actions and structures (Schein 2004; vom Brocke and Sinnl 2011). The defining elements of culture are commonly illustrated in an iceberg model (Selfridge and Sokolik 1975). The point of this analogy is that the main part of culture, much like an iceberg, comprises largely invisible elements that lie underneath the surface (see Fig. 2). While these elements are referred to in different ways, e.g. Schein (2004) refers to

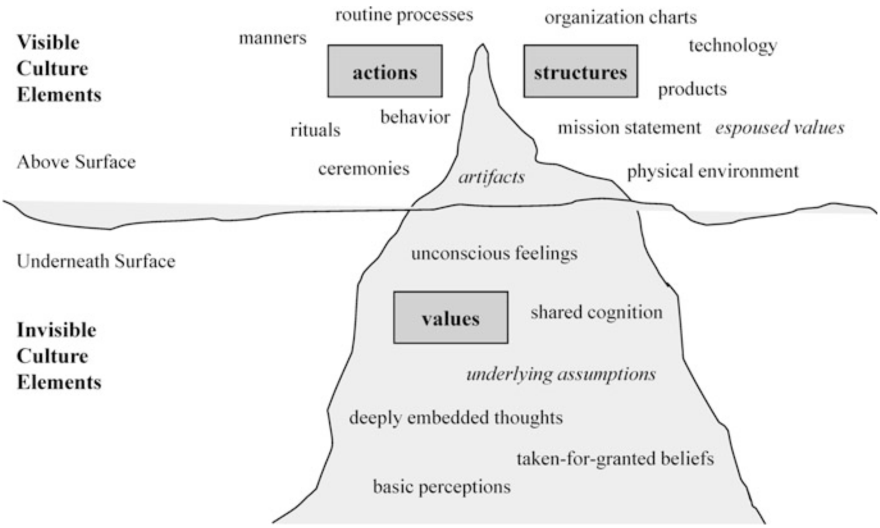

Fig. 2 Culture elements in an iceberg model: invisible values, visible actions and structures

them as underlying assumptions, culture researchers commonly use the term *values* to describe the core part of culture (Hofstede 2005; Parsons and Shils 1951; Straub et al. 2002), i.e. the subconsciously shared concepts of the desirable.

These values manifest themselves in *actions* and *structures* above the surface (Giddens 1984), i.e., observable artifacts such as behavioral (e.g. manners, rituals) and structural (e.g. physical environment, technology) patterns that are the visible representations of the underlying cultural values (Schein 2004). It is important to notice that publicly expressed (espoused) values in the mission statement of organizations need to be distinguished from our understanding of invisible cultural values (Schein 2004). While publicly articulated values represent observable structures of organizations, they are not necessarily in line with subconscious values that are actually lived in an organization.

It is important to note that the concept of culture always refers to a specific group (Leidner and Kayworth 2006). Depending on the context, this group can be a nation, an organization, a work group, a profession, a family or even a loosely coupled group of individuals, such as a social soccer team. Group cultures can be inhomogeneous in the sense that subgroups within a certain group can exist, which form overlapping cultural identities (Hofstede 2005; Huntington 1997). For this reason, culture is a very complex concept that often consists of various intertwined group cultures.

3 Results from Three Core Studies on the Role of Culture in BPM

3.1 First, the Interdependence Between BPM and Culture

To gain a better understanding of culture's role in BPM, we conducted a comprehensive literature review (vom Brocke and Sinnl 2011). Acknowledging the fact that an all-encompassing review of previous research cannot possibly be undertaken, it is important to clearly define the scope of a review (vom Brocke et al. 2009). In this regard, the literature review we conducted followed established and comprehensive guidelines on this method (Creswell 2009; vom Brocke et al. 2009; Webster and Watson 2002). Accordingly, we set a clear focus on research that explicitly considers culture in the context of BPM.

Based on a structured analysis of existing literature on the topic, we developed a framework which organizes the various notions of culture that play a role in BPM practice. This framework explains the interdependence between the two concepts BPM and culture that can be identified in contemporary literature in the field (vom Brocke and Sinnl 2011). Figure 3 depicts this framework which we call BPM-Culture-Model.

The BPM-Culture-Model consists of three main concepts. The understanding of these concepts which we derived from the literature review can be described as follows:

- **BPM Culture**: BPM culture refers to a culture that is supportive of achieving BPM objectives, i.e. efficient and effective business processes. It is understood as a set of specific values which are inherent in the management approach BPM and which become visible in specific actions and structures that represent these values in the organization. It can also be considered a to-be culture when a BPM approach is followed. This means that the culture of the organization should embrace BPM-facilitating values. However, this does not mean that the corporate culture should only incorporate those values. Rather it should include those values into the existing culture.
- **Cultural Context**: Cultural context refers to the given cultural environment that a BPM initiative faces in an organization. It comprises several group cultures, such as national, organizational, or work group cultures. These group cultures are complexly intertwined, e.g. project teams from internationally working organizations often include employees from different nations and also from various departments. The cultural identities of each employee shape the prevailing cultural context in an organization and determine the as-is cultural setting at the start of a BPM initiative.
- **Cultural Fit**: Cultural fit refers to the basic congruence between BPM culture and cultural context. It represents the prerequisite for a successful BPM approach in organizations. In other words, the incorporation of BPM-supportive values, actions and structures in the cultural context of an

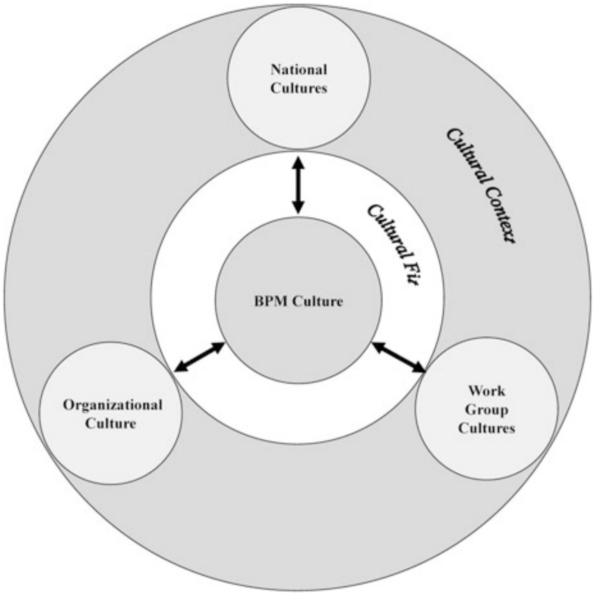

Fig. 3 BPM-Culture-Model (Schmiedel et al. 2014; vom Brocke and Sinnl 2011)

organization is a necessary, yet not sufficient means to achieve efficient and effective business processes.

The BPM-Culture-Model explains the interrelation between the concepts BPM and culture. It can be used to analyze BPM approaches in specific companies (vom Brocke et al. 2014; vom Brocke and Sinnl 2010). In this regard, the model helps explaining, for example, why BPM works better in one company than in another. Beyond, the model can also be used to for prediction purposes. That means, the analysis of a specific organizational culture can provide an indication for the cultural change that is required to realize a successful BPM initiative.

Particularly, when looking at the specific case of a company, the model can be used to evaluate how a specific organizational culture fits together with the concept of BPM culture, i.e. how far a cultural fit between the environment and the BPM approach is present. In cases where such a fit is not present, a BPM approach is likely to fail in case the organization is not willing to develop the present culture towards being supportive of BPM.

This BPM-Culture-Model provides the basis for our subsequent studies, which primarily focused on the notion of BPM culture with the intention to specify the concept and to measure it.

3.2 Second, the Concept of BPM Culture

To specify the BPM culture concept, we conducted a Delphi study as one of the two major empirical studies in our research. One of the main application fields of the Delphi method is concept development (Okoli and Pawlowski 2004). Therefore, this method was chosen to specify the concept of BPM culture, that was identified in the literature review. The Delphi method relies on the use of expert opinions to obtain consensus on the studied issue (Dalkey and Helmer 1963). Based on this, the Delphi technique allows to address unspecified issues that require diverse backgrounds of expertise (Czinkota and Ronkainen 2009; Linstone and Turoff 1975).

In fact, it was found that the specifics of a culture that supports BPM may most profoundly be identified by BPM experts from both academia and practice since BPM is a management approach that is developed and promoted by researchers and practitioners at the same time. Accordingly, our study involved experts from both areas. While the involvement of experts from different backgrounds yields the risk that consensus may not be found, the identified results in the case of consensus among the experts (which was achieved in this study) are solidly grounded in the opinions of thought leaders in the field.

The main question we examined in the Delphi study was which organizational values the experts consider to be supportive of achieving efficient and effective business processes. In an intensive iterative processes of addressing the experts and coding their responses, we identified four central values as being supportive of BPM (Schmiedel et al. 2013). These values are also referred to as CERT values based on their acronym. Table 1 provides an overview of the values and their definitions.

In our research, we discussed the identified CERT values against the background of an established culture framework (Schmiedel et al. 2013), i.e. the Competing Values Framework (CVF) (Cameron and Quinn 2006). The CVF distinguishes organizational cultures along two dimensions. The "focus" dimension differentiates an internal from an external focus of an organization. The "structure" dimension is determined by the two extremes of flexibility and stability. Based on these two dimensions, the framework contains four types of organizational cultures with a specific focus along the two dimensions: create, compete, collaborate, and control.

The framework is called *Competing* Values Framework since each of the dimensions comprises opposite extremes, however, the authors of the framework acknowledge that ideally an organization would incorporate all characteristics of the two dimensions (Quinn et al. 2011). A closer look at the CVF shows that the CERT values can be easily mapped to the two dimensions. Customer orientation matches the external focus while cross-functional teamwork matches the internal focus. Excellence fits to flexibility in the sense that continuous improvement and innovation represent forms of organizational change that require flexibility. Finally, responsibility fits to stability in the sense that accountability and commitment can be seen as structural control mechanisms which provide stability. Figure 4 gives an overview of the CERT values in the CVF.

Table 1 Constituting (CERT) values of the BPM culture concept

Value	Definition
Customer orientation	The proactive and responsive attitude towards the needs of process output recipients
Excellence	The orientation towards continuous improvement and innovation to achieve superior process performance
Responsibility	The commitment to process objectives and the accountability for process decisions
Teamwork	The positive attitude towards cross-functional collaboration

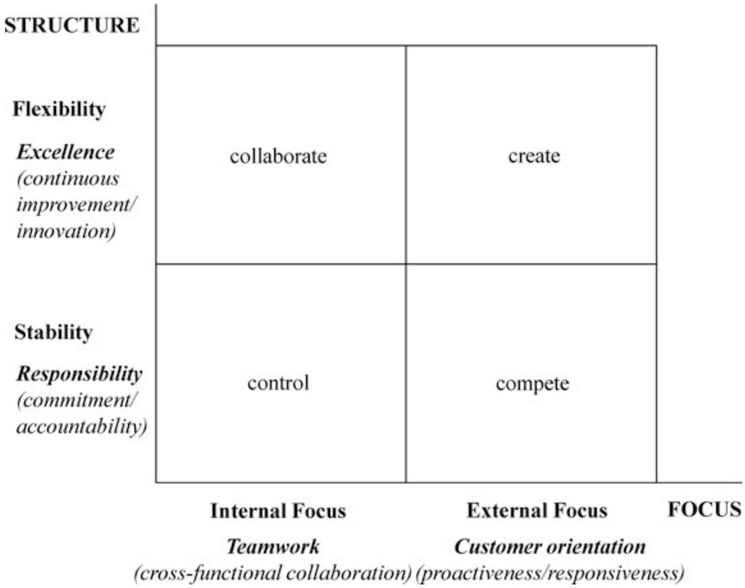

Fig. 4 CERT values in the Competing Values Framework (Schmiedel et al. 2013)

The examination of the CERT values in the context of the CVF reveals specific insights on the nature of the values and also gives potential explanations as to why they are difficult to implement in BPM practice. The seemingly competing nature of the CERT values may be the reason for the challenges that seem to be present in realizing a BPM culture in practice. For example, in daily business, it may be perceived as a trade-off to either focus on the excellence of internal processes or on the adaptation to external customer requirements.

The conceptualization of BPM culture in the presented study served as a basis for the further specification of the concept in another empirical study, which we present in the following.

3.3 Third, the Supportiveness of Organizational Cultures for BPM

To operationalize the concept of BPM culture, we developed and validated items that allow measuring the different dimensions of a BPM culture empirically. We perused the survey method to further specify the cultural values that were identified in the Delphi study as defining elements of the BPM culture concept. Developing a measurement instrument includes a broad range of methods itself. Following well-recognized and comprehensive approaches (Davis 1989; MacKenzie et al. 2011; Moore and Benbasat 1991; Recker and Rosemann 2010a, b), a multi-stage approach was used to develop an instrument to measure BPM culture.

Particularly, our approach involved methods such as literature review, interviews, own category method, ranking exercise, and index card sorting test. Testing the resulting instrument included techniques such as pre-test, pilot test, and field survey. This variety of data collection and analysis methods, which also involved a significant number of experts, enabled the development of a reliable and valid survey instrument to measure the concept of BPM culture (Schmiedel et al. 2014).

In the processes of instrument development, we identified two sub-dimensions for each of the CERT values that are summarized in Table 2. Based on these sub-dimensions, we developed and validated items to measure each sub-dimension. These items were then implemented in an online survey.

The survey instrument serves as an assessment tool to examine how far the culture of an organization is supportive of efficient and effective business processes along the eight cultural sub-dimensions. The results of such an assessment can be illustrated as displayed in Fig. 5. The visualization shows the differences between a BPM-supportive culture, a BPM-unsupportive culture and a partially supportive culture, as examples. The tool can be used to gain first insights on the organizational culture via an assessment through individuals but it also provides the opportunity to assess an organizational culture through several or all employees of an organization. The latter is particularly useful to compare the perspectives of various departments or divisions on the culture in an organization.

The instrument can also be used to compare the findings of an organization with benchmarking results from similar organizations of the industry sector. Based on such an assessment, organizations can determine culture development strategies. Those cultural dimension that received a low score but are considered strategically important to the organization can serve as a starting point for deriving specific activities on how to improve the organizational culture in terms of its supportiveness of BPM objectives.

In the following, we discuss the findings of our three studies regarding their implications for research and practice as well as their overall limitations.

Table 2 Cultural sub-dimensions of BPM-supportive values

CERT values	Customer orientation	Excellence	Responsibility	Teamwork
Sub-dimensions	External customer orientation	Continuous improvement	Accountability	Formal structures
	Internal customer orientation	Innovation	Commitment	Informal structures

Fig. 5 Exemplary culture assessment results

4 Discussion

4.1 Implications for Research

Several implications for research can be derived from the contributions of the three studies. At least five major areas of future research naturally and logically follow from the work conducted to date (Schmiedel 2012):

- *Model application*. The BPM-Culture-Model provides an avenue for future research. Specifically, the notion of a cultural fit between BPM culture and a given cultural context could be examined based on the conceptualization of BPM culture from this research. Propositions could be derived to provide a starting point for the quantitative assessment of the reliability and validity of this model. Such research could provide empirical insights on the explanatory and predictive power of the suggested model.

- *Case exploration*. The conceptualization of BPM culture revealed four seemingly competing, yet complementary values as major determinants of this concept. Future research can build on these findings in several ways. For example, it could be examined how far BPM initiatives face difficulties or even fail because organizations do not live all of the identified values at the same time. In addition, it could be analyzed whether practitioners perceive trade-offs in realizing those values as a potential reason for an imbalanced focus on the four values. This could be examined on the basis of several in-depth case studies.
- *Survey application*. The operationalization of the BPM culture concept brought forth a survey that can be applied to a number of areas of future research. For example, the measurement instrument that was developed serves as a reliable and valid tool to assess the impact of BPM culture on the overall firm performance. Further, it can be used to examine how far an organizational cultural context is supportive of a BPM approach. In this context, it could be assessed how far distinct work groups perceive the cultural fitness of their organization for BPM differently. Exploring the reasons for potential differences would then provide the basis for another area of future research as follows.
- *Guidelines development*. Based on the analysis of individual organizational cultures, guidelines could be developed on how to achieve a BPM culture. For example, best practices could be analyzed to learn what kind of methods or techniques could be established to stimulate actions that are in line with the identified BPM values. In this regard, the differences between specific industry cultures or national cultures could be analyzed since the prevailing cultural context may call for the need to implement the cultural values differently in daily operations. Case studies or action research may serve to address these areas of future research.
- *Research transfer*. Beyond the BPM context of our research, future research may apply the understanding of culture underlying the BPM-Culture-Model to BPM-related domains. In this regard, future research could examine further management approaches, such as supply chain management, project management, stakeholder management, risk management, etc., in terms of how they can be supported by a particular cultural setting. Presumably, some cultural values may be identified that are at the core of all of these approaches, others may indeed differ or even be conflicting. Based on this, research may be able to generalize what type of organizational culture supports overall organizational performance. In addition, this comprehensive research endeavor may provide valuable insights for managers with regard to the cultural values they would need to focus on when specific organizational difficulties arise or when a particular management initiative is launched. Taking it even further, an overview on the cultural requirements of several management domains would allow for a culture-driven organizational development on the one hand; on the other hand, it would enable a culture-oriented selection of suitable management

approaches for specific types of organizations (e.g., family-run company vs. military organization).

4.2 Implications for Practice

Apart from the relevance for the academic world, our research also contains several implications for practitioners. Specifically, at least five major guidelines can be identified for end user organizations end user organizations (Schmiedel 2012):

- *Awareness creation*. The BPM-Culture-Model can serve as a means to create awareness for the variety of cultural aspects that play a role in BPM practice. Moreover, the model structures the seemingly different perceptions of culture as both an influencing and influenced concept with regard to BPM. Particularly useful for practitioners may be the understanding that (1) the management approach they choose needs to fit to the culture of the organization in order to successfully realize their management initiatives, and that (2) they need to create a culture that fits to and supports their management objectives.
- *Target setting*. The specification of the BPM culture concept provides practitioners with particular insights on what constitutes a culture that facilitates their BPM initiatives. In this regard, the examination of the determining elements of a BPM culture revealed a reference culture supportive of achieving efficient and effective business processes. BPM practice can draw conclusions from the identified reference or target culture by critically reflecting how far the organizational culture that is present in their corporation represents a BPM culture, i.e. how far their culture supports BPM.
- *Culture assessment*. The measurement instrument that was developed to operationalize the concept of BPM culture was instantiated in the form of an online survey tool that practitioners can use to assess the supportiveness of their organizational culture for BPM. The tool displays the personal results of the individual analysis immediately upon completion in a graphical presentation. Based on the perceived existing culture, the assessment provides insights how far each of the four BPM value dimensions and their respective sub-dimensions are lived in the organization. At the time of writing, the tool is available at www.cultural-fitness.org (further details: www.bpm-culture.org).
- *Effort estimation*. Based on the assessment of the supportiveness of specific organizational cultures for BPM – either through the online tool or through critical reflection of the BPM reference culture – practitioners can estimate how far cultural difficulties may occur when implementing BPM. In this regard, our research serves as a means for practice to determine the relative effort needed when establishing a BPM approach in an organization. In other words, the intensity of required cultural change can be estimated on the basis of an as-is-analysis of the organizational culture.

- *Action taking*. Additionally, knowing the as-is-state of the organizational culture in terms of its facilitating character for BPM and knowing the BPM reference culture, practitioners can derive measures to be taken to achieve a cultural change towards a BPM culture. The institutionalization of the identified BPM values may include corporate training programs, hiring guidelines, peer performance evaluations, rewarding schemes, etc. In this regard, assessing how far an organizational culture facilitates a BPM approach represents a first step towards identifying actions that can be taken to realize such a culture.

4.3 Limitations

As with any other research, the conclusions offered in this chapter should be interpreted in light of some necessary assumptions and boundary conditions that we had to impose to be able to reach some definite insights.

Notably, in order to be able to explain BPM culture, we needed to focus on one specific level of a group culture. While our research on the relation between BPM and culture revealed a framework that includes several cultural groups, such as national culture and work group culture, the subsequent research concentrated on organizational culture. This narrowed focus on culture was required to conceptualize the notion of BPM culture which had been identified as a facet of organizational culture that plays a crucial role in both the research field and the developed framework. In fact, an examination of the derived framework, involving a focus on additional group cultures, could have only revealed tentative, hypothetical results at the time because BPM culture, one of the core concepts of this model, had not been specified and conceptualized. On the basis of the operationalization of the BPM culture concept, future research can now empirically examine the framework, including a focus on specific group cultures such as work groups or nations.

Second, we have to stress that our work on culture has been influenced by our very own cultural background. In this research, it was assumed that BPM is a general scientific approach which comes along with specific values that are underlying this approach and which shape the concept of BPM culture. Since BPM originates from Western countries, the values underlying this scientific approach may be particularly characterized by Western cultures. Yet, it was not examined in this research how far the understanding of the management approach differs across cultures around the globe. In other words, this research abstracts from potentially varying notions of BPM culture that may be present in different contexts. In fact, the notion of BPM culture may not only differ across national cultures but also across company specific contexts like industry. For instance, it might be that in high-risk industry sectors (such as construction) BPM success is measured in terms of compliance achievements more so than in efficiency or effectiveness gains. In our ongoing research, we attempt to understand some of these contextual factors in more details.

Finally, we stress that typical research method limitations that relate to the way we executed our studies also apply. These include limitations regarding sample size, respondent bias or subjective interpretation bias of the data collected.

5 Conclusion

Our research has been driven by the desire to be able to specify how cultural values determine successful BPM. To that end, we conducted three core studies, which help to gain a better understanding how the concepts of BPM and culture relate, what makes up the concept of BPM culture, and how it can be measured. On the basis of this work, which has been discussed in this chapter, we can now proceed to study – and ultimately explain – with previously unachievable detail and precision how culture as a potential success factor can drive, or impede, BPM success in organizations. Our work to date is also already assisting end user organizations in understanding the cultural settings in which their BPM operates, and in identifying appropriate culture development strategies to improve the supportiveness of their organizational culture for BPM.

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Cultural Change in Process Management

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Abstract Organizational change management is an important task in the context of Business Process Management (BPM). Organizational change covers a broad range of topics, from strategy to corporate culture and performance management. BPM is at the center of change initiatives as the main lever for implementing change through process engineering. Yet, especially the cultural aspects of organizational change have not been systematically integrated into the principles of BPM. Since organizational change is mainly driven by projects, an integrated change method would be helpful to support the business process manager to achieve the goals of change. Existing methods, however, are often rather inflexible and do not cater to the situational needs of a change project. Moreover, they tend to focus on specific topics of change, for example, either strategy or processes or culture. This leads to a disregard of the interrelation of the relevant topics, and with this, the complexity of organizational change. As a consequence, an approach is required, which first of all supports the holistic analysis of an organizational change project, and secondly provides a method construction process which allows for a situational design of the change method integrating the relevant dimensions of organizational change as well as the involved "hard" and "soft" factors. This chapter introduces a corresponding approach.

1 Introduction

Successfully changing an organization is still one of the major challenges of today's management. A study by Jorgensen et al. (2007, pp. 1–19) points out that despite many approaches in theory and practice, still only 38% of the analyzed projects are considered successful. An interesting fact presented is the fairly low diffusion of

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_28,

formal change methods. In only 22% of the companies, a formal change method exists and is employed during the change process. The authors compare the maturity of change management with that of project management 20 years ago: the degree of improvisation during the process is high and the success of the change process depends on a fair amount of serendipity. However, considering the value that can be destroyed by a failed change process, the dependency on serendipity is not acceptable. The volume of only the merger and acquisition market of 200 bn. Euro in 2006 already justifies a closer look at how organizational change processes can be managed more efficiently.

Organizational change is mostly driven by Business Process Management (BPM) (cf. Oesterle 1995; vom Brocke et al. 2012). Almost any effort of an organization to adapt to new requirements involves at some point of time analyzing the processes (cf. Baumöl 2008). This step results in either initializing a process reengineering or a process engineering phase, depending on the degree of change that is to be introduced. The reason for the high significance of BPM for organizational change is first of all the function of processes as direct levers for implementing the strategy. Secondly, they serve as junction between the strategy and the supporting information technology (IT) solutions by defining the business requirements for the IT solution. As a consequence, each change – be it on the strategy level or on the task level – is directly dependent on BPM.

One of the critical success factors of transforming the company by changing processes is the responsiveness of the people and their true commitment toward the new ways of doing things. As a consequence, a “process culture” with values, beliefs, and process-oriented behavior needs to be established before the change process starts [also cf. Bucher and Winter (2014)]. Moreover, the challenge today is to foster the ability to manage evolutionary, continuous change rather than driving revolutionary change. As a consequence, the “unfreeze–freeze” paradigm cannot be applied here.

The change method, in which the approach of business process engineering is ideally embedded, plays an important role for the success of the change initiative. Current BPM methods often lack a dedicated change management approach (cf. e.g., Spanyi 2006). This is probably the case because these methods are designed to focus on the content related rather than the behavior-related change. Thus, mainly the so-called “hard factors,” which are much more tangible and communicable, are addressed and the “soft factors” are at most treated indirectly. This becomes very clear, when during a project meeting, the question about the way a change is addressed is answered by the process consultants by explaining the way new requirements or changes in the process design during the implementation phase are managed. This misunderstanding happens very often and shows that there is still room for improvement with respect to the awareness of the cultural issues of organizational change.

It does not help, though, to refer to change methods for solving this shortcoming.

The majority of change methods proposed in theory and practice (cf. e.g., Tichy and Devanna 1990; Friedman and Gyr 1998; Vollmann 1996; Doppler and Lauterburg 2000; Burke 2002; Kotter 2008) concentrate on specific change topics, such as change of culture or change of processes.[1] This is efficient with respect to the chosen focus, but it often neglects the complexity of the entire change process with its many influencing factors. The methods promoted by consulting companies tend to be strictly standardized and fairly inflexible. As a consequence, companies facing a change process often find themselves changing the change method before even starting, and as a consequence, lose the efficiency gains a standardized approach promises (cf. Classen et al. 2003, pp. 3–12). The change process is operationalized by a portfolio of change projects. The goals and milestones of these projects are defined by the goals of the organizational change. The projects are managed by the respective project management methods of the company, for example, PRINCE2 or standards of the Project Management Institute (PMI). Since these merely have a supportive character for change methods, they are not discussed in detail in this chapter.

The hypothesis on which this chapter is based states that only a comprehensive and flexible approach toward organizational change can foster the receptiveness of the intended changes. To solve this challenge, the following objectives are pursued in this chapter:

- Explain the prerequisites for dealing with organizational change.
- Present a framework for describing change projects and the relevant influencing factors.
- Suggest an approach for constructing situational change methods called "Change Method Engineering (CME)," which caters to the requirements of the people responsible for the change process, for example, the business process manager.

Such an approach combines hard and soft factors and integrates with this the relevant dimensions of organizational change. Moreover, it has to be flexible to its construction process as opposed to trying to treat all organizations more or less the same way.

An approach like this supports the business process manager facing the challenge of dealing with organizational change in the following way:

- The business process manager needs to understand the overall consequences of the proposed changes on both the "hard" and "soft" factors: CME takes into consideration the most relevant dimensions of organizational change and integrates them. With this, it does not focus either on "contents" or on "behavior," but builds the necessary bridge to provide the full picture.
- The business process manager needs to have a framework for modeling the change process and the resulting change projects with all relevant factors: CME suggests a framework for modeling both the change process and the change project in connection with its "hard" and "soft" context to gain a detailed understanding of the prerequisites and requirements of organizational change.

[1] vom Brocke et al. (2014) present the case of the Hilti corporation, providing insights into how change processes are facilitated by a so called "culture journey".

- The business process manager needs to have a toolbox for constructing change methods, which answer to the respective requirements of the situation the company is in: CME provides a method construction methodology, which has been deduced from successful change projects.
- And last, but not least, the business process manager needs to identify possible barriers to accept and to adapt to the new process architecture: CME provides a concept based on keywords for the analysis of the state of acceptance in the dimension "culture & emotions."

The argumentation is first of all built on the notion that change processes are driven by a chain of individual decision processes which cannot be deterministically foreseen. Thus, following a constructivist approach toward change, a flexible construction of the change method is mandatory. Secondly, the hard factors normally drive the emotional change process, both directly and indirectly. Only by integrating the hard and the soft factors, a successful management of the change process becomes possible. Figure 1 presents the building blocks of the chapter and their relationship. It shows that there are three basic factors which have to be considered when managing organizational change. First of all, BPM has to be established as a management approach within the company, since it serves as a basis for driving the change process. It does so in two ways: On the one hand, the intended change is implemented in the business processes and BPM is the approach to manage it. On the other hand, the principles of BPM are also applied for managing the change process. Secondly, the prerequisites for organizational change must be clear and understood. The questions, what went well and what went wrong in other change projects, or are there best practices, must be considered. Thirdly, the

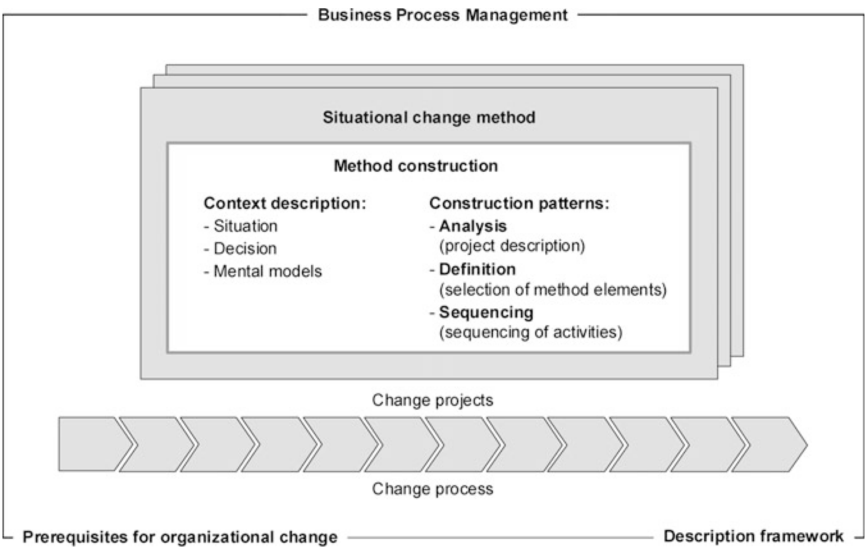

Fig. 1 BPM and change effects in the organization

change project must be clearly defined and documented. Thus, a framework for describing change projects must exist, which could serve as an input for the method construction process.

The change process starts with the first idea or need to change the organization and it goes on until the change is established within the organization. The goals of the change process are implemented by one or more change projects, which are based on a specific method [also cf. Bucher and Winter (2014)]. This chapter suggests a change method, which consists of two major parts: a framework for describing the project context and a procedure to construct a situational change method.[2]

The chapter develops in the following way: First, evidence is presented that the success of organizational change is in most cases dependent on the "human factor." Then, results of a 2004 study by the author highlight the most important factors for successful change from the perspective of the people "being changed." Following that, factors are presented which directly address and influence the "human factor" of organizational change. These factors are taken from an in-depth analysis of several change projects in the US (i.e., California), Germany, Switzerland, and Austria. With this, the prerequisites of organizational change are discussed. In the next section, a framework for describing change projects is presented, which was also developed based on the interviews of the 2004 study. As a basis for the method construction approach, the responsiveness to change is analyzed based on the concept of mental models. In the last section, based on the business engineering approach of method engineering, a method construction process is presented, which takes into consideration the requirements of situational flexibility as well as the integration of relevant dimensions of a change project. With this integrated approach, a systematic change process becomes possible, considering both hard and soft factors. It combines techniques from the engineering and business disciplines with approaches from organizational psychology. Moreover, in addition to the theoretical concepts, a case study is presented which shows the application of the presented ideas in a real-life company context.

