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Introduction

Lapo Mola, Ferdinando Pennarola, and Stefano Za

The 2013 ItAIS tenth Conference, from which this book originated, has taken place as a pre-event of ICIS 2013 that was held in Italy for first time.

The 2013 ItAIS Conference has attracted contributions far beyond the Italian IS community. In fact, more than 200 authors, from four continents, have contributed to the Conference, whose 100 papers were selected for presentation at the Conference by means of a double-blind review process.

Authors do consider ItAIS as a relevant annual event where they share and discuss their research-in-progress projects and their research agenda. Different backgrounds and perspectives are thus compared and research positions developed.

The 15 tracks have addressed many aspects of the main Conference theme: "Empowering society through digital innovation".

According to the multidisciplinary approach to IS that characterizes the conference, in this book the reader can find contributions presented by researchers working in different disciplines, such as: organization, management, human-computer interaction, IS design, and IS development.

Moreover, both the high international standing and the relevance of the guiding theme of the Conference is shown by the key-note speakers that were invited. In fact, the first one was Prof. Sambamurthy, a well known scholar of the international IS community, who highlighted how digital innovations and technologies are

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influencing, or even determining, the evolution of social and economic traits of countries.

Because of the high quality of the papers that were presented at itAIS 2013, the scientific committee decided to publish three different books addressing three specific issues. This book is focused on "Understanding how people and groups – including networks, teams, and communities – rethink their relationships in an increasingly interconnected world". The volume collects 25 contributions that were selected from the Conference papers (18) and from other AIS affiliated conferences (7), namely ECIS, MCIS and CONF-IRM.

These contributions can be considered as the state of the art of research within the Italian IS community. It deals with the evolution of the interaction of information technologies with organizations.

Other IS literature has focused on price/market [1, 2], on power rearrangements [3, 4], or on the strategic role played by technologies such as platforms [5–7].

This book, instead, considers digital platforms and artifacts currently in use not only in an economic and business perspective but also considering their interaction with society in general or with specific components [8].

In recent contributions [9, 10], the connotation of the term "organization" is a "territory with its population" whereby companies play the role of sub-systems. Other topics of interest for the IS researchers concern networks [11, 12], virtual networks [13] and virtual organizations [14], virtual communities [15], smart societies, smart cities [16], ecological sustainability, e-healthcare [17], e-government [18], and interactive policy making (IPM). This book offers a multidisciplinary view on different information systems topics and it aims at spreading current research results. For this reason it is relevant not only to academics but also to IS practitioners such as information systems managers, business managers and policy makers.

The book contains three sections which address the following topics: (1) online communities and collaborative environment, (2) smart cities and ecological sustainability, and (3) e-government and social issues.

This publication is the result of a team work where many people have actively contributed. We are grateful to the Authors, the Conference Chairs and Committee members, to the members of the Editorial Board, and to the Reviewers for their competence and commitment.

Finally, we would like to thank the preceding Editors, acknowledging in particular the continuing and valuable support by Paolo Spagnoletti who helped us in our editorial work.

1 Part I: Social Network, On-Line Communities and Collaborative Environment

The use of social media platforms has become widespread over the recent years. For many, their use represents a sort of daily routine, whereas for others these platforms are a support for business processes, e.g. for marketing campaigns. Hallikainen proposes a research model to explore and analyze the motivations and consequences of the use of social media platforms. Furthermore, organizational virtual social networks are viewed as a way to reshape social structures due to their ability to strengthen social ties, to change power relations and to enable new forms of cooperation. Bobsin and Hoppen analyze some important features and characteristics of their structure, recognizing some networks elements which may contribute to the development of a network based approach to study organizational phenomena.

In these social network scenarios, online reputation and leadership are relevant aspects that have to be carefully considered by organizations. The adoption of social media for internal purposes triggers the development of social leadership. It involves dynamics of collaborative and mutual influence between leaders and followers, and among followers themselves, mediated by social media. Lazazzara and Ghiringhelli analyze individual attitudes to social leadership as a function of cultural and technological factors. Francesconi and Dossena depict instead the evolution of Online Reputation Management Systems, as an interaction among development of technology, organizational needs, and strategic postures.

Aloini investigates the consequences, such as benefits and risks, and the value of embedding social functionalities into Enterprise Information Systems. He focuses on the changes that social software brings to the business environment and to information systems. He provides a first interpretive framework in order to assess a systematic in-depth investigation. Antunes and Costa investigate the most relevant concepts of online social networking and decision support systems research literature. They determine four concept clusters (technical infrastructure, online communities, network analysis, and knowledge management) and analyze their interconnections.

Shen and Khalifa investigate the identity confirmation (the self) and identification (the community) concerning virtual community participation. An important theoretical development is the conceptualization of virtual community identity and the elucidation of its system design determinants.

Knowledge Preservation is a crucial activity because it provides individuals and organizations with the basis for creating new knowledge and technical skills. Agrifoglio and Metallo investigate Knowledge Preservation within Communities of Practice. Based on case study method, they provide evidence on different methods and techniques to preserve both tacit and explicit knowledge. On knowledge related issues, Marjanovic and Hallikainen seek to extend the current boundaries of Business Process Management (BPM) research by considering complex knowledge-intensive business processes (KIBPs) across different actors: business, government, and communities. These processes concern complex human-care

systems or disaster recovery systems. They compare and contrast BPM approaches in both organizational and disaster recovery scenarios.

Toraldo et al. analyze the concept of "E-health care" taking into account the definition of its value, and the value created by e-health care platforms for their patients. In particular, their aim is to understand, how e-healthcare platforms can generate value thanks to the active role of its users. Within the healthcare context, Bonacci and Tamburis analyze the connections between technology-driven needs and social-related patterns in the Long-Term Care (LTC). This milieu is analyzed as a complex disease network from which many classes of chronic pathologies can be identified as peculiar sub-networks. The use of a social network analysis approach provides new perspectives for recognizing how the set of interactions and relationships within a "virtual team" (including formal and informal carers from different organizations) can bring to higher levels of knowledge transfer, organizational learning and innovation spreading.

Cabitza investigates the denotational meaning of "Boundary Objects" and "Knowledge Artifacts", as physical entities present in several socio-material settings in (inter) organizational domains. He focuses on their role in the analysis of the functions of real objects supporting collaboration and knowledge work.

2 Part II: Smart Cities and Ecological Sustainability

Ricciardi and Za in their theoretical paper seek both to define the boundaries of Smart City research and to draw a map of the interdisciplinary community focusing on this emerging issue. Using bibliometric and social network analysis they examine a representative sample of publications on Smart Cities, identifying a growing interest on this topic from 2004 onwards and underlining the multidisciplinary aspects of the issues. They identify four main areas such as: Engineering/Computer Science, Business/management, Social studies, and Public Administration, Environmental, Urban, Ecology, or Geography studies.

Smart cities are often an emerging urban strategy based on a sort of bottom-up approach. For this reason they lack a governance framework, able both to support decisions and investments, and to evaluate goal reaching, performance, and economic and social impacts. Dameri defines the roadmap to develop, test and apply a universal Tableau de Bord to measure smart performance in urban space. Canonico et al. present preliminary evidence of an ongoing research on smart city platforms. In particular, they investigate different organizational models and roles delivered by actors which are involved in such initiatives. After the identification of smart cities maturity stages by means of a literature review, they provide an analysis and comparison of six case studies located in different countries, adopting six dimensions: services integration, stakeholders' relationships, involved actors, collaborative partnerships, governance models, and technological aspects.

As mentioned by Ricciardi and Za above, Smart cities studies are also related to ecological sustainability. Seeking to investigate the relationships between

information systems and ecological sustainability, Vitari provides a framework showing how information systems, organizations, society and nature are intertwined. He also underlines as ecological sustainability cannot be separated from social equity, suggesting that this relationship could be a new issue on which IS scholars should start to pay their attention.

3 Part III: Countries, Societies and Public Sector

In this final part of the book we gather the contributions concerning e-government and social issues, considering the implications of the adoption of digital technology by governments such as the characteristics of users and their ability to participate (social inclusion issues).

Many developing countries are concerned with digital divide problems: successful strategies rely on the use of mobile technology and smartphones in projects aiming at improving people's quality of life. Vitiello et al. suggest that similar strategies could be profitably adopted in European countries to capture the 30 % portion of illiterates. They therefore propose a community-oriented mobile interaction design methodology to enhance digital literacy and inclusion in Europe, starting from a deep understanding of target users and of their needs. In their explorative study, Ruggieri et al. analyze the strategies and policies adopted by the Italian government (within the European Union context) to address the digital deployment of ICT infrastructures in the public education sector.

Mola et al. seek to understand the role of ICT as a potential strategic tool for communication in the law and accounting firms, investigating the gap between the national and international context. Taking into account the role played by technology for supporting communication among several subjects and to increase citizen participation in political decision-making processes, Sæbø et al. investigate the role of ICT in various phases of the Italian "Five Star" Political Movement, from its birth through the current stage. The focus is on its transformation from a protest organization outside the established political processes to its being the second most voted party within the Italian parliament. Charalabidis and Loukis present a methodology for the efficient exploitation of multiple Web 2.0 social media by government agencies in order to broaden and enhance e-participation. It is validated and further elaborated through "real life" pilots in the PADGETS research project ("Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media"—www.padgets.eu). This endeavor is supported by the "ICT for Governance and Policy Modelling" research initiative of the European Commission. The EU funding system is also considered by Iannacci who compares instances of cheating and non-cheating practices within the European Social Fund context.

Huntgeburth and Veit propose a research agenda for evaluating Open Government initiatives. The results of their study suggest that the outcomes of Open Government initiatives may very well backfire on governments.

Imra explores the typical pattern of individual computer usage of public servants in a less developed country. The study concerns Bangladesh and it is based on a survey with 251 respondents. The broad picture obtained outlines the perception and pattern of computer use in such a special context, and it will likely contribute to design appropriate strategies for the development of information systems.

Harfouche and Robbin present preliminary results of an ongoing study of e-government implementation in Lebanon.

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Part I
Social Network, On-line Communities and Collaborative Environment

Why People Use Social Media Platforms: Exploring the Motivations and Consequences of Use

Petri Hallikainen

Abstract This paper proposes a value based view to analyze the motivation to use social media platforms. A research model exploring the motivations and consequences of the use of social media platforms is developed. The model includes the perceptions of the social capital and the social rewards as consequences of the use of social media platforms. Understanding the use motivations becomes increasingly important when more and more businesses and not-for-profit organizations start using these platforms as part of their daily business processes.

1 Introduction

The use of social media platforms, such as Facebook, MySpace and Twitter, has become widespread over the recent years. For many, the use of these social media platforms has become daily routine. Particularly for younger generations social media has become an integral part of their social life. For others, these platforms don't seem to be so interesting or they might be interested in using them for a purpose, such as for searching information. Businesses have become interested in social media, too, and are establishing their presence in platforms, such as Facebook. Researchers have been able to indicate that social media can be used successfully e.g. for marketing processes [1, 2]. However, for many businesses the application of social media is still in its infancy and more about presence than integrating it as part of daily business processes, and the businesses are likely to move through different stages regarding their social media maturity [3]. Understanding why people use social media platforms would provide organizations with guidance when designing services for their clients.

Why do people use social media platforms? It's all about social interaction. Or is it? There is still a rather limited understanding of why people use social media platforms or why would they use them in the future. The reasons might also be

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different depending on the type of social media platform used and whether people are interacting with their friends or with businesses. However, it might not be that different, since people engage in social relationships with other people with expectations of receiving social rewards from the interaction [4]. In line with this, it can be argued that people want to satisfy certain needs when they interact with other people in the social media.

In the information systems literature a useful concept to address the satisfaction of needs is the concept of user's perceived value of the information system [5–7]. In the field of consumer research consumer values related to buying behavior have been widely researched [8, 9]. In the most well known technology adoption model, the TAM model, usefulness together with ease of use are seen to predict the intention of use of a technology (see e.g. [10]). However, in the present paper, the focus is not on confirming the predictive ability of these concepts but rather on understanding on a more detailed level what explains the use of social media platforms. That is why I argue that the user value concept is a more useful theoretical basis and can provide more depth to understanding what are the needs that using social media satisfies.

The concept of trust has been proven to be important in both the social interaction between people and as a factor affecting technology adoption. Trust can thus be seen as a factor affecting the consideration to use a social media platform as a technology artifact. In the present study the perceived realized value is suggested to be measured as the amount of social capital one can derive from one's social network. Trust makes utilizing one's social capital more effective since it reduces the need for control [11] and may thus affect the realized value of the social media use.

The present research in progress paper aims to develop a theoretical research model to study the following research questions:

1. Why do people use social media platforms?
2. Does using social media platforms result in social capital and social rewards?

The theoretical research model developed in the paper will be used to design a survey on the motivations and consequences of social media use.

In the next section social media platforms are discussed briefly. Section 3 describes the theoretical development and the resulting research model. Finally, Sect. 4 discusses the research model and summarizes the paper.

2 Social Media Platforms

The use of various social media platforms has become every day routine for many people. The number of active Facebook users has more than doubled in a couple of years being around one billion users in 2012 [12]. Web 2.0 and social media applications allow individual users and organizational users to interact dynamically and share as well as produce content using these platforms.

For many organizations, the first step in the use of social media platforms is to use them for information announcements. This would then develop into more interaction with their clients and finally the use of social media platforms may become institutionalized as part of daily business processes [3].

From the perspective of an individual the social media platforms can be utilized for searching information, maintaining contact networks, locating job opportunities etc. For the purposes of the current paper, I am focusing on the general motivation to use and the consequences of using social media platforms. More specifically, the present research aims to find out whether the social media platforms allow individuals to enhance their social networks and social ties [11] and whether they can draw social capital from their social media networks. Focusing on these aspects a research model is developed in the next section.

3 Theoretical Development and Research Model

The research model developed in this section is aimed towards investigating established social media platforms such as Facebook. That is why the aim is not to predict the adoption of these platforms but rather to investigate what needs drive the continued use of the platforms [13, 14]. Consequently the research model is not based on any of the models predicting behavior such as TAM, TRA, or TPB [15]. These models also exclude emotions such as enjoyment [16], which is proposed as one of the factors affecting continued use of social media platforms in the present paper. Moreover, distinguishing intention to use and actual use is useful when predicting use; i.e. whether intention leads to actual use. However, in the current study this distinction is not considered necessary because the research focuses on established use of social media platforms and their continued use.

Since my aim is to shed light on what drives the use of social media platforms the analysis is based on the concept of user's perceived value of using these platforms. Additionally, complementing the technology adoption models, the current research model aims to examine the perceived consequences of using social media platforms. It is suggested that using social media platforms would affect the perceived social capital derived from one's social network, which in turn would affect the perceived social rewards gained from the social interactions. These rewards represent the perceived realized value of using the social media platforms.

3.1 Continued Intention to Use a Social Media Platform

There is a large body of literature utilizing TRA, TPB and TAM theories that use the concept of behavioral intention to predict technology usage. However, in the case of technologies that are not new, such as SMS or established social media platforms (e.g. Facebook), researchers have suggested the use of the continued

intention to use as a proxy for the behavioral intention [13]. The concept of continued intention to use a technology has been applied in the earlier research on social networking sites by Lin and Lu [14]. Since the focus of the current paper is on established social media platforms, such as Facebook, we adopt the concept of the continued intention to use for our research. The factors affecting continued intention to use social media platforms and the consequences of the use are elaborated in the following sections.

3.2 User Values and Needs

User values and needs define the intended purpose of using the social media platforms. As Kujala and Vaananen-Vainio-Mattila [7] define: user values "describe users' psychological values that affect their views as to what kind of purpose, functions and characteristics are important to them in a certain usage situation and context".

Sheth et al. [9] defined five categories of values that influence the consumer choice behavior: functional value, social value, emotional value, epistemic value, and conditional value. They maintain that these categories are consistent with earlier research on value in different disciplines such as sociology or psychology [9]. These value dimensions are used in our research model to represent the needs that could be satisfied by the use of social media platforms. The value categories are defined in Table 1 based on [9] and the application to social media platforms has

Table 1 Value categories, adapted from [9]

Value category	Definition
Functional value	Perceived utility acquired In the case of social media: the capability of social media platforms to provide functionality or means to achieve one's goals
Social value	Perceived utility related to associating with specific social groups In the case of social media: the social value acquired from associating with social groups through using social media platforms. Maintaining one's social image through using social media platforms
Emotional value	Perceived utility related to arousing feelings In the case of social media: emotions aroused by the use of social media platforms such as enjoyment
Epistemic value	Perceived utility related to arousing curiosity, providing novelty or satisfying a desire for knowledge In the case of social media: the capability of social media platforms to arouse curiosity, provide novelty or knowledge
Conditional value	Perceived utility related to a specific situation (e.g. seasonal value of Christmas cards) In the case of social media: value related to social media use in a certain situation, such as one's birthday

been added by the author. Moreover, the application of the value categories in the case of social media platforms is sketched.

Based on the discussion above the following hypotheses can be made:

H1: Perceived utility gained from the use of a social media platform favorably affects the continued use of the platform.
H2: Perceived social value gained from the use of a social media platform favorably affects the continued use of the platform.
H3: Perceived emotional value gained from the use of a social media platform favorably affects the continued use of the platform.
H4: Perceived epistemic value gained from the use of a social media platform favorably affects the continued use of the platform.
H5: Perceived conditional value gained from the use of a social media platform favorably affects the continued use of the platform.

3.3 Role of Trust

Some scholars have defined trust as a situation, where individuals are acting against their rationale when they are willingly becoming vulnerable to their counterparts' actions [17]. In the organizational context, trust can decrease the need for control and improve cooperation, and can be defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" [18].

It can be assumed that trust affects directly the continued use of a social media platform. According to the literature on social capital trust is an important factor affecting the formation of social ties and the ability to draw social capital from one's social network [11]. Thus, it is theorized that trust affects the perceived social capital that can be derived from the social network.

Trust may thus affect the attitude towards the use of the social media platform directly and it may also affect the formation of social ties and the ability to draw social capital from one's network. The following hypotheses can be made:

H6: Trust affects favorably the continued use of social media platforms.
H7: Trust enhances the potential to draw social capital from social media networks.

3.4 Social Capital and Social Rewards

"Social capital represents the resources that accrue to an actor through the actor's social relationships, facilitating the attainment of goals" [11]. An individual would thus use the social capital from his/her network for achieving his/her goals. Trust may enhance drawing social capital from one's social network since it reduces the

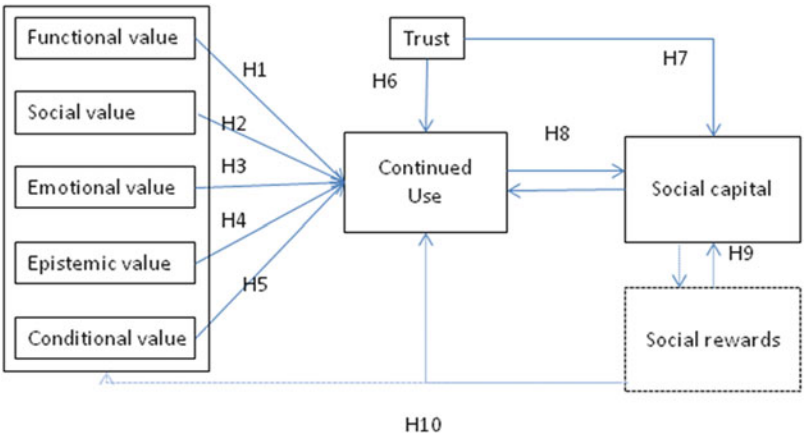

Fig. 1 The research model

need for control [11]. Social exchange theory [4, 19] uses the concepts of social rewards and costs to describe the total value that a person receives from the social interaction. If one is able to use the social capital from his/her network to achieve his/her goals it is likely that he/she would have a favorable assessment of the social rewards received from the social interaction. High perception of the social rewards from the social interaction on social media platforms is then expected to results in continued use of these platforms. The rewards resulting from the use of the social media platform may also change one's mental model [20] about the use and could results in a change of perceived value driving the use of social media.

Based on the discussion above the following hypotheses can be made:

H8: Continued use of social media platforms increase one's perception of the social capital available from the network and this in turn enforces the continued use.
H9: Perceived social capital and perceived social rewards have a reciprocal influence to each other.
H10: Favorable perception of the social rewards enforces continued use of the social media platform and may also affect the perceptions of the value driving the use of social media platforms.

The full research model is depicted in Fig. 1. It should be noted that at this point the research model is on a general level and it would probably need to be adjusted for conducting empirical research related to a certain social media platform.

4 Discussion and Conclusions

The aim of this research in progress paper was to develop a research model to be used in a future survey on the motivations and consequences of the use of social media platforms. The model is based on the assumption that one's values and needs drive their use of social media platforms. A set of five value categories found in the literature on consumer values was used to describe these user needs. Moreover, it was assumed that users would aim to derive social capital from their social networks to achieve their goals. Consequently, the perceived social rewards gained from the social interaction through the social media network were assumed to be affected by the ability to draw social capital from one's social network.

I believe that the approach presented in the paper adds to the current research on technology adoption and use in two ways which are discussed in the following paragraphs.

First, it opens the "black box" of usefulness by describing in more detail the needs that motivate people to use social media platforms. Researchers have pointed out the problem that the concept of usefulness in the TAM model lacks detail and the model presented here contributes to solve this problem. Moreover, researchers have pointed out that the TAM model does not include emotions, such as enjoyment [16] and some researchers have contributed to solving this problem by including "enjoyment" as part of their model [21–24]. Emotions are explicitly included in the research model of the current paper.

Second, the research model presented here extends the analysis beyond the intention to use and actual use, to the consequences of use. The model includes the perceptions of the social capital and the social rewards as consequences of the use of social media platforms. This contributes to the current technology adoption literature and has been called for by researchers [16].

As the use of social media platforms has exploded in the recent years it is important to develop knowledge of what exactly are the needs and motivations why people use the social media platforms. This becomes increasingly important when more and more businesses and not-for-profit organizations start using these platforms as part of their daily business processes. Better understanding the needs and motivations could help organizations to design services using social media platforms that meet the needs of their customers. As many organizations are currently in the early stages of exploiting the possibilities of social media developing this understanding can provide them with guidance to move forward.

It should be noted that the model presented here is rather general and it is aimed for conducting research on already established social media platforms, such as Facebook. It might be necessary to adapt the model to be used in different contexts of social media platforms. Moreover, depending on the context, there might be variables that need to be controlled, such as the age and the gender of the users. Other factors, such as experience, might influence the use of social media platforms as well.

The next step of my research is to operationalize the research model and develop a survey instrument for conducting the empirical research on the use of social media platforms. Initially, the survey will be conducted among a student population in Finland and in Australia, and potentially later in other contexts. The survey is a starting point for a larger research project with the aim to design effective social media platforms for organizations and their clients.

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The Structure of Organizational Virtual Social Networks

Debora Bobsin and Norberto Hoppen

Abstract Organizational virtual social networks (OVSN) reshape social structures due to their ability to strengthen social ties, to change power relations and to enable new forms of cooperation. Research in Information and Communication Technologies (ICT) has led to various approaches that analyze the impact of OVSN on organizations in terms of structure and behavior. Our study aims to analyze important features related to the structure of OVSN. It also aims to strengthen a network approach to analyze organizational phenomena such as working groups and connected individuals, as well as the impact of online networks in organizations. This study was based on the approaches described by Oinas-Kukkonen et al. [J. Assoc. Inf. Syst. **11**(2), 61–68 (2010)] and on the research carried out by Bobsin and Hoppen [Estruturação de Redes Sociais Virtuais em Organizações: um estudo de caso. In: XXXVI Encontro da ANPAD, Rio de Janeiro (2012)] to understand the process of structuring OVSN. Our main result is an OVSN structure consisting of actors and roles, interactions, operating elements and articulating goals. We also analyzed structural elements of networks which may contribute to the development of a network based approach to study organizational phenomena.

1 Introduction

The development of social media and collaborative tools enables the emergence of organizational virtual social networks (OVSN). These nets may reconfigure social structures strengthening social ties and allowing new forms of cooperation [1, 3].

Research on social networks in Information Communication Technology (ICT) resulted in several approaches that discuss their structural and behavioral impact on organizations [1]. Thus the social networks represent an interesting theoretical

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element to study the dynamics related to organizational structures and to the behavior of individuals and groups in organizations.

Furthermore, the OVSN can be viewed as alternative or complementary structures to the formally constituted structure. They may enable new relational structures that approximate social actors and alter the notion of hierarchy. Analyzed from this perspective, the constitution of OVSN allows organizational innovation because it approximates the actors and creates an environment for discussion and interaction between the organization and its processes. These networks also promote the sharing of work, ideas, projects, information and opinions [4].

Networks join people with common interests and their success is linked to the group identity that is established among their participants [5]. This identity is reinforced as people participate in the actions of the network and share their interests, providing a sense of community among the actors. Therefore, the OVSN depend on voluntary collective actions supported by online interactions forming a social structure [6].

In light of this, the aim of our research is to analyze important features related to the structure of OVSN. We also study a network approach to analyze organizational phenomena such as working groups and connected individuals, as well as the impact of networks in organizations. We postulate that OSVN are a source of innovation and support to business [5]. This case study adopted the Theory of Structuration (TS) developed by Giddens [7] as conceptual and methodological foundations in order to understand networks as structures being formed by interactions in a recurrent process.

In order to achieve the proposed objectives, we first present the guiding conceptual elements of our research, followed by the research method. Then, we describe and discuss the structure of OVSN and the important elements of the network approach to analyze organizational phenomena. Finally, we discuss the theoretical and practical contributions of our work.

2 OVSN and Its Structuring Elements

OVSN involve a group of people who openly communicate and interact with each other in a space mediated by technology, in order to seek some common goals guided by a set of policies and rules [8]. These networks form spaces for collaboration and interaction between members of an organization, and they foster an environment of freedom and volunteering. They tend to be open to the participation of people based on affinities [9, 10].

Despite the significant growth of networks, few can survive in the long term. This may result from the technical and social elements which constitute the OVSN [8]: Tasks, actors, work context and technology are highlighted as the key elements of Virtual Social Networks (VSN). However, other components may also integrate the network structure [11].

OVSN are characterized by horizontal interactions, by the democratization of decision making and thematic agglutinations, and by the use of ICT as a tool for interaction [9]. OVSN also promote the independence of their participants who are self-motivated and join the network spontaneously [5]. Based on organizational networks, actors often perform tasks choosing their partners and working on projects that help them fulfill their personal and organizational objectives. The purpose that unites the actors and the benefits provided by the network are essential to sustain it as a space for interaction [6].

OVSN use technology as a tool for effective interaction and communication. Networks are not necessarily characterized the technology employed. Users may adopt different tools to collaborate and communicate, such as email, social software, intranet, among others [11].

Organizational networks are often adopted for actions performed by a group of people, and are based on concrete work objectives, which are defined, co-defined or accepted by its participants [12]. An OVSN cannot be restricted; indeed, it should favor the articulation of actors with other networks because the organization is not an isolated unit.

OVSN presuppose a professional relationship among actors who establish horizontal connections in a collaborative environment. These ties can arise spontaneously or formally when based on organizational support. Relationships in networks often lead to roles with defined tasks. These structured roles are based on the activities and goals defined by the group [12, 13].

The regularity of the actions and the behavior of the actors result in a series of different roles in the networks [9, 14, 15]. We should emphasize the role of the coordinators or facilitators, who enhance interaction and communication. These leaders identify barriers that may hamper the functioning of the network, assisting the group in developing activities and in choosing suitable tools.

In summary, OVSN can be characterized by the participants' common goals, their coexistence with difference (of time, actors, cultures and heterogeneous processes), circulation of information, knowledge production, participation, collaboration, cooperation, horizontal and non-hierarchical relations, socialization of power, and negotiation. Hence, organizational networks may be conceptualized as interactions between actors, mediated or not by ICT, which set up a participatory space, with some planned actions and formalization (through a timetable), adopting specific goals and being influenced by the host organization.

A survey of studies using Giddens' TS in the Information Systems field was performed by Jones and Karsten [16]. They highlighted opportunities to adopt this theory to perform in depth research concerning the use of IT artifacts in organizations. Therefore the OVSN were investigated following fundamental features of the TS [7]: The time and space dimensions, the duality of the structure, and recursion. The time and space dimensions and the duality of the structure supported the identification of the actions and interactions in the networks that form the structures. Recursion allowed us to analyze the formation of the networks and the observation of manners and conditions under which structures were built, exist

and were transformed, and to perform our research without a priori definition of their structure.

Networks may be considered as spaces of communication, interaction and integration of its members. They are constituted by physical and social elements. As a consequence, the OVSN are continuously reconstructed through social actions, and they form new structures as the interactions become stable practices.

3 Research Methodology

Our research strategy was a single case study with the purpose to enable a longitudinal in depth study. This method was chosen because it allows the analysis of the behavior and the actions of groups and individuals in their daily lives [17]. Interviews, participant observation and document analysis were used to collect data.

The case was studied in a university organization (UNI) and three OVSN constituted the units of analysis. Three forums of discussion and deliberation formed the organizational networks, which were focused on undergraduate programs in three different areas of knowledge—Engineering and Mathematical Sciences, Teacher Education, and Applied Social Sciences. These forums covered topics of interest to their participants like legal and academic standards, the structure of the undergraduate programs, integration of courses, etc. The number of participants on each forum was in the range of 20–30 people. The forums operated based on face-to-face meetings and virtual interactions. The forums evinced the characteristics of an OVSN pointed out by Aguiar [9], such as horizontal interactions, democratization of decision making and thematic agglutination, as well as the use of ICT.

The OVSN were studied in a 5 years old university that operates in ten campi located in different cities in the South of Brazil. UNI was selected because its development is based on the use of ICT tools to promote the arrangement of work teams that are spread in different cities. UNI also facilitates the formation of OVSN understanding that they are a space for communication, interaction and integration of its employees. UNI expects that the networks give them an opportunity to exchange experiences, so as to contribute to the formation of an organizational culture.

The three OVSN had been chosen from a set of six existing forums because they were in different degrees of consolidation. The integration of one of the authors as an active member in one forum since its creation was another criterion of choice. A third aspect was that both authors took part in the other two forums as participant observers.

The longitudinal case study was carried out for 18 months. Twenty-eight interviews with the networks members and with UNI managers were realized. Forty documents were analyzed and ten meetings observed. The research protocol included the organization of the observations made in the units of analysis, a

daily field report, the subdivision of the research question on issues that guided the observation, interviews and analysis of documents (e-mails, virtual forums, chats, legislation, projects, meetings reports, etc.), the organization of interviews and the collection of documents. The use of this protocol aims to qualify the research reliability, since both authors were members of UNI.

The TS [7] was the basis of the data collection process and oriented the analysis to identify the actions and interactions in the networks that form the structures. This theory enabled us to address how actors conceived the OVSN, to characterize the environment and its boundaries, to define the roles of its members, and to describe their actions and interactions. Through a recursive process, TS allowed us to observe the communication processes, the actions undertaken and the results obtained. The framework developed by Bobsin and Hoppen [2] helped us in this process.

Information collected from our sources (observation, interviews and documents) was summarized based on the main themes that emerged from the theoretical approximations between OVSN and the main TS features, the time and space dimensions and the duality of the structure. This procedure allowed us to detect similarities and differences among the networks. The summarization procedure was followed by the analysis of the TS features used to describe the structuration process of the OVSN and to identify their configuration and main elements. The steps of this process were adapted from Crang and Cook [18].

4 Results

Results obtained support the idea that social actions can change networks. These results confirm that actors perform repeatedly social practices through which they develop, maintain or change their behavior and, also, that the networks are consolidated as social practices become routine and a shared identity is created, serving as an element to aggregate the actors in the group [5]. OVSN are established from every interaction, building and sustaining organizations and their management.

The social context of OVSN is characterized by the time and space dimensions and the duality of structure. The main elements of OVSN shown in Fig. 1 emerged from the analysis of the systematized data and from the comprehension of these dimensions adopting TS as framework.

4.1 The OVSN's Structure

Actors of a network play **roles** emerging from their professional experience and duties in the organization, from their actions in the network or from the meetings and group interactions. Therefore, we highlight the existence of roles related to the organization, to networks and interactions.

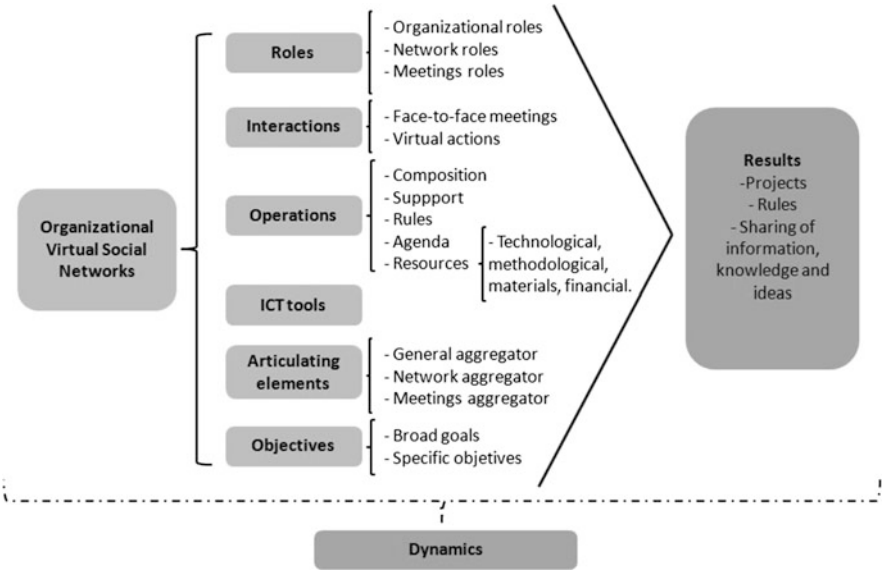

Fig. 1 The structure of an organizational virtual social networks

Organizational roles are associated with different functions and positions occupied by actors leading to different activities and responsibilities.

The *network* requires roles such as a coordinator to motivate the group and to mobilize actions. Coordinators helped to organize the face-to-face meetings and the development of activities between each meeting. We found that the more structured networks, which maintain active interactions and present concrete results, are those in which coordinators were more engaged. These coordinators encouraged actions in the networks and obtained the necessary resources to achieve the goals. They did it in a democratic manner without imposing their preferences and decisions to the group. As mediators of the interactions, these coordinators ensured the horizontality of the information flow and maintained the participatory nature of the network. This confirms the findings of Niederman et al. [15].

External members of the networks assumed the role of experts. Their expertise contributed to the discussions regarding a particular subject whose knowledge was not available from the network participants.

Our results also revealed that some participants assumed a linking function connecting the network to the hierarchy of the institution. These participants also connected with members of other networks, and they supported the information flow between different groups. These findings were also evinced by Marteleto [13].

Several actors mentioned the importance of individual actions of participants. When they returned to their work place after a face-to-face meeting, these actors informed their partners about the discussions and deliberations of the network, preparing the implementation process.

We observed some "floating" participants in the networks. These actors participated on few meetings and did not get involved with the actions performed by the group. In addition we also observed influencers. Under certain conditions and following their points of view they interfere in the action of other network participants. This role was also described by Aguiar [9]. Some of the participants were not identified with any roles in the networks. They justified this as a consequence of the horizontal interactions. Finally we found that during the activities of the network there may be other roles and functions defined collectively, which corroborates Marteleto [13].

The face-to-face meetings of the network followed the logic of a debate. Certain roles were created according to the organization of the meeting agenda in order to obtain more effectiveness in the network. The same happens in virtual interactions when the group had activities to accomplish. These roles were not formal.

UNI structured a support team to assist all networks. The team's assignment was to help networks to obtain the necessary resources—financial, material and informational—to reach their goals, and it had no power to make decisions for the group.

Interactions encompass both *face-to-face meetings*—structuration of documents and reports; preparation of schedules, socialization of participants and invitations to external members—and *virtual actions*—definition of deadlines, exchange of information and documents. The face-to-face interactions are conducted through meetings following an agenda previously defined by the group. Two to four non virtual meetings per year were organized. The activities carried out through virtual actions at the intervals between meetings were socialized at this moment. These face-to-face meetings were considered very important by all actors. They acquired a strong meaning of integration and socialization to the participants, representing a significant moment for people to meet each other. This phenomenon was also observed by Ren et al. [5].

Communications and interactions in the meetings are characterized by horizontality and non-hierarchy, being subject to controversies and enabling the participation in collective actions. This was also shown by Aguiar [9].