2 Prerequisites for Modeling Business Process Driven Organizational Change

To understand and in the end manage the change process successfully, it is first of all important to analyze the influencing factors on success and failure of organizational change. The second step is to model, that is, describe the change project as comprehensively as possible to make it communicable. Lastly, it is crucial to understand the mechanisms and levers for successful change. These steps are the

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[2]Bucher and Winter (2014) propose a general introduction into situational method engineering in the context of Business Process Management.

groundwork for a systematic approach toward constructing a change method and thus, managing the change project. In the following sections, the basics of the three steps are presented. These are, at the same time, the foundation for the CME approach which is presented later on in the chapter.

2.1 Influencing Factors on Organizational Change

Recent studies have shown that the rate of success of change projects is still considerably low (cf. Jorgensen et al. 2007): only 38% of the projects analyzed are rated as successful in every aspect, 46% of the projects are considered "troubled," and 16% are rated as failure. Figure 2 sums up these results graphically.

Among the 220 projects analyzed, the reasons for troubled or failing projects are diverse, but eventually they can be traced back to mainly soft factors (cf. Jorgensen et al. 2007). To complete the picture, it is interesting to look at a different study which analyzed successful projects and the main factors for success (cf. Houben et al. 2007). Here it is interesting to note that also "hard" factors (e.g., existence of training programs, compensation, organizational structure, and performance management system) played a role in the success. These factors were not mentioned in the analysis of failure. This represents a contrast to the failure factors, which are mainly soft factors. Table 1 summarizes the failure and success factors ordered according to their relative importance.

These findings support an in-depth study of 52 companies on methods applied in change projects in the San Francisco Bay Area and the Silicon Valley, Germany, Switzerland, and Austria conducted by the author in 2004 as well as the literature analysis of 37 case studies and methodologies (cf. Baumöl 2008). The recent findings of Jorgensen et al. and Houben et al. show that the issues of organizational change management seem to be quite stable, so it seems to be safe to assume that the findings from 2004 are still valid.

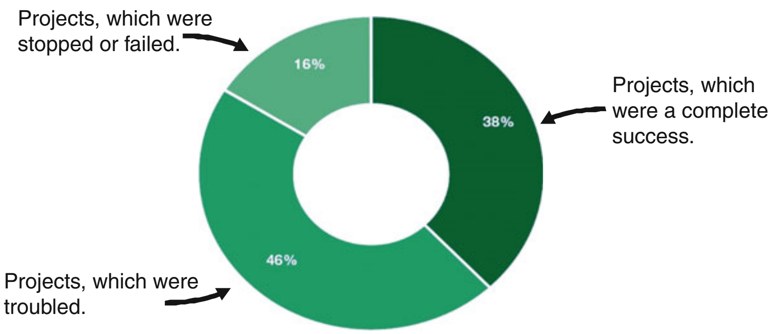

Fig. 2 Success and failure of change projects (cf. Jorgensen et al. 2007)

Table 1 Failure and success factors of change projects

Failure factors	Success factors
Insufficient commitment of management (61%)	Sponsoring by top management (83%)
Nontransparent goals and visions of the change process (56%)	Honest and up-to-date communication (73%)
Lack of leadership experience of management with respect to insecurity and fear of change (56%)	Involvement of employees (69%)
Conflicts within management (56%)	Motivating and change-friendly corporate culture (53%)
Lack of management support (52%)	Existence of "change pioneers" (39%)
Insufficient information, e.g., too late or incomplete (50%)	Efficient organizational structure (26%)
Insufficient room for coping with fears and resistance (46%)	Support of change process by alignment of corporate culture (21%)
Neglect of psychological factors within the project planning (43%)	Efficient training programs for the new processes and/or IT solutions (19%)
Insufficient human resources for the project (37%)	Compensation and incentives (16%)
Lack of confidence in the communication process between management and employees (36%)	Support of new structures by adequate performance measurement (12%)

One question of the interview questionnaire asked for the experiences with successful change and the relevant influencing factors according to the interviewee's opinion. Five main topics could be identified based on statements which reflect the major influencing factors on success. Similar topics have been identified, for example, by de Bruin et al. (2000). These topics are (also cf. Fig. 3):

- Strategy
- Leadership
- Sustainability
- Performance Measurement
- IT

To gain a certain degree of significance, only those factors were selected for defining the topics that were mentioned by more than 50% of the interviewees.

The main challenge stated by the interviewees was the balance of two different kinds of contexts: on the one hand, the commonly accepted and known context in which people are used to act, and on the other hand, the new and uncharted context which they are expected to adapt to within a short period of time. In other words, the balance of stable and dynamic structures within an accelerated change of context.

When people referred to strategic aspects of successful change, they mainly mentioned two things: first of all, the need for clarity about today's situation in connection with the clarity about tomorrow, that is, the target situation; and secondly, the structured transition process, which ought to be accompanied by a straightforward management of expectations, a reward system, continuous education for coping with the new structures and processes, an involvement of the people, and a clear and timely communication.

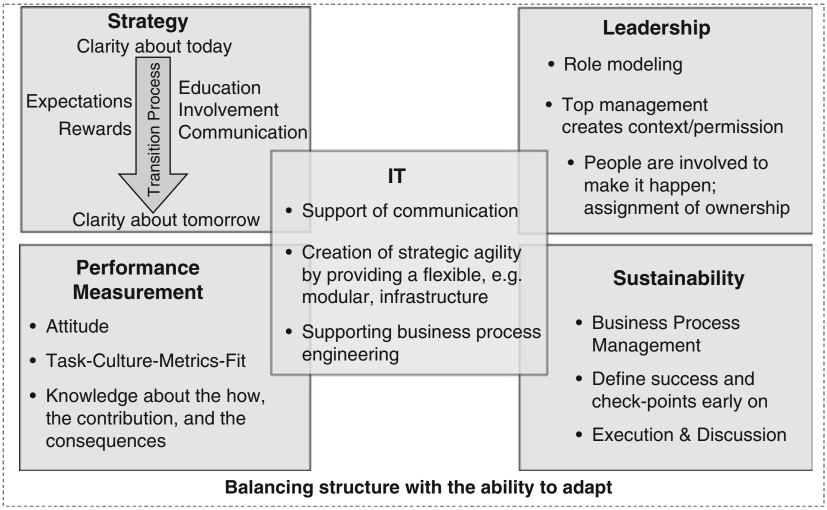

Fig. 3 Major influencing factors on successful change

Leadership aspects mentioned were the relevance of role modeling by top management and the change team, the importance of creating the right context for change, and an explicit approval of changed behavior. The last point is important, since accepted behavior in the "old world" often does not correspond with the required behavior in the "new world." Thus, top management has to make clear what the new rules of behavior are and that it is acceptable to change to them. Moreover, the interviewees stated that the assignment of ownership in connection with the already mentioned involvement were important.

When referring to "sustainability," the interviewees indicated that one of the most important success factors was the existence of BPM to provide a systematic approach toward the change of processes as a core activity within the change projects. In addition to this, they underlined the importance of a project-specific definition of its long-term, that is, sustainable, success after having finished the project, as well as the respective metrics and checkpoints. To do this already very early on in the project is important for target-setting and expectation management. At the same time, the interviewees claimed that the focus needs to be on the execution and the discussion of the results to proactively control the success of the project.

The next topic is performance measurement. In this context, performance measurement was referred to as the philosophy as well as the system that is used for setting objectives, defining metrics, measuring success, and defining as well as deploying measures for dealing with deviations. An important success factor mentioned here was the attitude toward the company in general and change in particular. The attitude is a prerequisite for accepting the performance management system and its metrics as well as measures. It can also be said that the more positive the attitude toward the company, the more receptive the employees are toward change. Furthermore, the interviewees stressed the so-called "task-culture-metrics-fit." This means that new tasks have to be aligned with (maybe to be changed) corporate culture as well as the metrics, which are used to measure performance. If, for instance, the company decides to establish a less hierarchic decision process and empower the employees, the hierarchical culture of the old days needs to be changed and the metrics have to honor a behavior which embraces the new competencies. If these three factors are not aligned, a cognitive dissonance (cf. Festinger 1957) occurs, which keeps the employees in continuous insecurity about their performance and contribution. This statement is furthermore supported by the interviewees. They claimed that during and after change projects, it was important for them to understand the employed measurement mechanisms, their specific contribution, and the consequences of their actions with respect to overall performance. They mentioned that often it was not quite clear how their performance was actually assessed and how their individual contribution impacted the performance of the company.

The topics "sustainability" and "performance measurement" have been separated to stress a typical shortcoming of change projects: even though a performance measurement system exists, the change project is controlled by typical project management-driven parameters, such as "on time," "on budget," and "on scope," rather than addressing the long-term effects and success of the project.

The last topic IT was mainly mentioned in connection with its support and enabling function. IT contributes to the success by facilitating communication and the exchange on the progress of the change project, its results and intentions. This platform function is considered crucial for the acceptance of change initiatives. Moreover, IT's task is said to support BPM and with this the implementation of the new or changed processes. Finally, it was mentioned that IT plays an important role in enabling strategic agility by providing a flexible, for example, modular, infrastructure.

These results clearly indicate that both hard (e.g., organizational structure or performance management systems) and soft factors (e.g., role modeling, incentives) must be integrated for a holistic approach toward change. The presented topics build the basis for gaining a systematic approach for modeling change projects, and thus, facilitate the communication process.

2.2 *Approach for Describing Change Projects*

Communication and exchange on the change project and the intentions, which are pursued by it, are mentioned to be important success factors. The basis for facilitating communication is a description of the project, which should be as comprehensive as possible. The present approach is based on keyword clusters to fulfill this requirement. These keywords are used to trigger the description of the underlying concepts, such as, for example, business model.

In the 2004 study mentioned above, keywords for describing change projects were elicited during the interviews and an analysis of change literature. These keywords can directly be connected to the topics, which have to be addressed for successfully managing change. These topics, however, are not independent from each other. Thus, the resulting 86 significant keywords have been subsumed under four clusters, which support their clear separation (for a full list of all keywords and the explanation of their allocation to the clusters cf. Baumöl 2008):

1. *Business architecture*: The business architecture is constituted by the business strategy and the derived business model, the process architecture, the structure of the supplier network, the company's position in the value chain, the skill set of employees, products and the characteristics of the customer base. Thus, keywords, such *as business logic, implemented management system, characteristics of decision processes, roles and functions, skill profiles*, or *technical infrastructure* are subsumed into this cluster. This cluster is, compared to the other three, fairly large. This is justified by the complexity of this cluster, since it covers all the contents-related issues of the change project.[3]
2. *Culture and emotions*: The corporate culture(s) and emotional configuration represent an important basis for responsiveness to change.[4] As a consequence, the description of the relevant factors and artifacts, which constitute this basis is crucial for the project. Keywords, such as *expectations of involved people, structure of power centers, key influencing persons and attitudes, stabilizing factors, history of the company's success, reasons for resistance,* or argumentation of *sense-making* belong to this cluster.
3. *Performance measurement*: The adaptation of the performance measurement system has been established as an important success factor during the interviews. Thus, it is not surprising that keywords for describing the performance measurement mechanisms came up in the course of the analysis. The following significant keywords are assigned to the cluster: *metrics to be used for measuring performance, activities for dealing with resistance and deviations from target values, speed of change, quality measures,* or *scenarios* for dealing with different prognoses.[5]
4. *Context*: The context into which the change project is embedded plays an important role. The context influences the options for the change project, that is, the freedom of action that is granted. Significant keywords for this cluster are:

[3]Burlton (2014) discusses the various aspects of planning and implementing business architectures from a process management perspective and presents a methodological framework for executing typical Business Process Management activities.

[4]Schmiedel et al. (2014) give an introduction in the concept of culture in BPM. Vom Brocke et al. (2014) report on a case study investigating into the role of culture in a global process standardization project.

[5]Heckl and Moormann (2014) provide a comprehensive discussion of process performance measurement.

the triggers for the change, possible discontinuities during the change phase, influence that stakeholders are exerting*, milieu of the industry,* or the *economic situation.*[6]

Since each change project has its specific characteristics and is thus almost unique, not all the keywords fit in any one case. This means that for the description of the change project, the most suitable keywords have to be selected. This immediately leads to the question which keywords are the right ones. One hypothesis of the 2004 study was that frequently occurring keywords define the so-called reference scenarios. These scenarios are used to define the general topics of change projects. By running a statistical cluster analysis of the keywords and the change projects they were connected with, it was indeed possible to confirm the hypothesis, and five reference scenarios could be identified.

These reference scenarios are:

- Strategy adaptation
- Improvement of strategic agility
- Business process engineering and business process redesign
- Communication and interaction with the customers' and business partners' networks
- Growth strategy and cultural aspects in a technological context

For each of the reference scenarios, a distinct set of keywords could be identified. As a consequence, a change project can be described based on this reference set and moreover additional relevant and situation-specific keywords can be added.

2.2.1 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part One: Description of the Change Project

In 2004, a mid-sized company in the financial services industry decided to reposition its IT organization toward an improved customer orientation. The goal of the change project was to establish an internal IT service provider within the IT department, but to have, at the same time, a direct interface to the business areas. Being a typical IT department, this required not only a change of the strategy together with a change in most of the processes but also a major change of its culture. To achieve this, CME in combination with the project management standards of the PMI were deployed.

The first step to describe the project and its context was to select the reference scenario: In this case, "strategy adaptation" was selected as the closest fit. Based on this, the standard set of keywords could be selected and during an initial discussion with the department head, three more keywords have been identified: *working*

[6]Bucher and Winter (2014) discuss the significance of situational particularities which have to be accounted for by Business Process Management methods.

Business Architecture

Way of communicating	Effects on products (output view)
Decision processes	Project scope
Method how the organization is developed	Project goals
Success factors of the change project	Process architecture
Skills profile	Degree of process orientation
Degrees of freedom to take decisions	Roles in the organization
Business logic	Way (style) of initialization
Challenges	Strategy process
Information management	Subject of change project
Intention and implementation	Degree of transparency
Core competencies	Drivers of corporate success and change
Communication channels	Existing change processes
Consequences of decisions	Degree of interdependencies
Customer satisfaction	Vision and mission
Management system	Value added
Organizational learning	Range in which the project takes effect
Planning of training and development of employees	Knowledge management process

Culture & Emotions

Addressees of the change processes
Working conditions
Dominant corporate cultures and sub cultures
Leadership: employees‘ activities and commitment
Leadership: Assessment of own skills and abilities
Leadership: cognitive diversity
Leadership: Management commitment and role modeling
History of past successes (company)
Communication behaviour
Power centres
Mentality/attitudes
Key influencing people
Fun factor
Stabilizing factors
Structure of group processes
Structure of communication networks
Sense making
Reasons for and manifestations of resistance
Mental models
Target behaviour

Performance Measurement

Metrics for managing of department
Incentives
Levers of control
Measures in case of deviations from target figures
Measures in case of resistance
Milestones
Qualitative metrics for controlling
Quality measures
Securing of sustainability
Scenarios
Speed of change

Context

Triggers
Influence by stakeholders
Milieu
Economic situation

Fig. 4 Example for the selection of descriptive keywords for a change project

conditions, required (target) behavior of the employees, incentives for good performance (cf. Fig. 4).

These keywords were used to describe the status as it is, as well as the target situation for the project, for communicating the goals and for exchanging ideas and standpoints with the people involved. It was a good basis for starting the discussion among the different groups throughout the department and to give the factual as well as the emotional discussion a direction or an anchoring, respectively.

The description framework provides an important technique, in the sense of method construction [cf. Fig. 6 and Bucher and Winter (2014)], to the business process manager. With this framework, he or she gains a holistic understanding of the project going beyond the sole focus on processes. Only with this understanding, the business process manager is able to design solutions for BPM tasks.

This section present the first step to initializing a change project – its thorough description as a basis for discussion. An interpretation of reactions and contributions to the discussion of the people involved in the change project as well as a conclusion as to their responsiveness to change, however, can only be successfully made if the underlying assumptions and beliefs are understood. Thus, the possibilities of analyzing and eliciting values, assumptions, and beliefs as constituent parts of the organizational culture needs to be discussed before constructing the situational change method.

2.3 Responsiveness to Change: An Explanatory Model

There are quite a few explanatory models with respect to employees' responsiveness to change (cf. e.g., Kotter 2008; Kanter 2003; Burke 2002; Strebel 2000; Watzlawick et al. 1974). The influencing factors which can be found in these contributions are diverse, for example, the definition and redefinition of the employment relationship, the group or rather peer structure, power centers within the company, the design of a vision of the new way to work and its communication, the importance of the "burning platform," the clear definition of the problem and its resolution, and motivational structures.

All these factors can be traced back to the way the employee perceives the current situation of the company, his or her position within the organization as well as the interpretation of the intended changes. From these pieces of information, the employee designs a model of the world and its operating mode; in other words, a mental model.

Already for some decades now, research on mental models has attempted to understand and explain human behavior (cf. e.g. Mathieu et al. 2000; Wilson and Rutherford 1989; Rouse and Morris 1986). Mental models are, in brief, a representation of the understanding of human knowledge about the world. Mental models are used to describe and explain observations as well as predict events (cf. Mathieu et al. 2000, p. 274). In this chapter, mental models are defined according to Rouse and Morris (1986, p. 360): they are "mechanism whereby humans generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states."

The concept of mental models can also be used to support the explanation of the responsiveness to change.

Norman (1983, p. 12) explains three properties of mental models:

- *Belief system*: A mental model reflects the belief system of the individual, which is acquired through observation, instruction, or inference. The belief system is a personal instance of the perceived world and corresponds to the situation in which the individual finds himself or herself, respectively.

- *Observability*: The properties of a mental model should correspond to the properties of the observed world and support the sense making process. Otherwise, the model cannot serve as an explanatory model for the individual. An example of this property is the belief of the early Greeks in the existence of Zeus: they explained natural phenomena with the existence of higher beings and with that could explain the observable phenomenon of lightning.
- *Predictive power*: The mental model serves the understanding and anticipation of the developing target situation. Thus, it ought to build on inference rules adapted to the information processing power of the individual to support the "running" of the mental model.

As a consequence, since the three properties can have different instantiations, it is safe to assume that there are different mental models with respect to daily business and change (cf. Klimoski and Mohammed 1994, p. 432; Cannon-Bowers et al. 1993). The mental models for daily business have evolved over time and build the basis for the development of a mental model of the change project.

The reception of change has not yet been fully understood. The use of mental models could be a means to gain a better understanding on why some individuals accept and endorse change and others reject it. The evolution of a mental model centers on individuals' assessment of their own capabilities and knowledge (cf. Mathieu et al. 2000, p. 274–275).

The 2004 study and the hints during the interviews have also proved the assumptions of the above-mentioned authors that the reception of change is influenced by the existing mental model and uncertainties about capabilities and knowledge with respect to four influencing factors. These factors are briefly described in the following:

- *Future*: Not surprisingly, change projects seem to be disruptive for the expectations of the future development. Almost anyone being in a change situation starts to make predictions about the future: What role/position, which responsibilities or new peers can be expected? Thus, it is mandatory to develop the conceptual model of the target situation, as has already been described in the previous section.
- *Skills*: The individual skills must be adequate for the already known or expected tasks or for new technology that is going to be implemented during the change project. Uncertainty evolves if the employee is unsure about the suitability of his or her skill level.
- *Workplace*: Working conditions belong to the group of very important but implicit, and thus, often neglected influencing factors of responsiveness to change. The expectations (e.g., improvement of working conditions, potential relocation, or new peers) connected with the change project play a vital role on how the mental model is developed.
- *Rules*: Change normally brings new rules to an organization. These rules can either have a normative character or belong to the newly developing culture and

manifest themselves either as organizational artifacts or implicit standards of behavior. Uncertainty can arise if the normative rules are not clearly documented in an early stage of the project or the new cultural rules do not become transparent and interpretable or adoptable, respectively.

The degree of uncertainty with respect to each factor influences the mental model each involved employee has of the change project. Thus, it could be a step toward a positive reception of the oncoming change to eliminate the uncertainty to a certain degree wherever possible. Since many instances of mental models can exist, which might differ only marginally, it is necessary to cluster these instances of the existing individual mental models to create profiles for efficient and targeted interventions.

The instances of these factors are moreover dependent on three other personal factors, which cannot easily be influenced, since they stem from the past:

- Technical and functional background: The employees have to be in the position to understand the intentions and objectives of the change project. A main requirement for this is their education and with this their ability to understand the technical and functional requirements of their tasks. This factor represents the required qualifications which an employee already possesses to fulfill a certain task. The factor "skills" refers to the skills which are required by the intended change and the employee might have to acquire first.
- Previous experiences, attitudes and "superstitions": Each employee has past experiences with almost any aspect of a change project, be it the technical objectives or the emotional or cultural effects. As a consequence, an attitude toward the project is developed, which can either be positive, neutral, or negative. It is important to understand the effects of the developed attitude to be able to interpret the ensuing behavior. The so-called "superstitions" or beliefs are another element of behavior. Superstitions have normally been developed over time and represent rules that seem to work even if they make no sense or cannot be validated. Nonetheless, these superstitions are deployed to the perceived intentions and objectives of the change project; especially, if the situation is new and unusual for the individual. Norman (1983, pp. 8–11) describes superstitions in connection with the use of a calculator: the observed persons pressed the clear-button several times because they were unsure of the functionality of the calculator and developed the belief that hitting the button several times for sure produces the expected result.
- Individual ability to process information: Each individual has a different capacity for processing information. This is also crucial for the responsiveness to change and needs to be addressed by selecting an adequate way of communication and providing information.

These factors need to be taken into consideration, but cannot be actively used to influence the reception of change.

To understand and influence the mental models which impact the outcome of a change project, it is necessary to form a conceptual model (i.e., an "objectified" model) of the target situation and compare this to the observed mental models of the target situation. The conceptual model tries to present the "objective" image of, for example, an IT system, which is the basis for explaining the IT system to a user and with this forming the user's mental model as to how the IT system works. Young (1983) and Greeno (1983) provided the first approach for dealing with conceptual and mental models. The conceptual model is a very important part of the effort to gain positive response to the change initiative, since it is the framework within which the employee is "trained" to understand and accept the new environment. The conceptual model has to fulfill three criteria to be of use (cf. Norman 1983, pp. 13–14):

- Learnability: The model must be easy to understand and interpret for the employees in the given context.
- Functionality: The model must provide enough input to understand the way the target situation works and the new "system" reacts.
- Usability: The model must correspond to the individual's ability to process information in the given context.

One conclusion which can be drawn from the above findings is that the design of the environment to enable employees responding to change in a positive way is the key. The employee uses the mental model as a guideline on how to act and behave in the familiar environment. To introduce new work processes or new ways of behavior, respectively, it is crucial to build on the present mental model and change it gradually. This means that new elements are added to the familiar environment rather than eliminating all familiar elements to start virtually from scratch.

One of the major requirements for an organization is, as already explained above, to be able to adapt continuously to the changing environment. Thus, the challenge for the business process manager is to balance the stable, familiar structures with new, flexible elements to foster the required ability to adapt. Information or rather the ability to process and make use of the information which is provided on the change project, its goals and the activities plays an important role. This information is processed within the mental model, which serves as the reference framework against which the new situation is assessed.

Method construction plays an important role in supporting the employees to accept change and contribute to the success of the change project. The construction process which is driven by the responsible person and addresses all employees who are involved in the change project makes the change effort visible, and with this, supports the adaptation of the mental model. At the same time, it serves as a means for communication. On the one hand, it enables the employees to deal with the change by exchanging opinions as well as fears. On the other hand, it enables management to understand the various responses to the change initiative, be it acceptance, skepticism, or rejection. This leads to the concept of shared mental models, which support the change effort by allowing the employees to build on their own mental models, compare them to those of peers, and discuss implications as well as next steps (cf. Stout et al. 1996).

Mental models are an important part of the context factors, which influence the change project, and as a consequence, are input factors for the CME. They are combined with two other input factors, “situation” and “decision,” and presented in the next section.

During the case study introduced above, some observations with respect to the influence of mental models could be made. These observations, although they were not in the main focus of the change project, are discussed in the following section.

2.3.1 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part Two: Observations on the Impact of Mental Models

Very early in the project, it became clear that three (more or less typical) attitudes toward the intended change were manifested: the “business-as-usual- prevails-anyway” attitude, the “it-is-about-time-let’s-change” attitude, and the “I-don’t-know-but” attitude. The observable attitudes are a manifestation of the mental models based upon which the employees receive and react to the intended change. Although it is difficult to objectively elicit mental models, it is possible to observe specific patterns of behavior and remarks which hint at the mental model. If the observation is introduced as a systematic instrument during the change project, it might help to influence the attitude, and with this, the underlying mental models. Although it was not done systematically in this project, some activities were directed to this subject.

The discussion of the above-mentioned attitudes during meetings and personal talks seem to prove the four factors as to how these models influence the receptiveness of change. The first attitude was mainly taken by IT specialists who had already seen some change initiatives and over time had come to the conclusion that nothing ever happens if they just do as they always did. Since the service orientation required the understanding of the user’s needs and requirements, which had not been in the focus in the mainly technology-driven department, it was especially important to influence this attitude. The introduction of the systematic description of the change project and method construction process helped to involve everybody in the department and catalyze discussion and engagement. This seemed to support the change of the first attitude. The second attitude is supportive of the intended change and most of the employees showing it, worked at the interface to the business areas; they could directly assess how important it was to understand the requirements. They were asked to be promoters of the change project, which worked quite well. The third attitude presents indecisiveness. The employees were skeptical about the change and mostly mentioned former, failed projects, which had already tried to introduce service orientation. It clearly helped to discuss the project and its goals in a systematic way and construct the change method with the involvement of the employees. However, not everybody could be convinced that the intended change would be beneficial in the end. As a conclusion, it can be said that the systematic and conscious handling of the existing mental models by first observing attitudes and using them for creating a conceptual model of the intended change could be advantageous for the success of the project.

3 Change Method Engineering: Method Construction for Organizational Change

Organizational change is driven by BPM – this is the foundation on which this chapter is based. As a consequence, BPM has to integrate not only strategic, governance or methodological, but also cultural aspects (cf. e.g., Spanyi 2006). Change is implemented through dedicated projects, which offer the chance to integrate BPM principles with those of organizational change. Thus, each change project should be based on a method which is constructed according to the specific situation. This method serves as a guideline for the course of the project. As the above discussion proves, a holistic approach, addressing both hard and soft factors, toward change needs to be pursued. The concept of CME has been developed to cater to the specific situational needs of change projects. It provides a toolbox for firstly systematically describing the change which is intended and the context in which it is embedded. Secondly, it is based on the above-mentioned set of reference scenarios and the pool of activities which support the implementation of the intended change (cf. Sect. 2.1) to select the "right" course of action for the situational method. And finally, construction patterns are suggested to support a systematic method development.

A change initiative has three phases: the pre- or rather planning phase, where the change method is constructed, the actual project phase (implementation I), where the change is implemented, and last, but not least, the phase "implementation II" where the move to daily business is made and the intended change is anchored within the organization.

The overall responsibility for the pre- and the project phase is with the project manager. Operational responsibility is delegated to the business engineer or the business process manager, respectively. One of the two has to manage the method construction process and its deployment throughout the phases implementation I and II (Fig. 5).

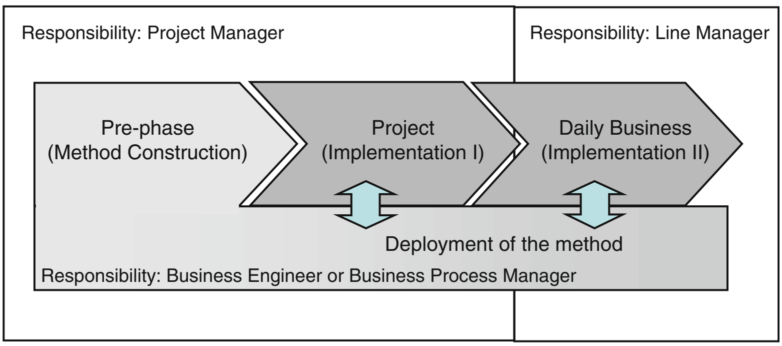

Fig. 5 Position of method construction during the change process

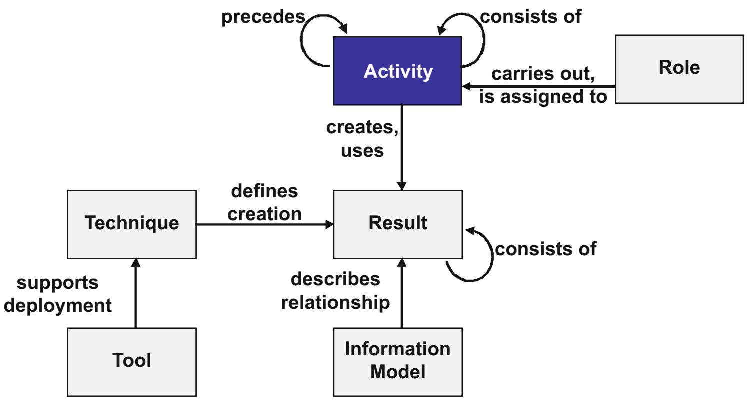

Fig. 6 Elements of a method

3.1 Basics of Method Construction

For a situational approach toward method construction, first the elements which constitute a method have to be defined. In a second step, the construction process has to be developed. According to Gutzwiller (1994), Oesterle (1995), Winter (2003), and Baumöl (2005), a method consists of activities, results of these activities, roles which are assigned to the activities, techniques supporting the activities, IT tools for documenting the results and an information model that ties the results logically together. The construction of the situational method develops around activities; they define the characteristics of the method. In Fig. 6, the above described elements are presented (cf. Winter 2003; Bucher and Winter 2014).

One of the questions to be solved is how the activities are gained. For the approach suggested in this chapter, the activities are derived from the descriptive keywords presented above. Each keyword can be translated into an activity, for example, the keyword "stabilizing factors" is translated into the activity "identification and analysis of stabilizing factors for the organization." As a consequence, the set of descriptive keywords for a specific scenario defines the activities for the change method.

The sequence of the activities is dependent on two things: there are activities which set the ground for the project, that is, they serve the determination, analysis, that is and documentation of the basic framework and the status quo of the environment into which the project is embedded (e.g., history of successes, business logic, power centers, and milieu). The second group of activities addresses measures, results, or consequences of the change project (e.g., measures in case of resistance, key influencing people, scenarios). This group of activities builds upon the first group and can only be defined after the first one. The sequence of activities within these two groups has to be defined by the project team and is highly dependent on the situation.

Project management activities, as they are defined in many companies, can be found in both the groups.

Depending on the activities, the other elements of the method are defined. These are, for example, the roles which perform the activities (process owner, project manager, change manager, etc.) and the results which are to be achieved (defined and documented processes, project plan, communication plan, etc.).

The method construction process is crucial, since it reflects the situation in which the change project is embedded. Even though it must be flexible and adapted according to the situation, it cannot be a more or less random process, but has to follow a structured plan, which supports the efficiency of the change project. As a consequence, the construction process belongs to the standard procedures of CME.

3.2 Structured Process of Method Construction

The method construction process consists of three phases: analysis, definition, and sequencing. These phases base on the so-called construction patterns, which are presented in detail in Baumöl (2008). In the following, the basic mechanisms of these three construction patterns are presented.

3.2.1 Analysis

The process of method construction is not only influenced by the context, but also by the mental model and the attitudes of the employees. As a consequence, an effective construction process has to integrate these influencing factors and start with defining them. The first step of the analysis phase is to understand and define the situation. This step requires first of all a precise description of the situation by focusing on the parameters, "complexity" and "risk," for both the current situation and the target situation. It is based on the topic of the change project and the ensuing reference scenario. Secondly, the decisions during the set-up of the project have to be analyzed. They are operationalized by the parameters "intention," "objectives," and "solution."

As a first step, the "situation" is described based on its defining parameters. The parameters, complexity and risk, are subsumed under the "problem domain." This domain represents the general definition framework for the project and the target domain (cf. Fig. 7). Complexity is operationalized by five perspectives in which complexity can manifest itself:

- *Organization perspective*, for example, a high degree of interdependencies within the organization drives complexity, and so does a very diverse background of the workforce.
- *Process perspective*, for example, a high maturity of the process architecture reduces complexity; a high number of involved process domains drive it.
- *Technology perspective*, for example, a high reusability of the IT infrastructure reduces complexity; the need for a considerable redesign drives it.

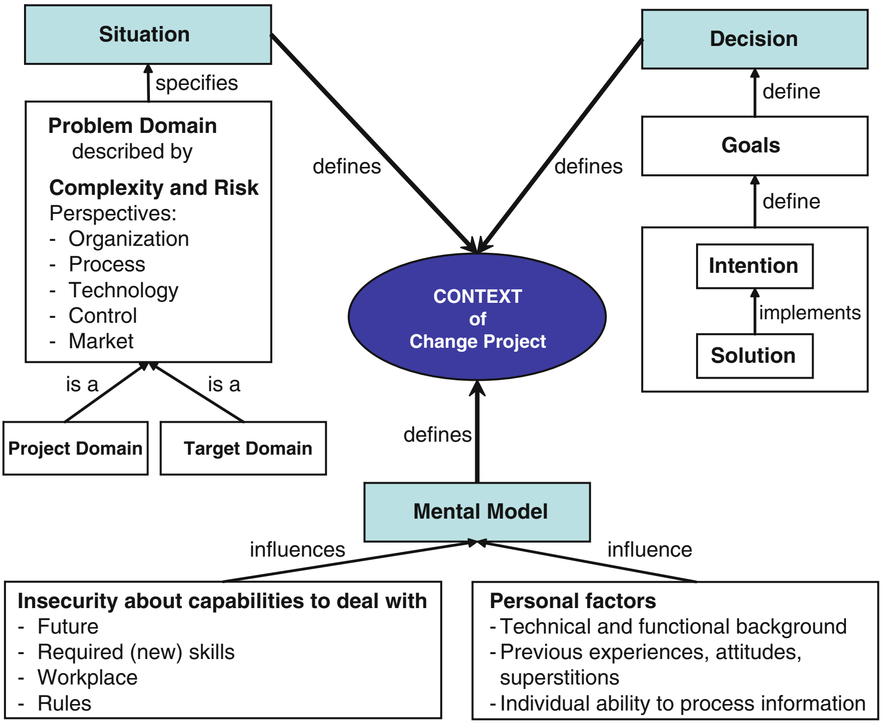

Fig. 7 Description of the situational context by three elements "situation," "decision," and "mental model"

- *Control perspective*, for example, a positive attitude toward the measurement system, maybe because of an attractive incentive system, reduces complexity; and so does a high maturity of the measurement system; a high degree of interdependency between various departments drives complexity.
- *Market perspective*, for example, a high dependency on suppliers drives complexity and so does a high sensitivity of the business model for innovations.

The documented analysis of these five perspectives leads to an overall estimate of complexity measured by the attributes "high," "medium," and "low."

Risk is assessed based on the same perspectives and analyzes the probability of the occurrence of a "risky" event, for example, from the organization perspective, the failure of the project due to resistance by the employees. The documented risk analysis of the five perspectives is also measured by the three attributes "high," "medium," and "low."

The second step describes the element "decision" by three parameters. The intention is analyzed as the first parameter. This is a text-based analysis of the prior and original goals of the change project. The approach to achieve these goals, that is, the chosen solution, is also described in this context and from these two parameters, the objectives which are directly related to the change project are deduced. Thus, a hierarchy of goals is defined: first of all, the overall goals of the intended change are set and then the objectives, in the sense of sub-goals for the change project or change projects, respectively, are deduced.

In a next step, the third influencing factor "mental models and attitude of employees" complements the tuple, which is thus constituted of three elements.

This factor is operationalized by the above-mentioned dimensions of uncertainty with respect to the individual's capabilities to deal with the intended change and the personal factors.

With this, the context of the change project, which requires a situational method is adequately analyzed and documented.

Figure 7 presents the tuple and the parameters used for operationalizing the context.

3.2.2 Definition

The second phase of the construction process is supported by the definition pattern. The goal of this process is to select the keywords for the description of the project and the activities for the method. This is carried out based on the reference scenarios and a discussion with the stakeholders of the project. Here, the combined approach of using standards or best practices and complementing them with the situational elements takes full effect: The reference scenarios provide the keywords which were used for the respective scenario in most of the analyzed, successful change projects and with this systematically support the selection of the keywords for the required comprehensive description of the change projects (cf. Sect. 2). Further keywords which refer to the specific situation can be added during the discussion process.

Since this step is crucial, this part of the definition process is constructed as an iterative activity. Only if the relevant stakeholders have committed themselves to the way of describing the project and the planned activities, the next phase, that is, the construction of the method, can be executed. Of course, the discussion process has to be restricted to a defined time frame to avoid endless loops of new or old arguments. As a result of this first step, a set of keywords is obtained, which can be used for the comprehensive description of the change project.

The next step in the phase "definition" is the deduction of the activities from the keywords as described above. The activities are the first elements of the method, which have to be selected to be able to define the rest of the other elements of the method (e.g., roles, techniques; cf. Fig. 6). The result of the second step is a concrete instance of these elements for the situational change method.

3.2.3 Sequencing

After the definition has been completed successfully, the third and last phase is the sequencing of the activities. The main goal of this step is to define the right sequence of the activities, that is, the phasing of the change project. This is carried out by developing various alternatives for the sequencing and discussing their pros and cons within the team and with the stakeholders.

After this last phase of the construction process, the method with all its elements has been completed and with this the pre-phase of the change project is concluded. Then, the project phase "Implementation I" can be started.

3.2.4 Case Study: Implementation of the Customer Service Idea Within an IT Organization; Part Three: Extract of the Results of the Method Construction Process

In the following, an extract of the results of the method construction process for the case study is presented. Figure 8 shows the activities and their sequencing. Another result of the construction process was a comprehensive list of the other elements of the method: all expected results of the activities, the involved roles, the techniques and the tools (e.g., ARIS), which were connected to the activities. As a support for the sequencing, two dimensions have been defined: four phases with respect to time and four blocks related to contents. These served as a basis for allocating the activities. The four phases were:

- Phase 1 "Initialisation and positioning"
- Phase 2 "Implementation"
- Phase 3 "Anchoring of the results"
- Phase 4 "Monitoring of the project success"

The four contents-related blocks were:

- Block 1 "Analysis of the prerequisites for the change project"
- Block 2 "Definition of the project"
- Block 3 "Definition of target parameters"
- Block 4 "Definition of control metrics"

The overall result of the construction process is the method "Internal IT Service Provider" consisting of a comprehensive description of the situational context of

Sequencing of the activities for the method "Internal IT Service Provider"	Phase 1 (3 month): Initialisation & Positioning	Phase 2 (10 month): Implementation	Phase 3 (2 month): Anchoring	Phase 4: Monitoring of project success
Block I: Analysis of the prerequisites of the change project				
Analysis of business logic				
Analysis and definition of value-added (as-is perspective)				
Analysis of customer satisfcation (as-is perspective)				
Analysis of process orientation (as-is perspective)				
Analysis of economic situation				
Analysis of working conditions				

Fig. 8 Extract of the results of the method construction process

the change project according to the abstract example in Fig. 7, a comprehensive description of the project itself (cf. Fig. 4), a list of activities and related elements and finally a chart with the sequencing of the activities, ordered according to time and contents.

The definition of the activities and the dependent building proved to be fairly easy, since the keywords were used as a basis and they represented already a common understanding of the change project. The sequencing, however, was much more subject to discussions and the responsible project member had to strictly guide the process. The method was then deployed and brought the expected success. Minor alterations during the process had nonetheless to be made, reacting to changes in the project context.

The application of the CME approach proved beneficial for structuring and communicating the change project and its goals. For the organization, it was the first time to explicitly model structures and openly discuss chances and risks of the intended change. The procedure to clearly describe the project and its context as well as the way to proceed during the project was well received and evaluated as a considerable improvement. Moreover, the support by the pool of method elements and the integrated approach to include all relevant dimensions of change were highly appraised. However, applying the method created a higher planning effort and increased the communication needs, thus taking up more time than other projects, especially for the responsible people. Sometimes, it was received as bureaucratic because of the need to explicitly document results in a fairly detailed way. Since it was the first time the method was applied, the learning curve was arduous although it was also steep. As a conclusion, it can be stated that to harvest the benefits of the method, it seems first of all to be necessary to follow a pragmatic approach when using the method, that is, “keep it simple and flexible.” Secondly, to make use of the learning curve effect, it should be introduced as a standard and be used for each change project. A dedicated training for the people driving the method in the organization seems to be a good addition since project management or process management training does not provide the entire picture.

To continuously improve the method construction process and enhance the pool of activities, a systematic management process is necessary. This process is described in the next section.

3.3 Management Process for Change Method Engineering

The management process for CME focuses on two steps: on the one hand, the structured procedure for constructing the method; and on the other hand, the continuous updating of the pool of activities as well as reference scenarios and enhancing of the knowledge base. This is necessary for a systematic use of CME to take advantage of the learning curve and to establish continuous improvement. The left-hand side of Fig. 9 (cf. Baumöl 2008, p. 156; Gericke and Winter 2006, p. 234) represents the above-described phases of the method construction process. The right-hand side presents the improvement process and its elements. The existing

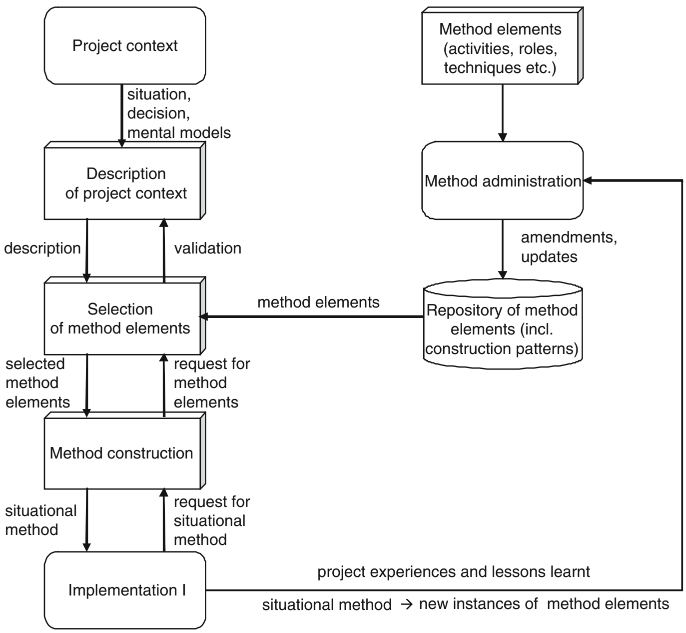

Fig. 9 Management process for CME with respect to the construction process and a continuous improvement

method elements constitute the initial knowledge base for method construction. Experiences from projects, new method elements, and other lessons learnt are used to enhance the initial knowledge base. Method administration is responsible for this step and the result of method administration is a so-called "repository of method elements," which also includes the construction patterns.

4 Conclusion

Change is for sure necessary for the survival of each individual and each company. Nonetheless, change projects create a high amount of tension within a company and often conflicting sentiments. Even worse, change projects tend to paralyze companies for a considerable time span. The responsiveness to change, be it accepting or rejecting, is a critical success factor for each change project. As a consequence, it is important to understand which factors seem to be important for the people with respect to change, how the mental model of change is created and finally, what are the possibilities to influence the responsiveness for the good of the people as well as the company.

All three questions have been addressed in this chapter. The first objective was to explain the prerequisites for dealing with organizational change. The analysis provided a systematic basis for initiating a change project: they answer the questions “what must be considered” and “which mistakes could be prevented from the start”.

The second objective was to present a framework for modeling change projects and the influencing factors. The resulting framework is the first one to support the comprehensive description of a change project considering hard (e.g., the process architecture) and soft factors (e.g., the influencing factors on mental models). Further research here is to investigate the options for eliciting and describing mental models by maybe defining certain profiles. Once mental models can be explicitly modeled and communicated, their influence on the change process can be further analyzed and activities for influencing existing change models can be added to the pool of CME activities.

The third objective was to suggest an approach for constructing change methods, which can be flexibly adapted to the specific situation. To achieve this, the concept of CME has been introduced as a means to drive change projects in a structured way by also taking into consideration the emotional prerequisites within the company. Further research in this area is necessary with respect to analyzing and complementing the reference scenarios and to complete the pool of activities without overloading the basis. Moreover, the systematic training of business engineers and business process managers with respect to the integral approach for organizational change must be driven onward by specific programs. What has already been achieved for project management must now be carried out for change management: establish standards and the communication of best practices rather than treating change management like a process whose results are serendipitous at best.

With these results, CME contributes to the domain of BPM by providing a comprehensive approach for supporting the business process manager to drive organizational change. It does not only consider the contents-related aspects of business process-driven change, but also the success-critical aspects of culture.

However, even though CME provides a framework for effective and efficient change, the business process manager has another crucial part in the change project. He (or she) is responsible for the construction of a situational change method which reflects the specific situation of the project. A thorough understanding of the system “organization,” and with this also the success factors of business process-driven change, is mandatory. The business process manager is the bridge between the hard and the soft factors of change.

There is still considerable research required in this field to understand the “people factor” of change. It is important to note that this research process can only add value if companies and universities work together closely and construct solutions for successful change initiatives.

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How Organizational Culture Facilitates a Global BPM Project: The Case of Hilti

Jan vom Brocke, Martin Petry, Theresa Schmiedel, and Christian Sonnenberg

Abstract The role of culture in business processes is often underestimated. Especially the success of Business Process Change depends to a large extent on the employees' willingness to adapt to a new work environment and eventually accept short-term losses for long-term benefits. We, therefore, engage with the Hilti Corporation analyzing the role of culture in a specific change project. After introducing the Hilti business model, we take a closer look at the measures taken at Hilti to actively manage a global culture by means of the Culture Journey. Against this background, we examine the impact culture may have on Business Process Change. The IT-driven change project Global Processes and Data (GPD) at Hilti serves as an example for exploring the way in which culture affects process change. We conclude deriving some lessons learnt from the Hilti Case on the role of culture in BPM.

1 Introduction[1]

Every company has its own culture with its own values which become apparent, for example, in the actions of the employees. The culture develops along with the history of the company, and therefore represents the people's behavior. However,

[1] Please note that this is a revised version of the chapter by vom Brocke et al. (2010) published in the first edition of the BPM handbook. We have kept the original data and conceptualization of the case, but we have taken out some theoretical background parts. In this regard we refer

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_29,

culture is not passive, it is not just a pattern *of* behavior. The culture of a company can actively be shaped as a pattern *for* behavior (Neuberger and Kompa 1987) – as Hilti does. Hence, it is an important step for a company to identify its core values as the origin of the corporate culture. Most of the times, these values, have led back to the vision and attitude of the founders of a company and have developed over time (Buß 2008). In this study, we want to investigate the specific situation of Hilti's corporate values, which in fact have been shaped strongly by its founder Martin Hilti, who started the company in 1941 in Schaan, Liechtenstein. Today, Hilti is a leading company for products, systems and services for the construction industry in more than 120 countries around the world.

In 2000, Hilti launched a major BPM project bringing all eight production plants, more than 50 sales organizations, and over 20,000 employees into one single global ERP system. From 2009 to 2010 we had the opportunity to investigate into this project based on document analysis and interviews involving major stakeholders of the project, including Martin Petry, co-author of the chapter, who is the CIO at Hilti and who was responsible for the BPM project under observation.

Another major aspect of the case is that Hilti upholds a clear value orientation and has developed the concept of the Culture Journey to facilitate that its employees become aware of the corporate culture and actually live the corporate core values. Apart from various activities belonging to this concept, Hilti summarized its approach to cultural awareness within the organization in a book provided to every employee. Below, an excerpt of this book is presented, alluding to what the Culture Journey at Hilti is aiming at:

> The way we do things at Hilti is based on living strong values. We act with integrity in all we do. We demonstrate courage to go beyond the circle of habits. We outperform through teamwork and we have commitment to personal and company growth. We share a common purpose of passionately creating enthusiastic customers and building a better future. We take responsibility for the development of the business, our team, and ourselves. We encourage, coach, and support each other to achieve outstanding results.

With such a statement, Hilti may not differ much from other corporations or organizations. However, as the people and corporate core values are vital to the business model of Hilti, much effort is put into making sure that the employees at Hilti really live up to these values.

With these two rather unique characteristics (a) the impressive BPM initiative with only a few of its kind and (b) the remarkable investment of Hilti in developing – and living – a clear corporate culture, the case can be used to investigate into potential relations between the corporate culture and BPM success. The overarching

to more thorough introductions which have been made available by now such as vom Brocke and Sinnl (2011), Schmiedel et al. (2013), as well as the introductory chapter by Schmiedel et al. (2014) in this handbook. By using the original data and conceptualization from 2009 to 2010 we intend to keep constancy to further publications taking additional perspectives on the case, such as vom Brocke and Sinnl (2010) and vom Brocke et al. (2013).

question in our research was: to what extend might the cultural values at Hilti (and the initiatives of the cultural journey in particular) have contributed to succeeding in the BPM project? In addition, what conclusions might we be able do draw from this case on a more general level?

In the following, we present the Hilti business model in which culture plays an essential role. We then take a closer look at the measures taken at Hilti to actively manage a global culture by means of the Culture Journey. Against this background, we analyze the impact culture may have on Business Process Change. We take the IT-driven project of Global Processes and Data (GPD) as an example and set out exploring the role of culture. As to our prior source of knowledge, we report on the results of interviews conducted with managers of Hilti. Finally, we conclude deriving some lessons learnt from the Hilti Case on the role of culture in BPM.

2 Culture as an Integral Part of the Hilti Business Model

2.1 Introducing the Hilti Business Model

In order to understand the relevance of corporate culture within Hilti's business processes, it is necessary to have a look at the business model of the Hilti Corporation. It can be seen that the organization's culture plays an essential role being perceived as the backbone of corporate success. In this section, we first give an overview of the business model and its various elements, before studying the mechanisms of realizing and maintaining a strong culture in more detail.

The Hilti business model is essentially framed by two elements: (1) *customer value* and *sustainable profitable growth* as the primary *objectives* (output), and (2) *passionate people sharing a motivating culture* as the essential *drivers* for business (input). Both elements span the Hilti business model displayed in Fig. 1. The various elements of the model show how Hilti aims to realize its objectives.

The model illustrates that business is initially driven by "Purposes and Values" that are shared by the "People" working at Hilti. These purposes and values are continuously communicated and further developed within the process of "Our Culture Journey." For guiding business activities the "Champion 3C strategy" is another essential pillar in the business model. Processes responsible for creating customer value and sustainable profitable growth are the engines of the business model.

All pillars of the business model are connected with a feedback loop, driving the continuous improvement of individual pillars. In the following section, these pillars are described in some more detail providing a framework for our further examination.

Fig. 1 The Hilti business model

2.1.1 Purpose and Values

At Hilti, the purpose of business is summed up by the Hilti Core Purpose Statement: *We passionately create enthusiastic customers and build a better future*. This statement nicely illustrates both, objectives and drivers of business.

Regarding the objectives, Hilti goes beyond the common goal of customer satisfaction and – according to the objective of creating customer value – draws the picture of the "enthusiastic customer." This underlines the intention to create success for the customers by identifying their needs and providing innovative and value-adding solutions. In one interview, a manager puts it as follows: *It is not about selling customers a drill, it is more about providing them a complete fastening solution in a certain situation. That means: where to put that hole, how to measure it, how to make that hole, what to fill it up with, and to ensure that a building is going to stay there for 10, or 20, or 50 years – and doing all this in an efficient way and in line with highest health and safety standards.*

Enthusiastic customers already account for one aspect of Hilti's sustainability objective. Building a "better future" also relates to this objective and is further defined through the following elements: (1) to foster a company climate in which every team member is valued and able to grow, (2) to develop win-win relationships with partners and suppliers, (3) to embrace responsibility toward society and environment. In discussions with representatives of the company, it became apparent that Hilti's responsibility-driven attitude may particularly ground on the special business Hilti is active in. A manager explained it like this: *Hilti is not about putting pictures on the wall. It builds tools to hold buildings together, to make sure that bridges do not fall down, to make sure that tunnels are safe, to make sure that concrete sticks to steel or steel sticks to concrete even in the most difficult conditions and environments*. This shows that sustainable solutions are a key objective for Hilti to serve its business purpose.

With regard to the drivers in the business model, Hilti's employees share the following corporate values:

- *Integrity*: Integrity means being upright toward all people you interact with, acting according to principles, incorporating a holistic perception, and feeling responsible.
- *Courage*: Courage stands for having a backbone, being brave enough to go beyond the obvious and proven and exploit new ideas.
- *Teamwork*: Teamwork signifies pulling at one string, sharing a common goal, using synergies and therefore enlarging competence.
- *Commitment*: Commitment implies identifying with the company, feeling an inner engagement for accomplishing high performance.

Hilti's corporate values account for a motivating culture and passionate people as important drivers of the business. These values serve different goals at the operational level. They provide a basis for both selecting new personnel, and developing employees within the Culture Journey. As a manager stated: *When we recruit people we ask: Do they fit our corporate core values? And if we see this guy is not so much of a team player [...] we do not even start looking at the skills.* Furthermore, Hilti's values provide a framework on how to work together in the business processes.

The priority given to purposes and values at Hilti is visible in the Culture Journey. Its impact will be analyzed later on in this chapter.

2.1.2 Our Culture Journey

The Culture Journey at Hilti is a corporate initiative that intends to make sure that the corporate purposes and values described before are meaningful to all employees working at Hilti. These approximately 20,000 people work in more than 80 market organizations around the world. In this global setting, a specific process is needed in order to foster a shared understanding within the company, and to help people identifying with the company. The Culture Journey binds people to act together and is an important source of motivation and integration. A manager underlines the importance of the initiative: *We need to ensure that everybody sings the same song. And we do that through the Culture Journey, continuously working on our corporate values.*

The implications of the Culture Journey for the business model in general, and also more specifically for BPM, will be further explored in the remainder of this chapter. Before going into more detail, the other elements of the Hilti business model will be briefly introduced in order to complete the picture. This will help better understand the various effects of Hilti's corporate culture.

2.1.3 Customer, Competence, and Concentration

In order to be the *customers' best partner,* a manager explains, *sales people and product managers continuously listen to the specific needs of the customers.* Many innovations are driven out of customer needs reported to, or experienced by, the product managers in the field. Therefore, the overall objectives of the corporation are transformed into tangible action plans and strategic initiatives are derived. Within the Hilti business model, the *champion 3C strategy* serves that purpose. It draws on *customer*, *competency*, and *concentration* as the main strategic *drivers*. Before, we described Hilti's enthusiastic people and motivating culture as the main drivers for business and customer value as a main objective. At the same time, customers are seen as business drivers. This shows the corporation's business understanding as being process-oriented in the sense that customers represent both beginning and end of the business process. Hilti's strategic drivers are specified as follows:

- *Customer*: *We want to be our customers' best partner. Their requirements drive our actions.*
- *Competency*: *We are committed to excellence in innovation, total quality, direct customer relationships, and effective marketing.*
- *Concentration*: *We focus on products and markets where we can achieve and sustain leadership positions.*

Specific initiatives are derived from these drivers. For example, Hilti employs a direct sales model and does not sell through a distributor network, or through wholesalers. That means a customer always buys a Hilti tool from a Hilti employee and thus communicates his needs directly to Hilti. Focusing on direct customer relationships is the key for Hilti being excellent in innovation.

In order to put these strategic drivers into practice, Hilti applies a strong process oriented structure building the next pillar of the business model.

2.1.4 Processes

In the Hilti business model, four process areas are defined on the corporate level, each of which is further distinguished on more specific levels.

- *Product Portfolio Management*: This aspect essentially deals with the design of new products. On the top level, it comprises the management of the entire portfolio of products and services across a life-cycle. It also comprises research and design of specific products on the more detailed levels.
- *Market Reach*: Considering the Market Reach process, five different sales channels are differentiated, namely (1) Hilti centers, (2) Territorial sales people, (3) Pro Shops, (4) B2B (incl. Hilti online), and (5) Customer Services.
- *Supply Chain Management*: On a daily basis, Hilti purchases significant amounts of material and delivers a high volume of its products to its customers. Supply

chain management deals with the logistics and the warehouse management by means of logistic centers. Moreover, the management of relations to its supply-chain-partners is an essential element for Hilti in order to achieve win-win situations.

- *Professional Services*: These processes include delivering after sales services. An essential part is dealing with repair services which should be provided with a favorable quality and speed. Another important part of Professional Services is fleet management: Customers pay a low monthly fee for the use of a Hilti tool and also experience a package of value added services that deliver direct business benefit.

In addition to the processes characterizing the core business, a process area for *management and support* is distinguished. In particular, IT services are located therein, supporting the four process areas.

All processes are measured in terms of outcomes in order to actively manage their contribution to the corporate purposes and values. These outcomes form the next pillar to be described as part of the business model.

2.1.5 Outcome

According to the primary objectives, Hilti is aiming at customer value and sustainable profitable growth. These goals can be translated into business goals at a more operative level. Sustainability translates, for example, in high quality as an undisputed element in the Hilti business model. At the same time, profitability is focused on. That means Hilti safeguards efficiency, in order to deliver high quality at reasonable costs, and in appropriate time.

For further operationalization of the objectives, visions are created covering the development of a 5–10 years life-span. In 2000, for instance, “Vision 2008” was announced named “Accelerated Profitable Growth.” As part of this vision, the goal was set to have a yearly turnover of four billion CHF and 450 million CHF of profit by 2008. As these goals were already reached before 2008, a new vision was announced in 2006, namely “Vision 2015: Be a Great Company.” One goal is to double sales to eight billion CHF per year, and to more than double profit by 2015.

In addition to the financial operationalization of the objectives, Hilti follows a stakeholder approach (vom Brocke et al. 2014), looking at the value contribution of the processes from the perspective of all stakeholders. Considering the employees’ perspective, for instance, Hilti aims at ensuring that everybody at Hilti grows into their job positions according to individual capabilities and preferences. In the same way, win-win relationships with the suppliers as service providers are an essential part of the value concept. Apart from the stakeholders directly involved in the processes, Hilti is also concerned about a positive impact on society and ecology. As a consequence, Hilti is actively involved in social welfare projects around the world, for example, in Sri Lanka and in Brazil.

Against the background of the Hilti business model, the role of corporate culture in BPM can be analyzed in more detail. In the following chapter, we examine the specific mechanisms of realizing and maintaining a corporate culture.

2.2 A Closer Look at Culture: The Hilti Culture Journey

It is comprehensible that "any successful process management effort requires a strong emphasis on culture, leadership and change management" (Davenport 2008, p xvi). While there is evidence on the importance of cultural aspects in BPM (Hammer 2014; Armistead et al. 1999), little is known about specific measures to actively consider corporate culture in BPM (Baumöl 2014; Gore 1999 for some discussions on probable measures and actions to design organizational culture; Lee and Dale 1998; Zairi 1997). As to the example of the Culture Journey at Hilti, we can now study such measures in more detail and analyze the leverage of these initiatives within a global BPM project.

There are different phases toward a consciously lived corporate culture. These include the development, the realization, and the maintenance of the corporate culture and its values. Regarding the development, a company's culture is based on the values and visions of the founders for the most part, and develops over time according to various internal and external influences. Very often, neither managers, nor other employees, are aware of the corporate culture. Awareness, however, is the first step to actively shaping it, accomplishing major changes, or harmonizing it worldwide. It is the first step to realize an aspired corporate culture.

2.2.1 Realizing a Corporate Culture: Taking Efforts for Values

Moving toward a specific corporate culture is a very intense undertaking. The more people are involved in an organization, the bigger the challenge to integrate people of different socio-cultural backgrounds. Sustainable initiatives are required that go beyond single workshops.

Hilti's tool to realize its aspired corporate culture is the Culture Journey. That means every employee goes through several so-called "team camps." These camps are organized off-site, and intend to foster teaching and learning of corporate values. The effort taken to organize and conduct these trainings is significant. *I have never seen a corporate initiative that costs millions a year to make sure that everybody is on the same page,* a, manager states. *And we are not talking about half an hour: The first team camp takes 2 or 3 days and we continue in that fashion resulting in 2–4 days of commitment every year,* the manager keeps on reporting.

Thirty-eight thousand working days were spent on the Culture Journey in 2007. In 2008, the working days even increased up to 53,000 days per year.

Every new employee of Hilti attends a training called "Welcome to Hilti." This is a 5 day event, of which 2–3 days are solely spent focusing on a "fast track"

Culture Journey. Further camps follow, according to a standardized process, making sure that everybody is going through the same training and getting new employees up to speed.

Summing up, we can conclude that quite a significant effort is made at Hilti realizing the corporate culture worldwide. Apart from building up a common understanding, initiatives for maintaining the corporate culture are also considered.

2.2.2 Maintaining the Corporate Culture: Making Values Relevant

Hilti's corporate culture is also embedded into the management process. Annual ratings are conducted in order to examine to what extent the corporate culture is actually lived by the employees. The degree of the aspired culture's realization is measured and consolidated – measured at the individual team member's level and consolidated at the department and group level.

For each employee "Performance Metrics for Personal Development" are evaluated by means of a scorecard, including sections for each corporate value dimension: integrity, courage, teamwork, and commitment. Based on this scorecard, regular feedback talks are conducted. As one manager reports, the corporate values are under close surveillance. If an employee, for example, lies and therefore violates integrity, the dismissal of him or her is taken into consideration. At the same time, *Commitment is strongly acknowledged* and employees receive appreciation for their contribution to the corporation's success.

Apart from the individual management of team members, the core corporate value rating also is an essential part of the performance measurement on the group and department level (see Fig. 2).

As part of the overall Performance Measurement a global employee opinion survey (GEOS) is carried out particularly capturing cultural issues. GEOS is a large scale survey that is conducted anonymously and that serves to comprise people's perspectives on the company. The survey, which nearly all employees participate in (well over 90 %), includes more than 80 questions focusing on areas such as direction, execution, trust teamwork, encouragement, and recognition regarding the department, team, and individual performance level. For instance, employees are asked to evaluate the work-relations in the team. Further questions elude to what extent employees' feel they understand the link between their work and the overall business, or to what extent they have the feeling of being supported in their personal development and career.

Following up on the ratings, Hilti takes actions to make sure the corporate culture can be maintained. Within this process, the employees' feedback is a valuable source of knowledge regarding the measures to take. Continuously examining to what extend the corporate culture meets the vision of it is an essential part of the Hilti business model *primarily fuelling the sustainable profitable growth at Hilti*, as one manager points out.

As a result we can observe that Hilti follows a systematic process in realizing and maintaining its aspired corporate culture worldwide. We now focus on the IT

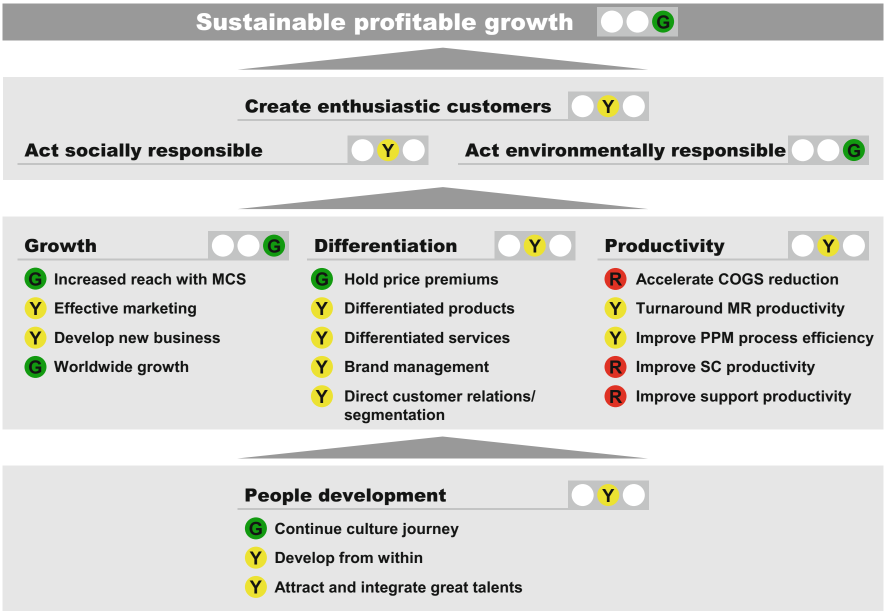

Fig. 2 Sample of a corporate value cockpit chart. *G* green, *Y* yellow, *R* red

department analyzing the impact the Culture Journey has on this particular department. Subsequently, we will take a closer look at the GPD project that was mainly driven by the IT department.