Virtual interactions adopted different ICT tools chosen by the groups. The tools were selected by the network participants taking in account the activities to be carried out. Thus, we can highlight that there are more structured and instrumental interactions when (1) collaborative tools are used for the construction of texts, and (2) more open communication technologies, such as chats, forums, instant message communicators were adopted to exchange ideas and information. These findings corroborate Mathiassen and Sorensen [11]. The choice of technological tools had a close relationship with the profile of the network participants and with their goals, and influenced the results of their interactions. So, technology, even if not standardized, is an important element of the structure of OVSN, which can facilitate or constrain the formation and consolidation of the networks.

The **operation** of OVSN requires rules, support, schedule and resources. The network *composition* indicates that there are actors with a mandatory participation due to their position in the organization—for example undergraduate program coordinators. All other members of the organization are invited and they participate

voluntarily. According to the goals previously set, participants form subgroups responsible for some actions in order to perform the tasks between meetings. This reinforces the importance of a network coordinator. The UNI support team also demonstrated its importance to the operation of the networks as it provided the logistical and, sometimes, the informational *support* to the face-to-face and virtual meetings.

Rules were established by the networks aligned with the goals they set. These rules provided organicity to the networks. They influenced deadlines and the formation of working groups in order to structure the standards to manage the undergraduate programs of UNI that did not existed at the time we started our research.

The only a priori guidelines established by UNI referred to (1) the existence of a network coordinator to organize and moderate the group and the discussions, (2) the mandatory invitation of the program coordinators, and (3) the invitation of external specialists, which contribute to the discussion of specific topics of interest.

Rules were complemented by the *agenda*. It represents a collectively deliberated plan of objectives and activities, as well as the definition of roles and resources to be adopted by the network. The agenda also refers to the organization of meetings, which guide the discussions and the activities in progress.

Resources involve facilities, multimedia projectors and computers, materials, logistics to organize the face-to-face meetings, specific managerial methodologies to perform actions, and project management tools adopted by the OVSN.

ICT tools support the interactions in the network, in particular the exchange of messages, information and documents, and the follow up of actions. We observed different forms to adopt technology in the networks. The use of ICT was related to the profile of the members and the activities accomplished. It was based on the knowledge of the participants and on the adequacy of the ICT functionalities to the tasks. We did not identified ICTs employed permanently. The platform for interaction (Moodle) and the videoconference tools provided by UNI were the only exceptions.

The technological infrastructure transformed the network conditioning the way actors developed their activities. ICT also caused changes in the actions of the network that resulted in changes on their virtual arrangement. Concerning the revelation of hierarchy, we observed that the ICT can serve as a way to operationalize coordination. We also evinced that technology transformed the OVSN according to the manner leading actors develop their activities, as well as that changes on the actions of the network resulted in changes of the use of ICT.

The **articulating element** of OVSNs serves as a bond that unites the actors. All network participants were employees of the same organization, from different hierarchical levels and functions. They constitute the *general aggregator* considering that the organization itself serves as an aggregator and is formed by connections between people. Thus, the actors are members of an organization and are initially articulated by professional ties.

The *network aggregator* comprised areas of knowledge and goals (such as the construction of documents, joint research, etc). As some external members

participated actively, the boundaries of the network are not limited to the organization. The *meetings aggregator* is composed by an agenda, goals and activities to be developed in face-to-face meetings. The location of meetings also took part of the aggregation process.

Objectives vary from broad to more specific. Among the *broad goals* we highlighted (1) the need for integration of the participants, (2) the knowledge sharing process, (3) the innovation in undergraduate programs concerning contents and pedagogical processes of teaching and learning, (4) the structuration of research groups, and (5) social projects. Among the more *specific objectives* we identified the structuration of rules and normative documents for the undergraduate programs and for UNI as a whole.

Results of the networks' actions can be very different, considering the integration level of the actors, the development of documents and rules as well as the sharing of information, knowledge and ideas. Results are directly related to the objectives and the agenda chosen.

Dynamics of OVSN is related to the technological resources adopted and the temporality of the actions (urgency of results), and is guided by goals. The group profile and the engagement of participants influenced the dynamics. Differences in the dynamics of the networks highlighted that each group was constructed in a particular way, influenced by the academic formation and by the professional experience of the actors. This phenomenon permeated the structural elements of the OVSN, and was observed by differences in their specific features.

We also observed that each group defined the systematics and procedures considered appropriate to develop its actions. They chose the tools and technologies to manage the network and to accomplish virtual interactions that may reflect on contextual dimensions. This occurred because the structure of the networks delimits the actions of its participants.

The analysis based on TS conditioned our model of OVSN and reinforce a procedural approach of networks. Therefore, the behavior of a network is a consequence from its objectives and articulating elements. Each network determines how to organize and how to develop the activities it wants to achieve. And elements as the purposes of the network, roles, interaction dynamics and resources to be used by its members must be evinced to better understand how the network behaves.

The structure is conceived by TS as a product and a process resulting from actions that enabled and restricted the interactions of the actors of OVSN. Corroborating this idea, Niederman et al. [15] suggested that contextual influences can interfere (and even change) the group agenda and establish particular structures influenced by the activities carried out. Other elements (besides the ones highlighted) may emerge from the interactions in the network since each group defines its work based on the objectives, changing its operation mode and results.

The importance of an institutional support for the networks was also observed. OVSN need and use organizational resources. Thus, OVSN have to be accepted and valuated by managers in order to allow the group to develop its activities. This must occur without a direct intervention of the hierarchy. Participants themselves must

take ownership of the network and understand it as a place of meaning and collective and participatory work.

4.2 Elements to Constitute a Network Based Approach

The elements of a network structure could also support a network based approach to improve the analysis of organizational phenomena, in special *interactions, operational and articulating elements*. They reinforce the consolidation of working groups and individual's connections and are able to capture the dynamics of organizational phenomena.

The network based approach is an important result for the study of the consolidation of structures and processes within new organizations. It also enables the analysis of work relations consolidation and of the process of knowledge diffusion. Our research strategy and the results obtained allowed us to empirically subsidize the propositions for social networks studies proposed by Oinas-Kukkonen et al. [1].

5 Conclusions and Implications

This research studied OVSN where connections are established to exchange information and to accomplish joint projects and perform actions that modify organizations. Based on our results some relevant questions may be highlighted.

The networks were in different stages of development, but we did not identify a development cycle of OVSN with well identified lifecycle stages. This corroborates Ransbotham and Kane [19], who state that groups like these do not undergo linear steps. They experience cycles of creation and maintenance which are not temporally determined.

OVSN may be used to integrate people, information and knowledge and are able to produce innovation. In spite of this, they are not always compromised with practical results. Networks use ICT to aggregate individuals and actions and may also strengthen social ties. In organizations, they serve as an integrating element similarly to the open networking sites. However, in the networks that we studied, actors emphasized the importance of presenting organizational objectives and effective results. The importance given to the objectives and results of a network are related to specific characteristics of the organization. In our case, it was a new organization, which was consolidating its normative and structural elements. In this specific case, networks contribute to participatory management, which is one of the principles of UNI.

Our main theoretical contribution is the construction of an OVSN approach based on the TS, which encompasses a set of elements that constitutes the structure of networks in organizations. We identified elements of an OVSN structure that reinforce the approach to study working groups and individuals connected to form

social networks, expanding the knowledge about this phenomenon. As networks are designed with dynamism and may change during the interactions, new structures that emerge must be understood. So the approach discussed may be of interest to organizational contexts which offer degrees of freedom to the development of non-hierarchical spaces, or to new organizations that are consolidating structural and regulatory instruments.

Our practical contributions are to understand OVSN as working tools and organizational practices. OVSN also contribute to understand how participants organize and mobilize themselves in a network and analyze the power relationships. Starting from the identified network structure, professionals can analyze the elements used to constitute participatory spaces which support institutional development. These spaces may reveal management challenges, as they integrate principles of democratization and collective participation. Thus, it is important to observe their formation and the conditions necessary to their development and institutionalization. Networks also represent opportunities for an innovative organizational development, setting up more fluid organizational forms, and fostering the comprehension of how actors engage in activities as well as how the actions mediated by technologies are organized.

Finally, we discuss limitations and directions for further research. As both authors were members of the organization studied, data collection and data analysis biases could not be eliminated. To minimize this issue, we adopted different sources of evidence and a rigorous systematic data analysis process.

Furthermore, our research was conducted in a university with several peculiarities. This indicates the need for further research addressing other types of organizations with different hierarchical designs and objectives. It is also important to investigate OVSN with other modes of interaction and which adopt ICT more intensively. Thus, it seems possible to obtain a better understanding of how ICT influence the structure of OVSN. And also, of how a network based approach may contribute to the study of the use of IT in organizations and the resulting organizational phenomena.

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Developing Social Leadership: Cultural and Technological Influences

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Abstract The development of social leadership is triggered by the adoption of social media for internal purposes by organizations. It involves dynamics of collaborative and mutual influence between leaders and followers, and among followers themselves, mediated by social media. The aim of this paper is to analyze individual attitudes to social leadership as a function of cultural and technological factors. Using data collected from a sample (N = 178) of employees, we developed and adapted multiple item scales from a wide range of sources in the literature to assess organizational culture, information technology and social media adoption, in addition to other individual and organizational variables. Regression analysis was used to investigate the relationship between these variables. What emerged was a three-dimensional model of social leadership as a positive attitude towards: shared responsibility, social media usage and direction. In particular, organizational culture strongly influenced two of these three dimensions, while the use of social media for personal purposes predicted attitudes to the use of social media in organizations.

1 Introduction

The use of social media to manage relationships with employees—that is to say, with a focus on internal processes (rather than on external clients)—is an experimental area of growing interest to both academics and practitioners. We ourselves have examined the internal social media initiatives of a number of organizations in a recent exploratory study [1], finding that several factors foster the adoption of social media to manage relationships with staff: primarily, internationalization, knowledge-intensive activities, organizational strategies focused on innovation, the need to manage the Y-generation workforce, cross-cultural issues and ongoing cultural change. Our exploratory research also showed that the use of social media to manage relationships with employees plays a key role in creating competitive

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advantage. At the same time however, it poses both cultural and managerial challenges. First, social media emphasize bottom-up dynamics such as participation, discussion, openness and contribution. Second, they increase the weight of the information dimension within the organization, primarily in terms of enhanced information sharing. From the perspective of Adaptive Structuration Theory [2], it is to be noted that followers can now access the information that leaders had exclusive access to in the past. Thus, leaders are engaged in continuous efforts to legitimize their position, while continuing to communicate the organizational vision and carry out supervision, in a challenging balance between traditional and new leadership styles [3]. This paper has three objectives: first, to propose and explain the new construct of social leadership. Second, to analyze individual attitudes to social leadership in relation to both cultural and technological drivers. Third, to suggest guidelines for managing the development of social leadership. Therefore, the core research questions addressed are: is there a relationship between perceived organizational characteristics—such as the cultural and technological dimensions—and attitudes to social leadership? How exactly are perceived organizational culture, deployment of IT and social media usage related to attitudes to social leadership? We drew on two perspectives—the Competing Values Framework [4, 5] of organizational culture and the model of IT implementation proposed by Albadvi et al. [6]—in order to generate hypotheses about individual attitudes to social leadership. We then tested these hypotheses with a sample of employees.

2 Theoretical Framework

2.1 Defining the Social Leadership Construct

The last few decades have seen an intensification of interest in the impact on leadership of the spread of flat organizational forms, increasing use of teamwork to attain organizational goals and the growing role of IT as a mediator of human interaction. As result, researchers have brought new approaches and concepts to bear on the study of leadership styles in contemporary organizations. The emerging e-leadership concept refers to a social influence process mediated by AIT that leads to changes in attitudes, feelings, thinking, behavior, and/or performance on the part of individuals, groups and/or organizations [7, p. 617]. Within such a perspective, IT is seen as creating a new context for the exercise of leadership. Not only do followers have increased access to information in general, but potentially they can access information that in the past was exclusively available to leaders. Virtual teams with responsibility for organizational tasks may be formed among people located in different countries, with diverse cultures and habits: leaders are required to act within networks that cross over traditional boundaries. The influence of leaders may be affected by the opportunity for followers to know and contribute more—and at earlier points—in the decision-making process [3]. The assumption

of the e-leadership approach is that IT does not change the fundamental principles of leadership but impacts on the dynamics between leaders and followers as well as the leader's role. Connections between people are shaped by technology [8, 9] and this in turn influences the virtual team's final performance [10]. Therefore, leaders must engage in sense-making activity by configuring the optimal mix of tools required by the task and the context and by designing the collaboration environment in such a way as to assure optimum communication and collaboration dynamics between leader and followers as well as amongst followers.

The traditional approach to leadership emphasizes the influence of the formal leader on the work outcomes of individual employees and teams [11, 12]. However, given the growing complexity of organizations today, it is becoming increasingly difficult for any one individual to possess all the skills and abilities required to competently lead an organization [13]. The traditional perspective cannot explain the leadership dynamics that arise in organizations characterized by high levels of interdependence, complexity, creativity and team-work. Therefore, concepts such as shared leadership, collective leadership and distributed leadership have recently begun to feature in the literature as part of the attempt to capture the collective dimension of behavior as along with the legitimacy of authority and leadership per se. The shared leadership concept takes into account the impact on team members and team performance not only of the formal team leader, but also of team members/followers. The focus is on the team: shared leadership is defined as "a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both" [14, p. 1]. The same authors also state that "this influence process often involves peer, or lateral, influence and at other times involves upward or downward hierarchical influence". This point of view, also in keeping with the emergentist perspective that frames leadership as an outcome of group dynamics [15], does not envisage the existence of a single formal leader, but sees the leadership function as being shared among team members [16]. Consequently, leadership is not only an individual trait, but is also an organizational trait [17]. In short, leadership "entails a simultaneous, ongoing, mutual influence process within a team that is characterized by the 'serial emergence' of official as well as unofficial leaders" [18]. Therefore, team members emerge as leaders when they have the skills/knowledge/expertise that the team needs. However, from the organizational point of view the challenge is to find the best way to combine top-down, bottom-up and shared dimensions of leadership in order to provide optimum connections between individuals. The social leadership construct that we propose here is consistent with both the e-leadership concept—in terms of the enabling role played by advanced IT in providing a collaborative setting—and the shared leadership concept—in terms of the definition of leadership as an organizational trait and as an ongoing, mutual influence process within a team. The social dimension of social leadership comes from the use of social media which stimulates social interaction, as well as from the focus on horizontal relationships between peers. Thus, we define social leadership as a social process of mutual influence among the members of a group/organization who, by interacting through social media, share the responsibility of leadership in

order to achieve group/organizational goals. Within this perspective, formal and informal leaders coexist as a result of the self-organization process enabled by the mutual feed-back system provided by social media. The aim of social leadership is to lead one another towards the attainment of both individual and group goals: that is to say, to enhance the sharing of tacit knowledge within an organization, increase levels of innovation and creativity, define new organizational policies and generate patents.

2.2 *Cultural and Technological Dimensions of Social Leadership*

Technology is influenced by the context in which it is used, but in turn has the power to modify the context [2]. Therefore, organization and technology recursively influence each other. In order to explore this interplay, specifically in relation to attitudes towards social leadership we need to understand: (a) to what extent organizational traits, primarily organizational culture, influence the development of social leadership; (b) and to what extent levels of IT and social media usage influence the development of social leadership.

Issues Affecting Organizational Culture Organizational culture has been defined as a "glue that holds organizations together" [19]. In recent years, cultural issues have provided a growing focus of interest for both scholars and practitioners [20, 21], although organizational culture remains a difficult construct to pin down and consequently to study [20] especially in relation to management practices [22]. Nonetheless, to guide our own examination of how organizational culture influences the development of social leadership, we chose to refer to the Competing Values Framework [4, 5]. This model is one of the most cited in studies analyzing organizational culture in relation to information systems [23] and has also been applied to the analysis of leadership issues [5]. The Competing Values Framework may be used to "explore the deep structures of organizational culture, the basic assumptions that are made about such things as the means to compliance, motives, leadership, decision making, effectiveness, values and organizational forms" [4, p. 298]. It is based on two main dimensions. The first encompasses the competing demands of change (focus on flexibility/spontaneity) and stability (focus on order/control). The second spans the conflicting demands of internal organization (focus on integration and internal processes) and external environment (focus on competition and adaptation). Four types of cultural orientation arise from the possible combinations of these two dimensions. Group culture combines change/flexibility/spontaneity with an emphasis on internal organization/integration. It values the development of human resources, with a focus on the team as well as on maintenance of the sociotechnical system. Trust, commitment, discussion, participation, openness and membership are core values. Effectiveness criteria focus on the development of human potential in a long-term perspective. Leaders tend to be

participative and supportive, facilitating interaction through teamwork. Therefore, we posit that *a perceived group culture will be positively associated with positive attitudes to social leadership* (H1).

Hierarchical culture combines stability/control/order with an emphasis on internal organization/integration. It values internal efficiency, coordination, measurement, evaluation, continuity, consolidation and equilibrium. Execution of regulations tends to be the key focus of organizations with this cultural orientation: motivating factors are rules, order and security. Leaders tend to be conservative and technically-oriented. Therefore, we posit that *a perceived hierarchical culture will be positively associated with positive attitudes to social leadership* (H2).

Developmental culture combines change/flexibility/spontaneity with external environment/competition/adaptation. It emphasizes growth, innovation, adaptation, acquisition of resources and external support. Leaders tend to be entrepreneurial, capable of developing a vision for the future and willing to take risks, with an emphasis on improving visibility, legitimacy and external support. Therefore, we posit that *a perceived organizational developmental culture will be positively associated with positive attitudes to social leadership* (H3).

Rational culture combines stability/control/order with an emphasis on the external environment/competition/adaptation. It values productivity, performance, achievement and clear goal-setting. The focus is on competition, goal accomplishment and decisiveness. Leaders tend to be directive, goal-oriented, instrumental and functional, providing structure and encouraging productivity. Therefore, we posit *that a perceived rational culture will be negatively associated with positive attitudes to social leadership* (H4) (Fig. 1).

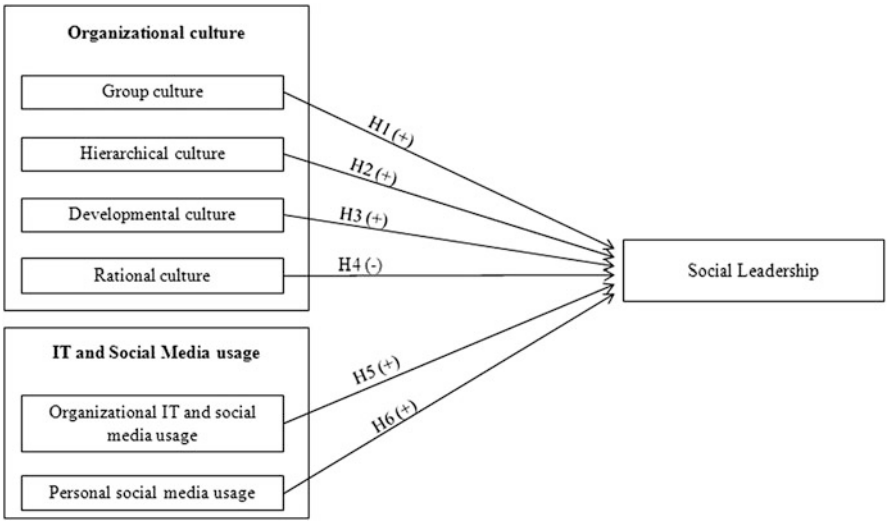

Fig. 1 Conceptual research framework

Levels of IT and Social Media Usage At the organizational level, according to DeSanctis and Poole [2], technology and the social process of technology use are interrelated. In other words, technology creates organizational structures that guide human behavior, but at the same time these organizational structures contribute to transforming technology within a recursive relationship. Thus, in this regard we expect *that a high perceived level of organizational IT and social media usage will be positively associated with positive attitudes to social leadership* (H5).

At the individual level instead, to what extent does the use of social media for personal purposes influence employees' attitudes towards social leadership? As ease of use, usefulness and compatibility increase, attitudes towards the use of technology are likely to become more positive [24]. In addition, Tornatzky and Klein [25] found that an innovation is more likely to be adopted when compatible with the job responsibility and value system of an individual. We may expect that a person already using social media for personal purposes to be more aware of the advantages that the introduction of organizational social media can offer, as well as more skilled in using them. Therefore, we posit that *a high level of personal usage of social media will be positively associated with a positive attitude to social leadership* (H6).

3 Method

3.1 Data Collection and Sampling

A survey methodology was used to test the hypotheses outlined above. A web-based questionnaire was constructed and distributed via a professional mailing list in the month of June 2013. The questionnaire contained items assessing social leadership, organizational culture, and IT and social media usage variables, as well as other information about the respondent and the organization employing them (e.g., age, gender, role, industry, etc.). In total, 178 fully completed surveys were returned. Fifty-one percent of respondents were male. Participants' mean age was 42 years (SD = 10.4; min = 24; max = 67) and they had an average of 18 years' work experience (SD = 10.7; min = 1, max = 45). Eighty-eight percent of respondents were university graduates and over 40 % held managerial responsibilities and were employed in the HR function. Over 50 % of respondents worked for large organizations (with over 250 employees). The majority were employed by Italian companies (78 %) in the services sector (services: 36 %, advanced services: 36 %).

3.2 Measures and Analysis

Dependent Variable In order to develop a questionnaire to measure individual attitudes to social leadership we drew on the qualitative analysis conducted in an earlier study of our own [1]. By surveying the existing literature and using focus group and interview methodologies, we developed a set of 15 items using a seven point Likert-scale (strongly disagree to strongly agree). The items focused on how the respondent defined and viewed leadership, particularly with regard to the use of social media within the leadership process, relational emphasis, mutual influence and the sharing of common goals. Sample items from the scale include "Leadership may be broadly shared among a set of individuals rather than centralized in the hands of a single individual" or "Social media can increase social interaction within an organization". A complete list of the items used, together with their loading on the relevant social leadership factor, may be found in Table 1. A pilot study was then conducted.

Table 1 Principal component loading matrix (varimax rotation) for social leadership items

	Component		
Item	1	2	3
Leadership does not reside solely in the appointed leader: followers also influence each other within the leadership process	**0.790**		
Leaders are influenced by followers	**0.717**		
Leadership may be broadly shared among a set of individuals rather than centralized in the hands of a single individual	**0.711**		
Leaders may pursue the attainment of goals suggested by followers	**0.689**		
In a team, individuals can adopt the role of both team leader and team member	**0.672**		
Followers can influence the leadership process as much as leaders	**0.647**		0.437
There is no such thing as just one leader: we are all leaders and responsible for the consequences of team decisions	**0.537**		
Leaders and followers share responsibility within the leadership process	**0.518**		0.421
The use of social media increases transparency within organizations		**0.862**	
Social media can increase social interactions within an organization		**0.859**	
Through social media you can establish good relationships with members of the organization you have never met before		**0.754**	
Social media enable employees to acquire a good understanding of the organizational vision and values		**0.736**	

(continued)

Table 1 (continued)

Item	Component		
	1	2	3
Leadership is about achieving common goals			**0.769**
The essence of leadership is to lead one another to the achievement of group or individual goals or both			**0.676**
The essence of leadership is accomplishing goals			**0.666**
Percentage variance explained	39.83	13.02	8.72
Cumulative percentage variance explained	39.83	52.86	61.58

Independent Variables Organizational culture was measured using the Competing Values Model as conceptualized in a validated scale published in Quinn and Spreitzer [26]. The instrument measures four ideal types—group culture, developmental culture, hierarchical culture and rational culture—by asking respondents the extent to which the listed organizational attributes describe the organization they work for. Each ideal type is measured by four items to be rated on a five-point Likert scale ranging from 1 (not at all) to 5 (to a very great extent).

In order to measure IT usage, we followed Albadvi et al.'s [6] classification. These authors proposed four criteria for the assessment of organizational IT implementation, namely IT in communication, IT in decision-making support, IT in production and operation, and IT in administration. Therefore, we asked respondents to rate the extent to which their companies applied technology within each of these areas on a seven-point Likert-scale (1 was "not at all" and 7 was "to a very great extent"). In order to measure social media usage we included three further items using a five point Likert-scale to examine the extent of company usage of social media both externally and internally (1 "never considered"—5 "fully implemented") as well as the extent to which respondents made personal use of social media (1 "not at all"—5 "several times a day").

Control Variables We also asked our respondents to answer some basic questions about their personal and professional characteristics. The control variables were: gender (dummy variable); age of respondent; possession of a university degree (dummy variable); type of university degree (four dummy variables); role (three dummy variables); organizational function worked for (four dummy variables).

Analysis In order to reduce the data on attitudes towards social leadership to a set of more meaningful variables, we carried out exploratory factor analysis. We expected that the components emerging from this analysis would reflect the construct of social leadership; therefore the three emerging components—namely, shared responsibility, social media usage and direction—became the dependent variables in the following step of the analysis. We entered the independent variables—the four cultures, levels of IT and social media usage and the control variables—into three stepwise regressions to determine the impact of the cultural

and technological dimensions on the three components of social leadership, thereby testing the hypotheses described above.

3.3 Results

Exploratory Factor Analysis A principal component analysis with Varimax rotation was conducted using SPSS, to identify emergent factor solutions for social leadership items. Factorability of the correlation matrix, as assessed via the Keyser–Meyer–Olkin test (KMO = 0.87) and Bartlett's test of sphericity ($\chi^2 = 1173.796$, df = 105, $p < 0.000$), was supported. Factors were retained on the basis of three criteria: first, we looked for factors with eigenvalues of over 1.0 [27]; second, we adopted Cattell's [28] scree test to graphically determine the number of components to retain; third, we retained only factors with two or more items loading at a significant level (0.60) [29]. The analysis yielded a three-factor solution consistent with the theoretical construct discussed above. Specifically, the first principal component included items related to a positive attitude towards shared responsibility; the second included items related to a positive attitude towards using social media within organizations and the third included items related to a positive attitude towards direction (Table 1). Values of Cronbach's α were 0.86 for the first component (shared responsibility), 0.87 for the second component (organizational use of social media) and 0.69 for the third component (direction), indicating an acceptable level of reliability.

Regression Analysis Before using regression analysis to test our hypothesis, we calculated scores for perceptions of organizational culture following the procedure developed by [26]. Average scores on the four items associated with each ideal type was used as a measure of each cultural variable. The only exception was the composite variable for rational culture, for which dropping one of the questionnaire items increased the Cronbach's α reliability measure from 0.54 to 0.69. In any case, values of Cronbach's α were 0.87 for group culture, 0.88 for developmental culture and 0.76 for hierarchical culture, indicating an acceptable level of reliability. The four cultures, as well as IT and social media usage and the control variables, were entered into three stepwise regression models in order to determine the impact of cultural and technological dimensions on attitudes to social leadership. The aim was to identify the most parsimonious set of predictors that was most effective in predicting the three dependent variables in our study: attitude to shared responsibility; attitude to using social media within organizations and attitude to direction. As reported in Table 2, only two of the predictors initially proposed, group culture and developmental culture, were identified as having a significant influence on attitude to shared responsibility. Specifically, perceived group culture appeared to have a positive relationship with and developmental culture a negative relationship with positive attitude to shared responsibility. The first predictor, group culture,

Table 2 Stepwise regression results for attitude to shared responsibility

	Degrees of freedom	Sum of squares	Mean square	F	Sig.
Regression	2	9.85	4.93	5.06	0.007
Residual	162	157.70	0.97		
Total	164	167.55		*R-squared:*	0.06
Variable	*Parameter estimate* (*b*)	*Partial R-squared*	*t*	*p*	*Standard error of the estimate* (*SE b*)
Intercept	−0.29		−1.31	0.191	0.22
Group culture	0.35	0.03	3.18	0.002	0.11
Developmental culture	−0.24	0.03	−2.28	0.024	0.11

Table 3 Stepwise regression results for attitude to organizational use of social media

	Degrees of freedom	Sum of squares	Mean square	F	Sig.
Regression	1	9.58	9.58	10.07	0.002
Residual	163	155.07	0.95		
Total	164	164.65		*R-squared:*	0.06
Variable	*Parameter estimate* (*b*)	*Partial R-squared*	*t*	*p*	*Standard error of the estimate* (*SE b*)
Intercept	−0.68		−3.02	0.003	0.23
Personal social media use	0.20	0.06	3.17	0.002	0.06

accounted for about 3% of variance and developmental culture for an additional 3 %.

With regard to the second dependent variable, only personal use of social media seemed to be a predictor of individual attitudes to using social media within the organization, accounting for about 6 % of variance (Table 3).

Table 4 presents the stepwise regression results for the third dependent variable. In this case, hierarchical culture was the first predictor entered in the model, accounting for about 9 % of variance in attitude to direction. The second predictor showing a positive relationship with the dependent variable was respondent's age, accounting for an additional 5 % of variance.

Table 4 Stepwise regression results for attitude to direction

	Degrees of freedom	Sum of squares	Mean square	F	Sig.
Regression	2	22.10	11.05	12.34	0.000
Residual	162	145.01	0.90		
Total	164	167.12		*R-squared:*	0.13
Variable	*Parameter estimate* (*b*)	*Partial R-squared*	*t*	*p*	*Standard error of the estimate* (*SE b*)
Intercept	−1.90		−4.79	0.000	0.40
Hierarchical culture	0.32	0.09	3.85	0.000	0.08
Respondent age	0.02	0.05	2.95	0.004	0.01

4 Discussion

This study is the first attempt to analyze the emerging construct of social leadership as a function of both cultural and technological influences. Our first set of hypotheses related organizational culture to attitudes to social leadership. Following the Competing Values Framework [4, 5], we hypothesized that group culture, hierarchical culture and developmental culture would be positively associated with positive attitudes to social leadership. On the contrary, we expected rational culture to have a significant negative influence on attitudes to social leadership. Our second set of hypotheses posited that higher perceived levels of organizational IT and social media usage, as well as personal use of social media, would be associated with more positive attitudes to social leadership. The outcomes of our analysis provide interesting insights into the topic, with many implications for managerial practice. First, the factorial analysis suggested a three-dimensional model of social leadership as a positive attitude towards: shared responsibility, social media usage and direction. This model featured the simultaneous presence of top-down (direction) and bottom-up (shared responsibility) leadership styles. The former is aimed at controlling and supervising processes with a view to attaining organizational goals, and coexists with the emergence of collaborative processes emanating from the bottom up, and enabled by social media. Three stepwise regressions provided our second set of findings. The first regression, which had shared responsibility as dependent variable, revealed a positive relationship with group culture and a negative relationship with developmental culture. As result, hypothesis H1 was supported and H3 was not supported. Although we found no support for our organizational IT and social media usage hypothesis (H5), the second regression, which had attitude towards using social media within one's organization as the dependent variable, revealed a positive relationship with personal usage of social media. Therefore, hypothesis H6 was supported. The third regression, which had

Table 5 Summary of hypothesis test

	Hypothesis	Conclusion
H_1	A perceived group culture will be positively associated with positive attitudes to social leadership	Supported
H_2	A perceived hierarchical culture will be positively associated with positive attitudes to social leadership	Supported
H_3	A perceived organizational developmental culture will be positively associated with positive attitudes to social leadership	Not supported
H_4	A perceived rational culture will be negatively associated with positive attitudes to social leadership	Could not be examined
H_5	A perceived high extent of organizational IT and social media usage will be positively associated with positive attitudes to social leadership	Could not be examined
H_6	A high extent of personal social media use will be positively associated with positive attitudes to social leadership	Supported

direction as the dependent variable, revealed a positive relationship with hierarchical culture. Therefore, hypothesis H2 was supported. In contrast, we did not find support for the hypothesized relationship between rational culture and attitudes to social leadership (H4). However, we found a positive relationship between respondent's age and the direction component of social leadership. Indeed, according to Inglehart [30], older workers are characterized by a traditional set of work values including respect for authority and an emphasis on control. Although it was not possible to test the relationship between a perceived high level of organizational IT and social media usage and attitudes to social leadership, personal use of social media was found to play a role in determining attitudes to social leadership. Indeed, personal use of social media is a critical intervening variable in attitudes to using social media at work. Given that the technology acceptance model (TAM) suggests that perceived usefulness and perceived ease of use influence an individual's attitude towards the use of a given technology [31], in this case the pervasiveness of social media for personal purposes makes people more inclined to use them at work (Table 5).

5 Conclusions

Overall, the results of this study suggest that corporate culture and attitudes towards social leadership are strongly connected. In particular, an internal focus within perceived organizational culture appears to play a prominent role in developing social leadership, given that both group culture and hierarchical culture have a primary focus on internal organization underpinned by the attempt to maintain the socio-technical system by balancing flexibility and control. Moreover, these two ideal cultural types also share a long-term orientation, which is considered to be a

key predictor of innovativeness [32]. These results are also in line with the work of Jarvenpaa and Staples [33], suggesting that people are more prone to share knowledge if they perceive that their organizations are high in solidarity—that is to say, there is a tendency to pursue shared objectives and relationships are based on common tasks and mutual interests—and in the need for achievement. Surprisingly, developmental culture is negatively related to social leadership. Basing our hypothesis on the emphasis on flexibility and change, we had expected that those perceiving a strongly developmental culture would be more positive towards social leadership. On the contrary, the primary focus of developmental culture appears to be on attaining visibility and legitimacy in the relationship with external, rather than with internal, stakeholders. Developing social leadership requires individual effort in terms of sharing knowledge, taking responsibility and cooperating through social media. This is probably more likely to occur if people know they will obtain visibility and legitimacy internally. Indeed, according to social exchange theory [34], people's behaviors are based on a self-interested analysis of costs and benefits. Therefore, an organizational culture that emphasizes evaluation and efficiency, and in which people can pursue long-term goals, seems more likely to encourage people to invest in social leadership. In conclusion, in order to foster the development of social leadership within organizations, management should encourage an organizational culture aimed at developing membership and cohesiveness while maintaining a clear vision of the goals to be reached. In order to facilitate the change management process a key factor will be the commitment of the top management team. Furthermore, accurate planning of a development process encompassing assessment and rewarding systems is required. This study shows that organizational culture plays an important role in developing social leadership. However, the results only account for a very low percentage of observed variance. For this reason, additional factors to those investigated here will need to be explored in future research. Given the increasing penetration of social media within organizations, we expect social leadership to receive growing attention. It will became a major concern as the dissemination process enters in a more mature stage.

Acknowledgments This paper stems from an idea originally developed within the Bicocca Training & Development Centre of the University of Milano-Bicocca.

Appendix (Tables 6, 7, and 8)

Table 6 Items wording from competing values culture instrument

1. The company I work for is like an extended family. People seem to share a lot of themselves	1	2	3	4	5
2. The company I work for is a very dynamic and entrepreneurial place. People are willing to take risks	1	2	3	4	5
3. The company I work for is a very formalized and structured place. People pay great attention to following bureaucratic procedures in what they do	1	2	3	4	5
4. The company I work for is very task oriented. A major concern is getting the job done. People aren't personally involved	1	2	3	4	5
5. The head of the company I work for is generally considered to be a mentor, a sage, or a father or mother figure	1	2	3	4	5
6. The head of the company I work for is generally considered to be an entrepreneur, an innovator, or risk taker	1	2	3	4	5
7. The head of the company I work for is generally considered to be a coordinator, organizer, or an administrator	1	2	3	4	5
8. The head of the company I work for is generally considered to be a producer, a technician, or a hard-driver	1	2	3	4	5
9. The company I work for is held together by loyalty and tradition. Employee's commitment is very high	1	2	3	4	5
10. The company I work for is held together by a commitment to innovation and development. There is an emphasis on being first	1	2	3	4	5
11. The company I work for is held together by formal rules and policies. Maintaining a smooth-running company is very important	1	2	3	4	5
12. The company I work for is held together by an emphasis on tasks and goal accomplishment. A production orientation is commonly shared	1	2	3	4	5
13. The company I work for emphasizes human resources. High cohesion and climate in the company are important	1	2	3	4	5
14. The company I work for emphasizes growth and acquiring new resources. Readiness to meet new challenges is important	1	2	3	4	5
15. The company I work for emphasizes permanence and stability. Efficiency is very important	1	2	3	4	5
16. The company I work for emphasizes competitive actions and achievement. Goal accomplishment is very important	1	2	3	4	5

Source: Quinn and Spreitzer [26]
Please indicate the extent to which the following organizational attributes describe your organization by rating each scenario on a five-point Likert scale ranging from 1 (not at all) to 5 (to a very great extent)

Table 7 Items wording for the extent of IT usage

1. Communication IT (e.g. e-mail, Internet, Intranet)	1	2	3	4	5	6	7
2. Decision support IT (e.g. data analysis, decision support system, forecasting)	1	2	3	4	5	6	7
3. Administrative IT (e.g. payroll system, databases, financial systems)	1	2	3	4	5	6	7
4. Production and operation IT (e.g. process quality control, automatic warehousing, CAD, CAM)	1	2	3	4	5	6	7

Source: Albadvi et al. [6]
Please indicate the extent to which IT has been used by your company for the following application objectives by rating each alternative on a seven-point Likert scale ranging from 1 (not at all) to 7 (to a very great extent)

Table 8 Items wording for the extent of social media usage

Has your company adopted social media (e.g. social network, blog, video/file sharing) to manage relationships with external clients?				
Never considered	*Currently being considered*	*Initial implementation*	*Partial implementation*	*Fully implemented*
☐	☐	☐	☐	☐
Has your company adopted social media (e.g. social network, blog, video/file sharing) to manage relationships with employees?				
Never considered	*Currently being considered*	*Initial implementation*	*Partial implementation*	*Fully implemented*
☐	☐	☐	☐	☐
To what extent do you use social media (e.g. social network, blog, video/file sharing) for personal reasons?				
Not at all	*Once/twice a month*	*Almost every day*	*Every day*	*Several times a day*
☐	☐	☐	☐	☐

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A Strategic and Organizational Perspective for Understanding the Evolution of Online Reputation Management Systems

Alberto Francesconi and Claudia Dossena

Abstract Online Corporate Reputation is a strategic but quickly damageable resource for firms and requires a fast detection of possible threats as well as proactive interventions. Through a longitudinal case-study, our aim is to depict the evolution of Online Reputation Management Systems, i.e. IS for online CR management, as an interplay among developments of technology, organizational needs and strategic postures. Some research propositions for future works are proposed as well as some methods and good practices for online CR management.

1 Introduction

Social media have radically changed the business landscape, with relevant consequences on knowledge management. Due to the increasing easiness and user-friendliness of publishing processes, especially if compared to traditional media (e.g. newspapers), every Web user is able to communicate unmediated and unchecked contents via simple and widely used publishing tools, thus affecting online reputation. Social media make easier and virulent the diffusion of comments, anecdotes, opinions, thus affecting the online corporate reputation (CR) which is a firm's core resource and a major factor in gaining competitive advantage [1, 2].

In managerial literature many authors have recognized the importance of a good online CR for firms. However, how firms could concretely manage their CR in the online context requires further investigations.

Though online CR is a strategic resource cumulated in time, it is 'fragile' and quickly damageable [1]. Therefore, a fast detection of possible threats is very important as well as proactive interventions that place an emphasis on continuous monitoring and action [3]. Moreover, another problem in managing online CR relies in collecting, filtering and classifying a huge amount of Web contents.

We argue that IT can play a crucial role in CR management. In literature the potential of IT is mainly linked to its ability to face Big Data issues [4] and to

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support a more informed decision making. Big Data refers to data sets large enough to require supercomputers, although now vast sets of data can be analyzed on desktop computers with standard software [4]. However, as Boyd and Crawford [5] have observed, Big Data is notable not because of its size, but because of the strictly relationship among data. 'Big Data is fundamentally networked. Its value comes from the patterns that can be derived by making connections between pieces of data, about an individual, about individuals in relation to others, about groups of people, or simply about the structure of information itself' [5, 2]. In information-intensive situation, 'meaning' becomes a key scarce resource [6] for firms because actors that can more rapidly make sense out of signals can act to capitalize on their insights faster than rivals without equivalent sense-making capabilities [7].

In these years many web agencies and consulting firms have offered full services intended to synthesize and to analyze the huge amount of Web contents making sense out of signals that may affect online CR. Even if the majority of these firms still conducts manual Web analysis, the adoption of IT for online CR management is increasing.

In this work we focus on 'Online Reputation Management Systems' (ORMS), i.e. IS focused on online CR management [8]. We start from a socio-technical point of view in conceiving IS [9, 10]. Therefore, we use the work system perspective which defines an IS as a system in which human participants and/or machines perform work using information, IT, and other resources to produce informational products and/or services for internal or external customers [11].

To our knowledge, there is still a lack in literature in terms of practical applications of IS for online CR management.

This work aims at investigating whether and which strategic and organizational factors can intervene in the evolution of ORMS. We argue the evolving nature of ORMS emerges as an interplay among potentials of IT, organizational needs and strategic postures.

In order to investigate the evolution of ORMSs and due to the novelty of this topic, both in theory and in practice, we have developed a case study—Reputation Manager (RepMan)—through a longitudinal perspective. RepMan is an Italian pioneering and now leading service provider which offers consulting and e-services based on a proprietary ORMS. The longitudinal approach allows to shed some light on the under-researched issue of the development of ORMS. Exploiting the experience of RepMan, some research propositions for future works are proposed.

The paper is structured as follows: in the second section we summarize the main theoretical and empirical contributions on online CR, focusing, in particular, on online CR management practices. We identify as a relevant research gap the lack of managerial literature specifically focused on IT tools for online CR management. Our work aims at giving some useful insights in this direction. In the third paragraph the case study and the methodology adopted for its analysis are introduced. In the fourth section the case study is discussed and a preliminary framework and some research propositions for future works are proposed. Finally, in the last

section we draw conclusions, emphasizing some methods and good practices for online CR management.

2 Theoretical Background

In a recent integrative review of management studies, Rindova et al. [12] have conceptualized CR as the stakeholders' collective knowledge about the perceived quality of the firm and its prominence in the organizational field. CR depends upon past actions and describes firm's ability to deliver valued outcomes to multiple stakeholders [2]. Because CR is created both internally—mainly through organizational features, competencies and behaviours of its members—and externally—through external stakeholders' actions and perceptions—different views about the real capability of CR management can be found in literature. Some authors even neglect the possibility of a direct CR management [13], while others [2] argue CR is built in a planned manner by firms collecting information from the environment and developing practices which integrate social and economic considerations into their competitive strategies. Anyway, the success of a firm is increasingly dependent on activities made online by its stakeholders and, consequently, on its online CR [14]. Therefore, many authors have explored the online CR management practices and how to concretely manage online CR. This is a research field that is gaining increasing attention from both academics and practitioners.

Alsop [1] argues that one of the most important rules of online CR management is the constant vigilance, due to the exposure of firms to unprecedented scrutiny through the Web and 24-h all-news television channels. From an organizational and IS point of view, organizations need to adopt more sophisticated approaches that place an emphasis on continuous monitoring, listening and action [15]. Moreover, the diffusion of social media requires adequate organizational responses to 'put new systems in place to permit timely and appropriate response to the increased level of comments on significant issues that the Internet enables' [16, p. 262]. Bennett and Martin [17] have recommended managers training on Web monitoring to move quickly on issues that could negatively affect CR. Many authors [18, 19] have analyzed how Internet-based technologies affect the management of crisis and have suggested firms should monitor their online business environment in search for potentially conflictive issues. Bornemann et al. [20] have argued CR management has changed drastically comparing the old and the Internet economies, due to power shift towards consumers. Bunting and Lipski [21] have argued the Web has radically altered the dynamics of CR formation and management. Effective online CR management requires firms to develop new capabilities and models of communications with online stakeholders to engage them in ways which are different from traditional top-down [18, 22, 23].

However, stakeholders 'empowerment' in sharing their opinions on the Web can be also an important opportunity for firms. For example, they can turn this phenomenon to their advantage (e.g. for marketing, innovation and competitive

intelligence), through the development or the acquisition of new capabilities for a proactive online CR management and a different perspective on the relationships with stakeholders. From this perspective the Internet is both a fundamental communication channel and a critical information source for firms. For example, a very interesting way to exploit knowledge shared in the Web by stakeholders refers to recent open-innovation and crowdsourcing approaches [24–26]. Research shows that some of the most important and novel products and services are developed by users—especially who von Hippel [25] calls 'lead-users'—and that many users engage in developing or modifying existing products or services. Firms can gather reliable intelligence from outside as a means to track moods, issues, ideas, social and market trends, combining and integrating the potential of an ORMS with other IS (e.g. in Marketing and Customer Care area). In this way, firms are more likely to maximize their chances for a timely and proper response [27] and the capacity to reach niche audiences [21] too. Furthermore, these niche audiences, often in the form of online communities, can connect firms with opinion-leaders [28] which may act as brokers to develop relationships with key stakeholders, by identifying potential opportunities and preventing crises [18]. The user engagement seems to be a critical aspect. Miles et al. [29] express the point in this way, 'for effective strategy to occur, there should be a channel for honest, unfiltered information to flow from the boundary spanning employees who directly interact with stakeholders and technology and strategy making top executives'.

Stakeholder engagement allows a firm to access information from its stakeholders [30]. Freeman et al. [31] have conceived stakeholder engagement as a principle and have argued that 'a large cast of stakeholders is necessary to sustain value creation' (p. 282) and the purpose of any business truly is and ought to be the creation of value for all stakeholders [32]. The result of the stakeholder engagement process is that taking ethically correct actions is also instrumental to good strategy [32, 33]. Katsoulakos and Katsoulacos [34] argue that the existence of 'advantage-creating stakeholder relations' supports organizational knowledge development. Similarly, Nelson and Zadek [35] argue that engagement creates an 'alchemy' of relationships, where resources experience transformation as well as simply being combined. User engagement is commonly linked to firm's innovative processes [30, 36]. Moreover, stakeholder engagement is commonly perceived as strictly linked to online CR [37]. Users that share Web contents that affect online CR frequently are also those who are more engaged with the firm's activities, processes, and behaviours such as customers and lead users, employees and the CEO [38].

In brief, we argue online CR management requires firms to be rapidly responsive and proactive, e.g. continuously scanning the online environment seeking either potentially conflictive issues or business opportunities, and building relationships and engaging stakeholders such as opinion-leaders and key influencers. Ethically correct actions are crucial for both stakeholder engagement and CR.

3 Empirical Setting and Method

To our knowledge, there is a lack in literature in terms of practical applications of IT for online CR management purposes. Therefore, we take a pragmatic approach and we adopt a single case-study methodology [39] which is proper for the explorative aims of this study. As Lee and Baskerville [40] provided numerous examples, the belief that the study of a single case is undesirable or deficient is widespread among IS researchers, even among case researchers themselves. In particular, according to the willingness to investigate the evolution of ORMS, we have conducted a longitudinal analysis of RepMan, a spin-off of ActValue, an Italian pioneering and leading service provider of online CR management since 2004. The proprietary ORMS is the service core. Simply put, the ORMS searches for data, information and pieces of knowledge within the entire Web or specific domains on selected criteria (e.g. very active or critical blogs, forums, social networks, etc.), supporting a more systematic and informed decision-making for online CR management [8].

A longitudinal perspective for a single case-study [41] is a suitable method for this work. This study is an upgrade of another one conducted in 2010[8]. In the previous analysis we have described RepMan's ORMS features, main e-services offered and RepMan's customers' needs for online CR management. In the current work we have updated our case data through three new semi-structured, one-on-one interviews (each lasted about 2.5 h, on April and September, 2013) with the CEO and the head of Online Reputation Business Unit.[1] Draft reviews have been made by the interviewees before finalizing the transcription to strengthen the internal validity of the study [41] and for triangulation aims. The time interval of 3 years allows some longitudinal reflections about the identification and observation of dynamic elements and processes [42]. In fact, we have collected primary data on the technological evolution of the ORMS and secondary data on RepMan's customers, in terms of postures, attitudes and behaviours towards online CR management.

4 Findings and Discussion

In 2010 the ORMS supported only two e-services [8]: a web monitoring service to identify or to manage Web contents that can affect CR and an ancillary service to monitor general themes of discussion (e.g. politics, fashion, and so forth). Between

[1] Starting with about 50 projects on online CR management in 2010, currently RepMan has 254 projects with important clients in sectors such as finance, telecommunications, media, pharmaceutical, automotive, food, and fashion. Most of them are large multinational firms that ask for cross-national analyses, though there are also start-ups that want to evaluate new business opportunities, as well as professionals, CEOs, politicians, and public figures that ask for managing their personal reputation. The number of employees has dramatically increased in the last 3 years, from 10 to up to 25 units.

2012 and early 2013 RepMan added other e-services supported by the ORMS. Today, Web monitoring capacity enabled by the ORMS is a necessary but not sufficient condition for CR management. Therefore, the services related to the ORMS include now:

- **Social Media Monitoring**, the main service for a continuous and automated Web scan. This is also the starting point for **Reputational Engineering**, i.e. disseminating shrewd messages with contents and languages tailored to specific contexts (e.g. specific online communities). A related service is **Crisis Management**, performed through a frequent Web monitoring (every 2 h) after critical events and rapid coherent reactions (both online and offline). The crisis plans can also be used proactively rather than reactively: e.g. when a client-firm expects that some behaviours or facts could generate damaging contents, a crisis plan for fast detection of possible threats and proactive interventions is implemented.
- **Social CRM,** a web-based platform that supports CRM activities. The ORMS scans the Web (e.g. social networks) to detect brand fans and to collect information to enrich the 'traditional' CRM and knowledge repositories. Related services are **Social Influencer Identification**, used to identify key-users and opinion leaders, and **Engagement**, a consulting service aimed at strengthening relationships and loyalty with opinion leaders through one-to-one marketing.
- **Client Care Online** scans the Web to identify the unanswered questions of firms' customer care services.
- **Brand Protection** supports the legal protection of the brand and contrasts frauds (e.g. a specialized module of the ORMS scans e-marketplaces such as e-Bay and highlights products marketed at 'suspicious' prices, e.g. new products at very low prices).

A minority of RepMan's customers exploits the e-services in an autonomous way, often after training. The others ask for consulting or outsourcing.

Through a work system approach and a socio-technical frame [9, 11, 43] we can summarize our findings as follows.

The enrichment of RepMan's service offer has been enabled by the development of IT, expertise and competencies, on the one hand, and fostered by new requests, organizational and strategic postures of customers, on the other hand. The development of RepMan's ORMS, as any other IS, can be depicted as a co-evolution of the 'technical' and the 'social' sub-systems.

The technical sub-system includes IT and processes [9, 2] and it has been developed towards a more efficient information processing, allowed by faster treatment of big data. This, in turn, has enabled new strategies such as new services to identify and engage external key-users, key-influencers and opinion leaders. Though this engagement largely relies on human interventions, their identification and profile-analysis are streamlined by IT. IT automatically collects specific pieces of knowledge about users (e.g. who they are, what they are looking for, what are their interests, where they publish web contents, and so forth) from major social networks.

The social sub-system includes people (e.g. human participants and customers) and social structures [9, 2] and their relationships. Human participants (e.g. RepMan's analysts, consultants and project managers) have developed routines, best practices, expertise and competencies over time, embedded into the ORMS. They act as 'catalysts' of instances and requests for service improvements that come from 'increasingly jaded' customers about online CR issues and opportunities, as emerged by recent interviews. Over time, the relationship between RepMan and its customers has been accompanied by growing needs and opportunities for a closer coordination.[2] Moreover, new capabilities and different postures allow to strengthen and to exploit the relationships with key customer's stakeholders involving them to co-create value. The relationship between RepMan and its customers has become closer also because of the 'object of analysis': in RepMan experience - as emerged by our interviews - online CR is often conceived also as managing the personal reputation of key figures such as the CEO. The individual and organizational level are seen as strictly related. Moreover, the online reputation of individuals is seen more 'manageable' and under control than the online CR. Therefore, a suggested way to influence online CR is through interventions and actions that influence the individual reputation of key figures within the firm. In other words, the online CR management is strictly related to people and not only to the firm's products and services. Anyway, in RepMan experience, the online CR management always requires a comparison between a firm's reputation and that of main competitors. Therefore, what really matters is a sort of 'comparative online CR'. From our longitudinal analysis we can depict a framework and some propositions for further studies.

In 2010 online CR management was often conceived by RepMan's customers in a reactive and short term way. RepMan's customers asked for Web monitoring and the definition of short-term plans with corrective actions to face online CR threats (e.g. a viral diffusion of negative comments about a person, a brand or a firm behaviour, a product malfunction, and so forth). The implementation of corrective actions was followed by further monitoring, thus restarting the cycle again. The organizational change brought about by the introduction of ORMS regarded mainly the automation [43, 44]: IT innovation automated the task of Web monitoring [8]. The output of corrective actions remained confined within the online context: e.g. increasing website visualizations, deleting Web contents that negatively affect online CR, and so forth.

As emerged by last interviews, RepMan's service evolution has been symptomatic of a recursive relation between IS and the evolution of organizational and strategic posture of customers towards a more mature and proactive approach in online CR management. The organizational change brought about by the introduction of ORMS affected not only the manner in which tasks are performed but also

[2] For example, the Social CRM and the Engagement services require a close coordination among RepMan's analysts and consultants and the customers' units such as Marketing, Customer Care, PR and so forth.

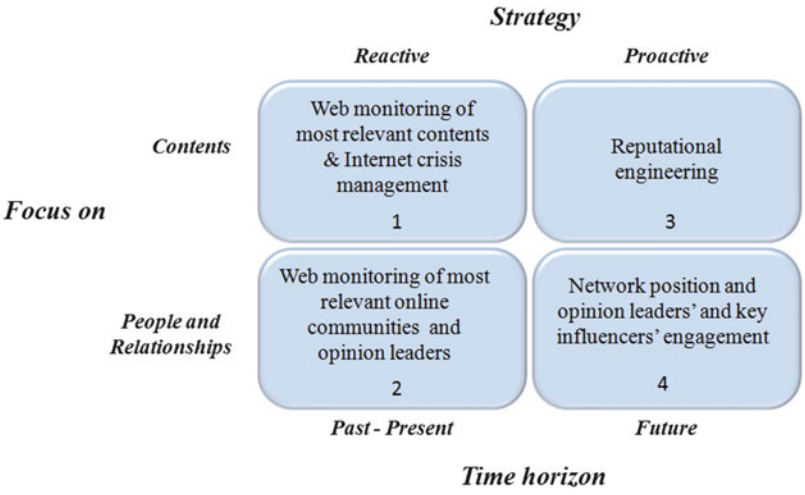

Fig. 1 Different approaches in online CR management: lesson learned from RepMan case

those individuals who perform them. This level of change, also called 'informate' [44], typically occurs when the information intensity of the process being performed change substantially due to the introduction of new IT. Accordingly, performance indicators of online CR practices evolved, including either online and offline indicators, such as growth in market shares.

Nowadays, RepMan's CEO is convinced that almost every firm is aware of online CR relief, though the strategic posture and proactiveness can be quite different. Based on RepMan experience, we argue two dimensions (Fig. 1), i.e. *time horizon* (past-present and future orientation) and *focus* (on Web contents or people and relationships), can be useful to depict different CR management practices. Firms can focus mainly on Web contents or on people (e.g. key-users, key-influencers and opinion leaders) that generate contents and their relationships ('focus' dimension). Firms can mainly focus on what is already published on the Web and thus have 'already affected' the online CR (past-present orientation) or can mainly focus on what might affect the online CR in the future (future orientation) in the 'time horizon dimension'.

Crossing *time horizon* and *focus* we obtain four quadrants. The first one depicts a focus on Web monitoring to identify most relevant contents, often those that have already damaged the online CR (reactive approach). Corrective actions might be, for example, requests of removal and legal actions, Search Engine Optimizations to reduce the visibility of negative contents (e.g. giving visibility to positive ones), new Web contents and so forth.

The second quadrant depicts a reactive approach focused on people. Firms try to identify and engage key influencers and opinion leaders whose contents have already affected the online CR. Firms adopt both online and off-line actions aimed at engaging key influencers and opinion leaders (trying to sustain a positive

'word of mouth') or try to gain a favourable network position in targeted forums and online communities to control reputational resources, e.g. through 'men on the inside' [45]. Corrective actions might be giving 'social support' to key influencers and opinion leaders that publish positive comments or 'punishing' who publish negative contents (e.g. simple warnings or request for banning from forums or communities or 'social pressure').

The third quadrant depicts a more proactive approach on contents. Firms are future-oriented and focused on Web contents that might affect online CR, trying to prevent potential problems. The strategy consists in what RepMan names as 'reputational engineering', i.e. a set of actions aimed at creating and giving visibility to contents that positively affect reputation or at cushioning critical events not yet of public domain. The reputational engineering concept of RepMan goes further the online environment: the monitoring of the 'online sentiment' is related to the off-line environment, according to the interdependencies and feedbacks highlighted by Francesconi and Dossena [8]. In fact, the results of corrective actions implemented by RepMan are monitored also through the analysis of press.[3] Other related aspects taken into account by RepMan are, for example, the expenditure in advertising and the stock market quotes of customer-firms. In RepMan's opinion the reputational engineering is not a simple matter of online reputation but it refers to the ability to analyze jointly all these information.

Finally, the fourth quadrant is similar to the previous albeit mainly focused on people. In RepMan's experience it is very difficult to create a critical mass of contents able to positively affect the online CR. An effective and simpler solution is often represented by working directly on some people's reputation, such as key external opinion leaders or customer-firms' CEOs (especially for large firms).

We have to highlight that, in this work, we have not taken an ethical stance, but simply we have tried to report the experience of RepMan. Reactive and proactive approaches can be conceived as the extremes of a continuum. In RepMan experience a shift from first to fourth quadrant seem to have happened over time, coherently with an increasing awareness of firms-customers towards online CR issues. These results require deeper future research to go beyond the limits of this study as well as the kind of association among strategic and organizational elements reported in Table 1.

Finally, trying to exploit our single case for further studies we define two research propositions.

Proposition 1 The increase of awareness, knowledge and competencies on online corporate reputation is associated with more future-oriented postures in online corporate reputation management.

Proposition 2 The increase of awareness, knowledge and competencies on online corporate reputation is associated with increased focus on people and their relationships rather than on mere web contents in online corporate reputation management.

[3] An agreement between RepMan and the major newspaper allows accurate press reviews.

Table 1 Development of ORMS, organizational needs and strategic postures

Strategic posture	Time horizon	ORMS main function	User engagement	Customer firm's involvement in online CR management	Coordination between RepMan and customers' units
Reactive	Past-present	Web monitoring	Null / Low	Low	Low
↕	↕	↕	↕	↕	↕
Proactive	Future	Reputation engineering	High	High	High

5 Conclusions

Focusing on ORMS, our work has explored the potential of IS to gather knowledge from the Web to support a more informed decision making and for (re)acting faster in online CR. We have made a longitudinal analysis to depict the evolving nature of ORMS as an interplay among IT, organizational needs and strategic postures. A framework that assumes a relationship between IT development of ORMS and some strategic and organizational elements is proposed.

From a pragmatic point of view and certainly not taking an ethical position, the experience of RepMan provides some suggestions for a more effective online CR management:

- The Web can be an opportunity to be exploited and not only a threat to be faced. This require a more proactive posture.
- IT acts as an 'enabler', e.g. allowing faster and easier management of big data, but an effective online CR management requires specific competencies.
- A proactive management of online CR requires the contextual analysis of very heterogeneous performance indicators, both online (e.g. website visualizations) and off-line (e.g. growth in market shares).
- Online CR management is related with the personal reputation of key figures such as the CEO. The individual and organizational level are strictly related.
- The online reputation of individuals is more 'manageable' than the online CR.
- The online CR management requires a comparison between the firm's reputation and that of its main competitors (a sort of 'comparative online CR').
- The use of ORMS arises as an interplay among strategic postures, corporate objectives, threats and opportunities arising from online environments mediated by competencies on online CR management.

In spite of the limitation of a single case and the use of secondary data, some propositions and a framework for further studies have been suggested. The tentative classification of firms' postures (reactive vs. proactive, contents vs. people and relationships) origins from our interviews and, thus, from the experience of

RepMan. Our argumentations might benefit from a collection of primary data. It might be interesting to investigate whether:

- The use of an ORMS is associated with a better online CR management and a better decision making (not only 'more informed and streamlined' processes).
- A more proactive approach in online CR management is more effective than a reactive one and under what conditions.
- Firms can use different approaches at the same time or over time and under what conditions.
- Under what conditions firms use an ORMS in autonomy, in outsourcing or through consultancy.

But, from a higher point of view, it would be useful to incorporate the ethical dimension, or at least to consider the suggestions of scholars about the more general issue of stakeholder engagement. 'The topic of stakeholder engagement has, for good reasons, received greater attention in recent years. It makes sense to say that firms *ought to initiate and facilitate respectful, honest and productive multilateral communication with their stakeholders*. This makes sense because stakeholders make up these firms, and the relationship networks to which these stakeholders belong make up the communities and markets within which these firms do business' [46 italics added].

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Social Evolution of Enterprise Information Systems: A First Interpretive Framework for Benefits and Risks

Davide Aloini

Abstract What are Enterprise Information Systems going to be in the next 5 years? How are employees, customers, partners and suppliers going to interact within and throughout the company borders in the next future? Social software irruption in the EIS world is already a reality for CRM, SALES and HR modules, so can EIS really become "socio-professional" systems? Which is the value of embedding social functionalities into EIS systems? Which are the potential benefits and risks? These are just few of the numerous questions this research would like to answer about the changes that social software is leading to the business environment and information systems. In this perspective, this paper suggests a first interpretive framework in order to assess a systematic in-depth investigation.

1 Introduction

The world is rapidly digitizing and connecting individuals, enterprises, processes and devices. Social media have caused a revolution in everyday life forcing us to rethink the way we communicate, in business as in private life, definitely enabling new kinds of partnership and collaboration processes, and also opening new opportunities for business process management [1]. A new class of company is emerging, the one that uses collaborative Web 2.0 technologies intensively to connect the internal efforts of employees and extend the organization's reach to customers, partners, and suppliers [2].

In this context, new potential concerns and risks also arise: fundamental problems are related for example to safety and data protection for some business conversations, but simultaneously new managerial challenges also emerge. Social Software can be a great marketing tool to promote business, nevertheless it may not be the best way to interact with business, specific processes or projects depending on the particular interactions, process logic and criticalities of the transaction objects. Without security concerns, social media would have the tools to increase

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productivity in the workplace and improve collaborative efforts—for example message boards and instant messaging quickly connect people giving a chance to proactively solve business problems—but they should also be tied into Enterprise Resource Planning (ERP) to allow tracking of interactions and prove how certain business decisions were made or how projects progress.

Up to date, whether Social software in firms has already been in use for a number of years, this has mostly occurred in an unstructured way, so that standard or best practice ways of applying social software are not visible yet. Managers and researchers alike still struggle with questions, such as why and how to interpret social software, what are shared perceptions, how to appropriate potential business value, when to enact work practices involving social software, and where to align it with other business processes [3].

In this perspective, the present paper aims to suggest new directions for Information System research drawing a first preliminary framework for a systematic investigation of social software value and risks for business operations.

2 State of the Art

The very recent years have witnessed a growing interest in the development of the Enterprise 2.0 concept both from academicians [4] and practitioners (Social Business Research Report, MIT Sloan Management Review [5]). Particularly, there has been a variety of theoretical and empirical research proposing innovative methodologies, tools and initiatives in many different related management fields, such as Strategy, Organization, Innovation, Information, Technology, Knowledge, Marketing (Customer and Supplier Relationships). Suddenly, the new functionalities provided by Web 2.0 and Social software started promising innovation for traditional activities in functions such as R&D, Purchasing, Sales and Marketing innovating their activities and definitely getting a new life for their processes. In this perspective, more and more people (Vendors, Consultants and Academicians) have been fostering a similar evolution for software supporting business processes, and more in general sponsoring an overall integration of social software with Enterprise Information Systems such as Enterprise Resource Planning (ERP).

In order to facilitate and support the development of a theoretical framework for this research, the following sections will present the state-of-art in the field according to a double perspective which are somewhat complementary: the academic research and the practitioner initiatives.

2.1 The Academy's Research: A Literature Review

Academic contributions on Enterprise 2.0 and specifically on Social Software are flourishing and embrace different fields and perspectives. In the work "Information

systems strategy: Past, present, future?" Merali et al. [6] assess a meta-analysis of the domain based on a longitudinal review of SIS research. Drawing on Nelson's theorization [7] they finally propose network science and network thinking as an essential paradigm for the future evolution of the SIS domain, to enable the co-evolution of the requisite Social Technologies to shape and leverage the emerging network ICT capabilities. It is shown that the emerging Physical Technologies in the ICT domain are essentially technologies for integration of complex networks (Web 2.0, Cloud computing) and for utilizing distributed resources and capabilities. The strategic research agenda, while focusing on knowledge creation, thus takes into account the impact of new technologies, such as social software, on business processes, models, governance and management instruments.

Another review on Social Software was assessed in the field of Global Software Development by Giuffrida and Dittrich [8]. They show that literature on the topic is spread among different research communities and countless publications (from Computer–Human Interaction to System Sciences community). Social software emerges as a support for collaborative work, simultaneously fostering awareness, knowledge management and coordination among team members, more than people socialization. Among other evidences, authors underpin the need for more context-related observational studies to support future design and appropriation of collaboration support.

Notwithstanding the flourishing production, the theoretical research on social software is mostly polarized around the fields of innovation and knowledge management while the empirical works are characterized by experimental stand-alone solutions which are scarcely integrated with company processes and information systems.

Social media was often proposed and adopted to support users participation in to the innovation process [9], stimulate creativity, enhance the idea creation process [10] and also support idea management, as well as supplier involvement [11]. Particularly, the Open Innovation paradigm has fostered and exploited the potential on the innovative technologies of the Web 2.0 [12, 13].

Knowledge management research instead promoted largely social software to deal with tacit knowledge, support learning process and manage unstructured codification and storage of company know-how. Georg von Krogh [14] has analyzed the impact of social software on our conceptions and practice related to knowledge management. In the past knowledge creation, sharing, and capture processes were considered as enabled by central-proprietary IS implementations: "centrally managed, proprietary knowledge repositories, often involving structured and controlled search and access". The advent of social software has forced a deep change in traditional knowledge management where social software constitutes a main trend providing open and inexpensive alternatives to traditional implementations [15].

Just recently research on the use of social technologies moved in other management areas involving Sales/Post-Sales, Marketing, Purchasing, Human Resources activities. Preliminary studies started to be assessed in social Customer Relationship Management (CRM) [16]. Largest contributions regard the new opportunities

offered by Social Web in CRM (direct market access, interactive contact, better demand understanding) [17], related business strategies [18–19], as well as the possible evolution of data architecture [20]. Introductory discussions have taken place on topics related to Social Business Process Management (BPM) [21–23] and social software-driven SCM innovation, as well as, in Supplier Relationship management.

Literature shows that current research still focuses on part of the entire view mostly according to a B2C perspective. At our best knowledge studies analyzing the value, implications and risk of social software integration into EIS/ERP systems in order to fully support an agile and interactive management of intra and extra company's business processes are lack, if not completely absent.

2.2 The Practitioners' Perspective

As often happens in many technology-driven innovation process, the high speed of technological progress induced practitioners' world (Vendors and Consultants) to act as first mover in the field of social software research. First pioneering experiences of social software adoption can be dated at the beginning of 2000s when some big corporate (e.g. UK, British Telecom) and consulting firms started to adopt knowledge management, innovation management, internal communication and collaboration systems leveraging on new technologies and tools such as communities, blogs, wikis, social networking tools, mashups, collaborative planning software for peer-based project planning and management, enterprise social bookmarking for tagging and building organizational knowledge. These solutions, however, were often introduced in a not systematic way (without formal models for the creation of complex systems) but as experimental stand-alone applications leveraging on the perceived real utility of their support in a changing work environment.

Over time, some consulting groups launched initial study on the social phenomena firstly in order to identify and classify potential and perceived business benefits. IBM, for example, identified four main needs for Social Software adoption in business processes: need for innovation, need to connect, need for execution, and need to empower.

A recent survey from McKinsey Group [31] reveals a growing rate of adoption for Social Software Technologies also sustaining preliminary evidences about a potential correlation between the technology enabled collaboration with external stakeholders and market share gains, as well as the adoption of distributed decision making, de-hierarchized processes and participative processes (working teams within and cross organization) with company operating margins. Most of the expected benefits can be classified as Internal Purpose, Customer Related purpose and Working with external partners and suppliers. The primary aims belong to the knowledge management domain, searching for process efficiency and effectiveness (business process reengineering/optimization), innovation management.

The importance of the inclusion of social media functions into EIS/ERP systems is also supported by another analysis on Enterprise 2.0 in Industrial ERP by IFS North America [24]. Benefits seem to be well understood by executives and directly perceived especially to streamline and communicate inside the enterprise to document business processes, extract tacit knowledge from senior workers, or also provide an intuitive enterprise environment to be used by young workers.

Some ICT experts evaluated that, in order to effectively use social media in the daily business processes within and outside the company borders (avoiding redundancy of information and operation activities), it only makes sense that EIS/ERP systems should interact with it.

In this context most active ICT players (e.g. SAP, Oracle, IBM) activated intensive investigations to understand the fundamental issues for EIS/social software integration, wondering where collaboration makes sense in business processes, and what types of collaboration are required. They also launched experimental developments of social information platform/systems embedding social functionalities into the most promising ERP modules. At the end of 2012, some of them started to promote first integrated social software solutions on the market embedding social computing services, networking capabilities and activity streams directly into enterprise applications. For example: SAP (Jam), Oracle (WebCenter), IBM (social platform).

Whether these evidence are neither exhaustive nor conclusive, they proof a starting and significant interest to the topic of "use of social software to support company operations". Broadly speaking, most of the provided solutions concentrate on some key business areas, such as CRM, HR, Learning and Talent management, Finance applications. Nevertheless supply chain collaboration applications are clearly stated as the next targets to achieve in order to support communication, coordination and collaboration inside and outside the organization.

3 Research Objectives

This research aims to explore the benefits, risks and implications of a possible social drift of EIS/ERP systems. This is a new and still under investigated topic in IS research, rising numerous and interesting questions we consider valuable for a deeper investigation. As clearly emerges from the state-of-art, academy research and practitioners' initiatives are going on with different speeds and following complementary directions. If it is true that Social media irruption in the EIS/ERP world is already a reality for some Vendors (e.g. CRM, SALES and HR modules), the existing market solutions are not mature but still in an experimental phase and there is a lack of research in the field. Nevertheless, a more systematic research approach is needed.

This paper would be a first step in order to assess a systematic in-depth investigation of real benefits of social evolution of EIS vs. potential risks of a fashion-driven innovation and the subsequent technical and managerial related implications of such an adoption as well. Here following the main research questions: Can EIS/ERP systems really become "socio-professional" systems? Which is the value and the opportunity of embedding social functionalities into EIS/ERP systems? Which are the potential benefits and risks of EIS/ERP socialization? Which are the possible implications for the Technology, Organization and Management systems?

In this perspective, we advance here a first interpretive framework in order to set the stage for further and deeper research and collect valuable feedbacks by the IS community for possible improvements.

4 Research Framework

The research rationale posits that embedding social software functionalities into EIS/ERP system can positively impact on Business Process Performance at a strategic, tactical and operational level (H1). This can in turn affect the Extended Enterprise Capability (H2). Simultaneously, a positive impact on system adoption and use due to the new social technologies (H5) can again affect Business Process Performance (H4) and Extended Enterprise Capability (H3) (Fig. 1).

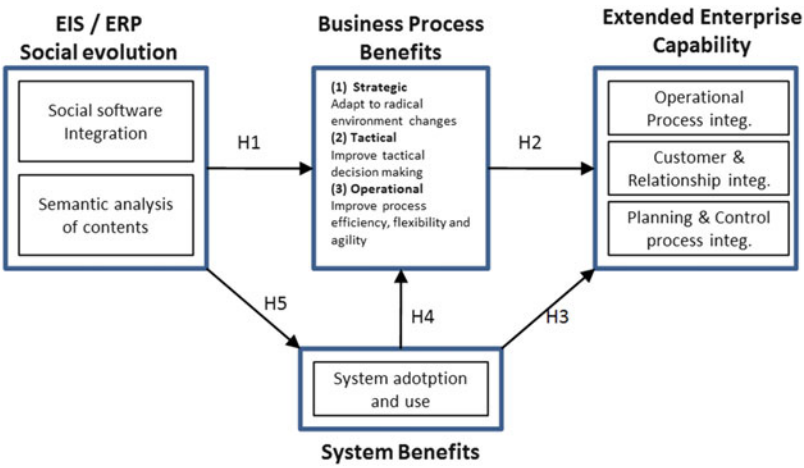

Fig. 1 Research framework

4.1 Embedding Social Software into EIS/ERP Systems

With Enterprise 2.0, social software finds its way and the collaborative philosophy of Web 2.0 is adopted in the company to support business processes. When we refer to integration of Social functionalities into EIS/ERP applications (Social software integration or social evolution of EIS/ERP) internal–external social networking, collaboration tools and other social software enabled functionalities are not seen as a silo separate from processes where business people do their work but on the contrary they are transversally available for supporting company business process management, contextually managing data, processes, people and contents [25].