2.3 *Implications for Hilti IT: A Business-Driven IT-Strategy*

Even though IT plays an important role throughout the entire business processes and, therefore, cannot be separated from "business," the alignment of business and IT is an issue. This can be seen from both theoretical discussions on the two disciplines and from the governance structure in practice where most often there are IT departments separate from other departments. Hence, the clash, or rather the alignment of business and IT, is widely discussed (Coombs et al. 1992; Guzman et al. 2008; Leidner and Kayworth 2006; Robey and Boudreau 1999).

At Hilti IT, a strong alignment with the overall corporate values can be observed ensuring that the corporation's business and IT go in the same direction. In particular, the Culture Journey had a significant impact on the Core Purpose Statement, terminology, and organization of Hilti IT.

2.3.1 Impact on the IT Core Purpose Statement

According to one of the IT Managers, it was within one of the team camps that people from Hilti IT created their own Core Purpose Statement. Just like the overall Hilti Corporation has a statement that describes the purpose of the corporation (*We passionately create enthusiastic customers and build a better future*) Hilti IT also started to work on the creation of such a statement. It reads as follows: *We passionately enable business excellence through global IT solutions.* The Hilti IT Core Purpose Statement was carefully derived from the Hilti Core Purpose Statement by questioning how Hilti IT can contribute to reach the overall objectives. IT is, thus, not at all seen as a means in itself, but as a means to support excellence in business.

2.3.2 Impact on the IT-Terminology

The Culture Journey led to a change in thinking that had an impact on the terminology used at Hilti IT. Right out of the discussions driven by the Culture Journey, there was the intention of expressing the idea of global cooperation in the wording commonly used. *We need to have the courage to completely disband having or even using the term "local IT." You are not local IT anymore, you are now "global IT."* This action was indeed a small change, but it turns out to make a specific difference. For example, the Spanish IT team is no longer a "local IT" team, but rather an "onsite IT" team, and part of the global picture.

2.3.3 Impact on the IT-Organization

In terms of work practices, the Culture Journey also contributed to "breaking down departmental walls" and fostering cooperation between the departments. The implementation of joint *task forces,* for example, developed directly from the attitude to take responsibility valuing teamwork. In these task forces, business and IT people, for instance, work together on innovative solutions. According to our interview partners, the task force members do not perceive themselves as representatives of individual departments. They are not *us and them*, as a business representative said. *That is not IT and this is not us. We are a team. Yes, we do not belong into the same department but we sit in the same room*, he explained further.

Summing up, we can learn that the Culture Journey has a significant effect on the way IT is carrying out business at Hilti. In particular, there is no divergent sub-culture but rather a strongly business-oriented IT. As the examples show, the shared corporate purposes and values had been a major source for the development of a new IT-Strategy. What we have not analyzed so far is the leverage of the corporate culture. In order to do so, we will look at a global BPM project at Hilti.

3 Global Processes and Data: An IT-Project Driven by Culture

3.1 Scope of the Project

Realizing the IT-Strategy of 2000, Hilti started quite a remarkable project on GPD. The objective was to overcome local data and process silos by introducing global standard business processes and standardized data structures supported by a global SAP solution, managed centrally from the headquarters in Liechtenstein. By the end of 2008, in excess of 95 % of revenue, in excess of 40 sales organizations, and all eight production plants were operated on one global system. This means more than 15,000 users work with SAP ERP and 6,000 users also work with SAP Mobile.

Global standards for processes bear great potentials in terms of economies of scale. However, at the same time, these initiatives may face tremendous resistance from the local actors (Brenner et al. 2014; Tregear 2014). While methods for modeling standardized processes and process variants may well be at hand, particularly from the field of reference modeling (vom Brocke 2007; Hallerbach et al. 2014), there are strong obstacles with regard to people giving up well established local processes for the sake of globally "dictated" ones.

Against this background, the GPD project is considered an ambitious initiative. It was conducted following multiple waves and has until now been perceived as successful. For our study, such a huge transformation project was interesting to pick as an example to reflect the role of corporate culture in this process. We mainly base our study on the assessment of the managers who were actively involved in the project.

At first, we analyze the scope of the GPD project in more detail. Driven by the IT strategy, GPD particularly required: (1) a global scope, and (2) an orientation toward the support of globally decentralized sales processes.

3.1.1 IT Becomes Global

One objective of the IT strategy was to globalize IT. Before the implementation of GPD, the organization of Hilti IT was fragmented, that is, having two chief information officers (CIOs), one CIO of Hilti, and another one for Hilti North America, in addition to multiple independent IT heads locally, who reported to local management teams.

A Hilti IT Manager described the need as follows: *A centrally managed IT with one global CIO was needed to properly handle a globally used, integrated business application environment for 15,000 users.*

After redesigning the organization of Hilti IT, the "onsite IT" teams would report to the regional infrastructure managers (RIM) who, then, would report to the central

IT team at the headquarters which is called "global IT." The RIM are split up into five regions: the Far East region, three regions in Europe and the Americas.

To make sure that Second Level Support for all Business Applications is available at all times, three strategic locations for the Second Level support teams were selected. *We apply a follow-the-sun Second Level support concept. We went with Kuala Lumpur in the Far East, Headquarters in Schaan, and Tulsa in the US almost perfectly within an 8-8-8 h schema,* an IT manager explains.

Consequently, moving toward a global IT has not only led to economies of scale, but also accounts for Hilti's employees further growing together, practicing teamwork on a world-spanning scale. Therefore, the process change impacts Hilti's culture, providing a flow of activities that intensifies global collaboration among employees.

3.1.2 IT Supports Sales

The IT Strategy also had to account for the fact that Hilti is not only a production company. Actually in terms of headcount, Hilti is a service company involving most people in direct sales. One manager put it like this: *The majority of people are not making drill hammers. Actually, the majority of people are involved in direct sales. Globally we have 200,000 customer contacts every day.*

Hence, it is crucial to support the customers in the best way possible *by driving integrated marketing and sales processes through its Market Reach community, creating outstanding customer relationships and MR productivity. That's what CRM @ Hilti is all about.*

For this purpose, Hilti built a global process for CRM, which entails a comprehensive 360 customer information offering, the seamless integration of all sales channels, as well as a structured Sales Management Process (SMP). This defines the relationship between marketing and sales, the proper planning of the weekly customer visits, as well as the execution on the road. It is a natural extension of Hilti's Champion 3C strategy (Customer, Concentration, and Competence) which translates to being the customer's best partner, having the customer requirements drive actions, delivering excellence through innovation and total quality, and ensuring a direct customer relationship. To accomplish this, Hilti selected to base all customer relevant information on an integrated CRM system. This tool enables the 360 picture of the customer base, which all Hilti sales channels are utilizing, fitted to their specific needs.

The vehicle chosen to deliver and capture a significant portion of this information is an SAP based, in-house optimized solution, named TS-Mobile. With a PDA, the territorial salesperson gets the information concerning upcoming customer visits and logs customer information and sales activities, eventually synchronized into the SAP CRM and ERP solutions.

Hilti was well aware of the fact that introducing GPD was not only a matter of deciding on an information system, and therefore an IT project. On the contrary, the biggest difficulty of the process change was to have employees around the world change their daily way of work and adopted work patterns. Challenges had to be foreseen which are now discussed in more detail. The role Hilti's corporate culture played in overcoming the difficulties of the change project will be considered afterward.

3.2 Challenges Within the Project

Introducing GPD, brought in massive changes not only for Hilti IT, but also for all Hilti employees. Following the corporate culture, it was considered essential to integrate people in the change process from an early stage, in order to facilitate acceptance of the new system and to get support in the new processes.

In this section, we illustrate specific challenges within GPD in order to better understand the project and the changes for the employees going along with it. We differentiate between (1) organizational issues and (2) financial issues.

3.2.1 Organizational Issues: Restructuring Hilti IT

The organization of Hilti IT underwent significant changes initiated by the GPD project. These changes are related to business process orientation and include three perspectives: subject areas, infrastructure, and governance.

The subject areas within the IT were closely aligned to the business processes, namely the following three (in alphabetical order):

- *D-area*: comprising development, production, supply chain, and logistics. This area is aligned with *supply chain management* and *product portfolio management*.
- *F-area*: basically comprising support and management functions, finance, human resources, and back office support mechanisms. The corresponding business area is *management and support*.
- *R-area*: comprising sales channels such as Hilti online, the TS mobile, and CRM. This area corresponds with *market reach* and *professional services*.

For the support of the three areas, Hilti IT established so-called Process Competence Centers (PPCs) according to the D, F, and R-area (Rosemann 2014).

Furthermore, an effective and powerful infrastructure was considered vital. The infrastructure layer in Hilti IT is supported by a team covering technical components such as servers, storage facilities, laptops, operating systems, or application provisioning. Another layer in Hilti IT is the governance, which is concerned with enforcing business excellence, ensuring IT security, coordinating operations, and conducting performance measurement.

Accordingly, the IT leadership team, consisting of nine managers, is equally partitioned into three managers on the governance side, three managers on the infrastructure side, and three managers on the PCC (subject areas) side. That way a maximum alignment with business can be provided, consolidating the infrastructure, governance, and PCC perspective in one IT leadership team.

Restructuring the organization of Hilti IT was a difficult undertaking since it necessitated both changes in work practices, and changes in responsibilities.

3.2.2 Financial Issues: Adjusting the Budgeting Structure

The new organizational structure also had implications for the budgeting. Before implementing the global IT strategy, responsibility for the IT budget was in the hands of the (now called) "onsite IT" of each market organization. This was changed to a centralized model, according to which global IT autonomously governs the entire IT budget.

This change had a significant impact on the work practices and also affected the employee's perception. For example, the salaries of the IT people working in the onsite IT department used to be paid from the local market organization, which are now paid out of the centrally managed budget. A manager gives further examples: *If the IT in France wanted to buy a server they bought a server. If they needed maintenance on a router they bought that in Paris. As a consequence of this global IT strategy that has changed.* The global IT infrastructure team, as explained above, is now centrally managing the purchases of hardware and network capacity, thus disburdening the "onsite IT" teams and achieving economies of scale.

We can conclude that the GPD project at the Hilti Corporation brought along significant changes. These changes are driven by the economic potential of GPD and they are essentially facilitated by the IT infrastructure. However, we see that the effects of the initiative are not at all limited to IT. On the contrary, the managers reported on – to some extent – dramatic changes to the way people do (and perceive) their work. Therefore, GPD seems to affect both processes, and culture and the introduced challenges can account for enough reason to have a project like GPD fail. Since most parts of the change project have already been completed by now, we are interested in the results of the project, particularly in the role Hilti's corporate culture played regarding the challenges of the project.

3.3 The Role of Culture: Assessing the Cultural Leverage

Given the strong initiative at Hilti in realizing and maintaining its specific corporate culture, we are particularly interested in the role the Culture Journey played in the GPD project. Our interest is based on the fact that IT projects most commonly fail due to a lack of user acceptance (vom Brocke and Thurnher 2009; Baumöl 2014). This is the case particularly in projects which require changes in people's work practices to a large extent. Therefore, the support of these people is a crucial success factor (Anderson and Ackerman Anderson 2001; Hlupic 2003). As former IBM CEO Gerstner puts it, *culture isn't just one aspect of the game – it is the game. In the* *end, an organization is nothing more than the collective capacity of its people to create value* (Gerstner 2002).

With respect to previous studies, we therefore assume that (1) the Culture Journey and, especially, the shared corporate purpose fostered the support of the initiative since employees understand the benefits of the global initiative. In addition, we assume that (2) the corporate values – integrity, courage, teamwork, and commitment – have a positive influence on the people's behavior during the change project, and thus contribute to the effectiveness and efficiency of the project.

1. Overall influence of the Culture Journey on the support of the project
   Regarding the shared corporate purpose, representatives of Hilti perceived the Culture Journey as a facilitator for the change project. *We couldn't implement global solutions without Global Processes and Data and indeed without this commonly shared understanding driven by the Culture Journey, I think the project would not have turned out to be a success* a manager stated in our interviews. Of course, resistance was also part of the people's reactions in the GPD project: *No doubt that also challenges come along making people change their habits and giving up their well established practices for adapting to blueprints. But still, the corporate culture provided a means to manage these issues.* A shared corporate culture cannot prevent resistance in all cases, but it accounts for a common understanding that helps overcome those resistances.

   In addition, the corporate purpose gives a clear frame of reference explaining the need for change. Since Hilti integrated every employee right from the beginning, people felt being part of the global picture. The common corporate purpose gave meaning to the action of the single employee which in turn, for example, raised the willingness to work with the new ERP solution. People thus were able to accept single short-term discomfort for overall long-term benefits.

   As Hilti emphasizes the maintenance of its corporate culture, e.g., through its recruitment process and the Culture Journey, it ensures the sustainable success of projects like GPD. One manager put it in a nutshell: *Let's face it: you either get on or off the bus – and those people working with Hilti are happy to be on it. This has once again proven true regarding the great changes within the GPD project.*
2. Specific influence of the corporate values on the implementation process
   In addition to the overall support of the changed initiative, we further analyze the role of the corporate values as a potential facilitator for implementing change in the GPD project. In fact, the managers reported positive effects of the corporate values regarding the change process.

3.3.1 Integrity

The interviews revealed several effects of integrity. The organizational change of aligning the structure of Hilti IT with the structure of the corporation's business, for instance, is a stringent logic consequence of living integrity. It means that the entire corporate change serves consequently building a better future starting inside the corporation. People are likely to follow a project that is part of a bigger picture, when they already defined integrity as a value for themselves.

As all employees incorporate a holistic perception, it was thus easier to demonstrate the usefulness of the project as one essential driver for acceptance. Even though some changes were perceived as unfavorable for the market organization, at the same time they made sense from a holistic perception.

Integrity also facilitated the management of the project since each team concerned with the implementation of tasks was responsible for its actions. *If you say you are going to roll out a new solution, then roll out the solution. If you say you are going to do that by June 1st, then do it by June 1st*. Considering the scale of the project, a high level of accountability was crucial for project management.

Furthermore, the position toward Hilti's stakeholders was a key factor for the change management since it led to a broad understanding for the challenging situation during the project.

3.3.2 Courage

The corporate value of courage proved to be an important facilitator for the GPD project. Starting the initiative, already took courage considering the dimensions of the business process changes. While this was courage on the management side, our interviewees reported that courage was also a major source for people in the market organizations to leave the circle of their habits. *It took courage to kick of this thing at first, but also courage from all the people adapting to new ways of doing their job, without really knowing where this would lead them.*

In addition, the corporate value of courage imposed further positive effects on the management of the project. The characteristics of giving honest feedback contributed much to the efficiency and effectiveness of the initiative, as it was reported. *We have the principle, 'brutal facts, no blame' which is a matter of courage. This attitude for example, helped a lot: Obstacles appearing throughout GPD were communicated in a timely manner, and solutions were found.*

Courage set a positive climate for taking the risk of realizing the GPD project. In addition it also helped managing the required changes, particularly by means of an open and honest way of cooperating with each other. This relates to teamwork, as another important corporate value at Hilti.

3.3.3 Teamwork

The managers reported that another prerequisite for succeeding in the GPD project surely was 'sharing common goals' and 'pulling at one string' as it is referred to by the corporate value of teamwork at Hilti.

Apart from the general situation of people working together, a special quality of team work within the global change project was reported to us. This is the element of interlinking teams and building new teams involving members of different disciplinary settings worldwide: *Hilti employs high performing and specialized teams, being very good in one task but not necessarily in another. However, in order to implement a global solution by means of GPD, building multi-disciplinary teams became a vital necessity. For example, this takes accepting that I am in IT but I am going to be working in this very business related project or the other way round.*

Furthermore, the attitude of learning from each other turned out to be of major importance for the project. For that purpose, the environment of open communication and honest feedback created an atmosphere of respect and openness that helped to also learn from failures in the project. *If something is not working out as planned it has to be communicated. Learning from communicated failures of past projects and acknowledging these failures was vital for the GPD project. And even more so, it enabled Hilti IT to report a good success rate of IT projects nowadays.*

3.3.4 Commitment

The commitment of the employees involved in the GPD project was perceived as a major success factor by our interviewees. Not only the commitment of team members, but also the commitment of the senior and executive management was pointed out in the interviews. *There was definitely a need for commitment from the executive management and executive board to accept effort, impact and cost of the project. And this commitment to support IT and push GPD has always been there. It was clear for everybody right from the beginning that GPD really is of strategic importance to Hilti.*

Regarding the GPD project, the perception of the decentralized market organizations played a major role as they were directly affected by the change. Their commitment was of utmost importance in order to make people change their habits. Thinking in terms of the overall corporation and transcending, for example, departmental structures already accounted for significant commitment in the project. Interestingly, the people's commitment also affects the economic results of the units: *Right after we go live in any market organization their KPI's may deteriorate. Training is not enough, data is never fine, and change management is never prepared enough. Very seldom do you see them improve immediately, but rather it happens over time. That was strong commitment of the people believing in us and going along with the change.*

We see examples of the facilitating role of the corporate culture functioning as a driver of stability in Hilti's change project. Both corporate purpose, and values, played a significant role in supporting the GPD project. Hilti's employees living the corporate values account for a large part of the success in coping with the challenges of this change project. Against this background, we would now like to draw some conclusions and also indicate directions for future research.

4 Conclusion

In this chapter, we examined the role of corporate culture in BPM. Regarding our source of knowledge, we studied a real life example, reporting from interviews conducted with representatives of the Hilti Corporation. At Hilti, culture plays an essential role for business. As such, it is also incorporated as the major element in the Hilti business model. The systematic process, called 'Our Culture Journeý' helps disseminating and living the corporate culture on a global and corporation-wide scale. For the IT department, this initiative particularly led to a business-driven IT strategy.

As to the role of culture in BPM, we can conclude that the Culture Journey was both a driver and an enabler for change. It can be considered a driver regarding the GPD project as the IT Core Purpose Statement called for global solutions that could be met by managing processes and data within a global IT setting. In addition, the Culture Journey also turned out to be an important enabler for the GPD project. According to our interviews, the changes were hardly possible without the clear corporate business model. More specifically, it is this facilitating role of the corporate culture that is of foremost interest for BPM in general. Hence, we further set out analyzing the potential leverage of the Culture Journey within the GPD project.

Within our study we found several good examples showing that positive effects on the change project could be realized by the Culture Journey. We particularly analyzed to what extent the corporate purpose in general, and the corporate values more specifically, were perceived useful by the interviewed managers for conducting the GPD project. It indeed remains an open issue to quantify these effects in terms of an economic leverage.

Apart from the impact Hilti's corporate culture had on the change project, we also found that the change of processes influenced culture. Process improvement allowed for an intensified way of living the teamwork value on a global scale.

Drawing from the statements of our interviewees' one might conclude that GPD would not have been as successful in absence of the specific corporate culture. Hence, the earnings of the initiative might be kept in mind when evaluating the leverage of the Culture Journey. Just as well, the implementation efforts could be taken into account. However, such issues can hardly be calculated and were thus better left to their qualitative nature.

What we can learn in terms of value considerations, however, is that efforts in culture are investment-related in nature. Shared corporate purpose and values once realized (and continuously maintained) may well serve for multiple purposes within the corporation. In our study, we picked the GPD project as one example, while at the same time numerous other fields exist to which the corporate culture delivers value, such as avoiding high employee fluctuation and a related loss of knowledge, or arranging win-win situations with business partners.

Our findings reported in this chapter are – indeed – limited to the Hilti Case. We analyzed corporate documents and conducted interviews with managers involved in both the Culture Journey, and the GPD project. However, considering the early stage of research on culture in BPM, we aimed at utilizing this case study for setting a basis for future work, and eventually stimulating further research in this important new field in BPM.

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Creativity-Aware Business Process Management: What We Can Learn from Film and Visual Effects Production

Stefan Seidel, Katherine Shortland, David Court, and Didier Elzinga

Abstract Creativity is of considerable importance to many organizations and is a core competitive factor in a variety of contemporary industries. Consequently, process managers increasingly ask: How can I successfully manage an organization without crushing creativity? In this chapter, we describe an approach to creativity-aware process management that is based on the understanding that many value-creating processes comprise both well-structured, transactional parts and often highly creative parts. We explain how the creative parts ("pockets of creativity") can be identified and described in those processes that highly rely on creativity ("creativity-intensive processes"). Our explanations are grounded in studies in film and visual effects production (VFX), but we argue that 'conventional' industries can learn much from their management practices. We propose a set of guidelines that can support process managers in successfully managing creativity in business processes without systematically crushing it. We use the case of a leading Australian VFX company in order to illustrate our explanations.

1 Introduction

There has been an increasing awareness that the management of business processes that involve creativity is critical. This is true not only within the growing creative industries (Hartley 2005; Hesmondhalgh 2002), such as game development and film production, but also within industries such as software development and

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This chapter is mainly based on Seidel (2009, 2011) and Seidel et al. (2010).

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_30,

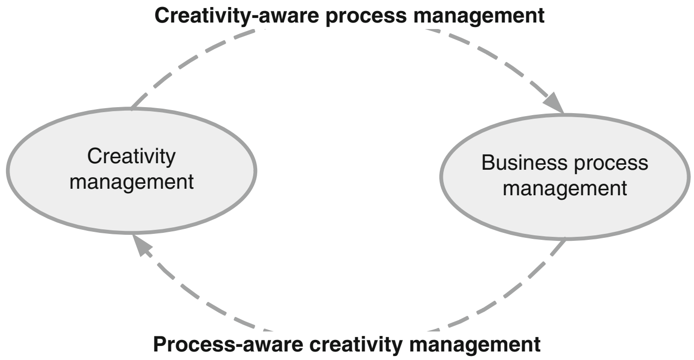

Fig. 1 Creativity-aware process management versus process-aware creativity management (Seidel 2009)

pharmaceuticals that rely on the creativity of their employees. Creativity is commonly associated with the generation of products, services, processes, or ideas that are both novel and appropriate (Woodman et al. 1993; Amabile 1996). Amabile (1998) states that, despite its importance, "creativity is undermined unintentionally every day in work environments that were established – for entirely good reasons – to maximize business imperatives such as coordination, productivity, and control" (p. 77). Managers are thus forced to ask: *How can I successfully manage an organization without crushing creativity?*

In recent years, Business Process Management (BPM) has shifted the focus toward so-called human-centric or knowledge work processes (Davenport 2005; Eppler et al. 1999; Harmon 2007).[1] BPM researchers and practitioners have been recognizing the role of knowledge, judgment, collaboration, and individual capabilities in many critical processes, ranging from financial operations to healthcare, art, design, and entertainment. The literature reveals important factors, such as high levels of required autonomy, motivation, and expertise (e.g., Davenport 2005). Still, creativity as a driver for the innovativeness and competitiveness in organizations deserves special attention in BPM (Seidel 2009, 2011).

Figure 1 suggests that the recognition of the importance and impact of creativity on BPM may be called *creativity-aware process management*. The recognition of BPM as a management approach with the potential of effectively managing creativity may be called *process-aware creativity management*. Our focus is on creativity-aware process management, which is built around the concept of the *creativity-intensive process*.

[1] Human-centric processes are discussed in detail by Harrison-Broninski (2014). Approaches to support knowledge work by means of process management are presented by Davenport (2014).

Over the last few years, we have studied organizations from the creative industries in order to understand how creativity influences business processes and their management (e.g., Seidel 2009, 2011; Seidel et al. 2010). The creative industries are those which focus on creating and exploiting intellectual property (Hartley 2005). Prominent examples are the film industry, visual effects (VFX) production, or the development of computer and video games. The processes we studied can be described as highly dependent on creativity, interdependent, complex, and intensively involving the client. We have learned that such processes are characterized both by divergent and convergent thinking as well as an often vague understanding of the requirements of the creative product. In conjunction with different subjective perceptions brought in by a variety of involved stakeholders, this leads to high uncertainty with regard to process flow, required resources, and particularly the outcome (Seidel et al. 2010). In fact, in many cases the specifics of the outcome are not fully understood until the process is completed. As a consequence, the process manager is faced with particular challenges, such as high risk exposure and high demands for flexibility.

In this chapter, we introduce a model of creativity-intensive processes. We explain how creative organizations manage these processes in order to pursue both operational and creative process performance. In doing so, we describe the concept of *pockets of creativity* that conceptualizes creativity in business processes and we explain how organizations can manage creativity at a process level. We propose guidelines to support process managers in successfully managing creativity without systematically crushing it. We will use the case of a leading Australian VFX company in order to illustrate our explanations.

2 Illustrative Case[2]

Rising Sun Pictures (RSP), is an Australian VFX company exclusively dedicated to the production of effects for feature films. The company is based in Adelaide and Sydney. Clients of RSP include major Hollywood film studios, international producers, directors, and VFX supervisors. The company has contributed to films such as *The Lord of the Rings, Harry Potter,* and *Superman.*

The increased value share of VFX in film and television (TV) has contributed to more and more globalized competition which is accelerated by emerging technologies such as high definition television (HDTV) and digital intermediate (DI) postproduction paths. VFX companies that have traditionally relied on the creativity and flexibility of their resources are now increasingly forced to apply contemporary business approaches, such as BPM, to stay competitive.

[2] The case study was conducted between 2006 and 2008.

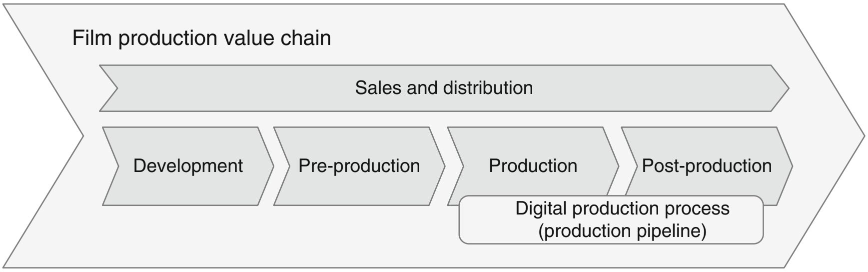

Fig. 2 Film production value chain

The film production value chain can be roughly divided into the stages of development, preproduction, production, and postproduction (Clevé 2006). Within the development stage, tasks such as budgeting, financing, and scheduling are carried out to initiate a project. Preproduction deals with all the aspects related to the practical production needs, such as casting, location scouting, etc. Subject to the production phase is the actual shooting (Clevé 2006), that is, the production of the feature film, TV commercial, etc. The postproduction phase comprises all the steps that have to be done between production and final delivery (Clark and Sphor 1998), such as editing or sound editing. The creation of VFX is also within this phase (Wales 2005). Although the creation of VFX is often seen as a separate production process called the digital production process (e.g., Kerlow 2004), it typically begins parallel to the production phase. Figure 2 visualizes this model.

The main process of RSP is the so-called VFX production pipeline, which generates digital sequences for films. The pipeline comprising complex sets of processes is characterized by innumerable interdependencies and high levels of creativity which result from the complexity of the generated products. For example, generating a VFX shot requires the creation of the so-called bones, textures, and animation. The primary outputs are computer-generated images (digital assets) that can contain characters, animations, and realistic simulations. One such example is an animated spider. Figure 3 shows the results of an intermediate process step of generating the spider (the so-called mesh). These computer-generated images will later be part of a shot that includes footage from production. Thus, there are also interdependencies with production processes. For example, the spider may be dangling from a web in a barn that was shot on a “real world” set; hence the intimate connection to the production stage.

The generation of VFX is a resource-and labor-intensive process. Even short sequences may take the work of several weeks or even months. Thus, ineffective management bears huge financial risks.

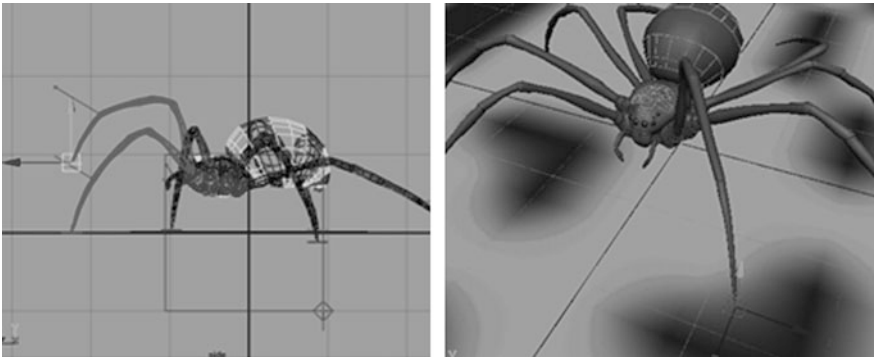

Fig. 3 An exemplary outcome of a VFX process: an animated spider

3 A Model of Creativity-Intensive Processes

3.1 The Dynamics of Creativity-Intensive Processes

Mastering creativity in organizations requires us to understand the *creative process,* the *creative product,* the *creative person,* and the *creative situation,* as well as the interaction between these components (Woodman et al. 1993). In creativity-aware BPM, we propose a process-centric view that establishes a connection between these components: Creative persons are actors in business processes who generate creative products. Thus, the creative product is a process-oriented object that is characterized by novelty and purposefulness (Firestien 1993). The business process is carried out in a creative situation, involving organizational resources and available information technology (IT).

Before we proceed to the model, let us consider a real-world example, the production of a particular shot involving the spider example. During the initial brief with the VFX company, the client (e.g., a director) discusses what that particular shot should look like. It is an iterative and communication-intensive process, where the VFX organization not only tries to understand the client's vision, but also stimulates the client with ideas she might not have had before. Simultaneously, the VFX company must also be conscious of matching the client's requirements to their own capabilities. As a result of this process of understanding and negotiating the requirements, both the client and the representatives of the VFX house have an understanding of what the product should look like. Thus, they develop a shared understanding of the process goals. For example, although the spider's location in the scene (e.g., dangling from a web) may be known, the exact action and emotion may not. Exactly how the spider reacts is uncertain and cannot really be described until it is seen. Generally, it can be distinguished between *attributes* and *meta attributes*. While attributes refer to aspects that can be specified in advance (e.g., technical format, etc.), meta attributes refer to those specifics of a

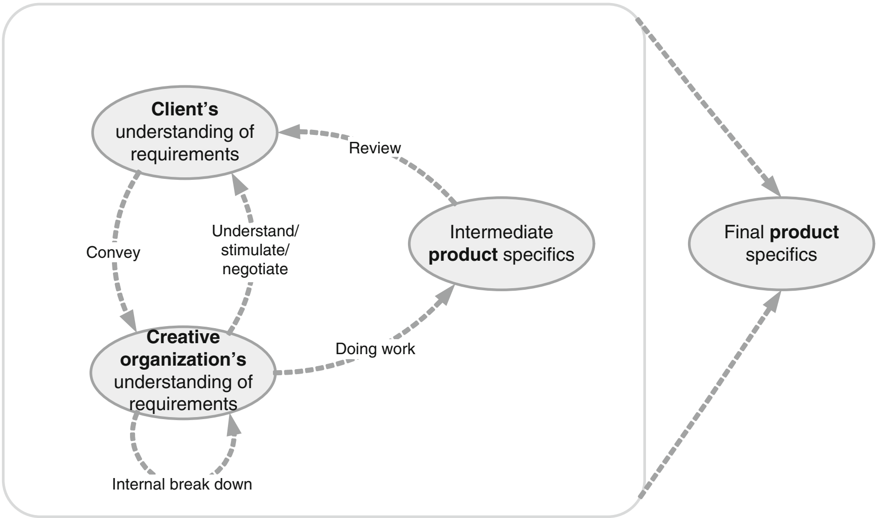

Fig. 4 The dynamics of creativity-intensive processes (Seidel 2009, 2011)

creative product that are related to esthetics and creative judgment and cannot be fully specified in advance (e.g., the spider should look "scary"). The VFX house starts to develop a first version based on their understanding of the requirements. The resulting (intermediate) product not only depends on the creative person's understanding of the requirements, but also on his/her creative and technical skills. Consequently, the product needs then to be reviewed by the client who, through seeing the actual product, may even get a better understanding of her own expectations. The result of this review may be further iterations of understanding and further negotiating the requirements, doing work, and reviewing.

Figure 4 suggests that creativity-intensive processes comprise a number of highly interwoven and iterative stages or phases: understanding the requirements, internally breaking the requirements down, doing work, and evaluating work. It must be noted that evaluation or review as well as doing work are part of understanding the requirements of the creative product. That is, the requirements are not entirely known before the process is completed. The completion, in turn, results in a final product and measurable process performance. Also note that the understanding of the requirements of a creative person or client is highly dependent on their expertise. Often, a senior creative person is more likely to understand the client's vision than a less experienced person. Similarly, a more experienced client will be more likely to be capable of describing what she actually expects the creative organization to do because she has a better understanding of that organization's capabilities.

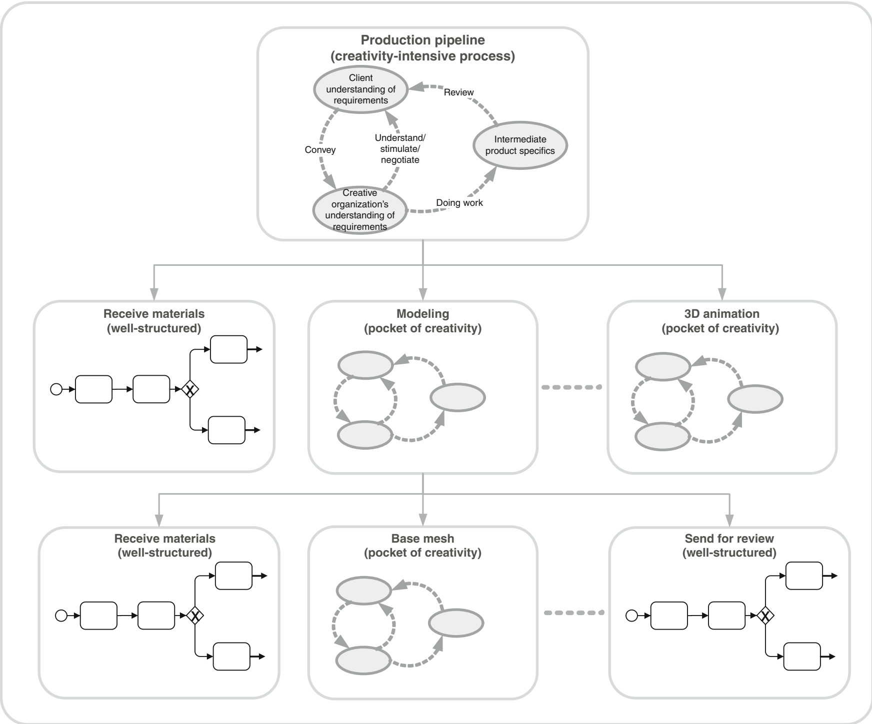

Fig. 5 Relationships between well-structured parts and pockets of creativity (Compare Seidel 2009; Seidel et al. 2010)

3.2 *Pockets of Creativity in Creativity-Intensive Processes*

In reality, the rather high level view of creativity-intensive processes as introduced earlier translates into business processes that consist of a number of discrete elements or tasks (Fig. 5).

For example, at a high level, the production pipeline can be seen as a constant iteration between understanding the requirements of a shot, generating the shot, and evaluating the shot. However, in order to actually accomplish this, certain discrete tasks (or subprocesses) must be carried out. Some of the discrete elements can be viewed as well-structured subprocesses with defined outcomes, whereas others are highly creative. The latter one we refer to as *pockets of creativity* (Seidel et al. 2010). An example for a well-structured element with a defined outcome in VFX production may be the task of *receive materials,* where materials such as references and scans are received from different sources. *Modeling* and *3D animation* are examples for pockets of creativity, where artists generate creative products such as the spider. The dotted lines indicate that a complete production pipeline comprises many more elements than are depicted in Fig. 5.

Figure 5 also illustrates that pockets of creativity may be further broken down. At the highest level, a pocket of creativity is a creativity-intensive process by itself. At the other end there is the individual creative process, such as generating a particular idea for a visual effect. For example, the pocket of creativity *modeling* is a quite complex process which iterates between understanding and refining the requirements, doing work, and evaluation. At the same time, this pocket of creativity will take place in another, higher level pocket of creativity in creating a particular asset or character (in this case the creativity-intensive process of the production pipeline), which also iterates between elaborating and refining requirements, doing work, and evaluation. Both the outcome of the modeling and the outcome of the whole character animation are not known until the process is completed.

How can one identify pockets of creativity within creativity-intensive processes? First of all, creative tasks are characterized by both divergent and convergent thinking as creative persons strive to generate something that is both novel and original. Moreover, pockets of creativity very much rely on the tacit knowledge and the expertise of the involved people. Yet, in order to identify pockets of creativity, more tangible factors are needed. Pockets of creativity can be described by three types of *uncertainty* and three types of *constraints* (Seidel et al. 2010).

First, as creativity means to produce something novel or original, the outcome is never entirely known in advance (product uncertainty). As indicated, those characteristics that are not fully known in advance (e.g., the emotion of the spider) may be referred to as *meta attributes*. Still, it is not the case that nothing is known about the product and there are typically certain requirements. These constraints limit the uncertainty with regards to the outcome. As indicated, those characteristics that are known in advance (e.g., the fact that there will be a spider) may be referred to as *attributes*.

Due to the uncertainty with regard to outcome and differing (subjective) perceptions of the creative product, the actual structure of the overall process or the number of iterations etc., are not known in advance. For example, in VFX production, there are certain process steps that every artifact (character, animation) goes through. However, the required elements, order, iterations, and exceptions are highly dependent on the nature of the shot. Also, different creative persons will carry out the same task in different ways. Still, it is typically not the case that nothing is known about the process structure. For example, particular well-structured subprocesses, such as review processes or aspects of data management, are known in advance.

As required process steps and iterations are not entirely predictable, so are resources and involved people not known in advance. For example, different creative people may use different resources (e.g., different systems) to carry out the same task. One example from VFX production is the so-called *matchmoving*, a process of creating a 3D camera for a particular set of images. While this process is time-consuming and expensive, often the VFX supervisor will not know whether it is required until the shot is attempted without it. Still certain resources that are required (e.g., particular IT systems) are typically known as well as resource restrictions (e.g., available time and budget).

Table 1 Characteristics of pockets of creativity

Property	Description
Product uncertainty	Certain characteristics of a creative product are not known in advance. Uncertainty with regard to outcome depends on various factors such as the level of requirements specifications.
Process uncertainty	The process structure (required process steps, number of iterations, control flow) of creativity-intensive processes is often not known in advance. This is mainly due to different perceptions of the involved creative individuals and evolving product characteristics.
Resource uncertainty	Required resources in creativity-intensive processes are often not fully known in advance or vary during execution. As different operational procedures and different creative actors require different supplies, resource requirements remain uncertain until a creative product is finished.
Product constraints	Product constraints limit the degree of uncertainty in the outcome of a pocket of creativity. They are important for review cycles involved in a process and for process sections succeeding a pocket of creativity. Explicating characteristics of a product known in advance enables to secure required product characteristics and define how the process can continue after a particular creative task.
Process constraints	Process constraints describe how much of the process can or has to be pre-determined. They may impose mandatory process steps and temporal dependencies between specific process fragments. For instance, review steps may be enforced for every major refinement of a creative product.
Resource constraints	Resource constraints describe both resources that are compulsory to carry out a pocket of creativity (i.e., requirements) and resource restrictions under which the creative product has to be developed. Time and budget are common resource restrictions whereas specific technical assets or skill-sets of creative individuals exemplify mandatory resource requirements.

Adapted from Seidel et al. (2010)

Table 1 provides an overview of the three types of uncertainty and constraints that characterize pockets of creativity.

3.3 Risk in Creativity-Intensive Processes

Due to the above-described uncertainty, creativity-intensive processes are associated with high levels of risk. First, uncertainty in outcome can lead to customer dissatisfaction due to the subjectivity that is linked to the judgment of the quality of the creative product. We refer to this risk as *creative risk*. Second, uncertainty with regard to process structure and required resources can lead to what we refer to as *operational risk*. For example, the process may require more iterations than expected, which then results in higher costs and time consumption. Moreover, uncertainty with regard to process structure and required resources may lead to a mismatch between what is required to fulfill the customer expectations and the actual capabilities of the creative organization.

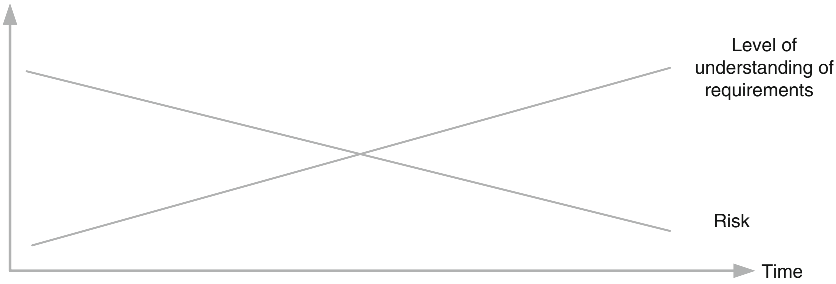

Fig. 6 Development of level of understanding of the requirements and risk in creativity-intensive (Seidel 2009)

Yet, it must be noted that uncertainty in creativity-intensive processes also affords great opportunities. Creativity-intensive processes are inherently linked to a certain creative potential which denotes the processes' capability of generating truly creative products. The creative potential is particularly influenced by the constraints with regard to product (i.e., the level of detail of the requirements specifications), process, and resources (most notably time and budget). Low levels of constraints are associated with higher levels of uncertainty – and creative potential as well as creative and operational risk, in turn. Generally, more time and budget allow for the exploration of more options, and thus are associated with higher levels of creative potential too.

As has been indicated, the understanding of the requirements of the creative product evolves throughout the process. Consequently, the degrees of freedom, as well as the associated risk, are highest at the outset when almost any thought is permissible. Throughout the process, various constraints are imposed upon the process, such as limited resources and a constantly evolving understanding of the requirements both on the client's and the organization's side. Figure 6 provides an overview of how requirements and risk develop throughout the process.

Note that this model is a simplification in that it describes how the understanding of the requirements and the associated risk ideally develop throughout the process, if the creative organization successfully (a) develops a good understanding of the client's vision, (b) matches the requirements with their capabilities, and (c) reviews the product throughout the process. How creative organizations accomplish this is explained later in this chapter, when various managerial practices are discussed.

3.4 Summary of Properties of Creativity-Intensive Processes

To summarize, creativity-intensive processes can be characterized by varying levels of structure (comprising of both well-structured and creative parts), high levels of interdependency and iteration, and knowledge-intensity. As a consequence, the process manager is faced with particular challenges, such as high risk

Table 2 Properties of creativity-intensive processes

Property	Description
Varying levels of structure	Some parts of a creativity-intensive process have a predetermined structure, other parts do not. Thus, creativity-intensive processes comprise both flexible, hard-to-predict sections (pockets of creativity) and well-structured sections.
Iterative nature	Creativity-intensive processes are highly iterative. They constantly iterate between understanding the requirements, doing work, and reviewing work.
Operational risk[a]	Creativity-intensive processes are characterized by operational risk. This property denotes the probability of the occurrence of process-related errors, such as a mismatch between the requirements of the creative product and the creative organization's capabilities.
Creative risk	Creativity-intensive processes are characterized by creative risk. This property denotes the probability of the occurrence of unwanted consequences that are mainly due to uncertainty with regard to process outcome and different subjective perceptions of this outcome.
Knowledge-intensity	Creativity-intensive processes require knowledge and expertise of the involved creative persons. Often, pockets of creativity are characterized by the application of tacit knowledge.
Creative potential	Creativity-intensive processes have a certain creative potential. This creative potential denotes the processes' capacity of generating products that are truly creative and thus characterized by high degrees of novelty or originality.

[a]Risk can be defined as the probability of the occurrence of an unwanted consequence (Peltier 2004)

exposure and high demands for flexibility. Table 2 provides an overview of important characteristics of creativity-intensive processes.

In what follows, we will use this conceptualization in order to discuss the salient roles, management practices, and use of information technologies in managing creativity-intensive processes in the VFX industry.

4 Roles in Creativity-Intensive Processes in VFX Production

Creativity-intensive processes involve various stakeholders. Focusing on the creative aspects of such processes, at least three groups of people deserve closer attention: artists, creative supervisors, and clients. As we will see in the subsequent section, these stakeholders shape creativity-intensive processes and need to be considered when it comes to managing these processes.

4.1 Creative Person

In the VFX industry, the creative individuals who perform the actual creative work are commonly referred to as artists. These artists, such as a compositor or an animator, will produce a particular element that contributes to a shot or series of shots. There are often multiple artists in the same role managed by a creative supervisor. They contribute their creativity in order to generate creative products. But what are the characteristics of creative individuals that in particular contribute to their ability to be creative, and that the process manager must recognize when allocating tasks? Expertise, motivation, and creative thinking skills have been proposed as key characteristics (Amabile 1988, 1998). This very much concurs with what we can observe in VFX production. Expertise, for example, is not only important with regard to a person's ability to act creatively by producing her elements, but also with regard to her ability in assessing what it takes to carry out a particular creative task (how long it will take, etc.). Given the uncertainty linked to creative processes, this capability is of high relevance in order to plan for the process. Generally speaking, higher levels of expertise of creative people are associated with lower levels of uncertainty and thus lower levels of risk. Moreover, motivating creative people is a particular challenge which goes beyond the use of financial incentives. In the next section, we discuss the so-called *creative buy-in* to motivate people and still successfully meet a project's goals. Finally, the artist's work is very much characterized by divergent thinking (Runco 2007). As indicated earlier, divergent thinking contributes to the uncertainty that is part of any creative process.

4.2 Creative Supervisors

Due to the complexity of creativity-intensive processes, creative organizations need to employ what can be referred to as creative supervisors. Creative supervisors are process managers who, due to the creative nature of the processes, need the ability and authorization to quickly respond to changing requirements with regard to the creative product and the process, including process design and resource allocation. Creative supervisors act as process intermediaries who are responsible for aligning the organization's processes with the client's processes and for communicating with the client. Often, creative supervisors are creative people with high expertise (i.e., more senior people). More so than just experience, creative supervisors must possess the specific skill set of being able to plan, manage, and oversee a group of artists. Generally, creative supervisors must pursue two main goals: operational process performance and creative process performance. While the first goal pertains to classical measures such as time and budget, the latter refers to the quality of the creative product. Given the creative product's subjective nature, measuring the quality of a creative output is difficult. We will discuss the measurement later in this chapter. In order to pursue these goals, creative supervisors have to

- Manage the process internally (allocating resources, build teams etc.),
- Coordinate communication and manage the expectations of the creative organization and the client.

In VFX production, creative supervisors are process managers who are usually responsible for processes at different levels of granularity. For example, a so-called lead may be responsible for the production of a particular character (character lead) or sequence (sequence lead), whereas a VFX supervisor is accountable for a whole range of elements that compose a shot or scene.

4.3 Clients

As has been maintained earlier, processes in VFX production are not only client-focused, but also actively involve the client. In fact, the client contributes to, and shapes, the processes in many ways. Clients of a VFX house can be producers, directors, and VFX supervisors from other organizations. Initially, the client will deliver an overview to the VFX house on the potential scope of what is required. Depending on how specific the client is at this early stage, the brief may be open to a great deal of interpretation or quite deterministic. In a highly iterative and interwoven process, the requirements of the creative product are determined and the supervisor seeks to match these with the organization's capabilities accordingly. It is also essential that the supervisor establishes a working style that suits the needs of the client. This working style depends on the client's background, expectations, as well as the particular project. Relevant issues to be dealt with by creative supervisors are:

- Where in the process shall the client be involved? Who will communicate with the client?
- How well does the client understand the VFX process and hence how early in the process can they be shown results?
- What artifacts are delivered to the client and when are they delivered?

5 Managing Creativity-Intensive Processes in VFX Production

Having introduced the main characteristics of creativity-intensive processes, as well as the different roles, we now describe how creativity is effectively managed at a process level in the VFX industry, and we derive a set of guidelines that are hoped to be valuable for process managers in any domain. Generally, creative supervisors in VFX production need sufficient authorization to quickly respond to changing requirements with regard to the product and the underlying process, including process-design and resource allocation.

We suggest the process manager to consider the following general guidelines:

1. Recognize the high uncertainty in both process and outcome and view it as a chance to generate highly creative and valuable outputs.

2. Structure the process around its pockets of creativity as these are the sections where the organization creates business value and distinguishes itself from its competitors.
3. Encourage risk mitigating strategies such as clarity in communication between all levels of the process to ensure that the expectations of all relevant stakeholders are met.
4. Constantly re-evaluate and re-align processes. Every process blueprint becomes irrelevant if the organization does not deliver to the client.

In the following, we introduce primary managerial practices, as well as IT systems, that are used in the creative industries in order to manage creativity-intensive processes. We proceed in analogy to the generic emphases of understanding and refining the requirements, doing work, and evaluation. We use the notion of *emphases* rather than *phases* so as to highlight that creativity-intensive processes are highly iterative and are not to be seen as a rigid sequence. We then introduce different IT systems that can be used in order to support these different managerial practices. Keep in mind that the three stages are highly iterative and are not more than a high level blueprint of creativity-intensive processes.

5.1 Understanding and Refining the Requirements

Understanding the requirements of a creative product (e.g., a VFX shot) as clearly as possible reduces uncertainty with regard to outcome, required resources, and process flow, as the creative organization can develop a better perception of what is needed to carry out the process. The challenge of understanding requirements is twofold: Firstly, the creative organization needs to understand what the client expects them to do. Secondly, it must be ensured that the organization has the technical and creative capabilities to meet the client requirements.

In our VFX example, the organization has to first understand the general requirements of each shot: where is the spider located, what does the spider do, and what other elements should be in the shot (e.g., trees, etc.). In order to reach high levels of client satisfaction, creative organizations must not only understand the requirements in general, but also what product features are of particular importance to the client. In some cases, it is possible to identify those pockets of creativity that are of exacting importance for a certain project and, thus, need to be treated with particular caution. At the same time, the organization must match the requirements with their technical capabilities. For example, if the shot would involve fluid dynamics, this would rely on a very sophisticated simulation pipeline. Very few companies have this capability and so taking on work that requires it depends on an understanding of the cost implied in achieving the result. This is a common and important problem for most VFX companies – understanding a priori that it will take to build creative capability. Once the requirements are understood at the highest level and the shot is broken down into discrete process steps, requirements need to be understood at the more

Table 3 Managerial practices in understanding and refining the requirements

Managerial practice	Description
Creative brief	The initial creative brief is done upfront and is a process of creating a common understanding between creative persons and clients with regard to what is required. This stage is not only about briefing the creative people; creative people can stimulate the client by presenting reference to encourage creativity. The creative brief is hence a practice for supporting requirements engineering in a creative way.
Providing stimuli	The creative organization provides stimuli to the client in order to iteratively generate a shared understanding of the project goals. As mentioned above, the practice of providing stimuli is often combined with the creative brief.
Showing references	Showing references supports the creative brief; it helps to generate a common understanding between creative people and client on where the project is heading. Besides, it can provide stimuli for coming up with truly creative ideas.
Matching requirements with capabilities	Determining the requirements also requires the creative organization to match what they are expected to do with their technical and creative capabilities. This task can be quite challenging given that required resources and process steps are hard to predict. Getting caught up in operational problems can compromise creativity. In VFX production, for example, it is relatively common to discover that an approach taken is not able to deliver the creative results required. This particularity of "temporary process failure" must thus also be considered when allocating resources.

detailed levels. One example is the 3D animation of the shot, where the animator has to understand how precisely the spider moves in that particular shot. Again, the requirements at this more detailed level must match the organization's capabilities as well as available resources, including time and budget.

Table 3 summarizes important managerial practices that creative organizations use in order to understand and refine requirements.

Summarizing, we propose the following guidelines for the process of understanding and refining the requirements of a creative product:

- Understand the requirements early in the process so as to mitigate creative risk. Use a variety of tools and techniques in order to create a mutual understanding of the requirements (in VFX production, these may include style frames and previews, for example).
- View understanding the requirements as a highly iterative process of negotiation between client and creative organization.
- Match the requirements to your capabilities. Know what can be done and validate early that you are capable of meeting the client's expectations. Being caught up in operational problems is one of the greatest risks to creativity.
- Understand what features of the product are most important to the client.

5.2 *Doing Work*

Our research has revealed two main types of managerial practices that are used throughout the process of doing work: *managing the scope of creativity* and *allocating resources*.

5.2.1 Managing the Scope of Creativity

Allowing freedom for a particular task increases variance – and thus uncertainty – and decreases predictability. This leads not only to greater creative potential, but also to greater risk. The process manager (creative supervisor) must carefully decide what freedom she allows for each and every task to achieve high creativity and innovation while still ensuring that everybody works toward one aim. As Amabile (1998) puts it, autonomy "around process fosters creativity because giving people freedom in how they approach their work heightens their intrinsic motivation and sense of ownership. Freedom about process also allows people to approach problems in ways that make the most of their expertise and their creative thinking skills" (p. 82). By defining pockets of creativity and setting up goals and constraints, creative persons are actually granted freedom where it is needed while they do not have to diverge at their own risk. Possible constraints are deadlines, clearly defined outputs (such as a certain number of alternative artifacts etc.), review processes, and regular communication among creative persons and stakeholders.

As indicated, motivation is one of the most relevant factors that impact on a person's capacity of acting creatively (Amabile 1998). Monetary incentives are in most cases not the sole source of motivation to enhance people's creative power. In fact, creative people's motivation may be fostered by means such as allowing them freedom or even putting them under time pressure. The creative supervisor must find a balance between the creative people's personal creative agenda and the actual project goals in order to motivate people while simultaneously pursuing process goals and delivering to the client. This balance is called the *creative buy-in*.

Summarizing, we propose the following guidelines for managing the scope of creativity:

- Find a balance between project goals and the personal creative agenda of creative people.
- Try to not restrict creativity but channel it down the right path.

5.2.2 Allocating Resources

Pockets of creativity are crucial to an organization's success as this is where the organization can distinguish itself from its competitors. Yet, as has been maintained, the creative parts of processes are difficult to predict with regard to required resources. Thus, we first advocate to identify pockets of creativity and then

Table 4 Managerial practices in resource allocation

Managerial practice	Description
Task allocation and team building	Creative persons who are allocated to a task must have a certain expertise to be capable of accomplishing that task. Task allocation can also be used in order to facilitate knowledge transfer between experienced and less experienced individuals. Creative parts of a process are largely characterized by the application of tacit knowledge; by putting junior and senior persons on the same task, an organization enables the transfer of tacit knowledge. Moreover, through finding a balance between creatively challenging and rather simple tasks, creative people can be given the opportunity to follow their creative agenda, which, in turn, fosters motivation.
Time allocation	A lack of time is often associated with a lower quality of a creative product. Thus, creative supervisors must identify the particularly complex and creative parts of a process, so as to allocate sufficient time. Generally, more time enables creative people to explore and come up with various options, which can then be used in order to create a shared understanding between client and creative organization. Although insufficient time can reduce the quality of the creative product, sometimes enforcing constraints can generate creativity under pressure.
Allocation of other resources	Other resources include artist systems, such as particular animation suites, for example. Again, the identification and characterization of pockets of creativity throughout the process landscape sets the baseline for resource allocation. If creative tasks with high impact on the overall process success lack resources, this may fundamentally hamper an organization's creativity and success.

to carefully consider what is actually needed to successfully accomplish them. The existent literature as well as our own research clearly point out that a lack of resources for creative tasks can completely compromise creativity (e.g., Amabile 1998).

Let us consider a shot where the spider will be dangling from a web. There may be a number of animators who have the technical capabilities of completing the shot. However, the VFX supervisor may further ask who has particular experiences with similar animations. She might then choose the person and further ask what software that particular person would use for that shot (different people may approach the problem differently) and make sure that the software is available.

Table 4 provides an overview of managerial practices with regard to resource allocation in creativity-intensive processes.

Summarizing, we propose the following guidelines with regard to resource allocation in creativity-intensive processes:

- Do not overload key talent with trying to achieve all tasks.
- Leverage people with less experience by allocating them to challenging tasks and letting them work with more senior people.
- Avoid resource shortage particularly where you expect people to be creative. Thus, channel your resources toward the more creative parts of your processes.

5.3 Evaluation of the (Intermediate) Creative Product

Two main types of managerial practices for product evaluation can be distinguished: *approval processes* and *ongoing communication.*

5.3.1 Approval Processes/Reviews

The most important means to evaluate creative products are approval processes which safeguard that the creative product meets the requirements. It can be distinguished between quality assurance (technical reviews) and creative reviews, and further between internal and external approvals. External approvals include clients while internal approvals usually involve artists and creative supervisors. Approval processes are quite a complex practice, as the process manager has to make decisions, such as: when should the approval happen? Who should be involved? Do people have to meet physically? This practice requires the identification of pockets of creativity, as these are the process sections that are characterized by high levels of uncertainty and, therefore, particularly require review.

Wrong decisions with regard to review and approval can have serious consequences for the overall process. Due to differing subjective perceptions of creative products, for example, the exclusion of key stakeholders may consequently lead to expensive product revisions.

Summarizing, we propose the following guidelines with regard to approval processes:

- Understand who you work with and what their ability is in assessing a creative product.
- Reviewing at the right stage is critical in order to mitigate creative risk.
- When reviewing, keep communication open, so as not to compromise creativity.

5.3.2 Ongoing Communication

Ongoing communication (often through showing work in progress) ensures that the project team works toward one aim. This practice thus aims to mitigate variance that may be caused by weak requirements specifications as well as creative freedom. As a rule of thumb, vague requirement specifications require more communication between the different stakeholders and increase risk. The identification of pockets of creativity enables the process manager to identify where within the process there is a particular need to communicate with the client.

Let us consider the spider example. After client and creative organization have developed a first (mutual) understanding of the requirements, the VFX house starts to model and animate the spider. The spider is developed step by step. The VFX house could wait until the spider is completed and then review with the client. However, if the client is dissatisfied this would mean an enormous amount of work that would have to be redone. Alternatively, the VFX house can involve the client into the process by showing them work in progress throughout the process, so as to ensure that the VFX house's understanding of the requirements and the client's understanding of the requirements indeed match. At the same time, the VFX house must understand who their client is; that is, the client's background and expertise. If the client is, due to low expertise, not capable of understanding where the process is heading when they are shown something that is far from finished, their involvement may actually hamper the process, consume time, and as a consequence, compromise creativity.

Summarizing, we propose the following guidelines for communication within creativity-intensive processes:

- Ongoing and appropriate communication is of high importance to ensure that the creative process is not heading down the wrong path.
- Communication is essential to creativity. Nominate key communicators early on to ensure clarity in briefing and feedback.
- As a rule of thumb, vague initial requirements specifications require more intensive communication.

5.4 The Use of Information Technology (IT)

Davenport (2005) argues that technology may be the most important intervention in the performance of knowledge workers over the last couple of years. This observation is also likely to hold for processes in the creative industries. Yet, it must be noted that the use of IT should not be mandatory; creative people need freedom in order to act creatively. The orchestration of IT tools that are used depends on the situation at hand. Moreover, as with other resources in creativity-intensive processes, it is hard to predict what tools will actually be required throughout the process.

In the following, we provide a brief overview of the most important classes of IT that are used in VFX production processes. We also explain how these software tools can be used in order to successfully manage creativity-intensive processes.

5.4.1 Artist Systems

Artist systems are tools that are used by creative people in order to generate creative artifacts. Examples for artist's systems used at RSP are 2D and 3D packages, which enable artists to generate images and carry out the different tasks that are done within the production pipeline. Usually, within the production pipeline various tools need to be used in order to generate VFX for a feature film.

5.4.2 Groupware

Groupware systems play a prominent role in all major stages of creativity-intensive processes in order to create a mutual understanding of requirements, showing work in progress, and evaluating creative products. Groupware is a collective name for those systems that enable groups to work cooperatively. One major benefit in the usage of groupware systems can be seen in a potentially higher number of iterations of the creative product, which can ultimately reduce creative risk due to differing perceptions of the creative product. Groupware systems range from tools such as email or instant messengers to tools that are particularly tailored to the industry.

For example, RSP uses a software called *cineSync* which is a remote review and approval tool based on *Apple QuickTime* technology. By synchronizing the timeline and playback of movies, people around the world are able to view the work simultaneously. The tool supports audio-visual communication and also allows for interaction, as people can draw on the images they are seeing. Thus, the software enables rich communication between geographically distributed stakeholders. As has been indicated, the process of determining requirements of a product as well as the process of evaluation highly depends on the involved people. *cineSync* enables different people to express their thoughts in different ways and, thus, furthers the process of negotiating requirements and evaluating creative products. Consequently, it enables involved stakeholders to create a mutual understanding of process goals.

5.4.3 Knowledge Management Systems

As (previous) knowledge is an important factor that influences creativity (Weisberg 1999), knowledge management systems (Alavi and Leidner 2001) are a set of technologies that are used in the creative industries for making knowledge available to accomplish creative tasks. For every pocket of creativity, it has to be considered what type of knowledge can be made available (e.g., technical guidelines on how to use a tool, previous experiences for a certain type of task, or artifacts that have been created earlier and that can now be used as reference material). Thus, the identification of pockets of creativity can help to understand where knowledge is created, where it is stored and located, and how it is transferred and applied (Seidel et al. 2010).

Consequently, by identifying and comprehensively describing pockets of creativity, the organization is enabled to integrate knowledge into their processes. In a similar manner, Davenport (2005) suggests to embed knowledge in the technology that is used by knowledge workers.

In the VFX industry, knowledge management is of particular importance, as much of the industry's knowledge is tacit knowledge that is located in the heads of, often freelancing, creative people. Consequently, the industry seeks to explicate and store this knowledge in knowledge bases, in order to make it available for the organization.

5.4.4 Asset Management Systems

Asset management systems for digital assets, for example, can be used to facilitate the process of understanding the requirements of the creative product, as well as the actual work (cf. vom Brocke et al. 2010). In the process of understanding the requirements, existent digital assets can be used to support communication by showing what has been done previously and what could be done. This includes cognitively stimulating both creative people and clients by providing new options and potential associations. As a matter of fact, in many cases, being creative means to put together what has been done previously (Couger and Higgins 1993). Thus, supporting pockets of creativity with asset management systems can increase productivity and the quality of the creative output.

For example, when a particular shot with our spider is to be generated, an asset management system can be used in various ways: First, previous shots can be reviewed so as to get a better understanding of what would be possible. Second, assets (such as a tree the spider is dangling from) that have previously been designed for other shots may be re-used in this shot.

5.4.5 Workflow Technology

With regard to workflow technology (Ouyang et al. (2014) on workflow management) it must be noted that such systems have to be used very carefully when introduced into creative environments. As has been argued by various authors, there is a danger of straight-jacketing; the so-called production-workflow systems in particular tend to be too rigid (e.g., van der Aalst et al. 2005). Creativity-intensive processes, however, require high levels of flexibility. When a creative organization introduces workflow-related technology, they must ensure that no unnecessary constraints are imposed on pockets of creativity. Automating the well-structured parts of the processes, however, can give people more time to be creative, which can ultimately result in higher product quality. As indicated earlier, one key issue in managing creative organizations is not overloading key creative resources.

Yet, our research has shown that even simple solutions such as task lists that show the next process steps can support creativity-intensive processes in many ways. Even though creative people need freedom in order to act creatively, they also need security on what they have to deliver and when. It is up to the creative supervisor to find the appropriate balance of creative freedom and structure. Consequently, organizations in the creative industries make extensive use of such systems.