First examples of social software integration are available in the companies practice: look at the HR area where social software can enhance social onboarding/social recruitment activities, Learning processes and Talent Management; or in Sales where social software may contribute to streamline processes as collaborative opportunity management, CRM, Sales on Demand; in Marketing to manage collaborative campaign; and even in Service and Post-sales to perform a collaborative service request resolution, for example building an ad hoc team (people from Sale, R&D, other functions) to solve customers' complaints, responding more effectively and efficiently to their needs. Moreover many financial processes are cross functional as it happens for collaborative budgeting, policies, procedures. In this context we cannot neglect to consider the potential support of Semantic Web Technologies (Web 3.0) for information management and process control (Semantic analysis of contents). Enterprise 2.0 tools, in fact, do not provide formal models for the creation and the management of such complex systems with large amounts of data [32].

4.2 Benefits and Risks of Social Software Integration

Expected benefits due to Social software integration into EIS/ERP system can be analyzed at two levels: support to company business processes (i.e. Business process benefits) and facilitation for system adoption and use (System benefits).

Business process benefits the opportunity of social software and in wider terms of social media tools integration into EIS/ERP systems has to be considered and analyzed in relation to the final benefits achieved to business process management. Supporting cross functional collaboration processes (in R&D, sales, marketing, finance, purchasing, production), social software adoption can allow new conditions for retrieving operational efficiency, agility and flexibility that are missing within the EIS/ERP workflow sometimes, allowing internal and external process integration, opening company processes to collaboration with partners, customers and suppliers and finally enabling enterprise 2.0.

The role and consequentially the potential value of social software is highly dependent on the context of use and the supported activity. Depending on the

Table 1 Business process benefits

Operational Improve process efficiency, flexibility and agility	Benefits result from enabling/streamlining cross-functional collaboration processes, allowing the use of structured and unstructured data to better plan and manage production processes, people, knowledge, contents and broadly company resources, also enhancing new paradigms for process monitoring and control
Tactical Improve tactical decision making	Improving the day-to-day business process collaboration and the access to information can impact on long-term benefits such as improved work assignment, work scheduling, quality management, on-time delivery, customer responsiveness, customer satisfaction, i.e. more widely improved decision making
Strategic Adapt to radical environment changes	Benefits arise from the system's ability to support efficient, flexible and agile business processes and capturing the value derived from facilitating knowledge management, business learning, empowerment of staff and higher employee satisfaction in the final purpose to get a competitive advantage and open new strategic business options

Table 2 Extended enterprise capability

Operational process integration	Capability to support collaboration with suppliers allowing efficient, agile and flexible supplier integration links for externally performed work into a seamless congruency with internal work processes
Planning and control process integration	Capability to support planning and control activities in the wide variety of operational configurations needed to assess business. Innovative Performance Measurement Systems should simultaneously manage structured and unstructured information facilitating both internal and external strategic assessment and process control
Customer and relationship integration	Capability to support operational integration with customers, allowing lean customer participation in innovation, co-design, customization, service/post-sale activities

system module (type of functions, activities, target users) the functional support provided by the system might be radically different. Following an internal process view as proposed by Chand et al. [26] and Su and Yang [27], we can split in business process benefits in three levels: Operational, Tactical and Strategic benefits (Table 1).

At a second level, internal business process benefits due to social software support can also contribute to external integration improving "enterprise 2.0" capabilities. Su and Yang [27] analyze three core competences for external supply chain integration: Operational Process integration, Planning and Control Process integration, Customer & Relationship integration. A description is provided in Table 2.

System benefits frequent concerns in the post-go-live phase of ERP implementation are referred to the human–computer integration [28] which influences company satisfaction regarding the efficiency and effectiveness in the use of the new information system. Botta-Genoulaz and Millet [29] identify fundamental alerts and actions for improving the systems, some of them here following: non-appropriation of the system by users; unsatisfactory operational execution; insufficient speed, respond time and ability to react; users create parallel procedures; the full ERP potential is not used. The integration of social software functionalities may constitute a major driver of change into the traditional EIS architecture. A user-centric system architecture (vs. a process-centric one) might help user to easily interact with the system in a more informal and unstructured way but still respecting process standards and procedures. Allowing social networking and other kind of social interactions into the systems, companies would give user a new media for communicating and managing information flow without losing the process control and assuring the traceability of information. Offering functionalities to deal with both structured and unstructured information within EIS, the new applications may enhance companies to simultaneous respond to their need of reducing Uncertainty and Equivocality, finally overcoming a traditional trade-off between information richness and clarity as stated by the Media Richness Theory [30].

Potential risks of social software adoption we think that, at an introductive stage, risks due to the social integrations can be analyzed according to the same framework we provided for benefits (but in a negative connotation). At the same time, the investigation on social evolution of EIS/ERP systems clearly implies to consider some major concerns about data/information security and tracking.

4.3 Methodology

The approach we intend to adopt at this first stage of the research is mostly explorative and based on the investigation of a number of selected case studies (from heterogeneous business sectors) characterized by the presence of an Integrated EIS and at least a pilot social software experience. This in order to assess preliminary empirical investigation and derive directions in the way of a better formalization of the interpretive framework proposed. Particularly, at the end of this stage, a first classification of benefits and risks is also expected.

Directions for the research are twofold: on one hand, investigating the business value (expected/real benefits) of social software integration into EIS and, on the other hand to analyze the technical risks and managerial concerns, also at the light of the existing experiences. In this perspective, the analysis would also try to engage in the research selected Vendors and Business Integrators actively involved in the field of EIS and social software.

With this aim, we propose a multidisciplinary case study approach ranging from the classical case analysis by survey instruments, to the investigation of current

experimental on-going projects, to technical analysis and value mapping trough discussion/debate with active technological market players. Each case study will be analyzed according to different process perspectives and by a multi respondent approach: one (1) case study—multi (n) functions/processes to be analyzed—multi (n) respondent.

5 Expected Findings

The research could offer interesting insights at different levels. Firstly, at a theoretical level, the goal is to provide an interpretive framework explaining the value and the potential risks of embedding social software functionalities into EIS/ERP systems. While the benefits, risks and feasibility of EIS social evolution are still mostly hidden, the subsequent impacts could be potentially huge in companies' life because of the numerous and deep interactions with the way people work, human–process–system interactions, information flows (integration) within and outside the company, management practices, systems of incentives and rewards, decision making/management, human resource management, intellectual capital sharing. The present proposal covers just some aspects of the topic but can hopefully open many directions for further research, as for example in Management theory, IT Management, and also IT-Project Management.

As for managerial implications, the research would set a first step to understand how to apply social media into Enterprise software in order to support different business processes and enhance reengineering and optimization opportunities. Approaching a first empirical evaluation of the benefits and risks of such integration, we also hope to contribute to the evolution of future EIS/ERP 2.0 systems.

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The Impact of Online Social Networks on Decision Support Systems

Francisco Antunes and João Paulo Costa

Abstract Previous research on this matter had already determined that many concepts are encompassed by both online social networking and decision support systems research. Due to the large number of concepts and using clustering techniques, we were able to determine four concept clusters, namely: the technical infrastructure, online communities, network analysis and knowledge management. Then, we intended to gain further knowledge on how those concepts influenced DSS related research and the contribution of each cluster to the support of the phases of decision-making process. We also wanted to perceive the interconnections among the concept clusters themselves, for which we used structural equation modeling techniques.

The obtained results evidence that not only online social networks are being used as a technical infrastructure to support the three decision making phases and to support knowledge management and online communities, but also that the other clusters only regard the intelligence phase of the decision process.

1 Introduction

Online social networking is almost omnipresent in nowadays personal life. However, recent research has revealed that such effect is rather potential than real, in business contexts [1]. The terms "Web 2.0" and "Web 3.0" have become such a commonplace that companies are now pasting it on as a marketing buzzword, with no real understanding of what it really means [2] or real application of its features, to fulfil its potential.

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In order to understand the state-of-the-art of the decision support systems (DSS) research and its actual interconnection with online social networking (at both technical and social related levels), we underwent a large study using a thorough analysis of four major bibliographic resources: ISI WOK, SCOPUS, SCIRIUS and EBSCO. To the best of our knowledge, no other study of this extent has been performed until now.

This paper presents the most relevant concepts of the analyzed online social networking and decision support systems research literature, based on both manual and automatic text extraction procedures from the above-mentioned bibliographic resources. As the interconnections of online social networking and decision support systems concepts were encompassed within the text, we resorted to network text analysis theory, as it assumes that language and knowledge can be modelled as networks of words and relations, encoding links among words to construct a network, analyzing the existence, frequencies, and covariance of terms or concepts. Baring in mind that, within the context of semantic network analysis, a concept is a single idea represented by one or more words [3], we used social network analysis tools to process and represent the obtained network of concepts.

The relevance of the obtained concepts was determined using the eigenvector centrality measure, as it determines the relative influence of concepts within the network. The underlying reason is that it assigns relative scores to all nodes in the network, based on the concept that connections to high-scoring nodes contribute more to the score of the node in question than equal connections to low-scoring nodes [4, 5]. Due to the large number of concepts we ran a modularity analysis of the concepts, in order to detect and study underlying concept clusters (communities), based on the Louvain method, which is specially fit for very large networks [6]. The process returned four clusters (technological infrastructure, network analysis, knowledge management and online communities), which represent the contact issues of both fields of research (please see [7] for further insights).

After determining the referred concept clusters we intended to gain further knowledge on how those concepts influenced DSS related research, specifically in terms of their actual support of the three traditional decision-making phases [8], namely the intelligence, design and choice phases. Not only had we wanted to determine the actual contribution of each cluster to the support of the phases of decision-making process, we also wanted to perceive the interconnections among the concept clusters themselves. To do so, we used structural equation modelling techniques. The results of this analysis are shown in Sect. 4.

We present in the next section, the process of publication collecting, which was the basis for this study. Then, in Sect. 3 we present the analysis with the social network techniques. Section 4 presents the exploratory study using structural network equation modelling techniques. The final section summarizes the main conclusions of this study, as well as some future research directions.

2 Data Gathering

The time-span of published research chosen for this project is 2003–2010. The initial year is the one when the first publication explicitly dedicated to online social networks, according to [9], occurred.

We used four major bibliographic indexing resources: ISI Web of Knowledge (Science Citation Index Expanded; Social Sciences Citation Index; Arts & Humanities Citation Index; Conference Proceedings Citation Index—Science and Social Science & Humanities—Current Chemical Reactions; Index Chemicus); SCOPUS (Life Sciences; Health Sciences); SCIRIUS; and EBSCO (Academic search complete). These bibliographic sources provided us the necessary grounds for searching information with scientific indexation across distinct scientific domains (as opposed to internet free content, such as commercial sites and blogs, whose validity is, most of the times, author dependent).

As we knew that using a "([DSS] AND [Web 2.0])" approach would lead us just to technical papers on DSS and internet technology, we decided to opt for a different approach, combining key concepts from both DSS [10] and online social networking [9, 11, 12].

DSS concepts:

- Decision support system (Personal Decision Support System/Group Decision Support System): A system developed to support (a) decision task(s);
- Group Support Systems: the use of a combination of communication and DSS technologies to facilitate the effective working of groups tangled with (a) decision task(s);
- Negotiation Support Systems: DSS where the primary focus of the group work is negotiation between opposing parties;
- Intelligent Decision Support Systems: the application of artificial intelligence techniques to decision support;
- Knowledge Management-Based DSS: systems that support decision making by aiding knowledge storage, retrieval, transfer and application by supporting individual and organizational memory and inter-group knowledge access;
- Data Warehousing: systems that provide large-scale data infrastructures for decision support;
- Enterprise Reporting and Analysis Systems: enterprise focused DSS including executive information systems, business intelligence, and more recently, corporate performance management systems. Business intelligence tools access and analyze data warehouse information using predefined reporting software, query tools, and analysis tools.

Online social networking concepts:

- Internet social networking: refers to the phenomenon of social networking on the Internet. As such, the concept subsumes all activities by Internet users with regard to extending or maintaining their social network.

- Social network sites: web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view/traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site.
- Social software: wikis, micro-blogging and social bookmarking services are types of social software. In an enterprise context, feature-wise, social software is closely related to groupware, though social software originates from the public Internet and is heavily shaped by its users.
- Enterprise 2.0: it describes the adoption of social software in an enterprise context. Much as internet social network denotes the phenomenon and refers to the application of social network software as its main enabling technologies, Enterprise 2.0 refers to the phenomenon of a new participatory corporate culture (with regard to communication and information sharing), which is based on the application of various types of social software technologies. It describes a wider approach that advocates a new organization culture of participation, inclusion, and sharing, rather than simply adopting social software.
- Enterprise social networking: refers to the phenomenon of social networking in an enterprise context, whether using intranet social network or referring to the organizational usage of public social network sites.

After retrieving each data set from the selected data sources, the resulting database presented almost 1,000 records, which needed additional processing. This processing was achieved using SQL (structured query language) in order to perform actions like: the removal of duplicates; the repairing of fields' data types; the removal of abstract books, etc. After completing these steps, the dataset was reduced to 499 records, which needed 'human' processing.

The first 'human' step was to read all the abstracts in order to eliminate papers that were completely out of the scope of this study. Although our search keywords widely narrowed the search within each data source, their data extractors did not differentiate the body of the papers from their references section, for instance. The list of papers was reduced to 326. These ones underwent a thorough reading, in order to assess their contribution to our study. At the end of the process, only 89 papers were selected as an actual interconnection of the decision support systems and online social networking research.

3 Social Network Analysis

As the basis to ascertain the influence of online social networking on DSS are the above-mentioned bibliographic resources, it implied that the required information was text-based and that the interconnections of online social networking and DSS concepts were encompassed within the text. To extract and analyze such relationships, network text analysis theory stands on the assumption that language and

knowledge can be modelled as networks of words and relations, encoding links among words to construct a network of linkages, analyzing the existence, frequencies, and covariance of terms or concepts. Knowing that within the context of semantic network analysis, a concept is a single idea represented by one or more words, concepts are equivalent to nodes in social network analysis (SNA) [3]. Consequently, SNA metrics are applicable to our study.

As complex socio-technical systems, online social networking and decision support are dynamic systems. Analyzing such complexity requires tools that go beyond traditional SNA and link analysis [13], namely through Dynamic Network Analysis (DNA), which combines the methods and techniques of SNA and link analysis with multi-agent simulation techniques. To that purpose we used the Automap CASOS (Computational Analysis of Social and Organizational Systems) toolkit to extract the relationship network among concepts of online social networking and decision support systems. AutoMap is a text mining tool that enables the extraction of network data from text, namely four types of information: content (concepts, frequencies and meta-data such as sentence length); semantic networks (concepts and relationships); meta-networks (ontologically coded concepts and relationships—named entities and links); and sentiment and node attributes (attributes of named entities).

We pre-processed the involved text files, manually removing the references and acknowledgments sections. We also created a personalized thesaurus from all the abstracts, in order to replace possibly confusing concepts with a more standard form (e.g. web 2.0, became "web_2d0"; decision support systems, became "dss"; business intelligence, became business_intelligence; etc.) to be applied to all papers. The identification of Named-Entities was also performed using the corresponding Automap tool, in order to create a "delete-list" to remove the references to authors. In addition, all numbers were removed from the text, as well as special characters. Pronoun resolution was also performed using Automap.

To calculate the network metrics, as well as its visualization, we used the open source Gephi 0.8 (beta) software, which is easily integrated with Automap and DNA. Gephi has been used in extensive peer-reviewed scientific research (journals, conferences, workshops and thesis), providing a powerful, free-of-charge, intuitive and easy-to-use analysis tool.

Although several centrality measures can be used to identify key members playing important roles in a network (such as degree, betweenness, and closeness, see, for instance, [14], for further details), we chose Eigenvector centrality as the measure to determine the relative influence of concepts within the network. The underlying reason is that it assigns relative scores to all nodes in the network, based on the concept that connections to high-scoring nodes contribute more to the score of the node in question than equal connections to low-scoring nodes [4, 5]. If we rank nodes by Eigenvector centrality, we can determine the key nodes (concepts) in the network. In order to obtain an understandable network representation and due to the large number of involved concepts, we limited (filtered) the concepts to those baring an Eigenvector centrality greater or equal to 0.15 (reminding that the values were encompassed within 0 and 1).

In spite of the fact that the concept network presents an interesting overview of the overlapping concepts of online social networking and DSS research, it is quite poor at revealing the thematic interconnection of the research field, which is, after all, our purpose. To obviate this problem, we ran a modularity analysis of the concepts, in order to detect and study underlying concept clusters (communities), based on the Louvain method implemented on Gephi 0.8 (beta), which is specially fit for very large networks [6].

3.1 Results

The results returned four concept clusters (again, please see [7] for further insights):

Technical infrastructure (TI)—It represents the concepts which stand for involved technical elements. The technical infrastructure encompasses research that elaborates, develops, proposes and analyzes social networking infrastructures, for distinct underlying purposes (data-gathering purposes, information extraction, taxonomy building, web-computing, consumer support, decision automation, etc.).

Online communities (OC)—This cluster focuses on people, users, teams, which points to community interaction. Instead of focusing on the network topology, it provides a focused view on the effects of online social networking among established online communities, baring distinct decision purposes or options (academic, acquaintance, leisure, etc.). In addition, research is directed towards group dynamics (formation, cohesion, behavior, etc.) and its effects (actual or perceived) among specific online communities.

Network analysis (NA)—It encompasses a networked analysis of organization, companies and distributed structures. Although directly related to online communities, the main focus of this research lies on the description, community detection, visualization of social networks, to provide interpretation and decision support according to the social network topology, by means of social network analysis measures (centrality, betweenness, closeness, degree, etc.).

Knowledge management (KM)—Finally, the last cluster represents knowledge management activities, especially around collaboration. The main focus of this theme is to address online social networking (and the so-called "wisdom of the crowds"), using the lens of knowledge management, namely its use (actual and perceived), usefulness and setbacks towards the objectives of knowledge creation, sharing, encoding, retrieval and representation.

4 Structural Equation Modeling

After finding the previous concept clusters, we wanted to find their interconnection and impact on DSS, namely on their actual contribution in supporting the phases of the decision-making process (as defined by [8]). To accomplish this task, we

underwent an exploratory study using structural equation modelling (SEM). SEM is essentially a path analysis baring a structural model [15]. Path analysis is a method, developed by Sewall Wright [16], in which path models with multiple variables are analyzed, and where each variable is standardized. Path analysis is used to describe the directed dependencies among those variables and, therefore, suitable as a confirmation tool, trying to confirm certain pre-established hypotheses, usually causal, or as an exploratory tool, trying to find dependencies among variables. In this latter case, there is no previous model or hypothesis and, after finding significant dependencies among standardized variables, path models can be built. This was the followed strategy.

In order to model the DSS concepts we considered the three main phases that can be found in a decision process and supported by a DSS [8]—the so-called traditional decision-making process: intelligence (DSS-I), design (DSS-D), and choice (DSS-C). Problem finding, analysis and definition occur during the intelligence phase, where divergence is supported through the generation of alternatives and, as the alternatives are evaluated by a group, the convergence process evolves. During the design phase, possible solutions to the problem are generated usually followed by the merging of related ideas and elimination of redundant or irrelevant ones, through a structuring process that might include the elicitation of criteria and their relative importance, as well as the indication of a value system. Choice involves divergent evaluation of the previous set of idea and convergent selection, possibly following an iterative process.

In summary, the variables within our SEM exploratory study were the four main concepts found with SNA techniques and the three DSS concepts: Technical Infrastructure (TI), Online Communities (OC), Network Analysis (NA), Knowledge Management (KM), Support to Intelligent Phase (DSS-I), Support to Design Phase (DSS-D) and Support to Choice Phase (DSS-C).

We built a questionnaire with 26 questions about the connections among the seven concepts related to the considered variables and we used a Likert scale to answer those questions. The typical question is resembles the following: “In this article there is a strong connection between online technical infrastructure and online communities”. The Likert scale had seven levels ranging from “Very strongly agree” (7) to “Very strongly disagree” (1). The questionnaire was answered regarding the 89 papers that allowed the exploratory SEM study.

In order to conduct the exploratory SEM study we used the WarpPLS 2.0 tool [17–19]. This tool can be downloaded from (http://www.scriptwarp.com/warppls/). It is a powerful partial Least Squares based SEM tool that identifies linear and nonlinear relationships and estimates path coefficients. It also calculates p-values and model fit indices. We performed several tests considering lots of different models and we used the p-values and the ARS fit index in order to choose the significant models. The p-value is the probability of obtaining a test at least as significant as the one that was actually observed, assuming that the null hypothesis is true. We rejected the null hypothesis when the p-value was lesser than 0.01 and we considered the path to be statistically significant. The ARS is the average R-squared value and in the case in which the paths are significant, the best model

is the one with the highest ARS. The paths coefficients are standardized weights of the regressions and are usually noted by the Greek letter β.

4.1 Results

The significant models and path coefficients are depicted in Figs. 1, 2, 3, and 4, determined by the Technological Infrastructure (TI), Network Analysis (NA), Knowledge Management (KM) and Online Communities (OC), respectively.

When comparing these models, we can see that online social networks research has been focusing on TI, as there are more paths involved (Fig. 1), and it is throughout this concept that the three phases of decision support are being achieved. Moreover, TI is also impacting the intelligence phase support through OC and KM. Finally, TI impacts the choice phase through KM.

Another major conclusion is that NA, KM and OC are basically being used, in the context of online software networking, to support the intelligence phase of decision processes (models of Figs. 2, 3, and 4). It must also be noticed that NA is impacting both KM and OC as application purposes by themselves (Fig. 2).

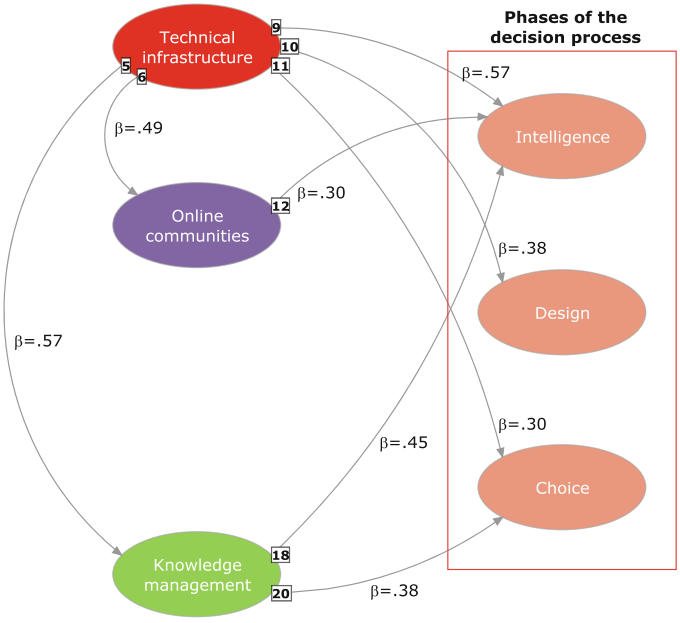

Fig. 1 Path model of the TI variable

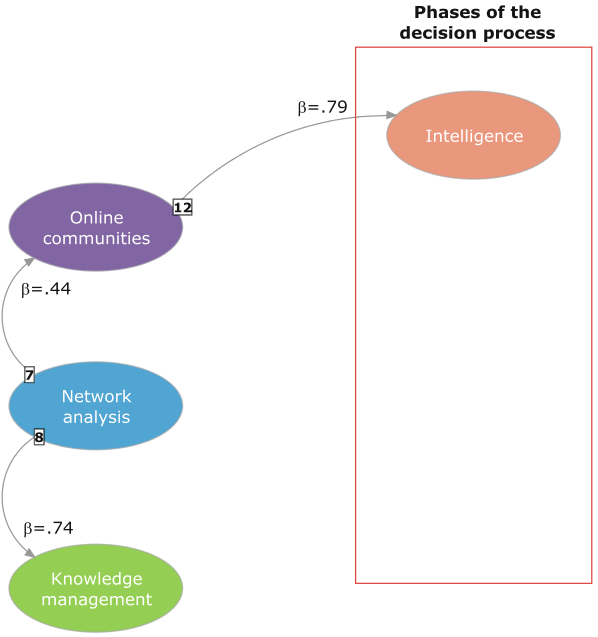

Fig. 2 Path model of the NA variable

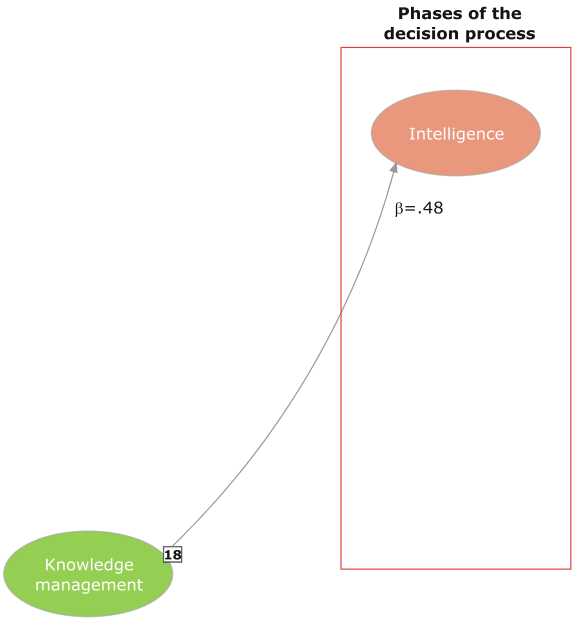

Fig. 3 Path model of the KM variable

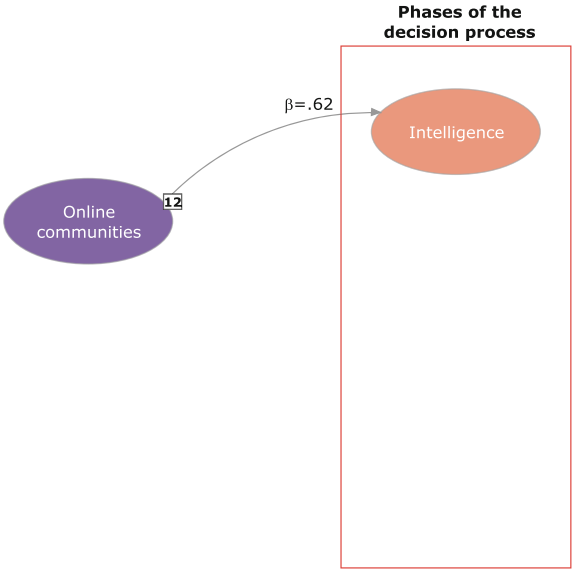

Fig. 4 Path model of the OC variable

5 Conclusions and Future Research Questions

We underwent an exhaustive exploration of the so called "indexed publications" of research on applying online social networks to support decision making.

We applied social network analysis techniques and software in order to find the key concepts of the ongoing research and we found four concept clusters: technical infrastructure, representing the involved technical elements; online communities, representing people, users, teams and their interaction; network analysis, encompassing the analysis of organizations and distributed structures; and knowledge management, representing the objectives of knowledge creation, sharing, encoding, retrieval and representation.

We then wanted to find the impact of these concepts on the three main phases of the traditional decision making processes: intelligence, design and choice. We used SEM techniques to find path models among the concepts and found that online social networks are being used as technological infrastructures to support the three decision making phases and also to support knowledge management and online communities. Another major finding is that, besides the technological infrastructure, the other concepts are only being used to support the intelligence phase of a decision process.

The conclusions of this study are limited by the inherent subjectivity of the study, because several key options were taken solely based on the authors opinions.

In spite of the revealing results on the subject, a new unanswered question seems to arise: considering that online social networks concepts and applications are relatively new concepts, is that fair to study them under traditional decision making paradigms (like the three phase model)?

To answer this question, we will try to understand in future work if other decision making paradigms are being put forward by online social networks.

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Explaining Virtual Community Participation: Accounting for the IT Artifacts Through Identification and Identity Confirmation

Kathy Ning Shen and Mohamed Khalifa

Abstract This study draws upon self-verification theory, social identity theory and self-categorization theory to investigate the dual effects of system design, i.e., identity confirmation (the self) and identification (the community), on virtual community (VC) participation. An important theoretical development is the conceptualization of VC identity and the elucidation of its system design determinants. Community presentation, i.e., system design features for presenting a virtual community identity, is hypothesized to facilitate identification by setting the boundaries for inter-group comparison and highlighting the in-group homogeneity. Furthermore, system design features that prior research identified as determinants for identity confirmation, i.e., self-presentation, deep profiling, and co-presence, are argued to have impacts on identification directly by influencing social comparison and indirectly by making the VC identity attractive. The research model accounts for the dual roles of system design features, i.e., effects on identification and identity confirmation, in explaining VC participation. The implications of these results for both theory and practice are discussed.

1 Introduction

Virtual communities (VCs), sometimes called online communities, describe the mediated social spaces in the digital environment that allow groups to form and be sustained primarily through ongoing virtual communication processes [1]. Much evidence has shown their potent influence in bringing together far-flung,

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like-minded individuals [2] and their commercial and/or social values [3]. Therefore, it is very important to understand the driving forces of VC participation.

Prior research suggests that two identity processes, i.e., identity confirmation and identification, may entail different practical implications for promoting participation. Research on identification usually emphasizes the collective influences and anonymity of individuals [4] in motivating VC participation, while research on verification proposes making personal identity salient and recognized [5]. While identity confirmation emphasizes the individual's self-concept; most prior studies on identification assume antagonism of individuality in the formation of identification, and agree that the salient personal identity would undermine the identification with the collective [6]. In the context of VCs, social interaction is enabled and shaped by various IT artifacts, the effects of which may more than often be channeled through multiple competing mechanisms. It is therefore imperative to develop a more comprehensive understanding of the effects of system design by investigating parallel identity processes.

Furthermore, although identification has been demonstrated as a significant determinant of participation, very few studies have investigated its formation in VCs. To date, most research on this topic has been done in the context of formal organizations. Even though a few studies have explored the notion of identification with physical communities, the basis for identification arises from the geographical proximity, and/or members' relational connection, which may not be applicable in the contexts of VCs where strangers communicate in a distributed environment. As most prior studies on VCs only incorporate identification or social identity as an antecedent or moderator to explain members' behavior, we still lack the understanding about how identification with a VC develops in general, and the impacts of IT artifacts in particular.

Thus, in this paper, we aim to examine the dual identity processes in driving VC participation with an emphasis on the antecedents for identification formation. We argue that these two seemingly contradictory identity processes are reconcilable and both of them are influenced by the usage of various system design features. To fill the gap in existing literature on identification formation in VC contexts, we develop the conceptualization of VC identity and propose the system design determinants for identification. Community presentation, i.e., system design features for presenting a virtual community identity, is hypothesized to facilitate identification by setting the boundaries for intergroup comparison and highlighting the in-group homogeneity. Furthermore, system design features that prior research identified as determinants for identity confirmation, i.e., self-presentation, deep profiling, and virtual co-presence, are argued to also have impacts on identification directly by influencing social comparison, and indirectly by making the virtual community identity attractive. The resulting research model enriches the understanding of the complicate implications of system design features by accounting for two competing identity processes, i.e., identification and identity confirmation, providing valuable guidance for VC moderation and promotion. We also expect this model to guide future empirical endeavor.

This paper is organized as follows. First we set out with a brief review covering two theories, i.e., self-categorization theory and self-verification theory, and discuss their application in computer-mediated communication (CMC) contexts. Then we develop the research model to explain the relationship between IT artifacts and VC participation as mediated by dual identity processes. This is followed by a discussion of key implications and promising research directions.

2 Theoretical Background

2.1 Social Identity and Self-Categorization Theory

Social identity was first proposed by Tajfel [7] and refers to "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership" (p. 292). Self-categorization theory is proposed by Turner [8] and his colleagues [9] as an extension of social identity theory. In this theory they specify in detail how social categorization produces prototype-based depersonalization of self and others, and thus generates social identity phenomena. Self-categorization or social categorization of self is a cognitive process whereby self is assimilated to the in-group prototype and depersonalizes self-conception, i.e., self is no longer represented as 'unique individual' but as embodiments of the relevant prototype. Once identified with a social category, the individual tends to define him- or herself in terms of the defining features of the social category which renders the self stereotypically "interchangeable" with other group members, and stereotypically distinct from outsiders [10]. Accordingly, Ashforth and Mael [11] define identification as the "perception of oneness with or belongingness" to the social category; Dutton et al. [12] consider identification as "a cognitive connection between the definition of an organization and the definition a person applies to him- or herself". Once identified with an organizations or a group, either physical or virtual, the individual will exhibit a more autonomous motivation resulting not only in a higher quality of engagement (e.g., greater persistence, effort, etc.) but also in more positive experiences such as enjoyment, sense of purpose, and well-being [13]. Since VCs are usually sustained by voluntarily user-generated content, identification has also been used to explain VC participation [14].

However, most prior research takes identification for granted without considering formation of identification in CMC. One exceptional case is the Social Identity Model of Deindividuation Effect (SIDE) [15], where the authors try to explain the relationship between characteristics of CMC and identification. According to SIDE, the resulting effects of deindividuation in CMC are identical to disruptive effects suggested by theories of deindividuation in social psychology [16]: decreased awareness of the social environment and of the self leads to decreased adherence to social norms. Factors that have traditionally been identified as causing

deindividuation, such as the combination of anonymity and group immersion [17] or interaction via a computer network [18], do not lead to the loss of identity but rather to enhance salience of social identity. This is because the relative lack of individuation in CMC smoothes the difference among the group members. Motivated to reduce the uncertainty in social interaction, members tend to be more sensitive to any salient social identity cues and over-attribute them to group members, leading to an extenuated similarity and unity of the group and causing people to be perceived as group members rather than idiosyncratic individuals [19]. In short, the deindividuation gives rise to a strong social identification in the context of CMC. Fiol and O'Connor [20], based on SIDE, even advocate the usage of lean media with high role clarity and team legitimacy in order to develop identification in virtual teams.

2.2 Individuality and Self-Verification Theory

In contrast with social identity approach where the group shapes individuals' self-views, self-verification theory argues for the active role of individuals in shaping their actual and perceived experiences within groups. Self-verification theory [21] assumes that stable self-views provide people with a crucial source of coherence, an invaluable means of defining their existence, and guiding social interaction (cf. [22]). Thus, people are motivated to validate and confirm their self-concepts, even when those self-concepts are negative [23]. In doing so, people allow others or encourage others to see them as they see themselves, a process which helps to obtain coherence in mental and social life and ensures the social interaction unfolding smoothly. Identity confirmation, then, refers to a state that exists when an individual's social environment is consistent with his or her "self-identities" and is conceptualized in terms of congruence between how a group member defines him- or herself and how other group members define that person [24].

CMC provides individuals another space for exploring new identities and/or extending existing identities [25]. Although direct application of self-verification theory is still rare, the notion of identity confirmation has been widely applied in prior research. For instance, Hars and Ou [26] demonstrated peer recognition for the focal person's contribution as a form of extrinsic reward for participating in VCs, leading to a high dedication to open source programming. Chan et al. [27] further identified different forms of recognition, i.e., identity, expertise and tangible recognition, and reported the positive linkages between recognition and VC participation. Recently, Ma and Agarwal [5] relying on self-verification theory, proposed that consonance between the focal person's self-concept and the others' perception of the focal person would enhance the focal person's knowledge contribution to, and satisfaction with VC. All such studies advocate rich media for individuality expression and self-identity communication.

3 Theoretical Development

Most prior research follows either social identity theories or self-verification theory, and implicitly treats personal identity and social identity as polar opposites [28]. Individuals and groups as representatives of antagonistic forces, that is, the expression of personal identity as being mutually exclusive with developing strong social identification, e.g., SIDE model. Furthermore, prior research has shown that these two perspectives have distinct implications for community design and management which may undermine each other. For instance, research from self-verification perspective favours the personal identity and encourages self-expression and individuality, which may undermine the process of depersonalization and lead to a low level of identification (e.g., SIDE). On the other hand, reducing identifiability to enhance identification, as suggested in social identity research, may prevent an individual's self-view from getting recognized and confirmed. Are these two theories conflicting or reconcilable?