Summarizing, we propose the following guidelines with regard to the use of IT in creativity-intensive processes:

- Technology should be scalable. A lack of scalability may compromise creativity.
- Do not try to automate creative parts of the process as this may lead to too rigid processes.
- Technology should be accessible according to the pull principle; that is, creative people can access a tool in order to solve the problem at hand. Do not force the use of software tools unless it is actually required.

5.5 Summary of Managerial Practices and IT Used in Creativity-Intensive Processes

In Fig. 7, we pick up the conceptualization of creativity-intensive processes introduced in Sect. 3 and relate it to the above described managerial practices and IT systems used in VFX prodcution. The managerial practices that are used in order to communicate with the client can be distinguished from those that are used so as to internally manage the process.

Creative organizations use these practices along with IT in order to pursue both creative and operational process performance while simultaneously mitigating operational and creative risk. The arrows in Fig. 8 illustrate how successful reviews and ongoing communication with the client can impact on the development of risk and the level of understanding of the requirements of the creative product.

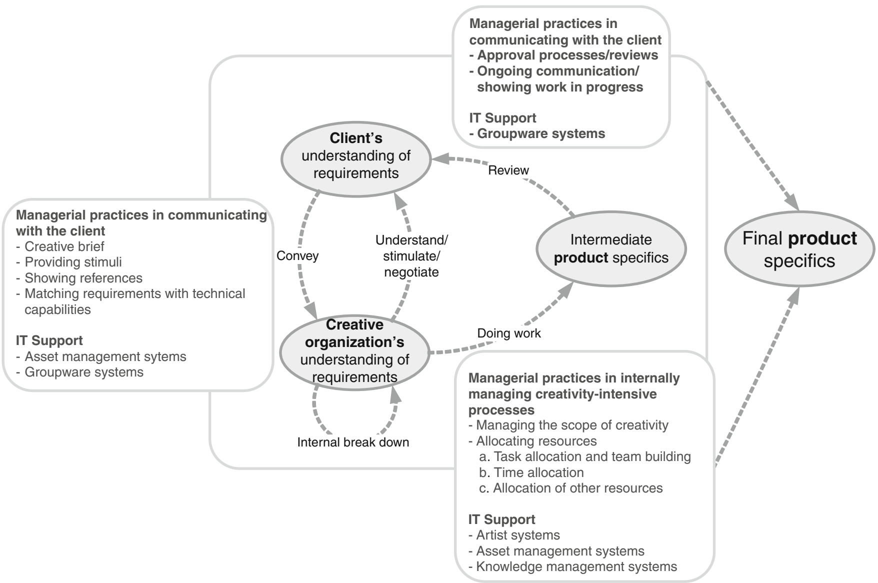

Fig. 7 Managerial practices and IT used in creativity-intensive processes

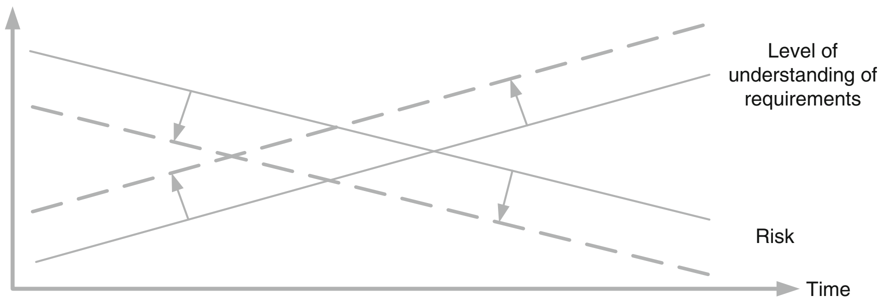

Fig. 8 Risk mitigation in creativity-intensive processes through the application of managerial practices and IT (Seidel 2009)

5.6 *Measuring Creativity-Intensive Processes*

Harmon (2007) states that it "is widely held that performance information is a key differentiator and that organizations that can obtain and use information about their markets and their processes in a timely manner can perform better" (p. 139). But does this also hold for creative organizations? Is not creative output difficult to measure? In a 2008 Harvard Business Review article, Ed Catmull, co-founder of Pixar, wrote that it is a misbelief that much of what is done in a creative organization cannot be measured (Catmull 2008). He argues that most processes involve activities and deliverables that can be quantified. As indicated, creative organizations pursue both what may be referred to as *operational process performance* and *creative process performance*. While the first one is relatively easy to measure, the latter one is not. In fact, creative organizations must find a balance between the two. On the one hand, every organization must follow business imperatives such as time and budget in order to stay in business. On the other hand, they must pursue creative excellence, which means to meet, and even exceed, customer expectations in order to gain competitive advantage. Ultimately, both operational and creative process performance determine customer satisfaction.

Operational process performance refers to classical measures such as time, budget, and process efficiency [see also on process performance measurement by Heckl and Moormann (2014)]. To achieve these, organizations apply managerial practices that are known from process management, such as process automation and process optimization. Other possible measures may include the number of iterations that are necessary to generate a certain type of creative product (for example a particular type of VFX animation), for example.

Creative process performance refers directly to the creative product. It can be measured by its novelty/appropriateness (quality), as well as by the number of outputs generated. While purposefulness may be relatively easily identified through customer satisfaction, novelty can only be rated by experts in the particular area. In fact, measures have been developed in order to evaluate creative performance. Firestien (1993), for example, states "the evaluation [of a creative product] must occur on a number of levels; not with a single factor, or a single total effective criterion score" (p. 265).

6 Conclusions

Creativity influences business processes and the way we do BPM. We believe it is both relevant and timely to take a closer look at the role that creativity plays within business processes, and how it can be managed. Existent modeling techniques, software tools, and management practices may support some of the important issues in this context. In this chapter, we aimed to move beyond such 'conventional' BPM wisdom as we discussed creativity-intensive processes as found in the creative industries.

The processes that we discussed in this chapter can be described as highly dependent on creativity, interdependent, complex and intensively involving the client. Other creativity-intensive processes, however, may be different. For example, they may not involve clients and may be characterized by lower levels of interdependency. However, we expect that the main characteristics, such as uncertainty with regard to outcome, process, and required resources, or operational and creative risk, can be found in many industries. Also, other industries may learn from the creative industries, as high levels of uncertainty are not only related to high operational and creative risk, but also to high creative potential. Finding a balance between risk mitigation and creative freedom can open tremendous opportunities to any organization.

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An Organizational Approach to BPM: The Experience of an Australian Transport Provider

Tonia de Bruin and Gaby Doebeli

Abstract When discussing Business Process Management (BPM), there is an obvious lack of clarity in the use of the term. A consequence of these varying interpretations is confusion among practitioners and an inability to compare and contrast experiences in a meaningful way. To date, there has been no clear articulation of the distinction between these interpretations and how this distinction is reflected in practice. The chapter provides a clear explanation of three interpretations and details how a large Australian transport provider has applied a BPM Capability Framework to guide its BPM Initiative that aims at being an approach to managing the organization.

1 Introduction

When discussing Business Process Management (BPM),[1] there is an obvious lack of consensus in the use of the term. Common interpretations include: (1) BPM as a solution for a business using software systems or technology to automate and manage processes, (2) BPM as a broader approach to managing and improving processes that focus on the process lifecycle and (3) BPM as an approach to managing an organization by taking a process-view or orientation.

A consequence of these varying interpretations is confusion among practitioners and an inability to compare and contrast experiences in a meaningful way. Furthermore, this lack of clarity leads to an inability to build a cumulative body of knowledge as results and experiences can appear to be conflicting and inconsistent.

[1]Please also see the discussions by Hammer (2014), Harmon (2014) as well as the conceptualization for BPM provided by Rosemann and vom Brocke (2014) in this Handbook.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_31,

To date, there has been no clear articulation of the distinction between these interpretations and how this distinction reflects in practice.

This chapter makes a unique contribution in this area. First, providing clear explanation of the three interpretations, together with examples of how the interpretations result in different decisions within BPM initiatives. Following this, the chapter details how a large Australian transport provider has applied a BPM Capability Framework to guide its BPM Initiative that aims at being an approach to managing the organization.

1.1 BPM as a Technology Solution

In some cases, the term BPM denotes a technology solution for an organization (McDaniel 2001). For example, before describing the "four tenets of BPM" being modeling, integrating, monitoring, and optimizing, McDaniel (2001) says:

> ...BPM entails integrating the value of each asset, providing a seamless interface, and coordinating the efforts of all assets to achieve a goal, in a given sequence, within a set time... and ...BPM provides end-to-end life cycle management of information requests or transactions made up on many steps...

In this context, McDaniel (2001) talks about the human element of BPM only in relation to the use of technology to automate manual tasks saying:

> ...executing a BPM solution is a pathway to internal employee efficiency. Enterprises can eliminate costly and slow manual steps that can be more effectively executed when automated...automating saves time for current employees and saves training costs for new employees...

The ten pillars identified by McDaniel (2001) provide further evidence of the technology focus of his use of the term BPM. The pillars include: (1) unified process automation and workflow model, (2) direct model execution and manipulation, (3) state management, (4) time-based exception management, (5) robust process monitoring and analysis, (6) nested model support, (7) concurrent model support, (8) standards based, (9) high scalability, and (10) high reliability.

Using BPM in this sense usually applies to a software solution to a given process or within a given project. While some software vendors still use the term BPM in this narrow technology sense, it is becoming increasingly common to use the terms Business Process Management Systems (BPMS) or Process-Aware Information Systems (PAIS) (Dumas et al. 2005).

1.2 BPM as a Lifecycle Approach

A number of researchers provide examples of the term BPM used to describe a lifecycle approach to managing and improving processes. For example:

> ...BPM is concerned with how to manage processes on an ongoing basis and not just with the one-off radical changes associated with BPR... (Armistead and Machin 1997)

> …A BPM approach involves four key areas including process documentation, establishing accountability and ownership, managing and measuring performance and improving processes by enhancing quality or performance… (Gulledge and Sommer 2002)
>
> …A generic BPM method of preparation, process selection, process description, process quantification, process improvement selection and implementation… (Elzinga et al. 1995)
>
> …A systematic approach to designing, prioritizing, managing, controlling and monitoring business processes… (Zairi 1997)

A common thread in these approaches is that the view of BPM is from the perspective of managing and/or improving the operations of a process or a set of processes. Garvin (1998) indicates that this approach often neglects the ongoing management and operation of many redesigned processes, highlighting a key limitation of this view. Furthermore, Garvin (1998) found that a tendency to focus on work processes led to administrative and supporting processes being overlooked which ultimately ended in inconsistencies in information and planning.

An underlying assumption in the use of BPM as a lifecycle approach to managing and improving processes is that a generic, systematic approach to BPM is possible and preferable. However, from a theoretical perspective, Sabherwal et al. (2001) suggest that taking such a narrow view will not capture the dynamics of organizations including the internal variances and external contextual situations.

1.3 BPM as an Organizational Approach

In addition to Pritchard and Armistead (1999), a number of researchers consider BPM to be an approach to organizational management that takes a process-view. For example, DeToro and McCabe (1997) indicate that BPM is a new way of managing an organization, which is different to a functional, hierarchical management approach. Similarly, at this level Harmon (2003) states:

> …In the Nineties, a number of management gurus, for different reasons, began to argue that it was more efficient to conceptualize a company in terms of a set of value chains or business processes. This approach has been given many names, but the most popular, today, seems to be the Process-Centric Company…

Harmon (2003) claims a process-centric organization is one whose:

> …managers conceptualize it as a set of business processes. Most process-centric companies, like most traditional organizations, still have departments and divisions. Unlike traditional organizations, however, process-centric companies place their primary emphasis on maximizing the efficiency of processes, and not on maximizing the efficiency of departmental or functional units. In effect, departments or functions contribute employees, knowledge and management skills to processes…Ultimately, however, the core business processes are managed and evaluated as wholes, and departments are rewarded for their effective contributions to successful processes…

At this level, the emphasis is on the management of the organization as opposed to using a standardized approach to managing the processes within the organization.

1.4 Distinguishing a Lifecycle from an Organizational Approach

Thus, the use of BPM at a process level and at an organizational level is fundamentally different. The following example highlights how this distinction could manifest within an organization.

Consider the notion of *documenting or designing*, a step in all of the above *BPM as a Lifecycle Approaches*. At this level, these steps lead to the visual representation of a process. Potential issues that individuals within an organization would address during this step could include:

- What level of detail does the representation of the process require?
- Who are the relevant stakeholders?
- How are their requirements captured?
- What technology is available for representing the model?

With the interpretation of *BPM as an Organizational Approach*, this step would result in different considerations. For example, from an organizational perspective the key issues in *documenting and designing processes* would include:

- What technology is the organization going to make available for modeling processes?
- Which people need to have access to this technology?
- Do these people need training in the technology?
- Who is going to be responsible for the maintenance of the model library?
- Where are the funds for purchasing the technology going to come from?

These examples show that there is a clear difference in the intent and consequence of BPM using these two different interpretations. Furthermore, applying a systematic lifecycle approach to the processes within an organization does not necessarily mean that individuals within the organization view the organization as a set of processes. Hence, being successful at adopting a BPM lifecycle approach does not automatically translate to being successful at an organizational BPM approach.

Arguably, the distinction between a *lifecycle* approach and an *organizational* approach may contribute to explaining why earlier process endeavors such as BPR and BPI were often unable to provide sustainable change within organizations. The authors contend that a major reason may be that, while endeavors such as BPR and BPI focus on changing *processes* and *process capability* within organizations, they do not focus on changing the *organizational capability* required to support process thinking at an organizational level. In other words, they do not challenge or change the fundamental way in which people think about how the organization operates. For example, approaches such as BPR and BPI do not focus on assisting to depict the organization as a series of interrelated processes. Nor do they assist in determining how to prioritize process projects for the organization as a whole or how to develop and implement appropriate governance mechanisms to guide process decisions throughout the organization.

This distinction marks the uniqueness of this chapter. While there is significant literature on a BPM as lifecycle approach, little deals with BPM as an organizational approach. This chapter addresses this shortfall by showing how one organization applies a BPM Capability Framework to guide the development of capability and to progress its (organizational) BPM Initiative.

2 Background to Company Q

Company Q is one of Australia's largest and most modern transport providers. Company Q has annual revenue in excess of $AUD 3 billion and managed assets of $AUD 10 billion. Operating for 143 years, Company Q is among the nation's longest running service enterprises with approximately 15,000 employees throughout the country. Company Q is a Government-Owned Corporation (GOC) directed by a Board that is accountable to two shareholding ministers.

Changes in the Queensland State Government in the late 1990s led to major organizational changes within Company Q. In 1999, a move to increase the commercialization of some State Government operations resulted in Company Q effectively moving from a monopoly government provider to becoming a national commercial operation in a competitive business environment. Since that time, Company Q has expanded operations by acquiring further subsidiary companies, and it is now a major player in the transport and logistics industry within Australia.

By 2002, following the move to commercialization, Company Q knew it had serious problems with its operations. Disparate projects were having a counteractive effect. Changing legislation and regulations were increasing reporting requirements and competition. Increased usage of its transport networks were resulting in scheduling difficulties, delays, and customer dissatisfaction.

Like many organizations, Company Q had actively tried to improve operations by applying methods like Quality Assurance (QA), Total Quality Management (TQM), Business Process Reengineering (BPR), and Business Process Improvement (BPI). Such endeavors had met with limited success reflecting in high levels of frustration and a lack of progress. Paradoxically, the failure of these earlier endeavors compounded in an inability to gain the necessary levels of executive support required to develop a long-term and sustainable approach to process thinking because of an inability to show early returns on investment.

2.1 BPM Within Company Q

In 2002, Company Q's Board and Senior Executives assigned the Chief Strategy Officer (CSO) to lead a major change program to establish a sound platform to achieve service excellence and allow further growth of the business. The overall objectives were to (1) gain transparency of processes and cost, (2) achieve accountability throughout the different levels of management, and (3) operate as a successful organization that makes profit.

At the time, this undertaking was ambitious because of the culture of Company Q being typical of a public sector, monopoly organization where the need for continuous performance improvement and change was not at the forefront of people's minds. This was evident within Company Q in a lack of recognition and understanding of process; the existence of functional silos; rules-based governance; and heavy unionization. Company Q considered the change program to be a *cultural* change program, with the aim of changing the mindset of staff members and moving toward a commercial framework.

Consequently, the CSO established three program streams. The three streams were *Performance through Governance, Performance through Business*, and *Performance through People*. The program stream of *Performance through Business* included a project that was to investigate *Business Process and Systems*. Company Q established a BPM team which was led by the Business Process Design Adviser (BPDA)[2] to progress this project. The BPDA reported directly to the CSO.

The first phase of the *Business Process and Systems* project led to the identification of an enterprise-wide BPM approach as a means of addressing a number of the operational and strategic issues facing the organization. This included a need for Company Q to become more competitive and more focused on its customers. Due to the failings of past endeavors arising from the implementation and use of methods including TQM, BPR, and BPI, the BPDA believed that an organizational BPM approach that focused on building sustainable capability within the organization was appropriate to addressing Company Q's needs.

In coming to this conclusion, Company Q conducted literature reviews, interviews, and study tours with other organizations facing similar issues in order to identify different management and operational concepts. Internally, the BPDA conducted workshops throughout the organization to engage key stakeholders in the development of a framework for the implementation of BPM within Company Q. However, getting support for adopting a BPM approach and developing the initial frameworks was difficult because of (1) conflicting literature and practice regarding what constituted an enterprise-wide BPM approach and (2) a lack of guidance as to how to go about adopting such an enterprise-wide approach.

The second phase of the project included making the frameworks operational in order to embed BPM principles and practices within the organization. In the first instance, the BPDA was responsible for the establishment of the methods and techniques within the framework, and the introduction of these to the organization. In this phase, the first deliverable from the BPDA was the development of the Enterprise Process Model that formed the base of the Process Architecture and provided Company Q with a tool to develop their new Business Model. The development of the Enterprise Process Model was not to the extent of an Enterprise Process Architecture but rather was a list of known processes in Company Q

[2]The BPDA is co-author of this chapter.

clustered by either function or end-to-end process. The second deliverable was the first version of Company Q's BPI and BPR Framework including initial principles, tools and methods (also referred to as Company Q's BPM Concept) and a proposed implementation plan. The implementation plan included the need to perform an organizational wide assessment to baseline the current state and identify potential organizational change arising from the adoption of a BPM approach.

The BPDA received approval to investigate BPM capability assessment methods to gain a deeper understanding of an organizations maturity in BPM. This investigation resulted in an early appreciation of the differences between a BPM approach that was focused on the management of processes (i.e., what this chapter calls a lifecycle approach) and an approach that was focused on the management of the organization (i.e., what this chapter calls an organizational approach). However, subsequent investigation revealed a lack of a suitable means by which to (1) understand existing practices and to gain guidance on progressing and embedding BPM practices within the organization and (2) an inability to measure the progression of BPM practices adopted within the organization.

In addressing these issues, the BPDA approached Queensland University of Technology (QUT) for assistance. This initial contact from Company Q's BPDA led to a study at QUT investigating the progression and measurement of BPM Initiatives within organizations.

3 Developing a BPM Capability Framework

Since 2004, researchers at QUT have worked to develop a model for assessing the maturity of BPM within organizations. One of the key outcomes from this research was a so-called BPM Capability Framework. The journey to develop this framework is documented in a number of existing publications including Rosemann et al. (2004), Rosemann and de Bruin (2004, 2005), Rosemann et al. (2006), de Bruin and Rosemann (2007), and de Bruin (2007).[3]

Since its development, the Principal Researcher[4] has used the BPM Capability Framework to explore the BPM Initiatives of a number of organizations. Furthermore, within industry, a number of organizations have independently applied the BPM Capability Framework to guide the development of their BPM Initiatives. In this chapter, the discussion centers on the application of the BPM Capability Framework by Company Q.

[3]The core elements of this BPM capability framework are also presented by Rosemann and vom Brocke (2014).

[4]The Principal Researcher is co-author of this chapter.

4 Applying the BPM Capability Framework in Company Q

Representatives from Company Q developed a deeper understanding of the BPM Capability Framework because of the ongoing relationship with the researchers and participation in BPM forums including the BPM Roundtable and the Queensland BP Trends Chapter. On this basis, Company Q's BPDA started using the BPM Capability Framework to develop a roadmap to guide Company Q's BPM journey.

In particular, the BPDA used the BPM Capability Framework to guide Company Q's (1) BPM communication, (2) BPM strategy development and implementation, and (3) internal BPM consultancy engagements. The following sections provide details on this application while Fig. 1 summarizes the key projects in Company Q's BPM journey and the timeframe in which they occurred.

4.1 BPM Communication

In late 2006, application of the BPM Capability Framework within Company Q resulted in an overhaul of the BPM portal site. The subsequent redesign of this communication media reflects the BPM Capability Framework. An underlying directory structure, mapped to the Framework, stores all BPM documentation available through the portal. Staff members within Company Q access this documentation

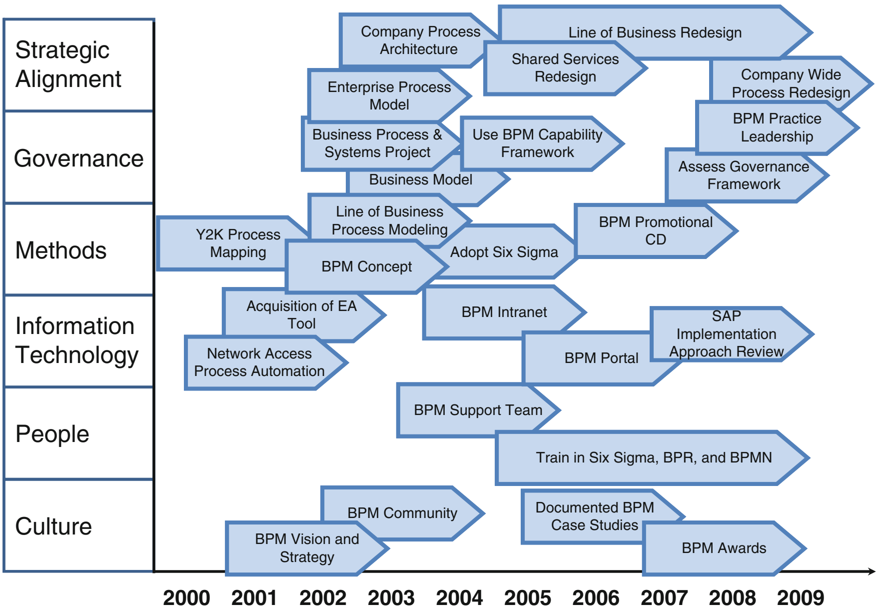

Fig. 1 Key projects in company Q's implementation of a BPM approach

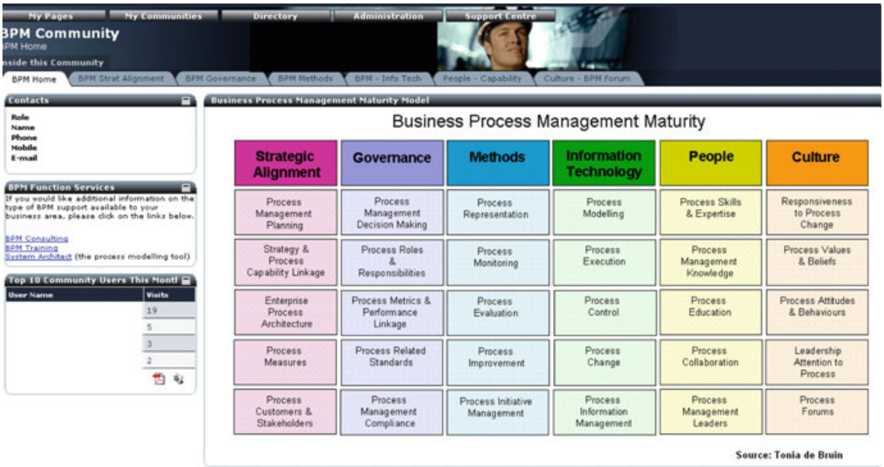

Fig. 2 Company Q's BPM community portal using the BPM capability framework

within the portal by clicking on the relevant Capability Area button to drill down to the available information. In doing so, the Framework provides Company Q with the ability to develop a common language among its staff members. In addition, the site acts as a corporate repository and single point of truth for "all things process."

The BPM team also uses the portal to provide management and staff with access to a range of education materials. For example, the portal provides access to:

- Company Q internal Case Studies of BPM projects
- BPM Book List
- BPM Conference Resources and Papers
- BPM Research areas structured according the BPM Capability Framework
- Links to major BPM Internet sites

Figure 2 shows the BPM Community Portal that utilizes the BPM Capability Framework at the core of its design and functionality.

4.2 *BPM Strategy Selection and Implementation*

Since 2006, Company Q's BPM team has used the BPM Capability Framework to progressively implement, refine, and build upon strategies to develop capability in various areas. For example, the BPDA uses the BPM Capability Framework to provide direction on which capability areas to give attention. In doing this, the BPDA uses the capability area definitions to understand the intent of the capability areas, and knowledge of the organization to determine an informal level of maturity in the capability areas within business units and/or projects. From there, the BPDA determines which capability areas will deliver the greatest immediate benefit to achieving the goals and objectives of Company Q. In doing so, the BPDA is able to allocate resources and develop capability that will optimize the benefit to the organization from adopting a BPM approach. The Principal Researcher is not directly involved in the determination or implementation of these strategies, however, the Principal Researcher and the BPDA meet regularly to discuss or clarify issues regarding the intent and interpretation of the capability areas and possible strategies and their implications.

4.3 Internal BPM Consulting Engagements

Following a restructure in 2005, Company Q's BPM team moved into the Shared Services Group with the responsibility to deliver BPM services to the different business areas using an internal consultancy arrangement. The team uses the BPM Capability Framework to guide the conduct of its consulting engagements, including the subsequent recording and documentation of the engagements and their outcomes.

Every consulting assignment is carefully scoped, and the initiation phase includes an internal BPM capability assessment. This assessment enables the consulting team to plan additional activities to further improve BPM capability as part of the project delivery. Once the consulting project is finalized, a session of reflection is facilitated by the BPDA to identify the project results as well as the progression of BPM capability in the particular business area. Every project is treated as a case study, with a summary capturing the findings and adding to the progression of Company Q's BPM journey. Each project contributes to the improvement of different capability areas within the BPM Capability Framework. The project summaries are an effective tool to further consolidate and communicate the BPM progress to the rest of the organization and for the BPDA to further set strategies to enhance capability areas within the model.

An example of one of the key projects delivered by the BPM team using the BPM Capability Framework in this way is the review and redesign of the strategic planning process for Company Q's Corporate Strategy area. This project was twofold, delivering the design of the *to-be* process while at the same time enabling the BPM team to incorporate the necessary links to BPM into the strategic planning process. The project's focus was on building the capability in Strategic Alignment and Governance. The project delivered a streamlined, integrated process for strategic planning including associated tools to make the process operational (e.g., a Process Priority Matrix). The project also provided the Corporate Strategy area with a clear customer value proposition, and established the process performance requirements to build the capability required. For example, the BPM team provided Corporate Strategy with an approach to identify and define their current value chains including how to redesign and redefined their business to meet the expected future needs of the market and to deliver value to their customers by being better able to meet requirements.

5 Benefits of Adopting BPM as an Organizational Approach

Since commencing its BPM journey in 2002, Company Q has gained many benefits from adopting an organizational approach to BPM. These benefits include an increase in customer focus, greater alignment in strategy and between areas of the business, changes in the way people within the organization work, improved governance structures, and increased recognition in the BPM community, as discussed in the following sections.

5.1 Increased Customer Focus

Within the last few years, customer surveys have shown that Company Q has become more customer-focused. The organization has dedicated resources to review and improve the service delivery processes within each Line of Business. Company Q refers to these dedicated resources (i.e., process professionals) as the BPM community. Members of the BPM community work together with the marketing and sales professionals and strategic planners to ensure that the proposed improvements to service delivery processes will meet customer needs.

5.2 Improved Strategic Planning and Strategy Deployment

The BPM team was engaged by the CSO to redesign the strategic planning process, together with the organization's strategic planning professionals. The overall objective was to design an integrated strategic planning process that would enable successful deployment.

To further improve the strategic deployment process, the BPM community assisted in building the necessary mechanisms in the Lines of Business to successfully deploy strategic initiatives. The BPM community is working to improve their program and project management across their BPI and BPR efforts to ensure maximized results. The efforts of the BPM team have resulted in a strong community of process professionals across the organization that are aligned in their thinking and who utilize common methods for BPI and BPR. The majority of Company Q's Lines of Business have recognized the importance of selecting and managing the critical programs and projects to improve service delivery from an end-to-end perspective and adopt these common methods within their own programs and projects.

The Chief Information Officer assigned the BPM team and the Enterprise Architect to develop the frameworks, methods, and tools to link business strategies and ICT. The efforts of the BPM team and the Enterprise Architect have resulted in a standard approach toward ICT Planning and Enterprise Architecture for Company Q. This approach minimizes the divide between business strategy and design and IT strategy and design. Consequently, Company Q is experiencing improvements in technology selection and solution development. The two teams provide an integrated service to the business, delivering future roadmaps, and designs in the areas of: business/process, information, application, and technology. All artifacts are consistent, reusable, centrally managed and recognized as key components of the organization's DNA.

5.3 Changing Human Resource Capability

The efforts of the BP community and the BPM team have contributed to breaking down the functional silos in the organization. Process projects have triggered ongoing discussions around further improving the service delivery processes from an end-to-end perspective and challenged accountability structures, organizational structures, cost structures, roles and responsibilities, and capability development. Cross-functional teams have been able to prove the concept of (cross-functional) process collaboration by demonstrating positive results in overall performance and customer focus.

Company Q has adopted a (People) Capability Framework including a Performance Management process for its staff (at all levels) that is based on the BPM principles. Under this framework, individuals are now accountable for the outcomes of a process and Company Q recognizes and rewards teamwork that aims to optimize the end-to-end process. The BPDA reviewed the (People) Capability Framework and provided guidance on the incorporation of capabilities required to move the current culture toward a *process-thinking* culture.

Consequently, the BPM team is now in a position to review their BPM training package in line with business needs as there is better linkage between current capability and the required future capability. This piece of work has also highlighted that additional methods and tools are required for the adoption of BPM at different levels of the organization, that is, Strategic, Tactical, and Operational levels.

5.4 Increased Recognition in BPM Community

In recent years, Company Q has nominated a number of the BPM projects for the Australasia BPM Awards. The categories of the award are aligned with the organization's current efforts in its BPM journey, calling for nominations in the areas of (1) Strategic Alignment and Governance, (2) Methods and Information Technology, and (3) People and Culture. In 2006, Company Q nominated one of their Business Process Architecture projects in the category *Strategic Alignment and Governance* and won the award. In 2007, Company Q nominated one of their

Business Process Redesign and Systems Implementation projects in the category of *Methods and Information Technology* and won an award for a second year.

Within Company Q, winning these awards has given the BPM community and the BPM team an increased profile. This has resulted in more proactive engagement of BPM professionals by senior management leading to greater involvement of the BPM team in emerging business issues. This external recognition of their success has also led the BPM community process professionals to be more motivated in working with the BPM team to progress the adoption of an organizational approach to BPM throughout Company Q. The BPM team in Shared Services is now the Practice Leader for BPM in Company Q, setting the overall BPM governance and providing support to upper level management in how to embed the BPM approach throughout the organization. Winning the awards has also given Company Q an increased profile in the Australian BPM Community.

6 Issues in Adopting BPM as an Organizational Approach

Despite the advances that Company Q has made, the progression of an organizational approach to BPM is not without issues. Recent changes within Company Q that have influenced the progression of the BPM approach include (1) changes in Company Q's business model and (2) changes to the organizational structure. These examples show that the progression of an organizational BPM approach requires an ongoing focus and needs to evolve to keep pace with changes that occur within the organization and its environment.