Examination of these two seemingly competing theories leads us to believe the latter for the following reasons. First, individuality and personal identity expression are an important component in many collective actions. For instance, the explicit expression of personal identities of employees is argued to counteract the negative consequences of super-ordinate identities [29]. Second, identification and self-verification reflect identity processes operated at two different levels. While identification emphasizes the comparison between self-views and the collective identity, the self-verification perspective focuses on the negotiation between an individual's identities and the others' perception of the focal person, operating at the relational level. Any individual in a group is inevitably subject to influences from both the collective and the others. Finally, they imply that there are two different motivations related to self-view: while identity confirmation emphasizes the demand for stability of self-view, identification suggests motivation for self-enhancement, self-esteem and uncertainty reduction. These motivations, although different, are not necessarily in conflict.

Hence, we argue that identification and self-verification are two complementary identity processes in explaining VC participation, and both of them are subject to the influences of IT artifacts (see Fig. 1 for the research model). Built upon the work by [12], we elucidate the antecedents of identification with VCs with a focus on IT artifacts. Community presentation, i.e., system design features for presenting a virtual community identity, is hypothesized to facilitate identification by setting the boundaries for intergroup comparison and highlighting the in-group homogeneity. Furthermore, system design features which prior research has identified as determinants for identity confirmation (i.e., self-presentation, deep profiling, and virtual co-presence) are argued to also have impacts on identification not only directly by influencing social comparison, but also indirectly by making the virtual community identity attractive.

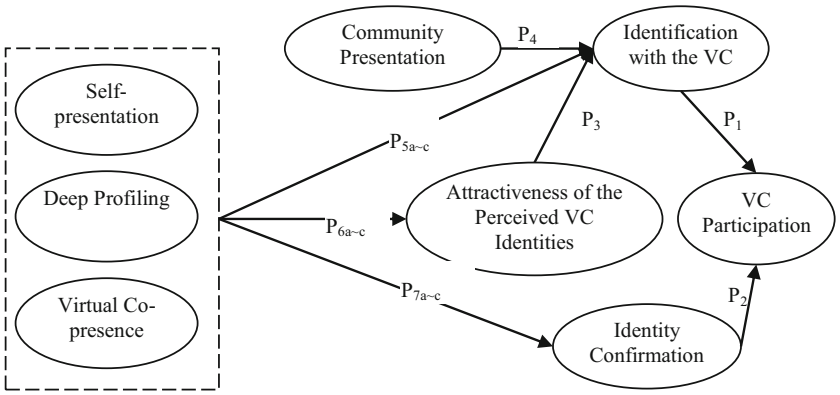

Fig. 1 Research model

3.1 Determinants of VC Participation

Identification has been demonstrated to be an important social influence exerted from the collective (in this case, VCs) [1]. This means that the individual defines him-/herself in terms of the membership in the group. Similar to organizational identification, this study defines VC identification as one's conception of self in terms of the defining features of the VC that renders the self-depersonalized (cf. [1]). Numerous empirical evidence has shown that identification with an organizations or a group, either physical or virtual, enhances cooperative behavior [30], participation [31], and knowledge contribution [14]. Thus, we also propose that:

Proposition 1 The member with strong identification with a VC will be more likely to participate in VC discussion.

While influenced by the collective, individuals in a VC also bring their interaction experience within the group into harmony with their own self-concepts through seeking confirmation from peers [22]. According to self-verification theory [21], people are motivated to validate and confirm their self-concepts, even when those self-concepts are negative [23]. In VCs, Hars and Ou [26] identified peer recognition for the focal person as a form of extrinsic reward for participating in VCs dedicated to open source programming. Chan et al. [27] further identified different forms of recognition, i.e., identity, expertise and tangible recognition, and demonstrated the positive linkages between recognition and VC participation. Ma and Agarwal [5], relying on self-verification theory, proposes that consonance between the focal person's self-concept and the others' perception of the focal person would enhance the focal person's knowledge contribution to and satisfaction with the VC. Thus, we also propose that:

Proposition 2 The member with high identity confirmation will be more likely to participate in VC discussions.

3.2 *Identification Formation in VCs*

According to Postmes et al. [32], identification can be either deduced from the collective identity or constructed from social interaction among members. In the prior section, the existence of VC identities was demonstrated from which individual members can derive identification. Meanwhile, in the context VC where people enjoy more freedom of speech and individuality is usually advocated as a part of VC culture, identification may also be developed and constructed through rich expression of personal identities or individuality. For both paths, IT artifacts play a central role in presenting and communicating identities, and supporting social spaces. Thus, built upon the prior research on identification and human–computer interaction, two categories of factors for VC identification are proposed with an emphasis on the effects of IT artifacts.

3.2.1 Deduced Identification

Deduced identification reflects social influences from the collective. How members evaluate a VC identity (e.g., [12]) and how the VC identity is presented to make it salient for the basis of self-categorization (e.g., [33]) are two important factors to make this process occur.

Organizational identification literature suggests that an ongoing identity comparison process influences member attitudes toward the organization [34], whereby members assess the degree to which their perceptions of the organizational identity are congruent with their self-identities [12]. Perceived organizational identity conceptualized as an individual-level construct refers to the beliefs of a particular individual organizational member and serves as a powerful influence on the degree to which the member identifies with the organization [30]. While perceived organizational identity may be highly correlated with organizational identity—an organizational-level construct—the two constructs are conceptually distinct. Moreover, due to the fact that it is always difficult to perfectly socialize members to a collective view, what are perceived by particular members as central, distinct and enduring attributes may not be consistent with what managers want to convey. A perceived organizational identity is viewed as attractive when it fulfills the needs for self-continuity, self-distinctiveness, and self-enhancement, and the attractiveness of this image leads to strong organizational identification [30].

In the context of VCs, the communication of VC identities is less controllable than that in an organization due to the informal organization and voluntary participation. Members have full flexibility in choosing topics, discussion boards, and partners for interaction. Consequently, imperfect socialization may be more salient and members may vary significantly in the evaluation of VC identities. Despite the differences, members join VCs to fulfill similar needs, e.g., understanding and deepening salient aspects of one's self through social interaction [31], and seeking self-esteem [35]. As with perceived organizational identity, members assess the

attractiveness of the perceived VC identity by how well this image helps maintain the continuity of self-concepts, provides distinctiveness, and enhances self-esteem. To the extent that the perception of VC identities is correspondent with the members' goals and values, i.e., attractiveness of perceived VC identities increases, they are more likely to develop identification with the VC.

Proposition 3 The attractiveness of the member's perceived VC identity is positively associated with the member's strength of VC identification.

Individuals self-categorize on the basis of any of available social identities, which is rather a spontaneous and often unconscious process. According to social identity theories, identity salience, or the extent to which specific identity information dominates a person's working memory, is a key determinant of identification [36]. It is argued that when features of social context serve to make a given social identity salient, the associated process of self-stereotyping has the capacity to consensualize beliefs within a given in-group by (1) enhancing the perceived homogeneity of that in-group; (2) generating associated expectations of agreement with other group members on issues relevant to the shared identity; and (3) producing pressure to actively reach consensus in dealing with those issues through mutual influence [28, 37–39]. In particular, when a VC identity is salient, it is likely to increase members' tendency to focus and elaborate on the VC identity over the other competing identities. Therefore, the likelihood of their identification with the VC is higher.

Identity salience is most often elicited by external factors [40]. Prior research has investigated various contextual factors, e.g., group symbols [41, 42], priming [42], visible differences in dress or physical arrangement of members [43], visual images and words [44] and direct intergroup contact [45]. In the context of VCs, however, these contextual factors are mainly integrated into the design of VC websites. VC designers and managers have to rely on IT artifacts to establish the VC as a viable and meaningful social category in members' minds.

In this research, Community Presentation is proposed to denote VC design features that present constituents of VC identities, including logos and symbols, the statement of purposes, membership policies, community initiatives and promotion, presentation of management teams, interaction states of the VC, demographic features (e.g., size, active members, postings and etc.), unique interface design, and unique functionality design. All these features make VC boundaries visible and help members answer the question, "What does this VC stand for?" Community presentation, therefore, reflects the efforts of VC designers and managers to establish the VC identities as stable, significant and a salient target for identification. To the extent that more constituents of VC identities are conferred on the VC, the VC becomes a more salient target for identification, and this is especially relevant in VCs that are purely online where perceived legitimacy is often lowest [20]. Thus, it is hypothesized that:

Proposition 4 When community presentation includes more constituents of VC identities, members are more likely to identify with the VC.

3.2.2 Individuality Expression and Identification

Apart from community presentation highlighting intergroup differences and intra-group homogeneity, IT artifacts are also designed for individuation with emphasis on inter-personal difference and diversity. Ma and Agarwal [5] has identified four categories of VC features, i.e., virtual co-presence, persistent labeling, self-presentation, and deep profiling and demonstrated that usage of these features would enhance accountability and perspective taking and consequently facilitate identity confirmation. Although some theories (e.g., SIDE model) following the antagonistic view, that is, the expression of personal identity is mutually exclusive with developing strong social identification, might argue for negative effects of such features on identification. The deterministic nature of this relationship has been questioned recently (see [46] for an overview). It is suggested that group formation is facilitated to the extent that it is compatible with the expression of individuality [29, 32]. Thus, the same VC features usage initially identified as facilitating individual identity expression and confirmation may also have positive impacts on identification, an important indicator for group formation.

Virtual co-presence refers to artifacts that provide a sense of being together with other people in a shared virtual environment (e.g., the 'who is online' feature). By making individuality expression observed and perceived, virtual co-presence is considered as a prerequisite for identity communication [5]. However, there is not only one implication for such features. According to the social presence theory, the development of a sense of presence implies mutual awareness, psychological involvement, and mutual understanding and is correlated with the feelings of immediacy and intimacy [47]. High social presence makes it more likely to build social relationships among members due to its capability to reduce discomfort, as well as increasing predictability and raising the level of affection toward others (cf. [48]), and increasing the possibility to develop attachment to the online community members. In addition, it is a well-known fact that the observation of in-group member actions gives rise to spontaneous inference of norms or conventions [6]. Features supporting the sense of presence make it easier for members to imitate each other's' actions, to engage in peer pressure and to create, notice and conform to social conventions [49], thus reinforcing social identification. Accordingly, it is hypothesized that:

Proposition 5a Usage of virtual co-presence features will be positively related to members' identification with the VC.

Self-presentation includes features used to convey personal identities. Features in this category include visual presentations, unique IDs, personal profiles, avatars, signature files and weblogs. Using self-presentation features makes members feel independent as they have a great control over what to present and how to present it. It also enables members to differentiate themselves from others. With various self-presentation features for individuation expression, VCs provide an attractive venue to balance the need to belong with the need to be different. Individuals

empowered to express their personal identities will be more likely to develop strong identification [29]. In addition, self-presentation features make otherwise anonymous participants more recognizable, enhancing the likelihood of developing attachment and mutual obligation [50], which are affective components of identification [31]. Finally, individuality-expression-enabled-self-presentation features may also facilitate inductive identification to occur [32]. Thus, it is hypothesized that:

Proposition 5b Usage of self-presentation features will be positively related to members' identification with the VC.

Deep Profiling designates features that help to infer profiles of specific members from historical records. Member profiles can be built through both referential and inferential techniques. Some online communities provide search functions for retrieving the historical activity records of a particular member or of a particular discussion subject. More sophisticated designs incorporate content hit counters, ratings of contributions and participants (usually done by administrators) and peer evaluations [51], as well as displaying the value of contribution [52], oversight or review of the contribution [53]. Self-presentation can be considered as referential profiling, while deep profiling constitutes inferential profiling. Similar to self-presentation, deep profiling is another arena for individuality expression. By making activities and interaction history visible and accessible to others, deep profiling individuates each member as a unique member. Moreover, recognition of members' contribution has been demonstrated as a main factor for community commitment [56]. Accordingly, it is hypothesized that:

Proposition 5c Other VC members' usage of deep profiling features will be positively related to members' identification with the VC.

According to social identity theorists, identification with a social group is mainly derived from the group's ability to fulfil its members' needs [10]. Individuality expression and facilitation of social interaction are actually advocated as value propositions for most VCs [31], suggesting the ability to individuate members, in itself, a marker of shared identity or common in-group membership [54]. Based on a field survey of websites, Eighmey and McCord [55] conclude that efficiently executed design features can facilitate participants to fulfill various needs. For example, features enabling virtual co-presence cater to the needs for social interaction. Self-presentation and deep profiling features fulfill the needs for self-disclosure. Some of the self-presentation features, e.g., emoticons and avatars, also make the virtual interaction more enjoyable. The consonance between individuality expression features and individual needs makes VC identities more attractive for members. Thus, it is also hypothesized that:

Proposition 6a Usage of virtual co-presence features will be positively related to members' perceived attractiveness of VC identity.

Proposition 6b Usage of self-presentation features will be positively related to members' perceived attractiveness of VC identity.

Proposition 6c Other VC members' usage of deep profiling features will be positively related to members' perceived attractiveness of VC identity.

3.3 IT Artefacts and Identity Confirmation

Consistent with the prior study [5], the hypotheses of the impact of virtual co-presence, self-presentation and deep profiling on identity confirmation are also included. The original study by [5] shows that path coefficients and significance are different for the two sites studied, suggesting that more research with different VCs is necessary to validate and perhaps extend the understanding of the relationship between IT artifacts and identity confirmation. Moreover, as the same artifacts may affect identification and identity confirmation simultaneously, the knowledge of their relative importance for each mechanism will provide valuable guidance for VC design.

Proposition 7a Usage of virtual co-presence features will be positively related to members' identity confirmation.

Proposition 7b Usage of self-presentation features will be positively related to members' identity confirmation.

Proposition 7c Other VC members' usage of deep profiling features will be positively related to members' identity confirmation.

4 Discussion and Implications

Prior research has suggested two competing identity processes in explaining VC participation with different focuses and design implications. Given the integral nature of VC contexts, it is therefore, imperative to address the dual effects of system design, i.e., identity confirmation (the self) and identification (the community) on VC participation. Moreover, this study represents the early attempt to address identification formation in VCs by conceptualizing VC identity and the elucidating its system design determinants. Community presentation, representing the effort of VC designers and managers, is hypothesized to facilitate identification. Furthermore, the relationships between system design features that prior research identified as determinants for identity confirmation and identification are also discussed.

The resulting research model entails several important theoretical implications. First, this study provides a more comprehensive view towards the mechanisms that translate system design into expected individual behaviors. Currently, we have witnessed an obvious trend of integration in many kinds of information system design, leading to two important implications. On the one hand, typologies of IT

artifacts need to be developed to provide a complete understanding of system design; on the other hand, multiple psychological/social psychological mechanisms need to be examined simultaneously to gain the insight on the complexity induced by technological settings. In this study, the conceptualization of IT artifacts in VC contexts is extended from the perspective of identity communication. Using "personal vs. collective identities" as a framework, the new conceptualization articulates well the IT artifacts used for VC identities and personal identities communication. Moreover, rather than focusing on single mechanism, this study advances research by accounting for diversity of underlying mechanisms.

The new construct proposed in this study, community presentation, also has important theoretical implications. Most prior VC research takes an individual members' perspective emphasizing the member-sustained aspect of VC sustaining, neglecting the management aspect. In practice, however, VC designers and managers are actively involved in launching, sustaining, promoting and even commercializing VCs. Their efforts, as reflected through the system design, should be considered as an important factor in understanding VC-related phenomenon. This study represents the initial effort to conceptualize the system design from the management perspective.

Another important theoretical contribution of this study is to explore the identification formation in VCs in general and the effects of IT artifacts in particular. Identification has been studied in many contexts, e.g., groups, organizations, communities, and more particularly VCs. In the context of communities, studies on identification have just started and many controversies still remain in several fundamental areas, such as the existence of community identities. In the IS field where VCs have received much interest, most prior studies take identification or theories developed in organizational contexts as given without exploring the specificity brought by IT artifacts. This study advances the theoretical work on identification by conceptualizing VC identities and developing a research model to explain identification formation in VCs; more particularly, the role of the system design for this process has been explored.

The propositions developed in this paper also provide valuable practical guidance for VC design and management. First our model suggests multiple IT artifacts that VC designers and managers can employ to enhance VC participation. In addition, by elaborating the theoretical underpinning of the effects of system design, the model can also guide the development of new features.

As a theoretical framework, the proposed model offers a clear guideline for future empirical validation and prospect research opportunities. All propositions are ready to be developed into hypotheses and tested in real VCs. Moreover, recognizing the diversity and dynamics inherent in VCs, we also expect the proposed model as a base model which can be used to investigate the diversity in VCs, e.g., gender composition, community stages and etc., which can be included as moderators. Finally, a longitudinal approach could be employed to investigate the dynamics in identity processes, system interaction and VC participation.

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Preserving Knowledge Through Community of Practice: A Multiple Case Study

Rocco Agrifoglio and Concetta Metallo

Abstract Knowledge Preservation (KP) is a crucial activity because provides individuals and organizations the basis for creating new knowledge and technical skills. Although some scholars have investigated KP within Community of Practice (CoP), less emphasis has been given to the process of KP as well as to the different ways. Thus, this study was aimed to investigate the KP within CoP. Based on case study method, it provides evidence on different ways and techniques by which tacit and explicit knowledge is preserved within two CoP.

1 Introduction

Knowledge and the capability to create and utilize knowledge are considered to be crucial source within organization and society. The traditional organization theory is based on the view of organization as a system that processes information or solves problems. Within organization, individuals continually process information and apply knowledge to solve the problems, developing so new knowledge useful for further decision-making activity. However, as Nonaka's research stressed, organization is not merely an information-processing machine, but an entity that crates knowledge through such action and interaction. Based on these assumptions, scholars have investigated how knowledge is created and how the knowledge creation process can be managed [e.g., 1, 2]. Although a great deal has been written about this topic, our paper focuses on the preservation of knowledge rather than knowledge creation.

KP could be defined as a process that allows to select, acquire, and storage knowledge in order to make it available for individuals and community. Scholars have mainly investigated KP as a component of knowledge management process,

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thus giving it a marginal role in knowledge management research. On the contrary, some studies have paid a great importance to this topic considering it basic to knowledge creation process [e.g., 3, 5]. Technological and scientific knowledge is never acquired once forever; to achieve new interesting knowledge does not mean that this knowledge will be preserved [6].

The preservation of knowledge is a process that seems obvious and automatic, but not so often. History is full of examples where people built new technologies useful for doing their work activities, but forgetting sometimes those previously built. Similarly, organizations create knowledge by doing their work (corporate memory), but this knowledge is not risk free and many causes could determinate knowledge loss in organizations. Furthermore, KP is a crucial activity because provides individuals and organizations the basis for creating new knowledge and technical skills. Thus, KP is essential to our ability to maintain available individual know how. KP research agrees that after knowledge has been acquired or developed, it must be carefully preserved. However, as Davidavičienė and Raudeliūnienė [4] suggested, the process of KP is very complicated because different kinds of knowledge require different systems and tools for preservation.

Polanyi [7] distinguishes knowledge into explicit (codified knowledge) and tacit (implicit knowledge). Explicit refers to knowledge that is transmittable in formal and systematic language. On the contrary, tacit refers to knowledge that is personal and difficult to convey, which makes it hard to formalize and communicate. Tacit knowledge is not easily express in the formality because is far less tangible and indwells in human mind and body [7]. While Polanyi research focused on content of knowing, some problems related to preservation are emerged. Indeed, while explicit knowledge could be easily captured in records such as libraries, archives, and databases, tacit knowledge is particularly difficult to transfer and store. The latter knowledge is deeply rooted in action and, thus, embedded into an individual and/or organization's operating practices. In this regard, tacit KP is more problematic and challenging for individual, community, and organization.

Among various tools allowed the preservation of knowledge over time, few empirical and ethnographic evidences underline the role played by CoP in this process. In particular, despite CoP was widely recognized by organizational research and IS literature as an efficient tool for knowledge generation and sharing, few scholars have also shown its natural tendency to preserving knowledge over time [5, 8, 9]. However, literature did not paid enough attention on CoP as tool of KP and even less on the process by which knowledge is preserved.

This study investigates the process of KP within CoP. After reviewed literature on CoP and KP within CoP, this paper provides two empirical evidences focusing on how tacit and explicit knowledge can be preserved through traditional and online communities.

2 The Community of Practice

A CoP is a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly [10]. Within CoP, people share their experience and tacit knowledge in free-flow, improving their abilities and skills, and fostering learning. People usually join CoPs for several reasons such as education, professional issues, and hobbies. Their main goal is to share information and interests only with other members. Several studies stressed that CoPs support organizational learning, innovation, and the development of members' capabilities [10, 11]. Typical examples of CoPs are groups of practitioners of craft and skill-based activities (e.g., developers, photographers, snowboarders, etc.). Thus, community represents a place enabling people to discuss about their identity, conflicts, and other topics spontaneously asked by members.

The notion of CoP is much deeper than a generic social system or group of technology users. A CoP overlaps, in some extent, the notion of market niche. The main difference between these two concepts is the role of knowledge, which is critical in CoPs, as it binds together their members, but it is less powerful in defining the boundaries of a market niche (which is a concept more related to the strategic analysis of firms). Therefore, individuals engaged in a CoP, therefore, do not just "use" a specific technology and its artefacts solely in order to achieve a given purpose or exploit a function. They recognise themselves as community members and share common values, ideas, knowledge, and opinions about the artefacts around which their community is built.

CoPs often evolve into virtual communities. In this case, members interact and exchange information and experience using ICT and online collaborative tools rather than face-to-face meetings. Internet and ICTs allow individuals to link up across distance, time, culture, and organizations, providing an environment that can facilitate their collaboration and interaction. Literature stresses that CoP cannot be dissociated from a common physical space, highlighting the role of face-to-face interactions to share experience and tacit knowledge among members [12]. On the contrary, other scholars have assumed that virtual CoPs exist and play a key role in fostering the socialization process as well as knowledge creation and knowledge sharing among the people who join to them [e.g., 13, 14].

Within CoP, members develop common sets of codes and language, share norms and values, carry out critical reflection, and dialogue with each other at a professional level, generating an environment characterized by high levels of trust, shared behavioral norms, and mutual respect and reciprocity [13]. This environment has been directly linked to knowledge creation and sharing processes. Katzy and Ma [15] argued that both the community and the professionals (e.g., developers, teachers, lawyers, doctors, academics, and consultants) themselves could add value to the "*status quo*" in terms of knowledge creation, knowledge sharing, and identification. Thus, literature suggests that the most frequent reason for joining a virtual community is to get access to information [e.g., 13, 15].

Despite the literature identifies the knowledge creation and knowledge sharing as mainly reasons that lead individuals to join CoPs, there are some empirical evidences of communities for which the main aim is KP rather than knowledge creation and sharing [5, 8, 9]. However, while the natural tendency of CoP to preserve both tacit and explicit knowledge was noted, less emphasis has been given to the process of KP as well as to the different ways.

3 Preserving Knowledge by Community of Practice

The process of KP was made possible by different knowledge systems and knowledge tools occurred over time. Heritage scholars have showed a wide range of ancient and more recent tools used by people to transfer and storage knowledge. The stones, papyrus, and books are some examples. Then, the ICT development encouraged KP extended new opportunities for knowledge transfer, capture and creation. Davidavičienė and Raudeliūnienė [4] provided an interesting overview of ICT tools for KP process such as database, data mining, collaboration systems, groupware, chat, forum, social network, etc. However, as authors suggested [4], 824, "ICT tools represent explicit knowledge transfer and face challenges in tacit knowledge preservation".

This study investigates the process of KP within CoP. Unlike organizations, CoPs are not formal structure, but an informal entity that allows members to connect each other for sharing a concern or a passion. Despite CoP is widely recognized by organizational research and IS literature as an efficient tool for knowledge generation and sharing, few scholars have also shown its natural tendency to preserving knowledge over time [5, 8, 9]. However, the literature did not paid enough attention on CoP as tool of KP and even less on the process by which knowledge is preserved. Furthermore, being tacit knowledge and explicit knowledge are very different from one another, even their preservation requires different ways.

According to Nonaka's research [e.g., 1, 2], knowledge is created through interactions between human agency and social structures by the conversion process of tacit and explicit knowledge. In contrast with Polanyi [7], Nonaka and colleagues research claimed that tacit and explicit knowledge are not mutually exclusive, but they act dialectically influencing and converting each other [2]. The conversion process of tacit and explicit knowledge consists of four phases: tacit-to-tacit (socialization), tacit-to-explicit (externalization), explicit-to-explicit (combination) and explicit-to-tacit (internalization). In this regard, the Nonaka model suggests two ways for preserving tacit knowledge, such as tacit-to-tacit and tacit-to-explicit, and as many for preserving explicit knowledge, such as explicit-to-explicit and explicit-to-tacit.

With refer to tacit KP, CoP encourages the socialization process among members and sharing of tacit knowledge of the environment through their practical consciousness. Tacit knowledge is embedded in the stories of people and in their

working experiences. As Ardichvili et al. [8] claimed, CoP is an efficient tool for helping people internalize tacit knowledge because allows them to talk about their experiences and to exchange knowledge while working on specific problem. In this regard, as Schiavone and Agrifoglio [5] suggested, tacit KP occurs by doing a specific practice. According to Marx's view, practice is a system of activities in which knowing is not separable from doing, and learning is a social and not merely a cognitive activity. Practice is not only what people do, but also what people are. While carrying out their activities, individual usually thinks, discusses, and compares with other people. In this regard, practice is both production of things and the result of this process [16].

Unlike tacit KP, the preservation of explicit knowledge through CoP is a process less difficult than other one. Usually, community members collect explicit knowledge from inside and outside and then disseminate it among others. Within community, explicit knowledge can be update by people who understand issues and appreciate the evolution of their field. For instance, community members usually get information thanks to attendance to conference, seminars and events and then reports back to the others. Yet, explicit knowledge could be easy collected and preserved by documents, reports, and other tolls both papery and digital. In this regard, CoP not only encourages knowledge creation and sharing, but also its preservation among members. However, as Wenger and colleagues claimed [9, 17], "not everything we know can be codified as documents and tolls", such implying that often individuals, organizations and communities preserve knowledge in explicit or tacit way [7, 18] or by combining both tacit and explicit aspects [2].

4 Methodology

Data were collected by using a qualitative methodology: the multiple case study. As Benbasat et al. [19] claimed, "case methodology is clearly useful when a natural setting or a focus on contemporary events is needed" (p. 372). Based on the multiple case study method, we conducted a qualitative analysis in order to collect data on two communities of preservation such as the Grecià Salentina (traditional CoP) and the WoodenBoat (online CoP). As suggested by literature, the analysis was conducted using both ethnographic interviews and document analysis techniques [19].

4.1 The Case of the Grecìa Salentina Community

The Grecìa Salentina is a small ethnic and linguistic Greek community survives today in the Italian Region of Apulia. Within this community people speak the Griko, sometimes spelled Grico, a form of the Greek language considered by

Greeks as a modern Greek dialect often called "Katoitaliotikà" (en.wikipedia.org/wiki/Grecià_Salentina).

Greek people have been living in Southern Italy for millennia, initially arriving in the Salento peninsula of Apulia by numerous waves of migrations. From early migration attested since Prehistoric and Greater Greece periods, Greeks continued to migrate to Southern Italy, settling in different places where continued to speak Greek as their mother tongue until the end of the Middle Ages. However, respect to other communities becomes entirely Italianized over time, the Grecìa Salentina has been able to preserve their original Greek identity, heritage, language and distinct culture (en.wikipedia.org/wiki/Griko_people).

Since the nineties, nine villages (Calimera, Castrignano de' Greci, Corigliano d'Otranto, Martano, Martignano, Melpignano, Soleto, Sternatia, Zollino, Sogliano Cavour) initiate a process of cooperation in order to enhance and promote the culture and traditions of Greek community. This process led to the establishment of the Consortium of Municipalities of the Grecìa Salentina, which aim is the promotion and preservation of Greek community's language and traditions. Then, other two villages, such as Carpignano Salentino and Cutrofiano, have joined to the Consortium of Municipalities of the Grecìa Salentina, an Institution characterized by 11 municipalities and 54,000 inhabitants now. Based on the art. six of the Italian Constitution which authorizes the preservation of ethnic minorities. The Italian Parliament has recognized the Griko community of Reggio Calabria and Salento as an ethnic and linguistic minority, under the name of "*Minoranze linguistiche Grike dell'Etnia Griko-Calabrese e Salentina*". This result also derives from initiative of the Consortium of Municipalities of the Grecìa Salentina. Even due to preserve Grico dialect, the EU established the "Pos Matome Griko", a project within the Lifelong Learning Programme which aim is to enhance a new and renewed interest for Griko language, making its teaching and learning easy in Grecìa Salentina area. Despite the Griko is currently taught in primary and secondary schools of the areas where it is spoken, this project aimed to promote linguistic, social and cultural diversity also through the development of a modern and innovative teaching methodology, supported by multimedia tools applied to language teaching (e-griko.eu/en/static/the-program-en.aspx).

The community of Grecìa Salentina is very rich of folklore and popular traditions. Apart Griko language, songs, dances and ancient customs are also passed from older to newer generations by observation, storytelling and working practice. For instance, community members have always performed songs and poems in Griko language allowing to current generations to listen them. Similarly, folk dances, and the Pizzica in particular, are well known for musicians and bands performance. Since 1998, the Melpignano village arranges a famous festival, known as "*La Notte della Taranta*" (Taranta Night), consisting of a whole night where many famous musicians alternate their performances with the Pizzica orchestras while women and men dancing together. Yet, ancient working experiences are well known now because performed by people who turned local tradition into a job opportunity.

4.2 The Case of the WoodenBoat Community

WoodenBoat is now an online CoP of owners, admirers, builders, and designers of wooden boats (woodenboat.com). Founded in September 1974 by Wilson WoodenBoat, WoodenBoat was born as an American magazine for boat amateurs and, then, it is become an important virtual place for people who share interest and passion for old and new wooden boats. Today, WoodenBoat reaches readers and community members by various ways such as publications, website, forum and blog, thematic events, and photo and video gallery.

WoodenBoat Pubblications (woodenboat.com/woodenboat-publications-brooklin-maine) encompass different magazines and books such as WoodenBoat magazine; Professional BoatBuilder magazine; Small Boats magazine; etc. Among them, WoodenBoat Magazine is the first and widely spread journal, published six times each year, now over 30 years in publication, for wooden boat owners, beginner builders, boating enthusiasts, builders and designers, repairers, and surveyors. Another important magazine is Professional BoatBuilder, published six times a year and focuses on materials, design, and construction techniques and repair solutions chosen by marine professionals.

WoodenBoat website (woodenboat.com) allows people to join community, forum and chat, and to get information about old and new wooden boats as well as on traditional methods of boat design, construction and repair. Furthermore, the website contains an ad-hoc section finalized to promote events such as BoatBuilding & Rowing Challenge, WoodenBoat Regatta Series, WOOD Regatta, and WoodenBoat Show.

WoodenBoat forum (forum.woodenboat.com) allows people to get information about specific topic such as building/repair, designs/plans, people and place, WoodenBoat Magazine, tools/materials/techniques/products and miscellaneous boat related. As statistics suggested, the WoodenBoat forum is widely used with 144,796 Threads, 2,802,936 Posts, and 36,057 Members. WoodenBoat community members also use the blog (boats.woodenboat.com) to post stories and adventures with boats as well as other information identified as particularly relevant for boat amateurs.

Finally, WoodenBoat website also contains photo and video gallery section (woodenboat.com/photo-video-gallery) and WoodenBoat TV (woodenboat.com/woodenboat-tv), a collection of short and long movies on wooden boat design, construction and repair. The movies collected in video gallery and WoodenBoat TV sections are vey useful guide for community members who performing their practice for work or passion. Thanks to these movies, community members learn from expert practitioners the old techniques and methods to perform wooden boats, promoting such the sharing and preservation of know-how.

5 Discussion

This paper was aimed to investigate the process of KP within CoP. In particular, it provides evidence on two CoPs, which members are committed to preserving knowledge, and on their different ways and techniques by which tacit and explicit knowledge is preserved. Indeed, the analysis of two case studies shows some differences that should be treated.

Firstly, both traditional and online communities preserve tacit and explicit knowledge, but using different technique only for the first. In particular, within the Grecià Salentina community tacit knowledge passes from older to newer generations by popular traditions, storytelling, folk dances and ancient working practices. On the contrary, within the WoodenBoat community members preserving tacit knowledge by using digital tools, such as video gallery, web TV and blog, that enable both learning and storage without time and spatial limits.

Furthermore, the Grecià Salentina is a traditional community where the use ICT and Internet is just related to promotion of community itself and its initiatives. On the contrary, the WoodenBoat is an online community and, thus, the use of these tools is crucial not only to promote community itself and member interaction, but above all to preserve that knowledge crucial for performing practice.

Finally, two communities also show a different role of older people in the process of KP. In particular, within traditional community the older members play an active role in KP process because they are constantly involved in all community initiatives and activities. Older people possess knowledge and skills useful for doing a working practice and are willing to teach others the ancient working techniques. On the contrary, within online community older members play a less active role in the process of KP. Indeed, they are usually involved for interviews or short movies by young journalists or video-makers who are very interested to tell their working stories and techniques. However, although the participation of older members is consumed in few meetings, their working techniques and stories will be preserved forever.

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Knowledge-Intensive Business Processes in Disaster Recovery

Olivera Marjanovic and Petri Hallikainen

Abstract This paper aims to extend the current boundaries of Business Process Management (BPM) research by considering complex knowledge-intensive business processes (KIBPs) occurring across business, government and community sectors. These processes are easily found within complex human-care systems or, as considered in this paper, in disaster recovery. We compare and contrast BPM in "traditional" organisationally bound environments with BPM required for management of these complex "non-traditional" processes. We specify research directions for this emerging field and proceed to identify some relevant theories and discuss how they could be used to study different aspects of these processes, in particular complex process-related knowledge and emergent coordination patterns that cannot be fully predefined.

1 Introduction

More than two decades of Business Process Management (BPM) has resulted in an in-depth understanding of highly routine, transactional processes, especially in relation to process automation and efficiency. As most organizations are expected to achieve "a similar level of efficiency in their routinized business processes—improving and (semi-) automating these processes will be the norm, rather than providing any competitive advantage" [1, p. 2]. The boundaries of BPM are now expanding to accommodate new types of BPs that include process-related knowledge work, that in the past, was mainly reserved for the designated knowledge-workers. Even more, processes that involve knowledge work are now recognized as the most important for organizations today [2]. These processes are now known as

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knowledge-intensive and are increasingly perceived as a more sustainable source of process-related competitive advantage [3]. Their key ingredients are human knowledge, experience and creativity that cannot be easily understood let alone analyzed, captured by process models, fully automated or acquired by the competitors.

Consequently, our shared understanding of the key term "process", held for many decades, has started to change. While in the past the term "business process" was universally accepted to represent highly structured, repetitive transactional BPs, typically at the operational level, the increased need to better understand process-related knowledge has forced both the researchers and the practitioners to expand their views [1]. It is all too common for the organizations to interpret 'process' as a 'flow diagram'. It specifies 'first you do this, and then you do that' [3]. "Sometimes the assumption is made that the concept of process and process management only apply to highly structured, transactional work, such as order fulfillment, procurement, customer service, and the like. Nothing could be further from the truth. . .Process should not be misinterpreted as a synonym for routinization or automation, reducing creative work to simplistic procedures" [4, p. 11]. Examples of well-known knowledge-intensive BPs include customer support, design of new products/services, marketing, management of data quality, IT governance, strategic planning.

Compared to the well-established 'mainstream' research in Business Process Management (BPM), research on knowledge-intensive BPs (KIBPs) is still emerging, as illustrated later in the paper. Even based on the limited research, it is possible to observe that the researchers interested in KIBPs, just like those in the mainstream BPM, focus predominantly on processes within clearly defined organizational contexts i.e. "organizationally-bound BPs". In other words, these processes are regulated by organizational norms and policies, with participants' process-related responsibilities defined by the formal organizational roles they assume. These observations apply to both to processes found in a single or across organizations.

In this paper we aim to extend the current boundaries of KIBPs by considering complex BPs that span the boundaries of business/commercial organizations (B), governmental agencies (G) and communities (C) including not-for-profit NFPs. Examples of these processes could be found in complex systems of human-care (e.g. aged-care, disability services), or in the case of this research, disaster recovery.

We argue that disaster recovery situations, although unpredictable, involve management of many different types of processes, ranging from the pre-defined and highly structured ones, as prescribed by emergency operating procedures and protocols (e.g. initiating an emergency warning procedure), to highly emergent, ad-hoc processes that need to be designed and managed as they evolve (e.g. emergency evacuation of people with special needs such as aged, frail or immobile citizens).

Furthermore, even when they are pre-defined by emergency procedures, the implementation of these "routine" processes becomes highly situational and thus knowledge-intensive. For example, during the Victorian bushfire disaster in Australia surviving families who lost everything were demanded to produce identification before their application for emergency relief would be processed. "Survivors unable to produce identification were told they needed at the very least a copy of a bank statement to prove who they were" [5].

More importantly, we argue that disaster recovery not only requires management of different types of processes, it requires a different approach to management, more mindful of, and accommodating to impossible-to-predict human (not customer's) needs. The same observation applies even more to the ad-hoc, emergent processes that, unlike the routine ones, need to be designed in-situ and simultaneously managed, quite often under the extreme conditions.

The main objective of this paper is contribute to a better understanding of management of processes, in particular management of KIBPs occurring at the intersect of B–G–C domains in disaster recovery. Based on literature, we compare and contrast BPM in "traditional" organizationally-bound environments with BPM required for management of these complex "non-traditional" KIBPs. We specify research directions for this emerging field and proceed to identify some relevant theories and discuss how they could be used to study different aspects of these processes, including sharing and co-creation of process-related knowledge across the boundaries of B–G–C, complex information flows as well as agile and emergent coordination patterns that cannot be fully predefined. We argue that the theoretical contribution of our work is relevant not only for the researchers interested in BPM in disaster recovery, but also for those interested in management of more agile, emergent processes across business, government and community sectors that for now remain unexplored by our research community.

2 Knowledge-Intensive Business Processes

Knowledge is now considered an integral part of the BPs and not something to be managed separately. It is deeply embedded not only in documents, models or formal repositories but also in organizational routines, processes and practices [6]. Knowledge is a combination of experience, context, interpretation and reflection and involves more human participation than information [2].

"While there appears to be an intuitive awareness of processes that are more knowledge intensive than others, the characteristics that constitute knowledge intensity have not been well documented in the research literature" [7, p. 33]. It is

also important to acknowledge that most jobs and work situations do require some degree of knowledge, even selling cinema tickets or driving [3].

However, this research adopts a much more complex view of knowledge work, as proposed by Davenport [2]. Thus, "knowledge work involves complex situational decision-making, is inherently emergent, and rarely, if ever, standard to the point that it becomes routine" [2, p. 12]. Therefore, BPs involving knowledge work of this nature, are considered to be knowledge-intensive.

Furthermore, Kulkarni and Ipe [7] studied cases of knowledge-intensive BPs, again in the organizational context. Using the process-technology fit perspective, they derived typical characteristics of knowledge-intensive BPs, including process complexity, knowledge complexity, and decision making complexity.

3 KIBPs in Disaster Recovery

Unable to predict the next occurrence of a natural or man-made disaster and its possible effects, countries all around the world are engaged in design, evaluation and implementation of various methods for disaster management. A typical disaster management model, such as the one described by [8], consists of four phases: mitigation (pre-disaster), preparedness (pre-disaster), response (during disaster) and recovery (post disaster). Obviously, each phase is unique in terms of its known, and more importantly unknown challenges, always exceeding human collective ability to predict, let alone address them.

While acknowledging the critical importance of all phases, in this research we focus on the recovery phase of disaster management, because of its highly agile and unpredictable nature that we envisage being of a great interest to the BPM community, especially those interested in KIBPs and highly agile environments. According to Lettieri et al. [8], "Recovery consists of those actions that aim to bring the disrupted area back to an often improved normal condition". It includes short-term and long-term activities called rehabilitation and reconstruction [9].

The main challenge of the recovery phase is to restore or improve the pre-disaster living conditions of the stricken community in short term, and in the long term achieve sustainability and survivability of the community [8–10]. Disaster recovery efforts include many different activities such as (1) rebuilding houses, buildings, infrastructure, (2) creating communications infrastructure, (3) providing loan, credits, technical assistance (4) strengthening disaster mitigation efforts and (5) debris management [10, 11].

Looking from the management perspective, disaster recovery could be seen as a set of complex and multi-faceted operational processes. They are highly situational and thus knowledge-intensive, even when "prescribed" by operational procedures such as in the previously illustrated by the example from the Victorian bushfire disaster. We argue that these processes are very hard to manage by any BPM method that relies on predictability and stability.

Moreover, these processes are by nature collaborative and often span boundaries of different formal and informal organizations, including those of very different types (business, government and community/NGO). This in turn creates quite unique challenges for their management, in terms of coordination, assumed and delegated roles and responsibilities, information sharing, technology support and so on. In addition to these cross-organisational challenges, there are additional intra-organisational challenges for each participating stakeholder, again related to their internal processes. For example, additional load as well as process efficiency requirements become challenging to handle, in addition to keeping everyday business running. For example, to help the victims of the January 2009 Queensland floods disaster, "between Nov 2010 and 17 June 2011, Centrelink paid out close to $464 million in disaster recovery payments, through almost 400,000 successful claims. . .At the peak of the flood recovery effort there were up to 2,500 Centrelink staff nationwide working on the crisis—almost 10 % of the Centrelink workforce. This was on top of Centrelink's business-as-usual processing of tens of thousands of claims for payment such as Newstart, Age Pensions, Families and Carers" [12]. Given the nature of work of this government agency as well as the recipients of social welfare and other types of government support, their "business-as-usual" claims could not be treated as less important.

Another equally important challenge for process management is created by fundamentally different types of participating organizations—government, business, and communities—each with different governance mechanisms. For example, while process-related roles and responsibilities are defined by the normative contexts of government and business organizations, in the community-based organizations this may not be the case. Yet, the latter organizations are often critical when it comes to influencing rather than regulating community behavior. For example, in a recent example from Australia, in spite of the alert systems working well, people simply ignored the issued Tsunami warning and even went to the beach [13].

The above examples provided an initial motivation and impetus to study process management in DR. Given the fact that all work could be seen as process work, as suggested by Hammer [4], we posit that management of disaster recovery processes become an important contributor to the overall success of the recovery efforts.

Table 1 Traditional BPM versus management of KIBPs in disaster recovery

	Traditional BPM	Management of KIBP in DR
BPM approach	Strategy-driven Organizational strategy translated into formal business processes executed by: resources (process participants and BPM systems)	Driven by situational goals Goals determined by participants based on their assessment of current situation Process participants assembled Processes defined in an emergent manner, taking into account emergency procedures, if available and defined
BPM context	Organizationally bound	Across different types of organizations: Business (B), Governmental (G) and formal and informal communities (C)
Main characteristics	Well defined subject matter with clear objectives	Sequence defined by process; heuristic and guesses; evolving subject matter
Process participants	In formal roles	Some in formal organizational roles
Data sources	Deterministic	Require human-expertise
Information type	Predefined; highly structured	Structured/unstructured; source cannot be predicted in advance
Types of process-related knowledge	Explicit—process models, business rules; Experiential—exceptions, process-related insights	Predominantly experiential:
BP modeling	Quite detailed	Only high level
BP improvement methodologies	Suitable for routine BPs: Methods focused on improved efficiency and cost reduction	Focused on improved knowledge processes, among stakeholders, within and outside of the immediate context of the given process
BP automation	Routine/structured: automated with little human interaction Semi-structured: human interaction required	To a very large extent unpredictable and reliant on the agile cross-organizational infrastructure that often needs to be established in-situ
Process-related competitive advantage	Routine/structured BPs: process efficiency; standardization to minimize variations	Not applicable
BP performance monitoring	Measures related to process efficiency and control: cost/time/output/throughput, expressed by key performance indicators	Hard to express and measure, but guided by situational goals. Often related to quality of human care

Based on the discussions above, Table 1 offers a high-level tentative summary of the main characteristics of KIBP management in DR in comparison with the traditional BPM.

4 Discussion: Research Directions for KIBPs in DR

Since DR requires many different groups to work together in unpredictable situations the coordination of work and adjusting the mechanisms for coordination becomes essential. The following research questions need to be considered in future research:

- How does the interaction between different groups emerge and take place in DR?
- What is needed to coordinate these different groups taking part in DR?
- What kind of forms does the interaction in the networks of community, government and business actors take?
- How do the different actors use and adjust the mechanisms to coordinate work?

To provide directions for future work, we offer a brief summary of a sample of theories that could provide further guidance to IS researchers interested in improvement of KIBPs, in particular the associated knowledge processes and complex coordinating mechanisms. Neither the list of research questions above nor the theories discussed is meant to be exhaustive but they are provided to inspire ideas for future research in the emerging field of KIBPs and DR.

Boundary spanning The ability of members in different communities to interact with each other is referred to as boundary spanning. Individuals who can link separated groups of people and facilitate information sharing are called boundary spanners. Levina and Vaast [14] call this "a practice-based perspective to knowledge management in organizations". If organizations can successfully engage their members in boundary spanning activities they can create knowledge based competencies when boundary spanners facilitate sharing of knowledge and experiences between different groups. Levina and Vaast [14] differentiate between nominated boundary spanners and boundary spanners in practice. In the case of DR, boundary spanning is even more challenging since the interaction takes place between very different business, community and government groups. Boundary spanning theory could help researchers to better understand how the interaction between these groups emerges. It could also potentially be used to design and test boundary spanning mechanisms between groups, leading to possible ways of improving KIBPs.

Boundary objects Boundary objects facilitate developing coherence across intersecting social worlds. They are "objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" [15]. To become boundary objects in use they need to be locally useful and they must have common identity, i.e. they must be common enough to be recognized by different social worlds [15].

Research on KIBPs in DR can benefit from the boundary object theory in many ways. Researchers can test the usefulness of existing boundary objects and whether

and how they have become boundary objects in use. By understanding the needs of various community, government and business groups, researchers could analyze what is needed from boundary objects to become useful for all these different groups taking part in DR and thus helping to transfer and co-create process-related knowledge.

Actor-Network theory Actor-Network theory (ANT) explores heterogeneous networks of both human and non-human actors. The relations between the actors are central in ANT. Since the different actors are heterogeneous, researchers have studied how boundary objects could be used to mediate different actor worlds [16]. A central concept in ANT is "translation" which "refers to the process of creating a temporary social order, or the movement from one order to another, through changes in the alignment of interests in the network" [17, p. 54]. The ANT lens could be used in disaster recovery research to study the interaction in the networks of community, government and business actors within and across KIBPs. Another interesting avenue would be to combine ANT with the concept of boundary objects and study how boundary objects might mediate the different actor worlds. Finally, ANT would be a very useful lens to study how actor networks respond to unpredictable situations.

Theory of coordinating Organizational and inter-organizational work is coordinated through coordination mechanisms, such as standards, rules or contracts. Jarzabkowski et al. [18] take a practice perspective and argue that "coordinating mechanisms are dynamic social practices that are under continuous construction" [18, p. 907]. They stress the dynamic nature of coordination mechanisms and call them coordinating mechanisms. Coordinating mechanisms "emerge through their use in ongoing interactions" [18, p. 909] through "performative-ostensive cycles that iteratively construct coordinating mechanisms" [18, p. 918]. The theory of coordinating is suitable for investigating situations with change and emergent patterns. That is why it provides a very useful theoretical lens for disaster recovery research. Using this lens researchers could study how different actors use existing coordinating mechanisms and how new coordinating mechanisms emerge. Understanding coordinating mechanisms as dynamic and evolving social practices provides a solid theoretical foundation for researching emerging coordinating mechanisms in KIBPs in DR situations.

5 Conclusions, Limitations and Future Work

Our study of management of KIBPs in disaster recovery confirms the relevance of this work and identifies challenges not currently addressed by the traditional BPM. Our main conclusion is that these complex emergent knowledge-intensive processes require management of process-related knowledge across the boundaries of community, business and government entities and organizations. Consequently, rather than through conventional BPM methods, these KIBP could be improved

through the ongoing improvement of the human-driven knowledge processes, in their context.

The main limitation of our work is that the discussion is mainly theoretical, although a brief motivational case was presented. However, the main objective of this study was to develop a better understanding of KIBPs in DR and to provide directions for future research in this emerging field, we argue that in spite of its limitations, our study offers an important step towards extending the boundaries of current BPM.

We also envisage that the theoretical contribution of our work is relevant not only for the researchers interested in BPM in disaster management, but also for those interested in management of more agile, emergent processes across business, government and community sectors that for now remain unexplored by our research community. Our current and future work include further applications of the identified theories to real-life examples of disaster recovery processes.

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E-Healthcare and the Co-Creation Approach: A Critical Perspective

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Abstract This paper engages in a reflection on the concept of 'E-health care' by analysing it from the point of view of its value. What is the meaning acquired by the concept of value in this context? And are e-health care platforms able to create value for their patients? The Internet and the IT have incredibly changed how healthcare can be delivered. E-health programs have been, in fact, experimented in order to improve the quality of the care and patient outcomes. The aim of this paper is to understand, how e-healthcare platforms can generate value thanks to the active role of its users. Implications will be discussed and a model of value creation will be developed.

1 Introduction

This article engages in a reflection on the concept of 'E-health care' by analysing it from the point of view of its value. What is the meaning acquired by the concept of value in this context? And what does it mean for Medicine 2.0 generates value for their patients? The idea behind the paper is to explore the relevance that social production has acquired in the construction of value in capitalist societies. Seen from this viewpoint, means of value creation that rest upon social relationships have been discussed by a variety of authors [1] that emphasize different sides of the phenomenon. Processes of socialization have been defined as a structural aspect of contemporary production processes [2] with empirical studies developed mostly in the context of the digital economy and industry [3]. E-health programs have been, experimented in order to improve the quality of the care and patient outcomes

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[4]. Indeed, this article turns its attention on e-health care solutions and in particular on those services that highly rely on the users to be delivered and to generate value.

The originality of the work and its contribution are manifold. First, the main contribution is located around the recent wave of studies on 'e-health care'. Reflections on how to implement their growth will be undertaken, by reflecting on incentives and strategies to entice users to contribute. Besides, this paper has also broader implications. First, it aims to reflect on transformations in value understandings—i.e. what value is and according to which logic it is produced. It seems that new means to define value are surpassing traditional political economy conceptualization.

Instead, new features as for example sharing with others and co-participating in the service provision are acquiring a central room when value issues are under analysis. In this light, the paper aims to raise some questions on how the use of e-health services can generate and diffuse economic value for its users.

This article is thus organized in the following way. The first part engages in a reflection on the concept of value and the logic behind its creation by reviewing the recent literature within management studies. Then, the article turns its attention on the idea of co-creation, showing that many virtual communities are flourishing and becoming widespread thanks to the co-creative activity of users and providers, where social cooperation becomes a central feature for value generation. In so doing, the empirical study focalizes on the case of three virtual platforms which are important example of e-health services. The aim of the project is to present a model for value creation grounded on the users' activity. Implications for future roles of users are discussed in relation to potential directions to create engagement for them in an effort to generate value through e-health platforms.

2 Background

In managerial studies, the notion of value has recently become object of intense debate, by reviving the interest of scholars and intellectuals writing from different perspectives (either mainstream or critical) and from different traditions of thought.

Following the post-crisis turmoil—involving jobs shrinking, the expansion of public sector debt, the resulting austerity measures—and the repercussion of that on the social sphere, many authors have started rethinking the idea of value and have put forward new (or revisited) definitions that could comply with the novel socio-political climate. On which basis value is created, and who are the main producers of value in the post-crisis era? And how is it possible to capitalise on it and diffuse value more widely within societies? These and more pressing questions have been and keep on being asked in recent times by scholars in the Western society.

The 2007 Special Issue of the *Academy of Management Review* on the topic of value creation demonstrates the growing interest on this specific stream of literature. In the introductory article published on the Special topic forum, Lepak et al. [5] have debated about diverse ways to approach the concept of value in the

field of management, by emphasising that such diversity is primarily due to the multidisciplinary nature of managerial studies (and the different traditions that informed managerial thought, among which sociology, organisation studies, economics, etc.). Besides, as noted by the authors [5, p. 180], the absence of a univocal definition on the concept of value is also due to the fact that scholars have emphasized different aspects of the phenomenon, that is: (1) What value creation is, (2) the process by which value is created, and (3) how to capture and retain value. In this vein, defining the source and nature of value creation, as well as the societal level of analysis becomes essential for an explanation of the concept. In accordance to this, we think that the recent financial crisis has contributed to engage in a rethinking of what value is and what logic is behind its creation, by including broaden dimensions that go beyond the pure monetary value and that are based on social and ethical notions [6]. One example is represented by the recent notion of ethical value [1], a term recently proposed to study alternative value logic mainly based on forms of production based on individuals' cooperation The concept of ethical value has been recently studied by Adam Arvidsson, whose terrain of analysis was represented by the diffusion of forms of social production on Internet-based platforms, such as 'Open Software' and web platforms. In his view, market value (based on a conflation between price and value) is not more sufficient to fully explain how value is produced. Still, its inadequacy lies in not being able to mirror other forms of values which also contribute to define the notion. The exemplification of this is given by on-line platforms, for instance the Open Software *Linux*, just to cite one, that highly rely on the activity of motivated co-producers that share their ideas and abilities through socialization.

In effect, by considering the notion of ethical value, the article reflects on the importance of cooperative activities of users on on-line e-health platform and it is able to provide an understanding of the extent to which this concept can explain how forms of value are generated. However, before engaging in a reflection on e-health platform, we will turn our attention to the idea of co-creation, so as it has been outlined in the marketing literature and in order to frame our contribution.

3 The Co-Creative Approach and On-Line Platforms

The co-creation approach has been widely depicted in the marketing literature as a form of economic value. Web platforms, blogs, community sites and other kinds of virtual interfaces are frequently depicted as venues for users' active participation in various forms of co-production. This follows a logic based on participants as 'operant resources', where they are framed as active contributors in relational exchanges and coproduction [7, p. 2]. The 'participative paradigm' derived from online collaboration has been clearly described by Tapscott and Williams [8], in their well-informed account of a 'new world' of 'ever-connected people' which are the mass creativity of many 'web initiatives'.

What is perhaps more interesting in the 'participative paradigm' is that online collaboration is animated by a sense of fun, willingness to share and the promise of new interactive experiences on the virtual platforms.

From this angle, the web 2.0 includes as its primary raw material users' contributions. Recognizing many of the features above depicted, this article considers three e-health platforms by examining the users' experience. The argument, simply put, is that the 'architecture of participation' [9], surrounding the web 2.0 is inextricably linked to the opportunity to generate forms of value that are based on the willingness to participate in forms on communities and social (albeit virtual) relations. These represent new frontiers in the social networking domain where users are encouraged to create contents online and participate in discussion forums. Users' experiences are, in fact, prominent for their experiential content and the emotional involvement in them and often these platforms are designed to provide an immersive engagement for its users where the recreational use of the platform is crafted to give a sense of fun and stimulate users' creative ideas.

Accordingly, the paper research questions are: What is the role of the users in the process of value creation? And which type of role do they adopt? And are e-health care platforms able to create value for their users?

4 E-Health Services and Value Creation

According to Kaplan, 'e-health can be defined as both a structure and as a way of thinking about the integration of health services and information using the Internet and related technologies' [10]. In effect, the Internet and the IT have incredibly changed how healthcare can be delivered. The ways to manage hospitals, how to keep track of patients' records, the exchange of information, remote health care monitoring, among many other health care services, are just some of the instances of the Information Systems application and wireless communications.

As observed by the World Health Organization [11] in a recent study on how to create common grounds for e-health in Europe, 'the implementation of successful e-Health systems at the national level is dependent on a framework of strategic plans and policies' (p. 16) that include: (1) Foundation policies and strategies (infrastructure, funding, policy and governance of e-Health development), (2) Enabling policies and strategies (issues pivotal to the e-Health development, such as citizen protection, equity, and cultural diversity), (3) E-Health applications (which include provider services, knowledge services, and public services).

This resonates with an idea of inclusion among the members that are differently involved in providing e-health services. At the same time, e-health services have become object of attention from many scholars who dedicated their attention to this emerging phenomenon.

Pagliari et al. [12] have noted that the use of health care Information Technology changed through times, 'from an emphasis on hardware, systems architectures and

databases, to innovative uses of technology for facilitating communication and decision making' (p. 1).

In effect, this observation goes in the direction of a more collaborative and participative use of technology related to the use of e-health where the focus becomes the empowerment of the healthcare user over the traditional telemedicine or telecare approach.

A very interesting observation on the changes occurred in the relation between patients' role and technology has been discussed by Eysenbach [13] who introduce the term Medicine 2.0 to make sense of such changes. The Medicine 2.0 borrows some of the characteristics of the Web 2.0 approach, where principles such as social networking, collaboration and openness are applied. Furthermore, the author provides a definition of Medicine 2.0 as the following:

'Medicine 2.0 applications, services and tools are Web-based services for health care consumers, caregivers, patients, health professionals, and biomedical researchers, that use Web 2.0 technologies and/or semantic web and virtual-reality tools, to enable and facilitate specifically social networking, participation, apomediation, collaboration, and openness within and between these user groups' (p. 2).

In this vein, the Web 2.0 technologies have boosted the use of Personal Health Application Platforms (such as Google Health, Patients like me and many more) that are highly based on participation and the engagement of patients in recognizing symptoms, checking for their own conditions, and improving their own health. E-health applications have also shown to be tools to empower patients and make them more responsible for their health choices.

By moving from this consideration, the next section explores in which way patients can actually create value for the platforms that they contribute to. Furthermore broader considerations will be made more on how value is produced through the social production of the users.

5 Research Design

To investigate the research problem—i.e. how value is generated by the activity of users that participate to online platform—the article follows a qualitative approach by adopting an Internet based research method [13]. Data production methods based on the Internet may vary and can range from the use of existing data to interviews or surveys. The article adopts a qualitative research approach to Internet research and investigates online-communities. In defining the research method, the data are produced through an active involvement of the researcher, where the researcher participates in communications on on-line platforms in order to produce its data. In this way contents uploaded by patients, such as discussion boards on websites or chat rooms, Internet postings are tracked down and analysed.

The article undertakes an analysis of the web materials of the platform in order to build a model on value creation from on-line platform. Thus, to produce data, the

article adopts a mixed method approach consisting of two main sources of data: (1) Online analysis on Internet communities; (2) Archive documents.

5.1 Online Analysis on Internet Communities

The core of the analysis is represented by the on-line contents coming from the websites of Medici.it, Health exchange and Wellness 4 you.

Videos posted on YouTube Official Channel and Face Book pages will be also analysed, since it is recognised their relevance in order to understand the users' activity on on-line platform. The analysis is based on three case studies that are examples of e-health practices, i.e. a virtual platform to exchange medical information between users (patients) and providers (doctors and specialists).

The study focuses on a comparative analysis of the following platforms: 'Medici.com' 'Health exchange' and 'Wellness 4 you' are platforms where users/patients can gather advice about healthcare issues and make choices on specialists to visit, treatments and therapies, and to ask suggestions to medical personnel. The platforms act as a sort of health advisor while users have a crucial role in the development of the website. As said, the model will be discussed based on the experiences of the three case studies. In particular it will be shown that the diffusion of e-health is actually based upon forms of social production between users, medical personnel and technology providers who actually contribute to create the service.

5.2 Archival Materials

Documentary evidences are produced, by collecting archive documents (websites and published materials). The article looks through archival documents on e-health technologies. Reports from the World Health Organisation, from the NHS and the Ministero della Salute Italiana will be taken into consideration in order to build a picture on the use of e-healthcare technology in Europe.

6 Findings

On-line platforms are an ideal site to explore how it is possible through forms of participation, sharing and involvement to generate value for users from e-health services. In what follows, the paper draws on the sources previously mentioned to outline the key themes that emerge following a close analysis of the on-line platforms.

6.1 Take Control of Your Health

One crucial aspect that actually explains much of the success of e-health platforms is the role played by the patient. From a passive receiver of medical services, the patient has acquired a central role, empowered and encouraged to take control (and responsibility) of his own health. This marks an interesting shift that helps to have an understanding of the pervasive diffusion of on-line platforms. This seems to pertain to the contemporary self-fulfilment Western project, which value aspects of individuals as autonomy, initiative and self-government.

For example, forums of discussion are central in the platforms and they are crucial to ask questions which are categorize in topics of interest and that helps patients to browse through question already answered.

Healthy living and creating a personal wellness plan are, for instance, some of the most recurring topic on these platforms.

For instance, one of the forum conversations on Health Exchange sees the user talking about the pain from severe headaches, and the self-remediation through arts. As one of the patient explains in the forum she/he uses arts and drawing to take his/her mind off of things with the aim to get some relief. A quite intense forum debate follows this post, where users bring their own experience of crafting, painting, writing, drawing as a way to escape from pain.

As it seems to emerge from this conversation, self remedies are often part of online medical communities. Patients tend to create a sense of solidarity with others and often the support goes over the simply use of medical advice. Another discussion forum, for instance, is around remedies for pain relief based on laughing and smiling. As observed by a user, laughter is the best medicine. It is, in fact, interesting the use of video and the links to images that some of the users post in order to bring happiness in other's people lives. Besides it is worth noting that patients can in reality mark other users' post or doctors' advice as useful and in a way this makes visible the empowerment of the patient/user about the relevance of a specific medical topic.

It seems that patients' empowerment almost signal a direction toward a new system of medicine made by patients for patients (at least in the virtual world). If these platforms rely on the collaborative swapping of helpful wisdom of patients, what is the place occupied by the completeness, accuracy, and reliability of doctors' diagnosis? For instance in another conversation a user talks about overtreatment and overmedication ordered by doctors, with the aim to inform each other of unnecessary treatments. In a way this is an example of emancipation of the user and what has been defined by some authors as the 'wisdom of the crowd'.

Despite that, it seems that the authority of doctors hadn't faded away, as it is shown by the words of the creator of Health exchange, a successful platform which wants to be seen as a medical network. This is what he states: 'the purpose of the platform is to have an online database of patients' reports on their diseases and their responses to treatment as this would speed the work and improve care. The plan is

to enrol one million patients and harvest their data for researchers. We're not a social site, We're a medical network' (Source website search 2013).

6.2 Performing a Community

As emerged from the analysis, it seems that one central aspect of the three e-health platforms is represented by the way in which medical resources are used. Although, most of the contents are written by specialists and doctors, these platforms seems to rely on the creation of forms of community where patients represent the real strength. One aspect that emerges from the analysis is the sense of community that users are able to generate. Strong bonds among patients seem originated in this context by sharing the same medical condition.

It seems that one central tenet is represented by sharing. The more patients share, the more they will learn about their own health and the more they will help other patients.

The focus on participation beyond the traditional role played by a patient (which is a recipient rather than an agent) has in the case of the e-health platforms drawing on the notion of co-creation, meant that the medical experience is hinged on the participants' active engagement.

Learning from each other, discuss test results, compare different medications, treatments or combinations of drugs are just some of the most common activities that patients undertake on the platforms analysed.

As it is evident, the connection that people create by sharing personal stories, offering help and experiences also leads to the opportunity to quickly build new friendships. Indeed, one of the most important values that contribute to enrich the users' experience is the role acquired by patients/friends. In effect, being producers of the contents means participating in medicine diagnosis as in-crowd, where actually individuals can compare symptoms and treatments by creating groups.

In this vein, medical communities allow patients to facilitating empowerment for self-care and health decision—making by using their ability to create forms of communities (albeit virtual) and participation.

In a way, by using online crowdsourcing platforms, organizational entities may delegate certain tasks to a broad, diverse and decentralized network of individuals. In contrast to the top-down or lead-users approaches, crowdsourcing relies on a system of self-selection as end-users decide for themselves whether they participate or not. At the same time, when interaction takes place, social processes are activated among individuals, which help to engender a strong communitarian spirit.

7 Discussion: A Model of Value Creation

Building from what emerged from the data analysis, the paper discusses now a model of value creation based on patients' co-creative activities.

Echoing the suggestion that web platforms tailored to collaboration and participation are becoming the new ideological paradigm of modernity, it has been pointed out that the main source of value occurs today at the point of social communication where the co-creation activity is in place.

In the model presented below, value creation flows actually by the interwoven activity of patients, doctors and platform's designers whose activity is highly related. The process of value creation is also influenced by changes related to the so called Medicine 2.0 revolution, based on principles of social networking, collaboration and openness.

First, the model considers the role of patients. Patients have gradually become more informed and empowered about their own health and this has opened up interesting avenue for a radical reconfiguring of the doctor/patient relationship. Patients' empowerment bring them to be more informed about their health and well being while health professionals are no longer the only source of information. This means that, to a certain extent, relationships between patients and doctors become more equal and collaborative. This is also linked to a higher knowledge acquisition. Patients 'use online tools to learn and apply expert knowledge, and play a more active role in the prevention, treatment and monitoring of their own illnesses and conditions. Empowerment is happening collectively too, as groups of patients and careers participate in solidarity networks and advocacy groups centred on specific conditions and experiences'.

This point brings attention to an interesting implication related to the role of the virtual subject, who is expected to become an 'active subject' who brings his personality and subjectivity in the activities undertaken. These are thus experienced by its users as places where they can put their creativity and affective capacities into participative activities. In this sense, the creative content generated by the web user is deemed as an important, yet unacknowledged resource for value generation as in crowd-sourced medicine seems in fact at the basis of many e-health platforms.

A second brick of the model is represented by medics and caregivers and their changing role in the Medicine 2.0. As emerged from the analysis of these platform, healthcare professional play a crucial role. They clearly give specific advice but also they promote their medical activities, as often on these websites they have a dedicated space. In a way their role has also changed from a model where the doctor seemed to be an authoritarian voice in the care to a "participatory medicine" where 'both the patient and the clinician bring the information, skills and abilities they have together to make a shared decision about a diagnosis or course of treatment'.

The last, albeit not least part of the model, is represented by platforms in itself. They way in which they are created and designed affect the patients' activity and the more or less engaging experience for the user.

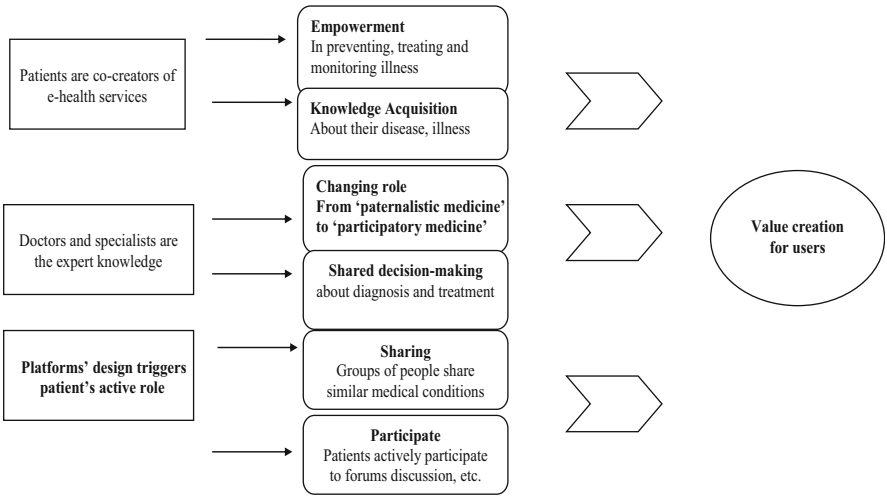

Fig. 1 E-health platform and the medicine 2.0

As said, patients' participation is fundamental and actually the participatory role of users has become the central dynamic to create value.

As observed sharing details of medical condition is a way to create bonds among patients. Virtual friends' support becomes thus the glue which stick many users together and that allow them to acquire control over their own health. This is an important form of value for patients since this allow them to have all the information they need for a decision about their healthcare to be made.

In conclusion the article argues that value is generated by the interconnected co-productive activity of patients, doctors and platform' designers and all of them capture some form of value during the transaction. This article focused on the value generated for patients but it is clear that other actors also take benefits from that. Doctors and caregivers can promote their activities through on-line platform and at the same time thanks to the empowerment of patients can liaise with more informed users and this can help medical personnel to save time. Also through a participative decision-making approach part of their responsibilities about treatments is actually reduced.

At the same time platforms' designers can count upon the creative content generated by the web user and this is deemed an important resource for the value generation and reproduction of the 'digital economy'. In this sense, immaterial components of users—including knowledge, communicative acts and cooperation—makes value for the platform's creator and designers (see Fig. 1).

8 Concluding Remarks

The article has offered an analysis of e-health care from a value perspective in an attempt to focus on a hitherto under-researched aspect, i.e. the value that e-health initiatives are able to generate for patients. It has set out to investigate the role of patients, doctors and platforms' designers in creating value and on which logic this type of value is generated.

Building from a notion of value that brings social production and process of socialization at the forefront of the definition, this article has contributed to the literature on value creation in managerial studies [14].

The paper delved into the literature on co-creation and the importance of users to generate economic value. From here it reflected on the participative paradigm derived from on-line collaboration where the participatory role of users becomes the central dynamic for the creation of value.

The paper adopted a qualitative mixed method, consisting of two main sources of data: online analysis on Internet communities and archive documents in order to explore users' activity on three e-health platforms.

By analysing on-line contents of these websites, the paper explored how patients engage in participatory activity. As suggested by the analysis, value creation flows actually by the interwoven activity of patients, doctors and platform's designers whose activity is highly related. The process of value creation is also influenced by changes related to the so called Medicine 2.0 revolution based on principles of social networking, collaboration and openness.

The reflection was guided by a wider underlying consideration, which is tied to transformations in value understandings—i.e. what value is and according to which logic it is produced. The paper found, indeed, that new means to define value are surpassing traditional political economy conceptualizations. The explanation of value based on labor time does not seem the only measure to determine value anymore. Instead, it argued that new elements—being able to maintain a sense of community, sharing with others and participating—are acquiring a central room when value issues are under analysis.

In this light, the paper raised some points on how the users' immersion can be transformed into economic value and for whom (patients, caregivers, platforms' designers) this translation is proving to be advantageous.

In a context where companies seem to show an increased willingness to engage talent from beyond the confines of their offices, it seems important to ask whether immersive Internet, forms of participation and user-driven innovations could constantly engage patients and to achieve a better quality of health care for them.

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From Knowledge Transfer to Innovation Spreading: The Use of Networks in Long-Term Care

Isabella Bonacci and Oscar Tamburis

Abstract The present work improves both the research hypotheses and the methodological study from the same authors, and aims at working out the connections between technology-driven needs and social-related patterns in the Long-Term Care (LTC) milieu, seen as a complex disease network, from which many classes of chronic pathologies (namely, Thalassemia, Cardiovascular diseases, Diabetes Mellitus type 2) can be identified as peculiar subnetworks. The adoption and implementation of the Social Network Analysis to study the dynamics concerning technology-assisted LTC emerges as feasible mean to strengthen the paradigm of patient-centered care, providing new perspectives for recognizing how the set of interactions and relationships within a "virtual team" (including formal and informal carers from different organizations) can bring to higher levels of knowledge transfer, organizational learning and innovation spreading.

1 Introduction

Healthcare systems, in many cases, cannot be actually referred to as "systems", since a low degree of integration is often envisaged among different actors; yet, a careful coordination is strongly required nowadays, according to national and regional policies to promote new organizational models, calling for the cooperation of all the stakeholders. This is particularly true when the objective is to create patient-centered "care networks" focusing on chronic diseases that, although often treated separately, are not independent from each other. Such diseases are comprised in the Long-Term Care (LTC) milieu and can be associated, under a clinical perspective, with the breakdown of functional modules best described as "subnetworks" from a more complex "disease network" connecting many cellular components [1].

Large-scale organizational transformations, as well as high-level strategic decisions, are then invoked as necessary, following the common idea that the healthcare

Isabella Bonacci: Sects. 1, 2, 4.
Oscar Tamburis: Sects. 1, 3, 3.1, 3.2, 3.3, 4.

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sector has to be compared to a complex adaptive system, i.e. a collection of individual agents who have the freedom to act in ways that are not always totally predictable, and whose actions are interconnected such that one actor's actions change the context for other actors.

In a complex adaptive system, actors origin (and change) mutual ties according to internalized rules setting self-driven trajectories [2, 3]. Network organizations stem from diseases networks to deal with the margin of uncertainty rising with a complex environment: in this context, information and communication technologies are able to manage the acquisition, storage and sharing of data, information and knowledge for different purposes in the delivery of care, in the linking and coordination among the operators, in the integration between social and health aspects, in the management of the facilities. In other words, ICTs can massively impact on LTC by acquiring a crucial role in the process of reorganisation and redistribution of responsibilities, significantly altering the existing relations among the various actors. The management of a so-called disease network requires therefore the creation of a common substrate for the Management of Information, Communication and Knowledge (MICK) [4] for all the actors to rely on a sort of ICT substrate called to hold all the data, information and knowledge in a unique context, and capable of propagate "instantaneously" any modification (and, to a greater extent, any kind of innovation) among the informative resources of the care system (see Fig. 1).