6.1 Changes in Business Model

In 2008, a change in the Board and senior management of Company Q led to a significant change in its business model, taking it from a model of an integrated transport provider to being a multiple company model. The new business model was designed to increase the flexibility and agility of Company Q, with stronger accountability to making it more competitive in the market place. Changes to the Corporate Governance Framework were necessary to enable the organization to implement the new business model.

Company Q revised their Corporate Governance Framework from a strongly rule-based to a principle-based focus to achieve the following benefits:

- Applying Principles as appropriate in the individual Businesses as one size does not fit all
- Making management more empowered in the decision-making process and having greater accountability in business outcomes

As a part of the new Corporate Governance Framework, the Practice Leaders (i.e., the functional and process owners) within Company Q developed Governance Principles for all practices (i.e., function and processes). Subsequently, the

Governance Principles underwent a peer review prior to implementation throughout the Businesses. However, since the new Corporate Governance Framework has been put in place, questions have arisen about its effectiveness.

Consequently, the Company Secretary asked the BPDA to assist in a review of the organization's new Corporate Governance Framework. The purpose of the review was to ensure that the design of the accountability structure and decision-making process was effective. The BPDA assessed the new Corporate Governance Framework against the BPM Principles to identify any gaps. The review found that, despite the involvement of the Practice Leaders, the basis for the accountability structure was more on functional demarcations. Furthermore, the review revealed that not all Practice Leaders were included in the initial development and peer review. The review by the BPDA also found that there was no alignment of the overall decision-making process within some end-to-end processes and that links between business areas and/or levels of business were missing.

An independent external reviewer analyzed the BPDA's findings and proposed an appropriate Corporate Governance Framework for Company Q. Company Q envisages that a subsequent redevelopment of the Corporate Governance Framework to address the issues found will create further challenges due to potential changes in accountability and organizational structure, and a lack of capability for executing the new framework. The success of this redevelopment will depend in part on the re-education of senior management and the development of Practice Leaders in the deployment of the practices based on the BPM Principles.

The low level of understanding of Information Management that exists within Company Q will also influence the change in the Corporate Governance Framework from rule-based to principle-based. A past compliance-driven culture has resulted in mechanisms for record keeping being in place; however, to assist the organization in becoming more competitive and to enable improved performance, a stronger information management focus needs to be established.

6.2 Changes in Organizational Structure

Since commencing its BPM journey in 2002, a number of organizational restructures have led to significant changes in the roles and responsibilities of the BPM team. At times, these changes have affected the manner in which the team operates or is resourced, while at other times, these changes have affected the location of the BPM team within the organization.

In mid-2007, the BPM team commenced their most recently defined role as the Practice Leader for BPM in the organization. Process professionals from the BPM community are now part of the individual support teams within the different Businesses. The process professionals work closely with people from within the strategic planning, human resource, finance, and IT functions as well as the areas of risk and project management. This change includes the BPM team working closely with other leadership teams of the organization to build BPM capability to support and enable a more enterprise wide and top-down approach to BPM. An example of this is the BPM team working closely with Practice Leaders and Line of Business management. This work is building BPM capabilities within the factors of Strategic Alignment and Governance. The expected consequence of the work is that it will set boundaries for the future development and implementation of Methods and IT and that it will activate the cultural change needed to achieve higher levels of capability in the People and Culture factors.

A further consequence of the multiple company restructures is that the IT systems that support the activities of end-to-end processes lack integration. The CIO is currently tasked with rationalizing the IT systems (where appropriate). However, moves to rationalize IT systems will present a challenge to business units as interim solutions are applied in order to manage the high business risks associated with the changes.

6.3 Lessons Learnt During Company Q's BPM Journey

Company Q has learnt numerous lessons that relate to the development and execution of strategies for implementing BPM as an organizational approach. The following points provide an overview of the key lessons learnt by Company Q during its journey. In keeping with the approach adopted within Company Q, these points are mapped to the *factors* from the BPM Capability Framework.

6.3.1 Strategic Alignment

Company Q found that a strong connection between strategy formulation and the selection of BPI initiatives needs to occur to optimize resource allocation. It recognized that a lot of effort was wasted throughout the organization by undertaking numerous improvement projects that were not business critical or strongly linked to the overall strategic objectives. These projects often came to a standstill or did not deliver value to the organization. The company has now determined that the strategic planners and BPM professionals work together, undertaking a business risk assessment and clearly defining the business critical improvement projects. This drives subsequent resourcing of projects and ensures projects undertaken are more effective and enable strategic objectives to be delivered.

Within Company Q, processes need to be clearly defined in order to be successfully measured. It was recognized that if the organizational processes were not defined from an end-to-end perspective, ownership and accountability for process performance could not be clearly assigned. When processes were not clearly defined, the process measures used related to only discrete components of the process and the performance outcome of the entire process was not managed successfully. The end result for Company Q was often unhappy customers. The experiences of the BPM community found that it was good practice to use the customer requirements to define the process and measures to ensure success.

It was acknowledged that Company Q had to become more customer focused to be able to compete in the market place and in doing so had to clearly understand customer requirements. Ultimately, Company Q had to decide which market segments were to be targeted as they found it was no longer feasible to cater to everyone as the cost of delivery was often higher than the return to the organization. Company Q investigated its service delivery processes and its cost to gain a better understanding of the market segments they should focus on considering the business environment they are working within.

6.3.2 Governance

Company Q found that BPM Governance needs to be put in place early to ensure clear direction and leadership and common terminology as people within Company Q only follow leadership when clear directions, boundaries, and rewards are set and properly interpreted and communicated. Furthermore, Company Q found that BPM Governance needs to be integrated into an overarching corporate governance framework as BPM is a management philosophy and not a standalone practice.

In Company Q's experience, transparency is a key element to gaining accountability as they found that few people would take accountability if they were not fully aware of "what the accountability is for." This meant that processes had to be well defined and furthermore, that the individuals accountable for the processes had a solid understanding of what was involved in achieving this outcome. Company Q also found that process leaders within the businesses needed support from their functional counterparts within an integrated BPM governance framework to ensure that optimal (process) decision making occurs.

In the experience of Company Q, linking individual performance measures with the overall end-to-end process performance acted to focus attention on continuous process improvement.

6.3.3 Methods

With respect to modeling processes, Company Q found that there needs to be a common process-modeling notation in use across the business to ensure consistent, reusable models. At the time of commencing their BPM journey, the notation selected was not as important as the consistent application of the notation and the ability for the notation to be supported by an associated modeling tool.

Company Q found that the use of multiple process improvement methods (in their case Six Sigma and Lean Manufacturing) was beneficial. This enabled the matching of the most appropriate method dependent on the different purpose and types of the improvement project. Company Q has developed guidelines on the selection of the most appropriate methods for use in different situations, and these form a part of their process review.

In Company Q's experience, strong program and project management capability needs to be in place to track the benefits for the business. Company Q found that this applied to process improvement and/or review projects as well as the overall BPM program of works that aims to deliver supporting BPM capability.

6.3.4 Information Technology

Company Q found that a common process repository/modeling tool is essential when progressing with BPM. The system itself (i.e., whether it was System Architect, ARIS or other similar software) was not important in the initial start up of BPM in Company Q. However, being able to match the suitability of the tool to the different purposes of the modeling has increased in importance when implementing different process improvement and review projects.

6.3.5 People

Company Q found that the most effective way for many of their staff members to learn was by them being involved in doing the work. Hence, the BPM team built BPM capabilities through discrete projects. Selection of projects was on their strategic importance and the level of energy senior management placed on the project. Every project provided the company with the required process improvement; however, as an additional value add, the projects also provided an increase in particular BPM capabilities as they served to develop the process related skills and abilities of the people selected to work on the project.

Prior to adopting BPM as an organizational approach, sharing of information within the organization was limited, despite endeavors to improve processes in numerous projects. Company Q found that an increase in the sharing of information and a new openness in the way in which people communicated with each other following involvement in process improvement projects that used the new BPM Principles and allowed different project teams to reuse information across the organization. This reduced cycle time and the cost of certain tasks.

Company Q's staff did not positively connect with the notion of process or BPM, nor did they like the use of BPM terms. Hence, members of the BPM community had to convey their messages in a language filled with analogies and stories to build acceptance in the wider organization.

6.3.6 Culture

Company Q found that top-down leadership is essential to achieve a holistic implementation that includes a BPM approach throughout the entire organization (as opposed to within discrete components of it). Within Company Q, acceptance of the BPM Principles required many staff and management to change their mindset – creating a need for a program of cultural change. Without strong leadership from the top and clear guidance, the required change in people will not happen.

In adopting BPM, the strategies used need to be communicated in a manner that is meaningful for all management and staff. This requires different approaches at the different levels of the organization and not just a uniform approach. In part, this is because the implementations of strategies that happen in the operation of the organization are not the same as those on the executive management level. However, it is also because the appropriateness of the communication medium and/or channel varies between the levels.

7 Conclusion

This chapter presents the experiences of an Australian Transport Provider in adopting BPM as an organizational approach. In doing so, the chapter clearly distinguishes such an approach to one that focuses on technology solutions or to one that focuses on the management of processes throughout the process lifecycle.

The experiences of Company Q showed the value in adopting a BPM Capability Framework to develop a roadmap to guide the progression of BPM. This roadmap included direction for BPM communication, BPM strategy development and implementation, and internal BPM consultancy engagements.

Company Q found numerous benefits flowing from the adoption of an organizational approach. These included an increase in customer focus, an increased ability to change human resource capability, and increased recognition of BPM both within the organization and within the broader business community.

Finally, the lessons learnt during Company Q's BPM journey show that often it is necessary to match the strategies for developing these capabilities to the individuals within, and experiences of, the organization itself for them to be successful. This suggests that a single, generic methodology for adopting BPM as an organizational approach is unlikely to lead to widespread success, and that organizations will find value in developing a capability "roadmap" that suits their unique needs and circumstances.

Acknowledgments The authors wish to acknowledge the vital role of all contributors to the ongoing program of research that supports this chapter. This includes the associated researchers from QUT and the individuals from Company Q.

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Business Process Management in International Humanitarian Aid

Hugh Peterken and Wasana Bandara

Abstract International humanitarian aid provides assistance such as food, shelter, and health or counseling services across national boundaries to communities in need. Universally, international humanitarian aid organizations play a critical role, by supporting the survival and recovery of communities affected by crises such as natural disasters, conflicts or disease epidemics. In most instances the technological, human and financial resources of diverse countries are put together to support communities facing crises. These events, often require immediate action and long term support to sustain the community needs and are highly sensitive to the contexts in which the crisis incidents occur. Large amounts of funds and resources are received each year to support such initiatives and successfully distributing humanitarian aid is a complex operation. Given the size of the funds involved, the sheer complexity and criticality for fast, efficient and effective action in these initiatives, it is somewhat surprising that there is not much evidence of a business process focus by the humanitarian community. This chapter describes the core business of International Non Government Organizations (INGOs), depicts how the main aspects of Business Process Management manifest within INGO's and points out the values and challenges of process centric approaches within international humanitarian aid organizations. The latter part of the chapter vividly illustrates these aspects using two example cases within the International Federation of Red Cross and Red Crescent Societies.

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4_32,

1 Introduction

The last 10 years have seen a number of large high profile disasters killing hundreds of thousands of people. There was the Indian Ocean tsunami of 2004, the Pakistan earthquake in 2005, the Haiti earthquake and Pakistan floods in 2010. In that time, as shown in the case study below, the International Red Cross was able to significantly improve its ability to help the population in need. It reduced the cost of supplying goods by 80 % and halved the delivery time, allowing many more people to be helped. The improvements in business processes that led to this transformation are discussed in this article, along with some challenges that remain within the sector.

International humanitarian aid is assistance provided across national boundaries to communities in need. It consists of goods such as food and shelter, and services such as health or counseling. The aid is typically provided in response to crises such as natural disasters or disease epidemics. The primary objective of humanitarian aid is to save lives, alleviate suffering, and maintain human dignity.

The bulk of international humanitarian aid is provided through three channels, sometimes referred to as the three pillars of humanitarian action (http://humanitarian-space.dk/fileadmin/templates/billeder/dokumenter/Seminar_12_juni/RCRC_statement_on_neutrallity_in_humanitarian_assistace.pdf), namely the UN and governmental action as one, international non government organizations' action as second and the humanitarian work of the Red Cross Movement as third.

The United Nations has a number of agencies and funds providing both assistance and co-ordination, including the United Nations Children's Fund (UNICEF) (http://www.unicef.org), the Office of the United Nations High Commissioner for Refugees (UNHCR) (http://www.unhcr.org), the World Food Program (WFP) (http://www.wfp.org) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (http://ochaonline.un.org/). The latter provides an overall co-ordination role for international humanitarian response. A significant response effort passes through international non-government organizations such as the International Rescue Committee (IRC) (http://www.theirc.org), Save the Children International (http://www.savethechildren.net) and World Vision International (WVI) (http://www.wvi.org). In many high profile disasters, the largest single response effort comes from the Red Cross Movement,[1] led by the Red Cross or Red Crescent society of the afflicted country. The International Red Cross movement consists of Red Cross or Red Crescent organizations in 186 countries (http://www.ifrc.org/index.asp), the International Committee of the Red Cross (http://www.icrc.org/) which works in conflict situations and the International Federation of Red Cross and Red Crescent Societies (IFRC) (http://www.ifrc.org) which co-ordinates and assists in disasters and health crises.

[1] For example, in the tsunami of 2004, the Red Cross and Red Crescent raised more than $3bn (International Federation of Red Cross and Red Crescent Societies 2005) of the $7bn total funds raised (International Federation of Red Cross and Red Crescent Societies 2005).

In practice the work of the aid agencies is highly complex and there are many challenges in running an efficient business process. The level of investment in supporting IT systems is especially low, estimated at less than 2.4 % of turnover in international non government organizations (Brindley 2009). This is low in comparison to the investments seen in the private and government sectors, which have an average of 5.9 % of turnover spent on IT systems (Tracy et al. 2008). Other challenges are in the co-ordination effort with other agencies, the legal framework of the recipient and donor countries (for example customs requirements or export restrictions) and the requirement to adapt to local requirements.

Much of the work is done through human interaction, with a strong focus on quality and accountability to ensure worthwhile outcomes. In the first instance, these outcomes may be to provide rescue, food, shelter and health services, but generally humanitarian programs also focus on longer term recovery and reduction in vulnerability for the affected communities. Given the complexity and variability of programs, much effort is put into an appropriate policy environment that defines working methods and best practices. Some examples of such policy environments are; the Humanitarian Charter and Minimum Standards in Disaster Response published by Sphere (http://www.sphereproject.org/content/view/27/84/), the UN Disaster Assessment and Coordination Field Handbook (http://www.reliefweb.int/rw/lib.nsf/db900SID/JDAB-5RJFX3?OpenDocument), the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations (http://www.reliefweb.int/telecoms/tampere/index.html) and the Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief (http://www.ifrc.org/Docs/pubs/disasters/code-conduct/code-english.pdf). These policies guide and define the boundaries, expectations and governance around the actions taken in the humanitarian aid situations.

International overseas aid from governments totaled approximately US$120Bn in 2009, of which approximately US$9.5Bn was humanitarian aid (http://www.oecd-ilibrary.org/content/book/dcr-2010-en). Add to this the substantial donations from private individuals, philanthropic organizations and business, whose contribution is more difficult to quantify, but in some countries is more than double the government aid (Hudson 2006). As an example, in the tsunami of 2004, it is estimated that US$4Bn in private donations were dispersed, over half of this by the Red Cross and Red Crescent movement.

Given the size of the funds involved and the nature of the related tasks, it is maybe somewhat surprising that there is not much evidence of a business process focus by the humanitarian community. Currently there are only a few specific areas of work within INGO's, where a business process view is taken. The management of related supply chains is a common area where a process view is observed across most INGOs. Aidmatrix (http://www.aidmatrix.org/), a US based NGO is an exemplary case study in this context. They looked at the US domestic disaster response effort as a business process that could be enhanced through a systems approach and designed a web based product that moved all the key process components into a single portal, accessible by donors, aid agencies and people in need. Through implementing appropriate business rules and enabling the users of the system, they have been able to simplify and streamline the overall disaster response process. Their product is now being used in all major US disasters, coordinated by the US Federal Emergency Management Agency (http://www.fema.gov). A trial version of the disaster management portal is available (see http://www.sandbox.aidmatrixnetwork.org/FEMA).

This chapter focuses on the value and challenges of a business process management approach in the distribution of international humanitarian aid (especially in disasters). The material is based on a number of case studies and the personal experience of the principal author who was the Chief Information Officer for the International Federation of Red Cross and Red Crescent Societies (IFRC) for over 5 years. First, the notion of Business Processes through the lens of the international humanitarian community is presented, describing how the core elements of Business Process Management manifest in humanitarian aid organizations. A summary overview of this discussion highlighting the values and challenges for BPM in the humanitarian context is provided. Next, two case studies; on the humanitarian supply chain and volunteer management is presented to illustrate the reality of the aspects discussed earlier. The paper concludes with a synopsis, pointing to some challenges and opportunities for future work.

2 Business Processes: The Views of the International Humanitarian Community Views

While the humanitarian community involved in international disaster response is very diverse, this chapter attempts to synthesize the community's perspective towards business processes using anecdotal evidence from the principal author's prior experiences. First, a brief overview of the core processes within INGO's is provided, with a particular emphasis on the international disaster response. Then the authors' view on the manifestation of core elements of Business Process Management (BPM) (see Fig. 1) as stated in Rosemann and vom Brocke (2014) is provided, covering how Strategic alignment, Governance, Methods, IT, People and Culture aspects influence the decisions and pathways for applying BPM in INGO's.

The complexity of the humanitarian response can be represented in business process terms in Fig. 2. The actions can generally be broken into three areas for analysis. There are the core value processes, implementing programs within the communities in need. There are a set of processes that support this work through for example, fund raising or recruitment. And there are processes often referred to as governance, which set policy and prioritize the work.

The core value processes are usually project based and project management methods are key to achieving successful outcomes. A program will start with an assessment of the humanitarian need. This assessment may identify a wide variety of requirements, from fresh water to immunization to counseling. Each INGO will

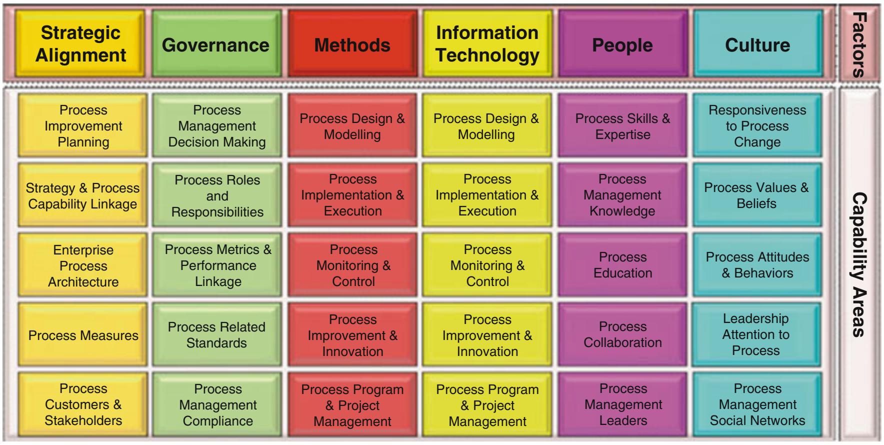

Fig. 1 The six core elements of BPM (Rosemann and vom Brocke 2014)

have a specialist capability, for example Médecins Sans Frontières (http://www.msf.org/) specializes in medical facilities and Save the Children International (http://www.savethechildren.net) specializes in program improving childrens' lives. The program of work may consist of many projects, from many different agencies. In deciding which needs to address, there is strong collaboration between agencies to best serve the community's requirements. There are structures in place to facilitate this collaboration including the Inter Agency Steering Committee

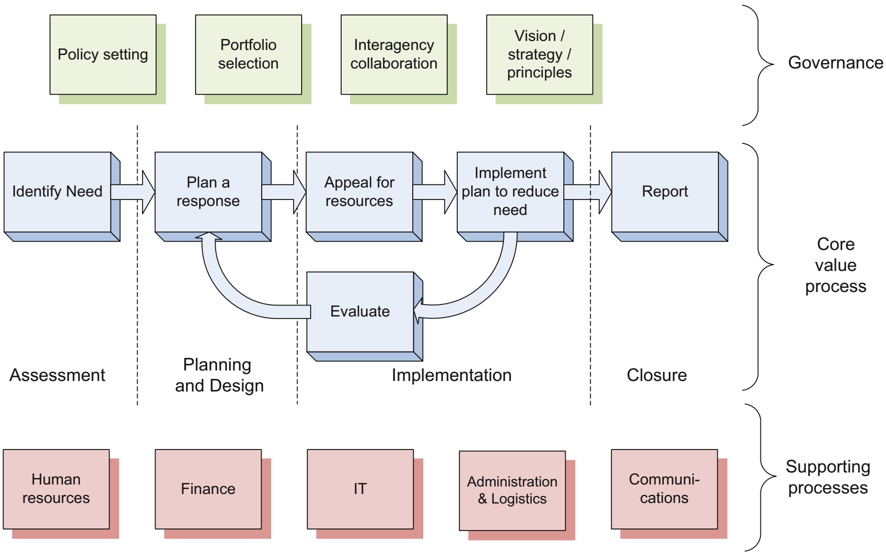

Fig. 2 Overall humanitarian aid process

(http://www.humanitarianinfo.org/iasc/) and the United Nations Office for the Coordination of Humanitarian Affairs (http://ochaonline.un.org/), shown in Fig. 2 as interagency collaboration.

Following assessment, a plan of action is created and the resource requirements are defined. These resources are requested through an appeal for funds. The appeal may be to individual donors, to governments or to corporate entities. Fund raising is probably the best understood process within the humanitarian community with sophisticated IT systems available (for example Raiser's Edge from Blackbaud (www.blackbaud.com)), clear metrics and industry benchmarks (http://www.blackbaud.com/targetanalytics/benchmarking/bench_overview.aspx).

With the funds that are raised, the program is implemented. There is ongoing evaluation and this, along with the response to the appeal, will lead to re-planning and revision. Finally, a report is produced to inform the donors on how their money has been spent. In many situations this cycle is repeated a number of times as the situation evolves and humanitarian needs change. For example, the initial needs after a disaster might be for search and recovery and first aid, which evolves into needs for hospitals, food and water, then into a need for shelter, reconstruction and counseling.

The support processes have many similarities to those in many commercial organizations. Operations are generally complex due to the international nature of the work, with multiple currencies, different employment laws in each country and multiple languages. Some support processes such as administration and logistics are sufficiently different to the standard commercial processes that IT systems have to be designed specifically for that purpose. These issues add to the costs of the processes.

The third major stream of work in INGOs is that of governance. This area encompasses many activities that provide a decision making framework. This stream receives considerable attention in the INGO world, and it is seen as important in ensuring that the activities of the INGOs are in the best long term interests of those people in need.

2.1 Strategic Alignment

Rosemann and vom Brocke defines strategic alignment as "*the tight linkage of organizational priorities and enterprise processes enabling continual and effective action to improve business performance*" and describe how a strategy-driven process improvement plan, bi-directional linkage between strategy and business processes, an enterprise process architecture and a well-defined understanding of process outputs are critical elements to achieve strategic alignment (Rosemann and vom Brocke 2014; vom Brocke and Sonnenberg 2014).

The contrast between the process focused organizations (for example retailers) and the people focused organizations (such as Red Cross) can be summed up in Fig. 3. In a human focused organization the realization of a strategy is driven

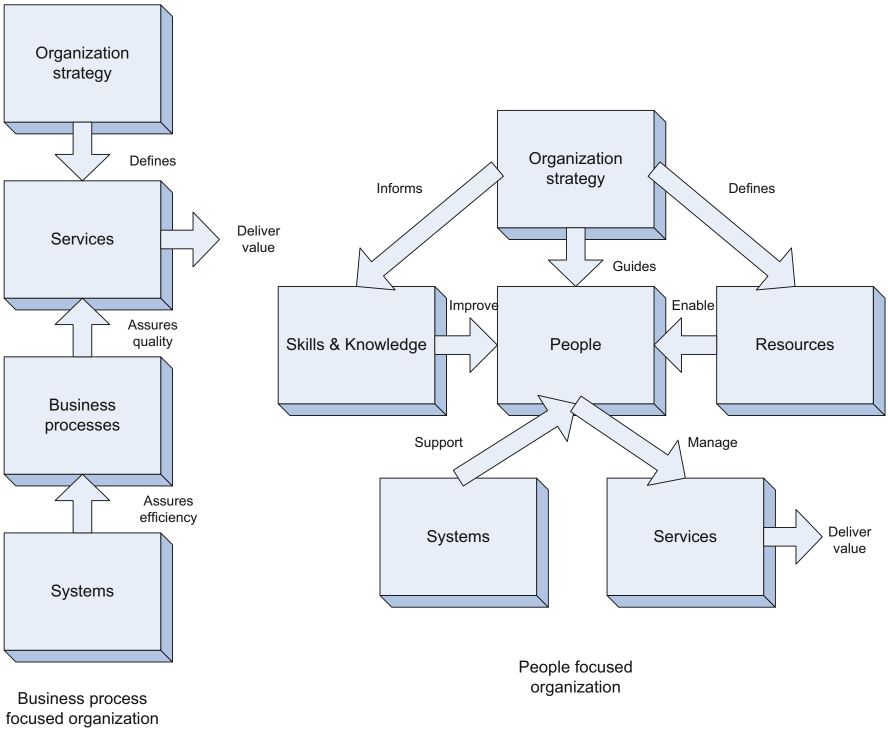

Fig. 3 Contrasting organizational perspectives

through individuals who are sufficiently capable to understand the strategy and then to undertake tasks within the local context that fulfils the strategic aims. The interpretation of the strategy is done through policy (for example with a policy on how to manage volunteers (http://www.ifrc.org/Docs/pubs/who/policies/volunteering-policy-en.pdf)), training courses (such as the Red Cross Impact Training Course (http://www.redcross.org.nz/cms_display.php?st=1&sn=11&pg=596)) and reference subject matter experts who can assist in recommending specific actions based on their experience and deep understanding of the subject. There is little focus upon, or understanding of, business processes.

The information systems environment focuses on supporting the individual staff members as a way of ensuring that the processes are followed. To give an example, the finance system at International Federation of Red Cross and Red Crescent Societies (IFRC) was engineering to provide immediate feedback to field staff on the financial health of their project (supporting the individual) while at the same time ensuring the reporting requirements of the organization under international financial reporting standards (supporting the process).

In contrast, a process focused organization has a clear view on how each service they provide supports the strategic aims of the organization. The processes are often monitored with metrics on process compliance and reflected in staff performance appraisals. The processes used to deliver these services are consolidated and optimized to reduce costs and improve quality with all encompassing IT systems such as ERPs, providing a backbone that is critical to the operation of the organization. When the system's environment fails in a process focused organization the consequences are often very serious. One example of this was the troubles encountered by British Airways on the opening of Terminal 5 at London's Heathrow airport (House of Commons London 2008; London Today 2008).

Another difficulty in approaching a business process improvement plan for humanitarian organizations is defining 'improvement'. While it may be possible to measure certain enhancements in the support processes (Davidso 2006), (for example reducing the direct costs of transporting goods), the improvements from the core value processes are notoriously difficult to measure. At a high level, success measures are reflected in the eight Millennium Development Goals, MDGs (The Millennium Development Goals Report 2010). Millennium development goal 1 is to eradicate extreme poverty and hunger by halving, between 1990 and 2015, the proportion of people whose income is less than $1 a day. This target is measured across multiple countries over 25 years, so the impact of individual humanitarian programs is difficult to attribute to the overall goal.

The humanitarian programs undertaken strive to positively influence the situation of the people in need, and most well designed programs will define the positive impact. Unfortunately there are many other factors that might affect achieving these outcomes, such as conflict,[2] adverse weather events[3] and corruption.[4] It is almost impossible to attribute a particular outcome to one thing alone; and running the same business processes in two situations may have very different outcomes. This may explain the strong emphasis and focus on the capability of people, why an iterative plan-do-check-act approach is used, and the extensive use of in-program evaluations; with business processes taking a back seat.

2.2 Governance

Governance "*establishes relevant and transparent accountability*, *decision-making*, *and reward processes to guide actions*" (Rosemann and vom Brocke 2014)

As mentioned in Sect. 2, there is considerable focus in humanitarian organizations on governance, accountability and decision making in complex multi-party operations. The collaborative nature of humanitarian actions means that processes occur across organizational boundaries; governance structures may change with

[2] For example, the humanitarian programs in North Eastern Sri Lanka after the 2004 Asian tsunami were severely hampered by the Tamil conflict.

[3] For example, hurricane Gustav in Haiti in 2008 hampered ongoing humanitarian efforts responding to previous hurricanes and tropical storms.

[4] As is widely reported in Afghanistan.

each project. The head of operations or the head of an organizational unit holds considerable authority and must carefully manage the operations under their control.

Inside humanitarian organizations, by contrast, business processes are predominately implemented within siloed organizational units. The management of these units provide the governance capacity where decisions can be taken within an existing hierarchy, metrics set, measured and acted upon. An example of this is the IT support processes, where ITIL may be implemented and the process governed inside the IT department, with the assistance of service desk software. Metrics can be defined (for example number of incidents treated within a timeframe), measured and referenced in individual's appraisals.

Within an organizational unit the business process director role (as defined in Bandara et al. 2005) is usually taken by the head of that organizational unit. The resourcing of other process roles depends largely on that person's commitment to business processes. Given the limited size of most organizational units, there is no capacity to permanently employ business process consultants or business process architects. These are generally contracted with any process improvement projects. Where permanent process analysts do exist, they work for the organizational unit manager, and are not always available to work on processes that cross organizational units.

The governance of processes becomes very difficult when the process crosses organizational boundaries. One example commonly seen in the humanitarian community is the difficulty in enforcing a staff performance appraisal process. This process touches every employee, but if the individuals do not feel that it is assisting them in their immediate task (such as responding to people's needs in a disaster situation) then compliance rates can become unacceptably low.

2.3 Methods

Methods are "*the tools and techniques that support and enable consistent activities on all levels of BPM* (*portfolio*, *program*, *project*, *operations*)" (Rosemann and vom Brocke 2014)

One significant challenge within a humanitarian organization, is to communicate effectively with staff to present a process perspective of the organization. The first challenge is that of language. For example, in the Red Cross there are four official languages (English, French, Spanish and Arabic) and two unofficial languages (Russian and Mandarin). Translating even basic business process documents which are developed in English is a challenge. Translators or interpreters find it very challenging to represent terms such as "business process management" or "process control" in another language when they do not understand it in English.

In some cases where process diagrams were translated in many languages (an expensive task in itself) there was ambiguity through local language variations. We found that the terminology used in describing the warehouse management process (item, waybill, pipeline etc.) translated differently between Spanish used in Europe and Spanish used in Central America where the main warehousing hub was located.

The industry standard techniques of business process modeling such as BPMN, Archimate and ARIS are generally outside the skill sets of humanitarian workers. Less sophisticated tools such as swimlane diagrams tend to be used, but they lack the features of other tools (such as the ability to; reuse, support collaborative model development, have multiple views, manage complexity through multi layers and support the distribution of models through diverse dissemination channels (Bandara et al. 2005; Curtis et al. 1992)), which inhibits humanitarian originations in reaching the benefits of effective process modeling.

2.4 Information Technology

Information technology (IT) refers to "*the software*, *hardware and information systems that enable and support process activities*" (Rosemann and vom Brocke 2014; Sidorova et al. 2014). As mentioned earlier in this chapter, IT departments within humanitarian organizations receive significantly fewer resources than those in private or government sectors. This restricts their ability to provide IT systems that support the organization's processes. Some humanitarian organizations run ERP systems (for example SAP, Navision or Oracle E-business suite), but the process needs of the organization often do not line up with the traditional process models implemented by the ERP vendors. Given the restricted funding environment, undertaking significant configuration or coding on these systems is often unrealistic. There is also a perception that ERP systems restrict the ability to adapt business processes to local variations.