An appropriate technological support is likely to make LTC more proactive and coordinated, improving both the quality of life of affected individuals and their families, and the economic sustainability of the overall system. Future technological deployments will induce therefore changes as for the roles of the care recipient and the formal and informal carers, with an impact on three major concerns: the

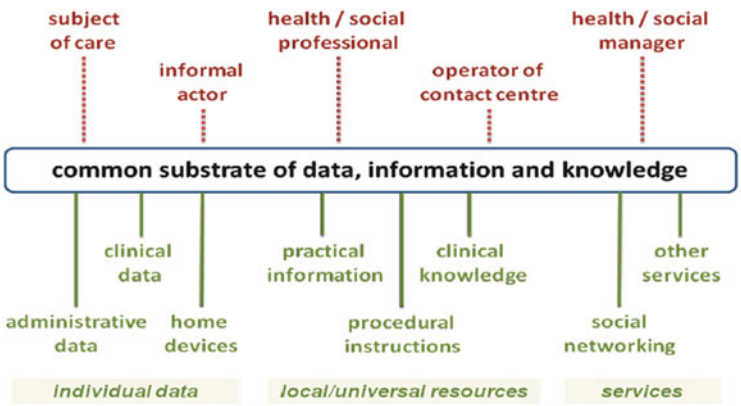


Fig. 1 To integrate social and health care, all the actors rely on a common substrate for the management of information, communication and knowledge (MICK) (*Source*: [4])

transformation of the care recipient into a proactive subject, the augmented potentiality for home care and the new functions that informal carers could assume.

2 Background and Objectives

Many scholars introduced complex systems as "*not simply resulting from the sum of their components, but rather from high levels of interconnectedness*" [5, 6], as well as "*highly integrated and co-evolving*" [2]. The power of connections between actors can make healthcare systems, and Healthcare Organizations (HCOs) within them, able by nature to *learn* complexity: this means that the actors cannot work as autonomous and independent, but strongly interconnected and influenced by the surrounding social system. One way of characterizing the relations among humans is to figure out networks of interactions that bind humans together in social structures [7, 8]: the set of possible relations between medical and non-medical subjects, either private or public, positively affect multi-scale and multi-disciplinary network-based initiatives involving medical staff working in hospitals, health staff posted in primary care health facilities, or community-based workers [9, 10]. A class of interventions designed to promote knowledge translation and to pursue paths of innovation uses aspects of social network theory to foster planned behavior change or knowledge translation [11, 12].

The Social Network Analysis (SNA), as theoretical and methodological perspective that emphasizes the social reality as reticular framework [13], leads to recognize the network organizational model (based on working interoperability standards) as the most fitting practice in the healthcare sector to achieve a rationalization of the supplying system, and a stronger integration of the assistance paths: the main goal is to allow a greater and more efficacious spreading of information and, consequently, a general improvement of the service quality [14].

Actors with different position in the network have different functions and capabilities from others and different influences on the network: SNA provides tools to identify knowledge brokers, i.e. individuals, for a health system, who will help co-ordinate actors in times of crises or shocks and build bridges between different groups of the system [15, 16]. Other actors essential to the diffusion of innovations, such as opinion leaders, champions or change agents, can be identified through the number of links they have with their peers or non-peer actors at different levels of the health system [17]. To this purpose, Kohn et al. made eventually the link between social networks and health systems even more explicit, by defining a health system as a network of actors aimed at providing health care: "*In healthcare, a system can be an integrated delivery system, a centrally owned multihospital system, or a virtual system comprised of many different partners over a wide geographical area*" [18].

Social networks thus stand implicitly at the heart of the definition of health systems [19, 20], as timely summarized through three key points from Blanchet and James [21], according to which:

- The complexity and embeddedness of health systems create very similar challenges for analysis to the ones generated by social networks.
- Social network analysis can serve the interests of health systems researchers by providing concrete measures and tools to define health systems.
- Evidence generated through social network analysis could help policy makers understand how health systems react over time and how ties between actors can influence the diffusion of innovations.

Becomes so necessary to think to an activity of "integrated design" of information flows between professionals and patients: in particular, in the case of Technology-Assisted LTC we should consider a wider idea of a coherent "virtual team" including carers from different organisations and also the contribution by the care recipient and the informal carers, i.e. a unique combination (or better, a networking) of actors performing an interdependent set of tasks to comply with the peculiar needs of each care recipient. LTC is relatively understudied under many aspects, and in particular the phenomenon of technology-assisted LTC is still in its infancy, so that our understanding of how social networks operate within this healthcare setting suffers from the paucity of studies in the area: emerges however clearly that it must be properly understood and addressed both to maximize its effects on society, and to improve the lives of citizens and their informal carers.

3 Methodology and Results

Three classes of chronic pathologies (subnetworks) descending from the original LTC-driven disease network, namely Diabetes Mellitus type 2, Thalassemia, and Cardiovascular Diseases (CVD), have been studied to distinguish among the clusters of ICT solutions requested, based on the similarity of the set of Care Tasks: the scope was to verify how the set of interactions and relationships within the different resulting "virtual teams" can bring to three possible high-level combinations of contexts, MICK issues and ICT clusters, namely: *minimal* (the citizen requires a periodic, continual attention for a long period, being at risk for a disease, or in an early, non-complicated phase of a chronic condition, or is under a follow-up to control the effect of a previous treatment); *systematic* (the citizen requires the synchronisation among health and social professionals and with the citizen and the informal carers, according to a stable plan with precise roles); *non systematic needs* (the citizen requires multiple activities with parallel responsibilities, strongly dependent on the "daily" evolution of the situation, to manage severe complications and co-morbidities). The importance to deploy the SNA approach emerges as feasible mean to point out, for each pathology, the unique match between technological-driven and social-related levels, the latters being introduced as: *interpersonal* (single person belonging to an organization); *intra-organizational* (specific people group within an organization); *inter-organizational* (relations existing between organizations) [14]. The present work, using a descriptive design

[22], improves both the research hypotheses and the methodological study from the same authors [23] in order to: (1) show how the adoption and implementation of the Social Network Analysis in the LTC milieu is supposed to strengthen the paradigm of patient-centered care; (2) provide new perspectives for recognizing higher levels of knowledge transfer, organizational learning and innovation spreading [24, 25]; (3) broaden the concept of interdependence between two (or more) tasks where the performance and outcome of one task are affected by, or need interaction with, the performance and outcome of the other task [26, 27]. The methodological approach comprised three main stages:

Stage 1 (describing the set of actors and members of the network) The field study was conducted during 2013 by means of the following two-phases survey administration on a sample of 150 chronic patients from three Healthcare Trusts in Italian Region of Campania:

- A first 18-questions survey directly submitted to the patient hospitalized (or to familiar/professional nurse);
- A Computer Assisted Telephone Interview (CATI) was then conducted about a week after the first contact.

Calling patients for two following surveys requested the deployment of two different questionnaires, complementary for some sections, in order to understand the personal and organizational difficulties (along with the health issues) the patient has to cope with once de-hospitalized. Along with those, a series of interviews with healthcare professionals were conducted, in order to measure out for each one of them the "weight" of the occurring interactions with every other member of the belonging network.

Stage 2 (characterizing the relationships between actors) SNA analyzes patterns of connections (ties) among information-processing agents (nodes). Once recognized the list of actors involved in the management of each of the three categories of diseases, the data gathered through the field analysis (surveys and interviews) allowed the creation of a set of three "$n \times n$" sociometric matrixes, where each node of the network is assigned both a column and a row; every cell featured then the "value" of the punctual interaction between a couple of actors (patients or professionals), on the basis of the chosen evaluation parameters, by using a number ranging on a scale from 1 to 7.

Stage 3 (analysing the structure of the systems) SNA combines the concept of the sociogram (a visual representation of relationships in a social group) with elements of graph theory to analyze patterns of interaction among people in various kinds of networks, allowing quantitative comparisons between different network structures [28, 29]. SNA software (UCINet) calculates quantitative measures of network structure including density, centralization, hierarchy and clustering coefficient. The software also generates a visual representation of networks through network diagrams. In the following paragraphs three boxes have been set up, one for each class of pathology, to summarize the main results emerging from the study. Using

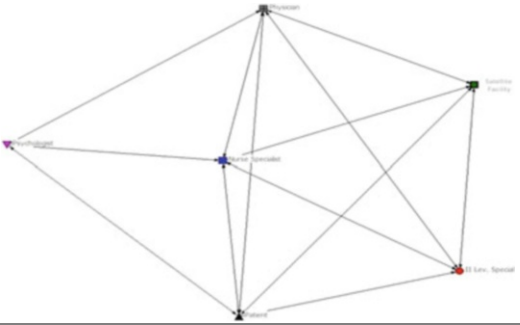
NetDraw, a tool from UCInet suite, a visual representation of three *To Be* networks was constructed, based on the resulting sociometric matrixes, aimed at showing the web of decision-making consultations resulting in a technology-assisted LTC environment. Some among the most important quantitative measures developed for use in SNA refer to the *network cohesion* (density: a measure of the relative number of connections; standard deviation: a measure of the variability among the whole set of connections of the sociogram) and the *network centrality* (Network Centralization Index: measures the degree to which a network approaches a perfectly symmetric or "star" network). The cliques analysis then worked out the main among the possible "high density subgroups" derivable from the network breakdown; furthermore, the main features of the pathologies, in terms of MICK information needs, system performance and ICT solutions to be deployed, have been described, in order to find out eventually the mentioned relations between technological-driven dynamics and social-related complexity patterns. The main scope of the study was to prove how the SNA can help to visualize the ensuing potential interrelationships among the selected diseases and help to design a sort of complex disease network, pointing out that the policy decisions based on LTC priorities are called to include the selection of the proper technological solutions, integrating whenever appropriate ICT and devices to provide innovative services.

The resulting research hypotheses have been formulated as follows:

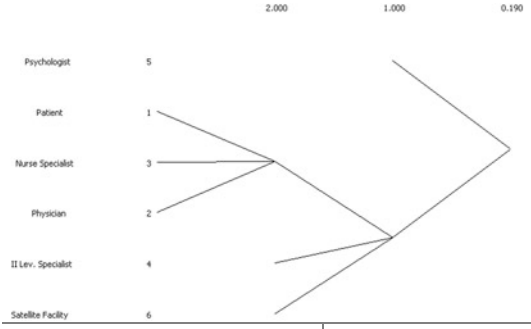
- Verify if the diffusion of innovation is related to the centrality of a network organizational unit (*individual level*);
- Verify if the structure and the position of the network can positively affect the system performances (*collective level*);
- Verify how the implementation of ICT applications can lead to positive, long-standing results to the whole Business System (*network level*).

Policy makers should rely on evidences generated through social network analysis to understand how health systems react over time and to better adjust health programmes and innovations to the capacities of health systems.

3.1 Thalassemia

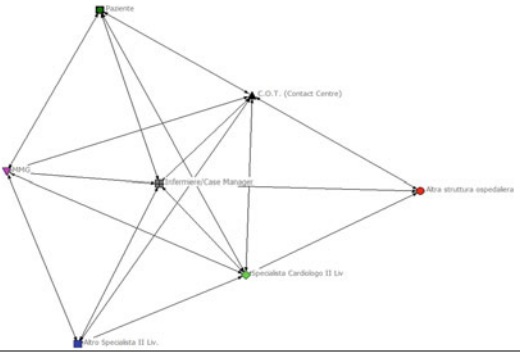
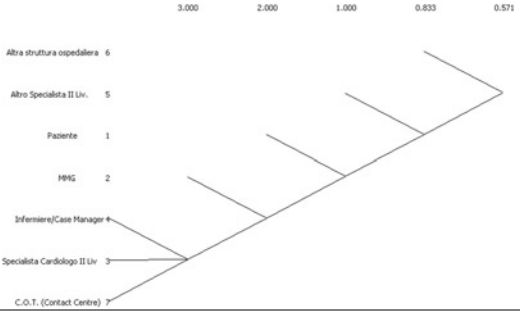
To be sociogram


Network cohesion	Standard deviation	Network centralization index
0.8667	0.3399	4.00 %

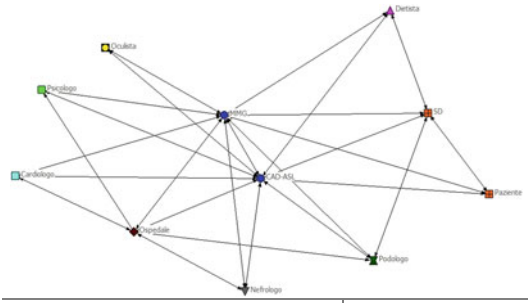
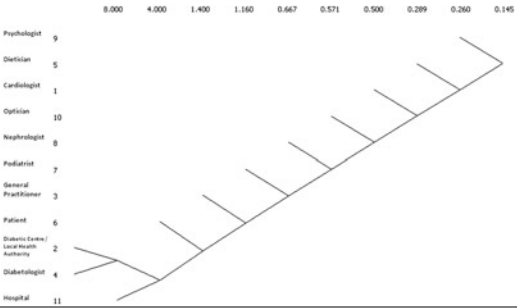
Cliques analysis (main clique)


Meta-situations (minimal needs)	*Care system side*: periodic measurements or observations of sentinel parameters according to specific care pathways; provision of social services to frail persons *Citizen side*: training/education on the specific health issues, the patterns of their evolution, the optimal behaviour and life style to recognize the risks and the changes in the situation
System performance	*Individual level*: prominence of one specific actor among the others, featuring high information exchange rates that deeply affect the network; more actors playing similar roles in different facilities
ICT solutions (regular attention)	*Professionals side*: registration of the patient on a health issue suitable list, with a synthetic description of a few parameters, to facilitate his/her periodic recall and the prescription of periodic tests; support from social operators in the documentation about the activities performed *Patient side*: management of a (web-based) Personal Health Record to store systematic self-made observations and measurements, the services to take part to a community of citizens with similar health issues to share information and experiences

3.2 Cardiovascular Diseases

To be sociogram		
		
Network cohesion	Standard deviation	Network centralization index
0.8095	0.3927	5.28 %
Cliques analysis (main clique)		
		
Meta-situations (non systematic needs)	*Care system side*: complex activities, with interaction among therapies, and not simple planning over a long temporal span *Citizen side*: decisions and responsibilities of citizen and informal carers are limited, clinical care mostly performed by professionals	
System performance	*Collective level*: specific core (couple of actors featuring all the possible connections); low rate of replaceability between "untied" facilities	
ICT solutions (tuning of care activities)	*Professionals side*: support to data capture and storage, support to decisions (access to up-to-date specialized knowledge, alarms on drug interactions, teleconsultations) *Patient side*: support to the informal carers in performing complex procedures, also with permanently operating home devices (telemonitoring)	

3.3 Diabetes Mellitus Type 2

To be sociogram		
		
Network cohesion	Standard deviation	Network centralization index
0.4636	0.4987	26.04 %
Cliques analysis (main clique)		
		
Meta-situations (systematic needs)	*Care system side*: multidimensional evaluation of the patient's situation, with the design of a shared plan (goal, role, responsibility and activities for each actor) *Citizen side*: periodic assessment (perhaps daily) of relevant parameters, also by home devices that may be directly connected to the network; tuning of the therapy according to the parameters	
System performance	*Network level*: strong need of cohesion around a "decision-making composite actor"; many possible connections observed; extended geodesics; high information exchange rates	
ICT solutions (stable care tasks)	*Professionals side*: update of the evaluation of the patient's situation, timely communication to other clinicians, management of a common agenda of planned care activities; *Patient side*: management of home devices (including their connection to the network), advanced modalities of communication with the professionals (email, telepresence, filling in web-based forms, etc.)	

4 Discussion

The boxes show out how the research hypotheses have been verified: as a matter of fact, for each class of pathology the match between the sociometric-related features and the timely ICT solutions envisaged was highlighted. In the first place, the star-like sociograms for thalassemia and cardiovascular diseases make clear the high level of network cohesion (>80 % density and <40 % deviation for both cases) [30]. The centrality of one or more main actors (the professional nurse as knowledge broker for thalassemia, and the "cardiologist/Contact Centre" couple as change agents group) can be pointed out as well (very low indegree percentage values) [30].

The care of the patient with thalassemia is a life-long commitment encompassing all aspects of care from birth to end of life. Comprehensive care includes a multi-disciplinary team, led by an adult or pediatric hematologist, with special interest in thalassemia, and splitted between a specialist centre and a number of satellite clinics [26]. The role played by nurse specialists, as network organization unit, stands as key contact for the patient and family, since nursing activity is called to provide support and guidance on routine care and assist in accessing local services [31].

The assistance network for cardiovascular diseases relies on a common organizational ground for patients suffering from either ischemic stroke, congestive heart failure, or hypertension, and emerges from the deployment of the Disease Management approach, that highlights the need in any case of coordination between hospital specialists and territorial healthcare organizations [32, 33]. Although the General Practitioner acts as the process owner of patient care path, the actual need for the Cardiologist to continuously monitotor the patient's vital signs can also promote the diffusion of telemedicine initiatives, based on the work of dedicated Contact Centres that make the actors involved constantly connected, with a more effective exchange of information, besides the possibility to answer promptly to any kind of emergency.

As for Diabetes, the realization of a sort of "information virtual ward" (specifically, in a territorial context) turns out as far more important than in the other two cases: the GPs, connected with the diabetic centre rather than with the diabetologist, aim to the key role of ideal co-leader of the diabetological team, as well as process owners of the integrated management of the pathology, meant to (1) coordinate and control the dynamics of communication and interaction/integration between the subjects involved in the diabetic patient care path; (2) promote, together with the central administrations, the activation of suitable systems for the strategic planning and the measurement of the corporate performances. The cliques analysis, in the end, leads to a higher number of subgroups, with smaller dimensions but a major proximity index, that is the capacity for each node to create ties with the other nodes, thanks to a redefinition of roles and social relationships, that sheds light to the potential evolution of the set of organizational routines. In such view, the strategic subject called to governing and monitoring the assistance processes, appears as more "expanded", and features as a "decision-making composite actor" [34].

It appears therefore clearly how for each subnetwork/pathology, the deployment of SNA offered a means for mapping and exposing the hidden channels of communication and information flows, as well as the dynamics of collaboration and disconnects between people in strategically important groups within an organisation [7]. Rather than focusing solely on the strength of individual relationships, SNA made us able to explore the types of relationships that condition communication and learning [35]. This can bring to work out an effective approach to find out the most fitting technological solutions for patients-related MICK: recognizing the complexity of the network can make in fact easier to get to tailored solutions for the management of information, communication and knowledge. In other words, the health issues of a citizen/patient can be led back to a specific "level of needs", that can change depending upon his/her personal lifestyle and surrounding context, and can be timely rendered by means of a network analysis.

Designing a network will therefore help to figure out, from time to time, the most suitable ICT solutions to deploy for all the kind of actors called to focus on the patient's care path: this implies that knowledge production and knowledge adoption and diffusion are not separate but intertwined phases, and makes eventually SNA rise as determinant of knowledge translation or information dissemination, but also as mechanism for inducing innovation [11, 36].

5 Conclusions and Future Prospects

The ongoing and future reorganisations of LTC processes, especially related to the increasing care recipient engagement for what concerns chronic diseases (i.e. with citizens becoming more responsible for their health status and lifestyles), asks for a 'systemic' deployment of ICT services [37, 38]. This phenomenon requires a strong political and managerial support, to enable cultural and environmental changes with a deep involvement of all the stakeholders, as well as to promote knowledge transfer and to support the diffusion of innovation. A greater effort is then requested to develop suitable strategies and models towards a stronger cooperation among the provider organisations and a better governance of care processes [4, 39].

In the overall, the present study contributes to understanding mechanisms for knowledge sharing among staff members insiede healthcare organizational units to permit more efficient and effective intervention design. A growing number of studies in the social network literature suggests that social networks can be studied not only as influences on knowledge translation, but also as possible mechanisms for fostering innovation spreading; in particular, our effort was meant to set forth that the use of networks for health systems can help unveil how technology can massively impact on long-term care by significantly altering the relations now existing among the various actors.

On the other side, social network analysis has traditionally focused on small, bounded networks, with 2–3 types of links (such as friendship and advice) among one type of node (such as people), at one point in time, with close to perfect

information. Moreover, many of the tools do not scale well with the size of the network or degrade gracefully with errors in the network. Recently, there have been a number of advances that extend SNA to the realm of dynamic analysis and multi-color networks [40], featuring three key advances: (1) meta-matrixes; (2) treating ties as probabilistic; (3) combining social networks with cognitive science and multi-agent systems. These advances result in a dynamic network analysis (DNA).

Moving from SNA to DNA means a change as for the number, type, complexity, and value of measures, not to mention the core issue related to the recognizing of appropriate metrics for describing and contrasting dynamic networks. Significant new research for the LTC milieu should be therefore needed (as well as suggested) in this regard.

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At the Boundary of Communities and Roles: Boundary Objects and Knowledge Artifacts as Resources for IS Design

Federico Cabitza

Abstract Boundary Objects and Knowledge Artifacts are physical entities that can be found in many socio-material settings in the organizational (and inter-organizational) domain, and share many characteristics. We make the point that an increasing number of authors mention either constructs partly unaware of their denotational meaning, i.e., the precise meaning it has been attached to them by their proponents to make them meaningful and useful. The risk is having these concepts lose their rhetorical, descriptive and applicative power. We contribute in stressing the importance to reconsider the denotational meaning in contrast to the metaphorical ones of these two concepts, for their role in the analysis of the functions of real objects supporting collaboration and knowledge work. This is done towards the more accurate elicitation of requirements for the digitization of these objects, as well as for the design and deployment of new IT artifacts in the organizational domain.

1 Motivations and Background

In the scientific discourse, its participants often use specialist terms and phrases to refer to specific recurring phenomena of the reality of interest. As natural language is intrinsically underspecified, we often observe a semantic drift in how different scholars use the same terms, even when their original proponents have given them rich characterizations and clear-cut definitions (e.g., [1]). To account for this drift it can be useful to distinguish between a *denotational use* of a term, when this is used coherently with the original proposal and hence it denotes a precise class of objects in the reality of interest with common characteristics; and an *extensional* or evocative *use* of the term, when conversely analogical and metaphorical writing is at play in pointing the reader to some feature of an object that is considered common with features of completely different objects (cf. metonymy). Extensional use is what lies behind the tightly related phenomena of the large diffusion of an

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expression (i.e., its academic fortune), cross-fertilization across even far-away disciplines, and the above mentioned semantic drift, by which a term proposed to denote something in a field ends up by connoting many different overlapping and possibly diverging meanings in other fields.

Our motivations to address this phenomenon in IS design research lies in the fact that we believe that, despite their diffusion (or maybe right in virtue of it), two terms are often used in the IS and HCI fields without paying due attention to their denotational use in the disciplines where they were first developed, i.e., sociology, anthropology, organizational studies and other humanities. These terms are Boundary Object (BO) and Knowledge Artifact (KA). We focus on these terms for their role in domain analysis, IT design and evaluation as reflected in the specialist literature.

Indeed, a simple query on Google Scholar shows that the term BO is mentioned in the above mentioned IT-related fields to date in almost 2,700 sources (approximately the 40 % of all scholarly occurrences); while KA occurs in 900 resources (of which more than 2 times out of 3 are closely related to IT). A Google Trends analysis can support the impression that interest in these two terms is steadily increasing in the last years (see Fig. 1).

We agree with Lee, who wrote that BO has become "a catchall [term] for artifacts that fit uncomfortably within the definition [which] may not be up to the conceptual heavy lifting that many of us have been trying to assign it [so as to] form a picture that is 'rather patchy and incoherent' [2] (p. 315)". Later, also Trompette and Vinck, editors of a recent special issue focused on the concept of BO, argued that this concept is often mentioned "in an anecdotal manner to refer to any artifact which is involved in coordination between actors or which is at the boundary of two worlds" [3]. Also Star herself has recently commented on this common attitude [4] by noticing how BOs' most known aspect, their so called "interpretive flexibility", "has often [been] mistaken or conflated [. . .] with the process of tackling back-and-forth between the ill-structured and well-structured aspects of [a social] arrangement" (p. 601).

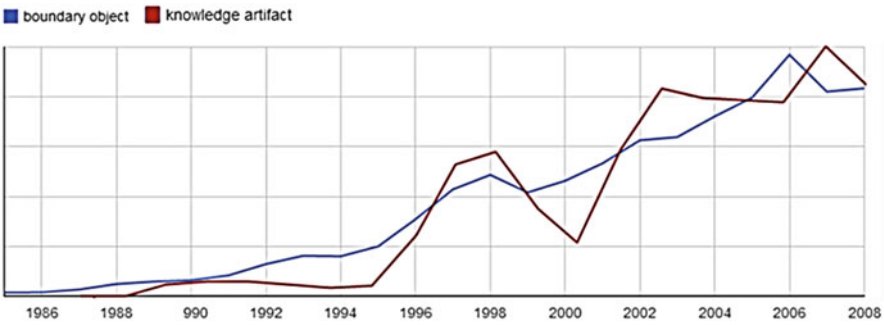

Fig. 1 Trends of occurrence of the bigrams "boundary object" and "knowledge artifact" in the Google repository of books written in English since 1985 (data available up to 2008; the bigrams are on different scales of percentage of the bigrams contained in the sample)

On the other hand, as also argued in [5, 6], KAs are mentioned even more frequently: whenever some material inscription has been advanced to the rank of knowledge asset or said to "codify" some notion or instruction. This inflation risks to make these oft-cited constructs become sort of cultural clichés that are mentioned more on the wings of tradition and imitation than for the sake of characterizing relevant objects of analysis properly, and that consequently these terms lose their power. With "power" we intend specifically the *rhetorical power* of a term, which regards the capability to frame and name relevant aspects of the reality of interest and create some interest around them; the *descriptive power*, which is related to the capability to describe those aspects both completely and accurately; and the *applicative power*, that is related to the utility of the term to enable and inform agency, i.e., in our case the design and development of IT artifacts and software applications in the organizational domain [7]. These three powers are tightly intertwined: the former two, regarding denotation, can affect the latter one, regarding IS design and evaluation, as also argued in [8].

For this reason, we stress the importance to reconsider the denotational meaning of BOs and KAs in contrast to their metaphorical one, for the increasing importance that these concepts have gained over time in the analysis of organizational (and inter-organizational) settings where they are recognized in real objects supporting collaboration and knowledge work. This recognition usually leads to the elicitation of needs and requirements for the digitization of these objects, as well as for the design and deployment of new IT artifacts supposed to act *either* as KA *or* BO. In what follows, we will make the point that *denotationally* KAs and BOs not only do serve different purposes, but also in different ambits, which call for different computational kinds of support and design principles. In particular, BOs inhabit boundaries *between* groups of people and support loose coordination, handover and interoperability between these; KAs support knowledge creation, circulation and acquisition, in short learning and innovation, *within and across* Communities of Practice, possibly mediating the interaction of people in different roles, hence the title of the paper. What follows is then a contribution toward the still hard challenge of digitizing/designing effective BOs and KAs in real organizations, a task that cannot do without understanding their affinities, differences and related requirements and characteristics.

2 Denoting Boundary Objects and Knowledge Artifacts

In this section, we present the main characteristics of Boundary Objects (BOs) and Knowledge Artifacts (KAs), respectively. In what follows, we will stress those elements that characterize these two kinds of organizational artifacts more clearly for the sake of presentation; however, we recognize that in real settings material artifacts can play multiple roles and show features and behaviors that are scholarly associated to either these archetypes. As a matter of fact, we could borrow the expression "intermediate objects" from [9] to address the common element shared

by BOs and KAs of being both material artifacts that are shared, exchanged and used by the members of networks and communities to mediate their interactions and achieve some goal in virtue of this interaction.[1]

2.1 At the Boundaries Between Worlds

Susan Leigh Star and James Griesemer coined the term "Boundary Object" (BO) in a 1989 article narrating of how people with wide-ranging backgrounds (and interests) came to collaborate to found a Zoology Museum at the beginning of the twentieth century. Concentrating on the many objects that were used and shared by these professionals, they focused on those objects "which both inhabit several intersecting social worlds *and* satisfy the informational requirements of each" (p. 508) [10]. What did they mean with the expression "intersecting social worlds"? "Social World" (SW) is a phrase that in the tradition of symbolic interactionism refers to informal forms of social organization that unite social actors in virtue of some common "world view" and mindset, as well as of the sharing of interests, perspectives [11] and even "constellations of practices" (p. 283) [12]. In [10], the heterogeneous actors involved (administrators, managers, researchers, amateurs), although different with respect to SW belonging, succeeded in organizing around shared purposes, reached mutual understanding by working around particular objects like dictionaries, diagrams, and catalogue forms, and came to articulate their own activities with those of others while maintaining their identity and keeping their initial point of view on the matter at hand [3]. In this setting, Star and Griesemer focused on the BOs that had a role in "developing and maintaining coherence across intersecting [but different] social worlds" (p. 508 in [10]) these actors belonged to. For these actors never created a "community of practice" around those BOs, these latter artifacts acted both as partial, unstructured and temporary bridges that "joined" the worlds involved, and as highly structured resources when used within one of those worlds [3]. From this seminal contribution on, BOs denote objects that "promote collective action and coherence of information from different sites" (p. 174) [13], and that act as devices enabling interoperability (cf. the concept of translation) and communication, like standards, classification schema, schematic process maps and structured forms.

Notably, 10 years later, Star (with Bowker) eventually changed the above mentioned definition by substituting the expression "Social World" with that of Community of Practice (CoP), [14, p. 297]. Did this change anything? Probably not a little, and for two main related reasons: one regards the subtle differences between SWs and CoPs; the other one regards the role of CoPs in organizations for the

[1] In this view, also the loose interaction between the writer of a book and its readers can be considered as a sort of asynchronous and distributed collaboration, and the book as playing the role of mediator in the unidirectional information exchange enabled by its reading.

creation and acquisition of knowledge. Thus first, what is the difference between a SW and a CoP? To consider a SW a "group of people brought together by a common commitment to collective action" is a licit simplification that is often undertaken in the design sciences (e.g., [15]), also because it was first proposed by Strauss himself with exemplificatory purposes [16] (p. 230). However, the concept of community, although less focused and grounded in a much vaster debate unfolding across multiple disciplines (e.g., [17]), precedes that of social world and encompasses a scope that is wider than the phenomena on which the agenda of symbolic interactionism focuses on, that is the internal forms of communication that bind "joint activities or concerns" together [18].

Wenger himself, i.e., the proponent of the term CoP, acknowledges affinities with the concept of SW, but purposely defined them at a more fine-grained level (p. 283) [12]. Indeed, a SW is generally intended to be more "diffuse and amorphous" [19] (p. 14) and more characterized by a "shared symbolization", a "shared interest" and a "common background". Conversely, people coming from possibly very different SWs can nevertheless belong to a single CoP in virtue of what they do *together* (i.e., their practices, including how to "learn" those practices) and of what they *produce* and *share* in those practices (the "content of practice") (p. 283) [12]. Thus, while membership in SWs "is a matter of affiliation", in CoPs it is a "matter of participation and learning", where ties between their members are stronger in virtue of frequentation, talk and that kind of acquaintance resulting from participating in the same enterprise and inhabiting the same "environment", what Addleson calls "social space" [20] and Nonaka, "Ba" [21]. This also implies that SWs are usually larger than single CoPs, but also more disarticulated, heterogeneous and physically scattered. For this reason, paradoxically, while a person adopting a certain mindset can be said to *represent* the related SW, CoPs cannot be reduced to any of their members taken alone: a SW is more an *abstraction of a social assemblage*, while a CoPs is a *concrete aggregate* whose members know to belong to it.

Therefore, putting BOs between CoPs instead of SWs means that the analyst should not detect BOs between individual stakeholders, nor between categories of people (i.e., roles), but rather detect them between groups of people and teams. In other and almost simplistic words, we can say that Star and Bowker purposely took BOs out of CoPs, to put them in-between. Moreover, the late definition of BO does not only restrict its denotational meaning but it also creates a link with the discourses regarding knowledge in organizations [22], in that "every practice is in some sense a form of knowledge, and knowing is participating in that practice [and] is defined only in the context of specific practices, where it arises out of the combination of a regime of competence and an experience of meaning" (p. 141) [12] and, that other way round, "knowledge is necessarily a social product [... that is] the messy, contingent, and situated outcome of group activity." (p. 48) [23].

2.2 Where Different Roles Meet and Work

Framing the denotational meaning of a KA is more difficult than for BOs. While the BO as a general notion has been introduced and defined by few recognized authors in the sociological discourse, the term KA has a more uncertain origin, and is often mentioned (much less frequently defined) in ranging fields, like Knowledge Management (e.g., [24, 25]), Librarian Sciences (e.g., [26]), Human Computer Interaction (e.g., [6]), especially CSCW [27, 28], Artificial Intelligence, especially in the Knowledge Representation field [5] and also in the Information Systems field (e.g., [29–31]). This explains the wide diffusion of the term and the cohabitation of different meanings, which all obviously relate to the role of artifacts in knowledge-related activities. The difficulty in providing one single definition of KA derives from the fact that across different disciplines there is not universal agreement about either what an artifact or, most notably, knowledge really is.

However generally speaking, two main approaches to KAs can be recognized in the literature: who emphasize the notion of knowledge-as-representations, and hence consider KA as sort of *containers* of these representations and, by metonymy, *carriers of knowledge*; and those who instead focus on knowledge-as-social-practice [32], and consider KAs as artifacts-for knowing [33]. In the former strand, KAs are defined as either "objects that convey or hold usable representations of knowledge" [30], as "vehicles for knowledge sharing" [5], as "defined pieces of recorded knowledge that exist in a format that can be retrieved to be used by others" [34], or as anything that "allows knowledge to be communicated independently of its holder" [35], like "documents, database entities, e-mails [. . .] books, memos, business plans in print, manuals, patent documents [30]. This enumeration justifies why this strand is also called "objectivistic" [29]: knowledge is in artifacts "independently of their holders"".

Conversely, the latter strand "conceptualizes knowledge in organizations not as context-free facts that people (or computers) may possess and transfer among themselves but as a set of practices that are embodied, socially shared, and learned as membership of a community" [36]; and it recognizes a KA in the "artifacts that are collaboratively created, maintained and used to support knowledge-oriented social processes [. . .] within or across CoPs" [6] and that hence become part of the community's "shared repertoire", i.e. the subset of routines, conventions and notions that the KA reifies. But what do we mean when we say that KAs *reify* social processes and experiences? Reification is a term that is usually used to convey a complex ensemble of related meanings, like representation, affordance, indication, evocation. In the context of knowledge and artifacts it means that structures and inscriptions are accumulated over time into KAs, and are therein subject to continuous (but usually slow) modification for both the effect and toward the aim of acting as effective "resources for action" [37] and for the tasks characterizing the community. That notwithstanding, reification is a term that should be used with caution to avoid oracular or tautological definitions, like e.g., those claiming that "KA are artifacts 'made up' of knowledge" [5]. This would be similar

to saying that hammers reify "how to drive nails" or that symbols reify the interpretation of their meaning: in a way, it would be like confusing cause and effect.

In a CoP domain, it can be rather claimed that, e.g., saddles and housing "enable and reflect" more and more effective ways to ride a horse, or arrows "enable and reflect" better techniques of bow shooting, or ploughshares to till the soil: that is that those artifacts ("*res*") have been built and modified over time to allow for more effective/efficient way to achieve a purpose and that, in a way, they represent how a community of, e.g., hunters and farmers, have improved their techniques through trials, errors, bad design experiments, serendipitously found good solutions, and lessons learnt. Thus, since "practice" is the concept that recurs in the most recent discourses related to both BOs and KAs, in what follows we will focus on the perspective of the Community of Practice, due to space limitations.

3 Putting Objects Together

In light of the short review of the denotational meaning of these two concepts made in the previous section, we can retain the following points: BOs are instituted *between* CoPs [10, 14] to provide a means for people to "connect in various ways to CoPs *to which* [they] *do not belong* [12] (p. 107, our emphasis) and "coordinate perspectives [...] for some purpose" or to solve a problem of common concern [38]. Automating a BO to this aim requires that such an artifact must be made *modular* in that "each perspective can attend to one specific portion" of it (ibidem, p. 107); *abstract*, that is able to "delete features that are specific to each perspective (p. 107); *accommodating*, i.e., capable to "lend itself to various activities" (cf. flexible interpretativity [4]); and *standardizing*, in that structured content serves only the aim to allow for coordination and interoperability, but each coordinating party has "only a partial control over the interpretation of the object, as locally it is used in ways that are unknown to the other side"".