When business processes are codified and supported with IT systems, this can create challenges for IT departments. When processes are run manually and within organizational units, there are human based systems in place to reconcile outputs between these units (Fig. 4).

Once the processes are automated, there is a need for interaction between organizational units that is enabled by an enterprise integration bus (EIB). The processes can now be made more interactive. As an example, the payroll in an organization is usually managed by the HR Department. Traditionally, the payroll for each month would be created and submitted to finance for recording as financial transactions. Any discrepancies from incorrect coding would be reconciled in a meeting or phone call between HR and Finance.

When an enterprise integration bus is implemented, the HR system might implement business rules to prevent staff being allocated to incorrect financial

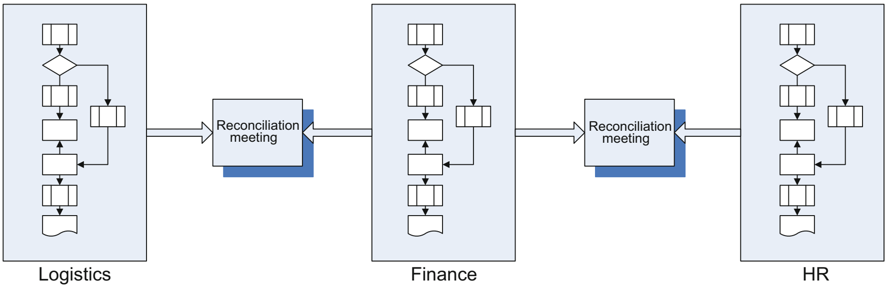

Fig. 4 Silo based business processes

codes when they are assigned to roles. This eliminates the need for reconciliation meetings and the process is more interactive between systems, as shown in Fig. 5

When there are discrepancies that cause a particular transaction to fail, the problem may be in one of the organizational units (HR or finance) but it also may be caused by software issues in the EIB. Thus the IT department might find themselves 'caught in the middle' when cross business processes are implemented.

The exact responsibilities for all possible issues can be difficult to agree and may be unclear. This often means that the IT department must investigate and allocate process exceptions themselves, just to keep the systems running. The implementation of an EIB may force the IT department to take a central role in managing cross functional business processes, often without any additional resources. This encumbrance may dampen the enthusiasm of any CIO in advocating a BPM approach.

BPM is defined as a discipline that integrates IT and business process expertise with the goal of transforming isolated business efforts into integrated and measurable cross functional activities that deliver operational and strategic advantages (Antonucci and Goeke 2011, p 4 and 6). Humanitarian organizations have both a limited IT capability and real difficulties in developing cross organizational IT systems to support complex business processes. This can have a direct impact on the process orientation of these organizations.

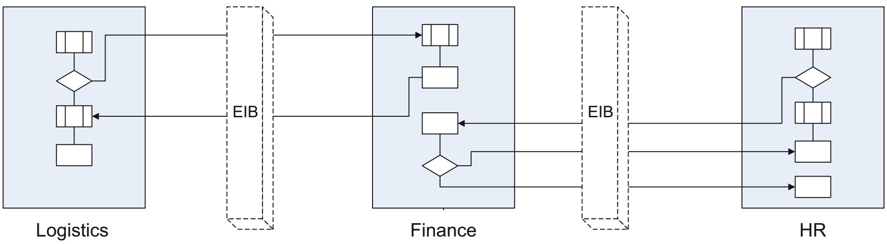

Fig. 5 Cross organizational business processes

2.5 People

This comprises human resources, and can be defined as "*the individuals and groups who continually enhance and apply their skills and knowledge to conduct the core business and relevant improvements*" (Rosemann and vom Brocke 2014). One of the pleasant surprises of working in the humanitarian community is the quality and commitment of the people in the sector. The diversity within the sector is unprecedented, with different cultures, countries and educational backgrounds providing a superb environment for developing solutions in challenging environments. Unfortunately within this talent pool, there are very few who join the organization because of an evangelical approach to process improvement.

There are pockets of process focused individuals, typically within finance, logistics and IT. Often such people are in high demand by the private sector and the salaries paid in the humanitarian sector are not competitive, hence staff attrition in this area is very high. Staff working on the relief and health programs typically have low levels of basic IT capability which restricts the ability to implement complex IT systems. There have been attempts to ensure that staff are able to use computer applications at a recognized level of competence, through implementing the International Computer Driving License (ICDL) certificate (http://www.ecdl.org/icdl/index.jsp). For example in the Arab States, UNESCO Cairo Office rolled the ICDL program in 12 Arab States with more than 200,000 registrants, over 500 accredited centers, and more than 50,000 holders of the certification (http://www.unescoicdl.org/showpage.aspx?pageid=91).

The people who work in the humanitarian sector often do not see their actions as part of a set of business processes. Figure 6 represents a more typical view from a staff perspective of the workings of a humanitarian organization. In for example a disaster response situation, staff will undertake activities such as meetings, fund raising, developing plans and communicating with stakeholders. These activities are undertaken based on a staff member's experience and within the policies and rules of the organization. Through these activities the donated goods, money, transport and people are transformed as quickly and efficiently as possible into the health services, food, water and shelter that the affected population is in need of. The Business Process moniker is usually applied to just the support processes such as the recording of financial transactions or the logistics of moving goods.

2.6 Culture

Culture in the Context of BPM, is "the collective values and beliefs that shape process-related attitudes and behaviour to improve business performance" (Rosemann and vom Brocke 2014; Schmiedel et al. 2014). As shown above, the overall circumstances of the humanitarian industry are not conducive to a BPM

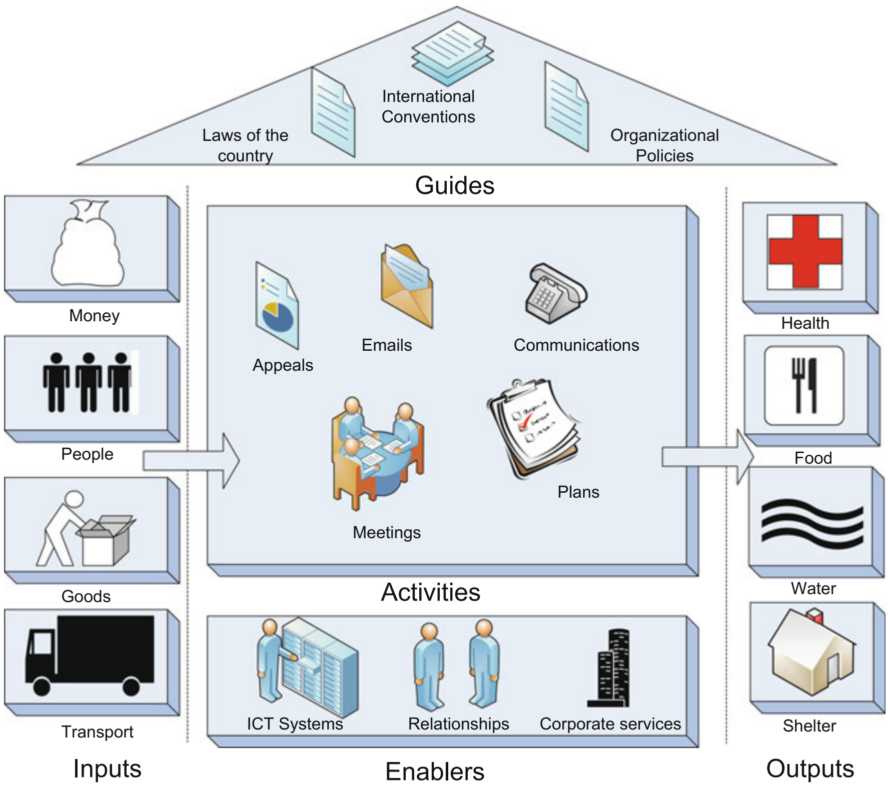

Fig. 6 Non-process perspective on operations

approach. There are two key driving factors working against the BPM approach and making it difficult for any humanitarian leader to take the issue forwards.

The first reason is the attitude of the donors. Donors are very interested in the overhead costs of humanitarian organizations and see a low overhead cost as a mark of efficiency. A popular charity ratings agency called Charity Navigator (http://www.charitynavigator.org) evaluates charities on organizational efficiency, giving higher ratings to charities that have lower overheads and more money going directly to programs. This position is compounded by the humanitarian organizations themselves in a race to the bottom on overheads. Médecins Sans Frontières (http://www.msf.org/) (MSF) is an international, independent, medical humanitarian organization that delivers emergency aid to people affected by armed conflict, epidemics, healthcare exclusion and natural or man-made disasters. In their 2009 annual report, Médecins Sans Frontières advertised a "management, general and administration" figure of 6.3 % in 2009 (http://www.msf.org/source/financial/2009/MSF_financial_report_2009.pdf). Oxfam in 2009 expressed their support ratio at 9 % in their annual report (http://www.oxfam.org.uk/resources/downloads/reports/report_accounts09_10.pdf). This compares with widely accepted figures of overhead in the equivalent commercial sectors of between 15 % and 25 % (for example see Lee and Covell 2008).

Unfortunately the development, implementation and improvement of business processes is an overhead (at least in the initial stages). The outcomes of a business process improvement initiative might reduce direct cost on the ground and may mean that more needy people can be helped, but the organization may be punished by donors who see it as an increase in overhead. Fortunately there are enlightened donors such as the Humanitarian Aid department of the European Commission (http://ec.europa.eu/echo/index_en.htm) and the UK Department for International Development (http://www.dfid.gov.uk/) who have specifically supported process improvement plans through funding supply chain improvements and improvements to human resource management.

The second reason is the litany of unsuccessful process definition and improvement projects that litter the humanitarian landscape. Projects may consume considerable resources defining and documenting processes, but may never move to the implementation stage because of the costs involved or the infeasibility of business change in worldwide dispersed organizations. When they do move to implementation, the failures become very public. Three examples of these difficulties were recently highlighted in a UN audit report of June 2009 (Terzi and Posta 2009). In one example highlighted in this report the World Health Organization implemented an Oracle ERP along with a radical process improvement plan (including off-shoring key finance processes). This severely disrupted the operation of the organization in a very public way (Russell 2009). Is it any wonder that the leaders of humanitarian organizations are wary of the potential risks of business process improvement?

2.7 Summary Views

The community reading this paper is probably already convinced that a serious approach to process management is key to success in business. This is not however a very widely held view amongst the stakeholders of the humanitarian community – the donors (with some notable exceptions such as The Fritz Institute (http://fritzinstitute.org/), ECHO (http://ec.europa.eu/echo/index_en.htm) and DFID (http://www.dfid.gov.uk/)), the leaders of the humanitarian organizations and many of the front line staff. The very real reasons for this are given above.

There is a reasonable compromise position. It must be accepted that many areas of work for humanitarian organizations are not amenable to a rigid process focus. The systems environment has to support staff in the less rigid process areas such as collaboration, communications and knowledge management.

The corporate services areas such as finance, IT, logistics, fund raising and HR can demonstrate improvement through a successful process based approach. The implementation of frameworks and best practices (such as ITIL), along with a sympathetic approach to the people environment is likely to result in real improvements in quality and efficiency.

The middle ground is where the challenge lies. This includes streams such as project management, case management and volunteer management. In many cases the process and system environment is not seen as an enabler and organizations can be stuck with inefficient systems and unused process documentation.

The private sector has become increasingly involved in humanitarian action over recent years. This is either through corporate social responsibility programs, through private foundations (for example the Susan and Michael Dell Foundation (http://www.msdf.org/) and the Rockefeller Foundation (http://www.rockefellerfoundation.org/)) or through direct employee engagement.

The private sector has a good understanding of the value of processes and the need for overhead; however it is rare for their corporate social responsibility programs to focus in this area. Successful corporate social responsibility programs generally have highly visible and emotive subjects, such as Procter and Gamble's Pampers campaign for vaccinations against maternal and neonatal tetanus (http://www.pg.com/en_US/sustainability/social_responsibility/pampers_vaccinations.shtml).

If in contrast, corporate social responsibility programs focused on improving business processes and the IT systems that support them, the impact of such investments could be much more significant. One interesting and innovative approach from the private sector that tackles the issue head on is the proposition from Accenture Development Partnerships (http://www.accenture.com/Global/Consulting/Accenture-Development-Partnerships/default.htm). In this model, Accenture provides highly skilled resources into INGOs to work on systems and process improvements. The resources are provided at a heavy discount through contributions made by the company and the employees themselves. Working on such a project is seen as a key part in every employee's career development.

3 Process Centric Examples in the Humanitarian Contexts: Insights from Two Cases

As mentioned above, there are many challenges in implementing a business process approach in international humanitarian organizations. This section illustrates the values and challenges of deriving process centric humanitarian approaches, narrating the experiences of two cases conducted within the International Red Cross.

The first case study is an example of the value and success of a humanitarian business process improvement initiative and illustrates a supply chain example at the International Red Cross between 2003 and 2006. It led to a dramatic reduction in costs for supplying assistance packages and was recognized with the European Supply Chain Excellence Award[5] (http://supplychainexcellenceawards.com/) in 2006 for both the public/not for profit sector and the overall winner for all sectors

[5] The European Supply Chain Excellence Awards were launched in 1997 as an initiative to recognize and reward organizations in Europe that demonstrate excellence in their supply chain.

in that year. This example has previously been documented in detail in (Cuckow 2006; Heigh 2006).

The second case study illustrates the associated challenges of BPM in the humanitarian sector. It describes the approaches to managing volunteers, which is a common requirement within this community. The diversity of situations and approaches makes a business process focus challenging to implement.

3.1 Case 1: The Humanitarian Supply Chain Initiative by Fritz Institute

The International Red Cross supply chain has many similarities with commercial supply chains, but its processes are sufficiently different that they warrant discussion. The supply chain is one component of the logistics function at the International Red Cross.

The core value processes in the humanitarian industry start with an assessment of needs (refer to Fig. 2). From this, a plan or project is defined and if there are goods required, a project is opened in the supply chain process (refer to Fig. 7). The requirements are appealed for, asking donors to support the activities of the agency. The amount of money raised, the goods available from donors and the speed of supply, feed into the project design, providing the field-based staff realistic information on what resources will be available to them and by when. The available goods are then transported to their destinations and tracked on route.

In practice, the expertise and knowledge of the logisticians is critical to a successful response. On hearing of a disaster, staff will promptly estimate the key requirements based on the type of disaster and the location. The procurement and mobilization can be started by the logisticians while the field staff are clarifying actual project needs. For example, an earthquake in a mountainous region will probably require winterized tents and field hospitals, whereas flooding in the tropics would require hygiene kits and water purification for disease control. The processes and systems allow this flexibility, while constraining other areas such as procurement to meet high standards required by many donors.

Prior to 2003 these processes at Red Cross relied on spreadsheets and manual processes in the Geneva office. Constraints were enforced through management oversight and manual sign offs. This provided flexibility and was very efficient, but made consolidated reporting challenging and required that all logistics operations took place in a central office. Thanks to a generous donation from the Fritz Institute (http://fritzinstitute.org/), a project was initiated with International Red Cross to define and optimize the business processes and build a web based IT system to support these processes. The result was the Humanitarian Logistics System (referred to as HLS) specifically designed to improve the management of the humanitarian supply chain.

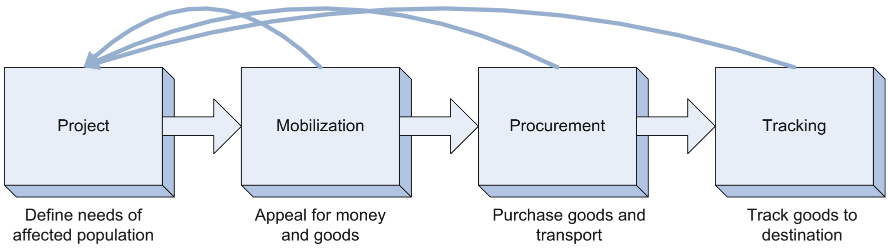

Fig. 7 The humanitarian supply chain at Red Cross

HLS is a web based supply chain management system that allows resources to be donated or procured and tracked from source to distribution point in real time. Goods are procured, transported, warehoused and distributed both in regular programs and in response to disasters. Requirements for goods are expressed as a mobilization table, and donors may provide money to purchase the goods or they may provide the goods themselves. HLS manages both procured and donated goods up to the in-country warehouse. HLS first went live in late 2003.

Following the initial project to define business processes and to implement HLS, ongoing emphasis was placed on continuous measurement and optimization of the supply chain (Jahre 2008). Data within HLS was analysed and process improvement metrics defined (Davidso 2006). Shortcomings in the data collected were identified and HLS was adapted. HLS is a web based system, which provides a capability to disperse activities in the business process to regions of the world closer to requirements. This was done at IFRC and provided many advantages in terms of cost, speed and local adaptability. At the same time oversight and controls were enforced which is important to maintain donor confidence. This process continues, driven by the evidence of the impact of improvements made so far.

In the 5 years after HLS was released, the International Red Cross implemented significant process changes and a new supply chain model. The increased complexity of processes required that the whole IT systems architecture be reengineered. The organization was running a set of largely isolated best of breed IT applications. These were unable to support the cross organizational processes and could not provide a consolidated view of performance.

The systems environment was migrated to a service oriented architecture with an enterprise integration bus (EIB) providing the capability to manage the processes as they passed between organizational boundaries (in this case logistics and finance). A data warehouse was also created to consolidate information from many systems and provide a holistic reporting capacity. The changes were far reaching, placing more control in geographically remote centers; optimizing procurement so the suppliers are contracted to supply goods which are neither supplied nor invoiced until they are needed in a disaster; and improving the distribution system so that immediate need stocks are held near to likely disaster locations. The latter change allowed goods to be shipped by road and sea in place of expensive air freight, dramatically reducing the costs of an aid package.

3.1.1 Applying the HLS: A Tale of Three Disasters

This section describes how the HLS positively impacted to support three global disasters. First these disaster situations are presented and then the overall impact is discussed

The Tsunami in South East Asia (**2004**): In December 2004 the tsunami hit, affecting 13 countries and causing approximately 225,000 dead and 1.5 million displaced people (International Federation of Red Cross and Red Crescent Societies 2005). HLS was in operation and provided the systems backbone for the response, ultimately benefitting almost one million people with a budget of nearly USD$600 million. In the first 12 weeks of operations more than 250 full air charters and more than 1,000 forty foot shipping containers were delivered by the International Red Cross. The value of the HLS system and the robust supply chain processes was evident to all stakeholders; while many non government organizations found their logistics systems challenged by the scale and complexity of the operation.

The management at the International Red Cross for the first time had the ability to measure the supply chain from needs to delivery. They could identify the date on which a community need was identified and track when the goods were supplied to meet that need. They could also uncover financial information on a granularity that was not previously possible. This analysis was undertaken following the tsunami, and led to clear definitions of key performance indicators and system improvements to ensure that the process measurements were relevant to agency staff and to the end recipient of aid.

Earthquake in Pakistan (**2005**): On 9th October 2005, an earthquake measuring 7.6 on the Richter scale struck Pakistan with tremors felt across the region from Kabul to Delhi. The affected area of almost 30,000 km^2 was the size of Belgium. In Pakistan, 73,000 people were killed, and more than 120,000 people injured. Approximately 3.5 million people were made homeless. This was the second significant test for HLS.

The requirements and challenges of the Pakistan earthquake were very different from the tsunami, but the basic business processes of supply chain were the same. The scale of response was similar and the system enhancements allowed the International Red Cross to monitor its response more closely.

Earthquake in Yogyakarta, **Indonesia** (**2006**): In May 2006, a magnitude 5.9 earthquake struck Yogyakarta in Indonesia. Six thousand people were killed, 25,000 injured and 450,000 houses were damaged or destroyed. The International Red Cross mounted the largest response effort, with the supply chain relying on HLS as its key system. The operation was closely reviewed once the work had moved into the recovery phase.

Table 1 Services provided to affected communities

	Indonesia tsunami	Pakistan EQ	Yogyakarta EQ
	100,000 families	95,000 families	65,000 families
Families receiving partial package by 2 months	28,021	29,229	53,112
Families receiving full package by 2 months	0	0	42,911
Average number of families served per day	445	555	613
% goods delivered from the that region of the world	13 %	68 %	100 %

3.1.2 Impacts of the HLS: An Example of Successful Process Improvement

The impacts from applying the HLS are depicted through the measurement of the key success metrics in the three disasters are shown in Tables 1, 2, and 3. The figures provided in these tables were derived from an analysis of the data held within HLS, sourced from (Heigh 2006).

As is evident from the above Tables, the speed and cost of response were dramatically improved. An aid package for a family in the Yogyakarta earthquake cost less than one fifth of the previous cost. Even adjusting for differences in location, this effect was very significant.

The key difference is not, however, the reduction in cost of delivering aid. It is in the improved outcomes for communities struck by disaster. In some cases the improvements mean that more families can be helped through the crisis and in other cases the money saved can be used to expand the scope of the response and recovery effort. In the Yogyakarta earthquake, the budget flexibility provided by reduced supply chain costs allowed a program to be initiated to rebuild destroyed houses. The money paid for building material and support from the Indonesian Red Cross[6] volunteers who assisted in the rebuilding effort.

The example of the HLS has had far reaching impacts inside and outside the International Red Cross. The success in logistics led to an increased focus on processes throughout the organization. A policy, procedures, process (3Ps) repository was created to provide worldwide access to key organizational resources. The process mantra was taken up by individual Department heads with for example the IT department implementing an ITIL best practice framework. Finally it drove a re-examination of the core project management processes that ensure delivery of the programs that the organization runs in the areas of disaster relief and community health.

Outside the organization, the importance of the effort was recognized by key donors and partners. A number of organizations started to use International Red Cross logistics capability for a small service fee, based on Red Cross's ability to

[6] Known as 'Palang Merah Indonesia'.

Table 2 Speed of delivery of humanitarian goods

	Indonesia tsunami	Pakistan EQ	Yogyakarta EQ
Days to activate end to end supply chain	18	10	3
Order lead time (requisition to delivery) in days	30	23	16
% of appeal items mobilized & delivered at 2 months	55 %	38 %	74 %
Average distance of relief items (km) to families	11,805	2,962	1,617

Table 3 Cost of delivery of humanitarian goods

	Indonesia tsunami	Pakistan EQ	Yogyakarta EQ
Operations total costs at 8 months	Not available	55,944,027	10,505,962
% logistics cost (sourced items + transport value)	–	86 %	87 %
Cost $US to deliver relief package per family at 2 months	–	824	142
Cost $US to deliver relief package per family at 8 months	–	450	142

efficiently manage the whole supply chain and to track goods from purchase to delivery (the system is currently being extended to track goods right up to the final distribution point).

A major donor to the International Red Cross, The Humanitarian Aid department of the European Commission (ECHO) recognized the value that the investment in business processes had delivered. The systems investment by Fritz of no more than $4 M (plus small ongoing operations costs) was delivering $10s of millions in savings on distribution costs every year. Not only was the aid cheaper, but it was more effective through arriving earlier and there was less opportunity for fraudulent activity – mainly because the HLS system had built in controls to ensure for example that purchases over a certain value had three quotes available.

ECHO continues to invest in business process improvements inside IFRC and offers incentives for other NGOs who receive ECHO funding to use the IFRC service rather than trying to build their own capability (a concept termed the humanitarian procurement centre). The work was also recognized internationally as best practice in supply chain management through with the European Supply Chain award in 2006.

3.2 Case 2: Volunteer Management in the Red Cross/Red Crescent

One of the fundamental principles of the Red Cross and Red Crescent Movement is that of volunteering. The movement is estimated to have approximately 17 million volunteers worldwide benefiting vulnerable people and their communities. Indeed

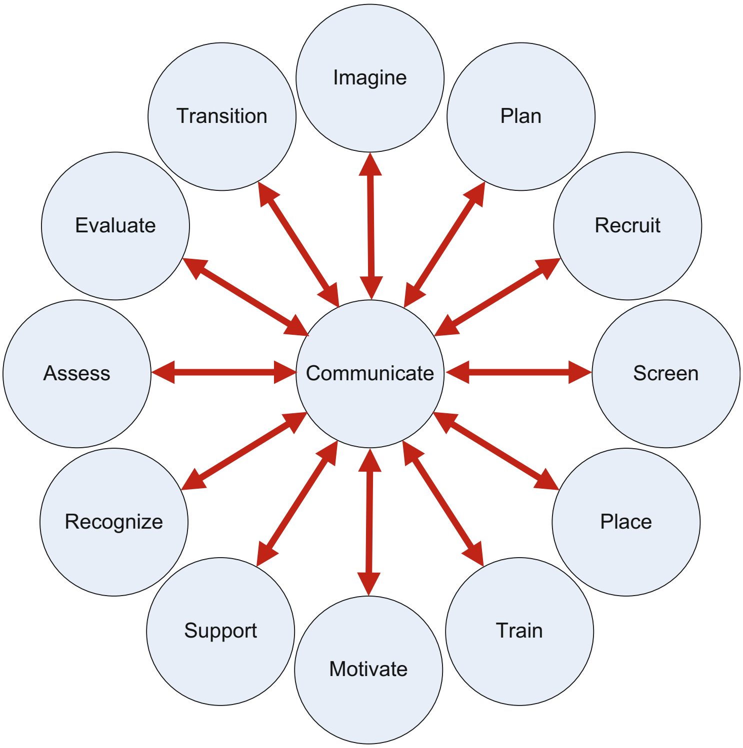

Fig. 8 Volunteer management activities

the Red Cross and Red Crescent Movement aspire to be one of the leading organizations in mobilizing and managing volunteers to help vulnerable people. To do this it sets out a volunteering policy (see sample Volunteering Policy at (International Federation of Red Cross and Red Crescent Societies 2005) and requires that certain statistics be collected about volunteers and the work that they do. In this case study we demonstrate that a business process approach to volunteer management in the Red Cross has not proven effective.

Within each country, the national Red Cross or Red Crescent Society is responsible for implementing the volunteering policy and collecting and reporting on their work. The national society must follow its own countries laws (for example on the privacy of data) and puts in place structures to manage volunteers according to the IFRC volunteering policy. There are many activities involved with volunteers as shown in Fig. 8. Reading Fig. 8 from the top bubble in a clockwise direction, we describe the lifecycle of a volunteer. Starting with a vision and a plan of what a volunteer might achieve, the volunteer is recruited, screened, placed, trained, motivated, supported, recognized, assessed, evaluated and if necessary transitioned to a different role or out of the organization. This lifecycle relies on constant communication for success. The diagram deliberately does not depict this lifecycle as a series of process steps, as the application of each bubble and the paths through them may vary considerably depending on circumstances.

These activities must be undertaken within the local context, often by volunteers themselves at the branch level. The circumstances of these volunteers differ immensely around the world – their age, ethnic background, education and motivation differ widely. The physical resources available to them might be substantial in some countries and non-existent in others.

In these circumstances, taking a business process view to volunteer management has not proven effective. There are numerous commercial IT systems that support the processes of volunteer management, but implementing them with all volunteers in a national Red Cross or Red Crescent Society is highly problematic. At branch level, where volunteer management generally takes place, there may be no computing resources and the branch committee members may be unfamiliar with the concepts that are needed to make such systems work.

In general, volunteer management at branch level runs on the basis of knowledgeable volunteers who have been trained on the key requirements. The processes are rarely documented and are different between branches, although checklists and paper based template forms may be used. In some cases local volunteers will construct their own IT systems to support volunteer management, often based on the skills and knowledge of an individual volunteer.

Referring to Fig. 8, volunteer management is seen as an activity of the individual who is guided by rules and policies and may be supported by systems (as often paper based and electronic). The focus is on clear policy settings and personnel development so that the overall aims of volunteer management are achieved. Identifying and mapping individual process steps has generally not proved to be a worthwhile task.

One consequence of this approach is the considerable difficulty involved in collecting and analyzing statistics about volunteers. The definition of a volunteer may differ between countries and between branches. The records are often paper based and challenging to collect; and branches are much more diligent in adding new volunteers to their records than removing inactive volunteers.

In a recent resolution of the Red Cross General Assembly (International Federation of Red Cross and Red Crescent Societies 2009) the definition of key volunteering statistics were harmonized. These will be used to create a global view of the volunteering resources. There is also work ongoing to define the monetary value of volunteers. This might persuade donors that, for certain programs, investment in a volunteer based organization can achieve better outcomes. It may be that these initiatives will strengthen the case for developing solutions to the issues mentioned above and lead to a more consistent approach to business process in volunteer management.

4 Conclusions

This paper has provided an overview of the challenges and opportunities of a business process focused approach within the international humanitarian industry. It has discussed the current status of business process programs, with many obstacles to be overcome to deliver more widespread acceptance of a business process perspective.

The focus in these organizations is on the capability of the individual to achieve outcomes within a local context. Many staff have poor basic IT skills and limited understanding of the value of business processes. This, combined with low investment in supporting IT systems, constrains the application of well defined business processes. The relative lack of metrics and easily measured success outcomes are another challenge.

Well defined, optimized business processes provide an organization with quality in its outputs, productivity of its staff and business information. For the individual staff member, however, business processes constrain their actions and often lead to an overhead from entering data into IT systems. While this data may be important to the organization to fulfill compliance or reporting requirements, the field worker sees it as inefficiencies enforced by headquarters. These perceptions lead to low process compliance and skepticism towards business process improvement projects.

The people focused organization is not unique to the international humanitarian community. Many other organizations such as small to medium enterprises have similar perspectives and challenges with the conventional business process view.

In the opinion of the authors, however, an approach to business processes that recognizes the realities of a people focused organization (Fig. 4) could succeed. Processes must support staff in their key motivation, which is to get things done as quickly as possible to alleviate the human suffering that they see around them. Any process design and system implementation must recognize the expectations of users; that systems are there to support them and not just to deliver data to some far distant management entity. The systems must provide immediate value to the user (for example by displaying relevant knowledge depending on the progression of the process), must mimic the current intuitive applications of the internet generations (such as Skype, Facebook and Twitter) and must have a compelling accessibility (for example using local language).

Creating a climate for investment in such systems requires donors who can understand the potential value of optimizing business processes. The ongoing costs of reviewing and optimizing processes and the IT systems that support them must be funded. The rewards from such an investment, would have the potential to improve the lives of vulnerable people far more than directly investing in specific programs in the field.

Insights from this chapter point to a number areas worthy for further investigation, for the progression of BPM and its application in the humanitarian sector. Investigations into the following areas will help to address some of the main issues identified: *How can one measure the success of BPM initiatives within the humanitarian context? How can capabilities be built and sustained within the sector? What IT capabilities are necessary for the adoption and successful conduct of BPM? What are the unique characteristics of people focused (as opposed to task/process focused) organizations? What methods, tools and techniques will be successful in improving the processes of such people focused enterprises?*

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J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4, © Springer-Verlag Berlin Heidelberg 2015

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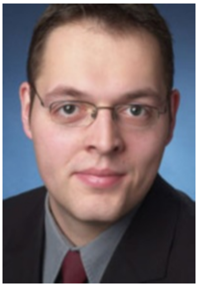

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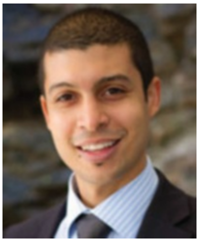

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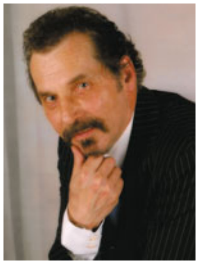

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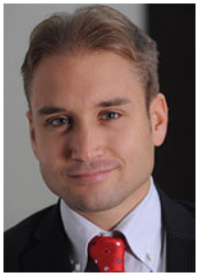

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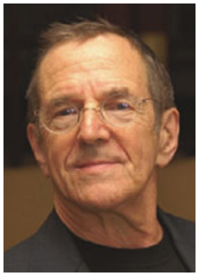
Robert Shapiro



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Index[1]

[1] Note: Page numbers in Roman represent Volume 1. Those in *italics* are in Volume 2.

J. vom Brocke and M. Rosemann (eds.), *Handbook on Business Process Management 2*, International Handbooks on Information Systems, Second Edition,
DOI 10.1007/978-3-642-45103-4,

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