Conversely, we saw that single KAs cannot be decoupled from their specific CoPs as they mediate knowledge-related practices that are locally situated and more grounded on the community's tacit knowledge [39] than on any explicit representation they hold. Automating a KA therefore calls for an appropriate requirement elicitation, local domain analysis, ad-hoc design solutions and, above all, for sufficient "slack" for end-users to maintain and evolve their tool [40] as this is necessary for the ongoing reification of the CoPs experiences.

However, if KAs are so peculiar of a specific CoP, how can the same KA be also found (or be shared) across several CoPs, as said in [6]? This is a subtle point that the expression "*within and across*" therein mentioned (see Sect. 1) just hints at but does not clarify. That means that each CoP exploits the common KA in its local and peculiar ways like a BO, but the KA *does not* act as a communication bridge between the CoPs, because it is an artifact supposed to support *situated* social practices of learning, decision making and innovation, i.e., knowledge-as-practice.

According to this argument, if a KA were to be used in two or more CoPs in pretty the same way *and*, at the same time, it also allowed for the sharing of information between these groups, we would rather be observing a further, transversal (*across*) CoP, that is defined by the interpretative practices of sense making and use of the KA, where different roles coming from possible different SWs create and share knowledge together.

In light of this point, let us take a couple of purposely simple examples. A group of friends decides to build a boat and have it sail after many trials and errors. If they eventually wrote a procedure on how to build a safe boat, this manual would be a KA only for the objectivistic perspective; conversely for the perspective we are focusing on now, that report would be a KA only if the builders had learnt or perfected their technique by writing the manual itself and drafted it beside the in-progress-boat. If the manual were eventually shared with another group of people, or these downloaded it from the Internet, this would not be a BO (because no alignment of practices or coordination would actually occur) and no knowledge would be "transferred" as well. However, the procedure *can* become a KA within the second group too, while they strive to become proficient in building a safe boat (and thus become a CoP). Only if the members of this second group succeeded, they could consider themselves members of a CoP of boat-builders, as the former group's members now are. We then subscribe what said by Henderson [41] that "information flow (let alone knowledge flow) is a myth. Information does not flow but rather must be constructed interactively by the human actors involved. Dealing with information is less like floating down a river and more like building a boat."

Another less didactic, but perhaps more informative yet, example can be taken from a domain that is often studied in the scholarly disciplines mentioned above: a hospital ward can be seen as a CoP whose members possibly inhabit different SWs, like the strictly medical SW and the care-oriented ones of doctors and nurses, respectively [42]. The patient record is the artifact that helps doctors and nurses collect facts about a patient, as well as formulate and test hypotheses and articulate interventions toward her recovery [43]: in so doing, caregivers perform knowledge work about the patient, but also about the effectiveness of a procedure and the progress of a pathological condition [44]. Care can be performed in collaboration with other teams (i.e., CoPs) of the hospital [45]. In this case, not every convention of record compilation and information retrieval that are peculiar to a ward team can be found also in other teams/CoPs [46]; however, a general picture of the patient and the overall care trajectory can be reconstructed across CoPs by members of a wider single hospital-wide CoP [47]. This phenomenon would be more difficult to detect across different hospitals or even regions and countries. In these cases, the record is just an information carrier that informs agencies in virtue of its standardized modules (e.g., the discharge letter), i.e., as a BO [48]. This is a case in which the same object (or IT artifact) can act both as a KA within a CoP, *and* as a BO between this CoP and another. Although here it would be improper to speak of "knowledge transfer", since only information is passed across the boundary, a third super-CoP can be at place, where sign interpretation is likely to yield the same conclusions.

4 Implications for IS Design

As said in the previous sections, the point to distinguish between BOs and KAs in the analysis of organizational settings should not be taken as either nominalist or pedantic. On the contrary, we made the point that recognizing what intermediary objects act as BOs, and what as KAs in an organizational setting means to recognize the main functions of those artifacts in that setting, and therefore to understand what the people therein involved either have developed or adopted to be supported in their tasks. This allows for a more accurate requirement elicitation in IT design [8] in that the analytic categories of BO and KA, when used denotationally, relate to different *general* design principles that both circumscribe but also help discover more peculiar and setting-specific needs.

Thus, in virtue of what we outlined above with no aim of comprehensiveness, we can summarize as follows: a BO is something that must be "well structured" for the members of a CoP, i.e., hold no ambiguity, convey clear meanings, comply with strict constraints and standardize outward communication, as clearly stated in [10, 14]. On the other hand, a KA is something that must be sufficiently open and flexible within a CoP to allow for the right amount of ambiguity, underspecification, redundancy, partial and temporary inconsistency and incompleteness that foster innovation and allow users to cope with the unexpected, as discussed at length in [6].

These differences are reflected in different functional and non-functional requirements. A computational BO, that is an IT artifact that is also used by the members of a CoP/organization to interact with the members of other CoPs, is still but a tool for *coordination*. Thus, an IT artifact that is used within a CoP to make routine work more efficient and that is also used to interact with members of other CoPs as a bridge in inter-organizational workflows must be sufficiently "immutable" to allow for the requirement of mobility [49]; therefore it must be designed to embed the conventions, policies and procedures that it helps to enact to these coordinative and interoperability aims (at least until these procedures are valid), so that it can pipeline activities effectively and make handovers efficient and sound: this is the case of workflow management systems and electronic structured forms for document exchange and handovers [2]. Conversely a KA is a tool by which CoP members learn and innovate their practices and techniques, or apply these to the world with ingenuity in an essentially contingent and unplannable manner, which could (and should) trigger the modification of the object itself and its content. A computational KA is then a tool supposed to foster socialization, idea externalization, the check of provisional solutions and the creation of the new in front of the unexpected [6]: these are all tasks that call for the general requirement of a higher malleability than it is requested (and sought) for BOs and for a greater modifiability of the structure, content and conventions by which members of the same CoP make sense of the artifact. Although examples abound of KAs in organizations, further research is needed to understand how computation can support effectively innovation and the "innovator training" and allow for a better appropriation by users of the computationally augmented artifacts supporting this kind of knowledge work [5, 6, 50].

5 Conclusions

Recently some authors in the IS community are advocating a partial reframing of the concept of IT Artifact, and a consequent redefinition of priorities in the research agenda of the IS field towards a more responsible consideration of the impact of these artifacts in the social settings where they are embedded [51, 52]. We concur with this new (or just renovated) concern for future-oriented technology analysis [53], and submit that anticipating "Socio-Technical" consequences must be part and parcel of the design of new artifacts that have yet to be instantiated. In this task of design, recognizing the main features that theoretic contributions have over time formulated on the nature of *material intermediary objects*, like BOs and KAs are, and being aware of the main differences existing between these archetypes of IT artifacts can reduce the risk that unnecessary requirements are addressed and potentially harmful constraints are enacted in instantiated IT artifacts. This attention for the analytical dimension of design could also make both designers and users better prepared to deal with the unintended consequences [54] that those artifacts will inevitably bring along.

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Part II
Smart Cities and Ecological Sustainability

Smart City Research as an Interdisciplinary Crossroads: A Challenge for Management and Organization Studies

Francesca Ricciardi and Stefano Za

Abstract This paper seeks to define the boundaries of Smart City research and to draw a map of the interdisciplinary community focusing on this emerging issue. To do so, we analysed the texts included in the websites of two major international Conferences on Smart Cities, and we used the Social Network Analysis (SNA) approach to examine a representative sample of 114 publications on Smart Cities. We found that Smart City research was hosted in Architecture and Social Sciences journals in the first place, but since 2007–2008 the interest in this issue boomed among Engineering and Computer Science scholars. Whilst there is a growing number of publications describing many ICT-enabled solutions for enhancing the competitiveness, sustainability and livability of cities, only few studies have addressed the organizational issues implied in such innovations so far. On the other side, our graph describing the interdisciplinary links within the 118 analysed publications shows that management studies occupy a strategic position within the interdisciplinary network of Smart City research. Then, Management and Information Systems scholars are given the opportunity to fill an important gap in an emerging stream of studies.

1 Introduction

In his seminal The City in History (first edition 1961, [1]), Lewis Mumford argued that if we examine the Fertile Crescent region as it was 7,000 years ago, we realize that it was not the size of the built-up area that distinguished the first proper cities from the many large Neolithic villages around them: it was their innovation capabilities, forwardness, competitive dynamism, which contrasted with the risk aversion, patience and repetitiveness of rural life.

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On the other side, the more a city becomes large and complex, the more it needs to develop further creative problem-solving capabilities, because it becomes more and more dependent on the successful networking of a wider area [2]. In other words, cities tend to be exposed to growing and unprecedented challenges of competitiveness and sustainability throughout time; and these challenges can be failed, with even fatal consequences, unless successful innovations are timely developed at different, interconnected levels.

Many scholars, in effect, highlight that the competition between territories occurs also at the level of the cities and surrounding regions [3]: different cities can prosper or fail within the same nation, depending on the extent to which each city is capable to innovate and evolve, as the astonishing case of the Detroit bankruptcy has recently demonstrated.

In the emerging world, indeed, cities are subject to world-wide competitive pressure to attract talents, investments and resources [4, 5]; they must struggle for their economic and ecological sustainability [6]; and their success depends on the satisfaction of innumerable stakeholders, with many different needs, such as bureaucratic efficiency, public space safety, affordable housing, landscape beauty, smooth mobility, etc. [7]. As a consequence, the cities that succeed in creating the conditions for "smart" innovation and adaptation flourish, whilst the others sooner or later decline.

This scenario is more and more influenced by ICT. In fact, the Internet is dramatically boosting many capabilities that correspond to the very raison d'être of cities: connection, sharing, confrontation, sense-and-respond, speed and cooperation.

Thus, each city poses big challenges to the people and organizations that directly or indirectly govern, plan, modify and manage it [8]; but, in order to successfully tackle such challenges, the solutions and theories developed by the traditional Management, Organization and Information Systems studies are not sufficient, since they tend to disregard the importance of the built environment for the people, institutions, organizations and networks rooted in it. Moreover, these disciplines have developed theories and tools for analysing single organizations or relatively small inter-organizational networks. Thus, if Management, Organization and Information Systems scholars choose the city as the level of analysis, they soon find that the complexity of the entailed phenomena is so high, that novel, strongly interdisciplinary theoretical tools and design capabilities are needed [9].

That is exactly what the emerging studies on Smart Cities are interested in. In these researches, scholars seek to investigate (and/or to enhance) the cities' capabilities to develop intelligent, i.e. forward-looking, innovations, taking into account the novel possibilities offered by ICT.

As our analysis will confirm below, this issue is strongly interdisciplinary, since it may involve economic studies (e.g. urban and regional economics), engineering studies (e.g. sanitation systems, energy management, building automation), architecture and city planning studies (e.g. mobility, sustainable buildings, housing solutions for the elderly and the disabled), sociological studies (e.g. social inclusion, knowledge communities, citizen empowerment), ICT and computer science

studies (e.g. cloud computing, embedded systems), and management and organization studies (e.g. e-government, health care systems, network cooperation studies).

The purpose of this paper is to describe the heterogeneous and interdisciplinary community of scholars committed to this wide issue.

More specifically, our Research Questions are the following:

1. What are the main journals that publish Smart City studies, and what disciplinary areas do these journals belong to? Is it possible to identify any emerging trends?
2. To what extent are the single publications on Smart Cities interdisciplinary? Is it possible to identify any emerging opportunities for Management/Organization Studies/Information Systems scholars?

2 Research Method

In order to answer our Research Questions, we decided to utilize the Social Network Analysis (SNA) to draw representative maps of the scholarly publications on Smart Cities. The first step was the identification of a representative sample of publications.

In order to minimize the exclusion of the most important and relevant writings from our sample, we chose to select the publications on the basis of a complete array of focused keywords. To do so, we decided to analyse the array of words used by the scholars involved in two main international Conferences on Smart Cities, identified through the Internet in June, 2013. The Conference "Smart Cities and Communities" (eu-smartcities.eu) was the first one retrieved by Google for the keywords "smart cities conference". The Conference "Smart Cities for Sustainable Growth" (smartcities2012.org) was the only one included in the paragraph Projects, Conferences and Research within the Wikipedia page "Smart Cities".

Both the Google engine and the Wikipedia contents are likely to mirror with sufficient accuracy the opinions of the users' community, so we felt authorized to consider the web sites of these two Conferences as representative of the language and concepts used by the international community of people focused on Smart City research.

We then utilized these two web sites to collect texts, including all the calls for papers, presentations, publications and keynote speeches available within the Conference sites in June, 2013. We analysed these texts through coding [10], and we found that they were quite consistent in identifying the following expressions as quasi-synonyms of "smart city": (1) "intelligent city", and (2) "smart community". Moreover, we found that "smart city" is sometimes spelled "smartcity".

Instead, we found that the expressions "digital city" or "e-city" are described in the analysed texts as related to a different concept, i.e. the presence of advanced computing and broadband communication infrastructures connecting government bodies, citizens and businesses of a city. This differs from the Smart City discourse, which although based on ICT-enabled solutions, usually shows a performance-

oriented approach, in terms of at least one of the following concepts: environmental sustainability, economic sustainability, competitiveness, and livability (livability is associated to a wide range of performance indicators, such as security, social inclusion, high-quality sanitation services, etc.). In other words, according to our text analysis, "digital city" and "e-city" could not be considered as quasi-synonyms of "smart city", but rather as a sort of precursor or forerunner concept.

On the other hand, we found that the expression "smart citizenship", although not really a quasi-synonym of smart city, could usefully be taken into consideration, since it implied the active role of citizens in the ICT-enabled innovation of politics, government and Public Administration.

We then utilized the quasi-synonyms we had selected, as topic in the query performed on ISI (Institute for Scientific Information) Web of Science (ISI-WoS) [11]. We conducted the searches and retrieved publication data taking into account the main three citation databases: Science Citation Index Expanded, Social Sciences Citation Index and Arts & Humanities Citation Index. They fully cover over 12,000 journals, over 150,000 conference proceedings, and over 275,000 books and book chapters, adding up to over 40 million searchable records. In addition, ISI Web of Science search seems to merge duplicate results when searching from multiple indexes, so there was no great fear of redundant data in the search results. Using "topic" as search field, the procedure searches the submitted words for each publication in title, abstract and keywords. On the basis of the selected quasi-synonyms, we execute on August 2nd, 2013 the following query:

```
Topic=("smart communit*" OR smartcit* OR "smart cit*" OR "intelligent
cit*")

Timespan=All years. Databases=SCI-EXPANDED, SSCI, A&HCI.
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As result we retrieved 118 writings, published between 1987 and the first months of 2013. Afterwards we performed an abstract analysis and we removed four writings from this list since they proved completely irrelevant to our research. At the end our set is composed by: 96 journal articles (included eight book reviews and 14 editorials), seven conference proceedings, and 11 others (categorized as "reviews" or "News Item" by ISI, but they are always journal papers). We adopted this set of publications as a representative sample of high-quality scientific publications on smart cities and we used it to analyse the evolution of this scholarly community.

3 Main Journals Publishing Smart City Studies: Emerging Trends

To answer the first Research Question, we analysed the journals and book series in which the writings we selected had been published. The list included 89 journals and book series; only 13 out of them (12 journals and a book series) had published more than one of the 114 selected writings, and only six journals had published more than two of the 114 selected writings. In other words, whilst a good number of journals include at least one paper on some Smart City topic, only few journals seem strongly dedicated to this issue. On the other hand, this situation may change soon, since the longitudinal analysis of the publication data reveals a dramatic increase since 2009 (see Fig. 1). Moreover also in 2013 the number of publications seems to follow the same trend, taking into account that not all the papers already published were present on the database when the search was done (due to technical update), and the year is not still ended. Finally, as the number of citations per year increases after 2009, also the impact of the set of selected publications seems to be relevant after that year.

We then utilized the UCSD Map of Science [12] to analyze the disciplinary areas of our panel of journals. We found that the stream of studies on Smart Cities is very dynamic from an interdisciplinary point of view. In fact, the first studies on Smart Cities (1987–1995) showed up in few journals focused on Architecture, Urban and Environmental Studies (classified within Earth Sciences by the UCSD Map) and Social Sciences. In the following years, the first Economics and Management journals appeared (classified within Social Sciences by the UCSD Map); but also some Engineering and Computer Science journals started publishing studies on Smart Cities. After 2004, the contributions in Engineering and Computer Science

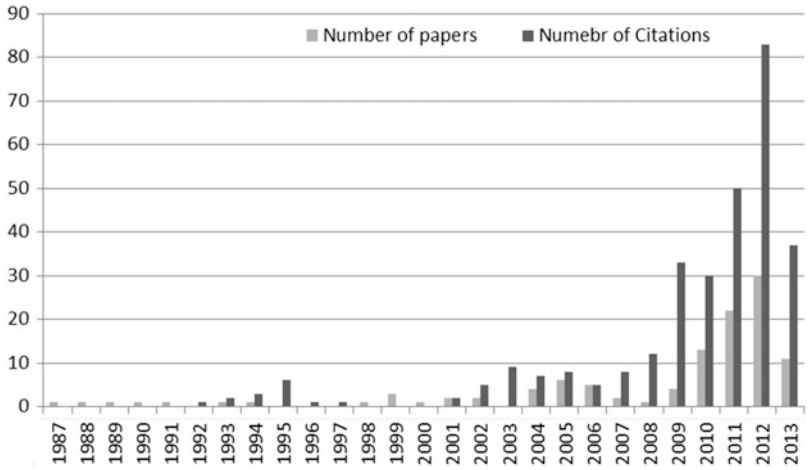

Fig. 1 Number of publications and citations per year. Data on year 2013 are partial

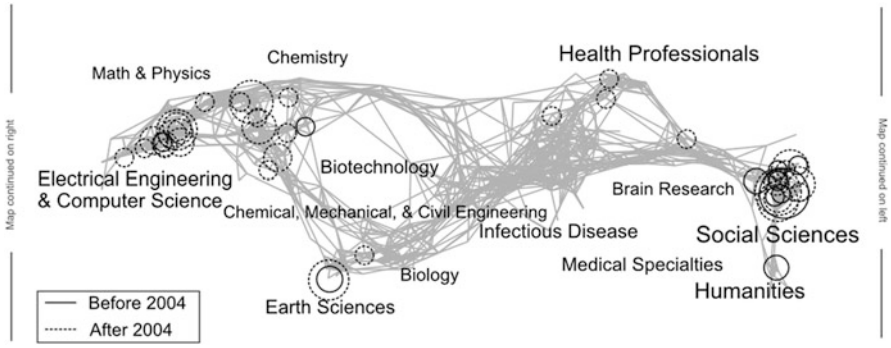

Fig. 2 Disciplinary distribution of the journals that published on Smart Cities

journals boomed. Meanwhile, between 2005 and 2007, three of the four most cited papers on Smart Cities were published [13–15], and immediately after, also the interest of Social Sciences journals in this issue increased further. Moreover, a number of journals focused on Health Care started publishing contributions on Smart Cities.

The disciplinary distribution of the journals that have been publishing on Smart Cities since 1987 is drawn in Fig. 2. It is based on the UCSD Map of Science, which depicts a network of 554 subdiscipline nodes that are aggregated to 13 main disciplines of science (e.g. Earth Sciences, Chemistry, etc.). The circles represent the records per unique subdiscipline. Each circle area is proportional to the number of fractionally assigned records. The map is drawn on a sphere, then the discipline on the right (Social Sciences) should be understood as linked to the discipline on the left (Computer Science).

In addition to the UCSD Map of Science, we also used the disciplinary categories of ISI-WoS to quantitatively compare the disciplinary areas involved in Smart City research. Each journal is associated with one or more disciplinary category within ISI WoS, then the sum of the percentages for a set of publications usually exceeds 100 %. We aggregated the ISI-WoS categories to create six wider categories, corresponding to the six disciplinary areas identified in the Introduction. We found that the journals that have published Smart City research so far are allocated in the following disciplinary areas:

1. Engineering, Physics, Chemistry: 62.3 %
2. Computer Science, Telecommunications: 35.1 %
3. Social and Political Studies: 33.3 %
4. Architecture, City Planning: 13.2 %
5. Management and Organization Studies: 12.3 %
6. Economic Studies: 8.8 %
7. Other: 7.0 %

4 Interdisciplinarity of Smart City Studies: Emerging Opportunities

The ISI WoS database classifies each publication also on the basis of the publication's own disciplinary area(s), independently from the disciplinary area of the journal. Many writings are classified as belonging to more than one disciplinary area; we used these data to identify the interdisciplinary links in our set of writings and to answer our second Research Question. For this aim, on the basis of the research areas assigned to each publication, we have designed the co-occurrence network in which:

- The node represents a research area and its size shows how many writings belong to that area (one at least);
- The edge between two nodes (research areas) exists if there is at least one paper associated to both of them (co-occurrence). The thickness of the edge is proportional to the number of the associations (number of papers that belong at least to both research areas).

In the figure it is easy to identify five main research areas (the biggest nodes): Engineering, Computer science, Telecommunications, Urban studies, and Business economics.

We found that there are areas with few, if any, interdisciplinary connection (including, for example, Physics, Chemistry or Geriatrics), whilst the network shows a sort of core where the disciplines are more densely linked.

If we look at the graph in Fig. 3 as if it was a geographical map, we can see that in the "south-western" part there is the Engineering area, including also Energy, Thermodynamics and Transportation. The Engineering area is strongly linked to the Telecommunications and Computer Science area, which in turn is the bridge between the Engineering area and the Social Sciences area, located more "north-west" in the graph. In the "north-eastern" part of the map, there is the area related to Public Administration, Environmental Sciences & Ecology, Urban Studies, and Geography. The central part of the network is filled by the disciplines of the business studies area, (called by ISI-WoS as Business & Economics and Operations Research & Management Science), and they represent a sort of bridge between the western part (Engineering area Social science area) and eastern part. Finally, a relevant triad (a triple of nodes with their ties) is present in the south-eastern part, related to Chemistry and Electrochemistry, but it is totally disconnected from the rest.

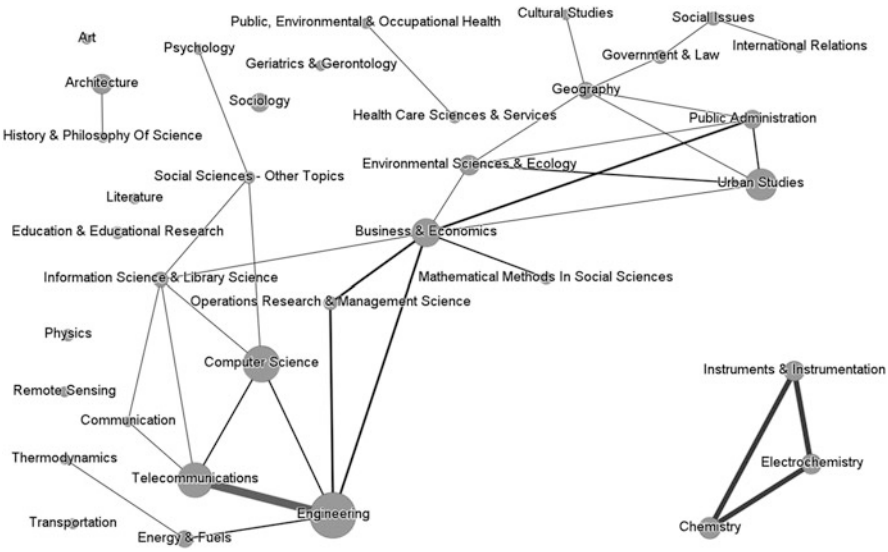

Fig. 3 Co-occurrence network based on research areas

5 Conclusions

On the basis of what arisen from our literature analysis, Smart City research is a vigorously emerging stream of studies. In order to better understand the boundaries of Smart City research and its interdisciplinary nature, we conducted text analyses on the contents of the web sites of two major international Conferences on Smart Cities, and we analysed a representative sample of 114 publications through SNA.

Consistently with our findings, we propose a two-fold definition of Smart City research, which consists in: (1) the study of ICT-enabled solutions aimed to enhance the city's competitiveness, sustainability and/or livability; and/or (2) the study of cities and surrounding regions as generators and/or implementers of ICT-enabled innovation, for improved competitiveness, sustainability and/or livability.

Our Social Network Analysis revealed that Management, Organization and Information Systems studies can play a pivotal role in Smart City research, since they fill the structural hole between the disciplines that have been the first to address the issue of city performances, such as Urban Studies or Public Administration, and the emerging technological side of Smart City research, involving Engineering and Computer Science on the one side, and Health Care studies, on the other side. Our research path will include, among other steps: (1) the enrichment of the dataset refining the keywords used in the query and considering also other databases (e.g. Scopus); (2) the investigation on the relationships among the publications present in dataset and their theoretical background always by using social network analysis tools [16].

Oddly enough, on the basis of our results only a minority of writings has addressed Smart Cities as a management issue so far: we propose that scholars take on this stimulating challenge.

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Urban Tableau de Bord: Measuring Smart City Performance

R.P. Dameri

Abstract In this paper, the author defines the roadmap to develop, test and apply a universal Tableau de Bord to measure smart performance in urban space. Smart cities are an emerging urban strategy, but they are moving bottom-up and therefore they lack of a governance framework, able both to support decisions and investments, and to evaluate goal reaching, performance, and economic and social impact of smart city. The Urban Tableau de Bord is a comprehensive framework designed to link quantitative and qualitative indicators to a specific smart city strategy. The roadmap explores the steps to pursue to implement this framework, selecting the most suitable indicators, using urban statistical data already available in the municipal database, designing a software to realize a Smart City Intelligence System and defining the scalability of this system to support also further enlargement of smart city initiatives.

1 Introduction and Literature Review: First Step

What is a Smart city? This concept is recently very used, but a clear and sound definition of Smart city still lacks [1]. During the latest few years, several cities all over the world have been starting to implement their own smart strategy, including several smart projects and initiatives. This trend could be described like a bottom-up movement, because technologies and private initiatives are the real source of this new urban strategy.

More than 700 scientific papers have been examined, published during the latest 20 years. The literature survey shows that there are two parallel trends regarding the study and analysis of smart city: the theoretical one and the empirical one. The theoretical field of study regards the aim to define, thanks to the deductive method, a concept of smart city able both to describe the worldwide scenario of smart city, and to drive choices, governance and investments in smart city implementation [2]. The empirical field of research regards the use of the inductive method to derive

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a theoretical definition of smart city studying the empirical implementation of smart city projects and initiatives all over the world [3].

However, even if a formal definition still lacks, we can design the conceptual boundaries of smart city and indentify the core components that define the smart city essence. "A smart city is a territorial implementation of ICT and other technologies to realize more sustainable, efficient and effective public and private services and infrastructures, to improve the quality of life and to reduce the environmental impact in the urban space" [4]. In this definition, we can find some main components: the territorial dimension, the technologies, the products (services and infrastructures) and the goals, that is, the citizens' quality of life respecting the environment. This definition is able to describe the behavior of cities trying to implement smart initiatives, even if they are not totally aware about their own goals, results and aims [5]. This smart city definition describes a general framework that is showed in Fig. 1; this framework looks like a Smart City value chain, where the delivered value is embodied into the reached goals.

Cities need to develop a performance measurement model, able to explain how smart initiatives produce value and how much they are able to generate public outcome for people. In this paper, the author defines the roadmap to develop, test and apply a universal Tableau de Bord to measure smart performance in urban space. This roadmap includes several steps, from literature review to empirical implementation.

In the first step, the international literature about smart city concept is examined and a sound Smart city definition is proposed, including smart technological instruments, goals and stakeholders. This theoretical concept is used to identify the expected results from smart city initiatives and projects and therefore to design the performance measurement indicator set. In this paper, to drive the roadmap description, the author uses the smart city definition presented in brackets in this paragraph and derived from the survey literature previously described.

In the second step, the author examines a number of international urban indicator sets. The examined sets are the most common ones developed by the most distinguished international authorities and research bodies, to extract the most useful

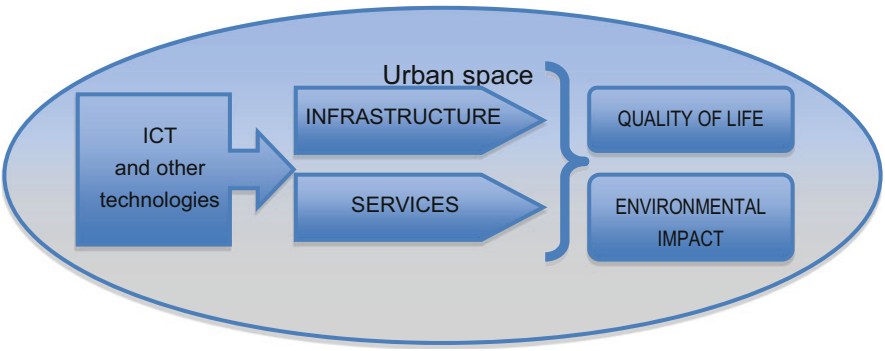

Fig. 1 The smart city general framework

indicators to measure the smart city performance. Using this method, the Tableau de Bord is built using qualified indicators already tested in the field.

In the third step, the Tableau de Bord is built, aiming at measuring the smartness of a city, both to evaluate the reached goals, and to support further decisions, investments and initiatives. To reach this aim, a Smart City Intelligence System software is designed, similar to a business intelligence system, to collect data, produce indicators, link them into a framework and support smart city governance process and decisions.

In the fourth step, the Tableau de Bord is filled up, using the statistic data from the urban database of an Italian city, already involved in a very large and deep smart strategy. This case study is useful both to verify the effectiveness and appropriateness of the indicator set, and to prepare the application of the Tableau de Bord to much more cities in Italy and abroad.

Finally, in the last step, the flexibility and scalability of the model is implemented, aiming at both applying it to cities of different dimensions, and to dynamically apply it during the medium term, taking into account the progressive maturity of the smart strategy and the evolvement of smart technologies and goals.

In the further paragraphs, the roadmap is analyzed and explained, and in the final paragraph Conclusions and further steps a critical note about the Urban Tableau de Bord is presented.

2 Smart City Performance Indicators: Second Step

As a bottom-up phenomenon, a smart city is a set of distinct smart projects and initiatives, mainly technology-driven, aiming at reaching each one its own goals. Generally, these goals are quantitative, technical ones, measurable thanks to some physical metrics such as CO_2 reduction, number of citizens using the broadband Internet and so on. However, none of these indicators is able to measure the smartness of the city, or the capability of all the initiatives and projects together to impact on complex goals such as the citizens' quality of life or the urban environmental impact [6]. For this reason, it is necessary to build a comprehensive evaluation framework, to transform analytical indicators into a synthetic performance measurement instrument.

To build a comprehensive smart city performance measurement framework is a hard task, especially because the smart city strategy is a multi-purpose, multi-technology project, involving several actors and requiring numerous initiatives. The risk is to create a overloaded set of indicators, a list of useless numbers unable to produce a good knowledge and awareness about the smart city strategy, its goals and its results [7]. To solve this problem, the author suggests to refer to the most qualified sets of urban quality of life and to select from these sets the most suitable indicators, to measure the socio-economic impact of the smart city strategy. That is, to apply the framework showed in Fig. 1, considering not only the quantity of

Table 1 The most qualified urban indicator sets all over the world

Name	Issuer	Contents
The Urban Audit	European Commission and Eurostat	A collection of quantitative information about the quality of life in European city
The European Common Indicators	Ambiente Italia Research Institute	A set of ten environmental sustainability indicators developed in conjunction with stakeholders
The Global City Indicators Facilities (*GCIF*)	The World Bank	A large set of measures mainly regarding the performance of city public services all over the world
The Quality of Life Reporting System (*QOLRS*)	The Federation of Canadian Municipalities	A set of indicators regarding social, economic and environmental trends in Canada's largest cities
The Cities Data Book	The Asian Development Bank	A very large set of detailed indicators regarding urban management and performance
The Global Urban Indicators	ONU	A set of measures and indicators regarding 236 cities all over the world to monitor the progress of UN-Habitat Agenda, the ONU program aiming at improving the quality of life in cities in developing countries
The Global Sustainable Urban Development Indicators	The White House Office of Urban Affairs	A set of indicators to measure USA's city progress in sustainable development

products—smart infrastructures and services—but also the quantity and quality of reached goals, that is, the environmental impact and the citizens' quality of life.

During the second step of the roadmap to build the Tableau de Bord, the most qualified urban indicator sets are analysed [8]. After a large literature survey, these sets are the following, summarized in Table 1.

Analysing these indicator sets, it immediately appears that they are very heterogeneous, both in the number of indicators, in their level of detail and in the covered topics. During this step, it is therefore necessary to harmonize the selected indicators and to connect each of them to the theoretical framework, considering goals and stakeholders to which the smart city strategy is addressed. This task is over the simple selection of indicators and it requires to build a veritable performance measurement instrument, as specified in the following paragraph.

3 Building the Smartness Dashboard: Third Step

In the third step to build the Tableau de Bord, the selected indicators are used to compose a smartness dashboard, with the aim to overcome the most severe defect of the indicator sets, that is, the lack of a comprehensive framework able to give a sense to numbers and metrics. It requires to introduce indicators into a

comprehensive vision of the smart city able to explain the relationship between the actions—that is, the smart projects and initiatives, the output and finally the outcome, that is, the obtained results.

In Fig. 1, we can identify the components of the smart city framework to link to the evaluation in the Tableau de Bord as follows:

– Used technology could be measured to assess the readiness of the city to be smart;
– Services and infrastructures are the output of smart initiatives and could be measured to assess the intensity of the smart city;
– The quality of life and the environment quality are the final result and should be measured to assess the outcome and the real impact of the smart initiatives and strategy on the citizens and on the urban space.

This classification reflects the S-curve model suggested by OECD to evaluate the ICT impact on people; it is dynamically adapted to the smart city context by the author [9, 10].

This dynamic vision of the smart city goals could be intersected with a contextual vision of the smart city, including all the stakeholders as argued by Dameri [10] and including citizens, public administration and companies or economic agencies. Also a topic vision could be further intersected, using the six dimensions of the Smart city explained by Giffinger [11]: Smart mobility, environment, people, living, governance, economy. Figure 2 describes the Tableau de Bord multidimensional nature.

Each of these dimensions crossing each other could generate a subset of indicators able to outline the reached goals and performance in a specific area: for example, it is possible to evaluate the outcome of the Smart city regarding citizens for the smart mobility, or the output of the Smart city for the Public Administration regarding the smart economy; and so on.

All these interpretative dimensions of the Smart city are able to give a mean to the indicator set: they are no more a list of numbers, but instruments to measure, assess and explain how much the city is smart and how much it impacts on the

Fig. 2 The smartness dashboard

stakeholders, in different fields and along the value chain of the smart city, from the output to the outcome.

4 Implementing the Tableau de Bord: Fourth Step

After defining the smart city dashboard and its dimensions, we have an empty box, able to guide our evaluation, but without evidence of its appropriateness. To verify the Tableau de Board it is necessary to implement it by filling up the dashboard. In this fourth step, the harder problem to face regards the availability of data to build and calculate the smartness indicators. Indeed, to collect data expressly for the Tableau de Board requires time, work and money.

However, to speed the empirical test of this evaluation instrument, it is possible to use the rich database available in the statistic office of the larger municipalities. In Italy, all the cities and especially the county seat have a very well built database collecting statistical data regarding several aspects of the urban life. This database is a veritable data mine, and the author suggests to use these source of data to implement the pilot case of the Tableau de Bord. The most important advantages of this choice are the following:

- Data already available on electronic support, requiring no further cost or efforts to collect them or very little ones;
- Long time data series, very useful to compare some impacts of smart projects or initiatives that appear in the medium term;
- Comparability between cities in the same countries (Italy for example, or France, and so on) as several data are collected to comply with national rules and therefore they respond to the same format;
- Wide set of available data, so that it is possible to choice the most suitable for the smartness measurement, in accordance with the selected indicators as explained in step 2.

There are also some disadvantages:

- Data have been collected for different aims and sometimes they are not coherent with the smart city framework;
- Data are comparable only at the national level, as the data format is generally different across different countries; however, in Europe Eurostat defines some data standard to be applied to several topic, and it permits a comparison at the European level, even if it is not possible at international level;
- It is necessary to take into consideration privacy constraints regarding public data.

Finally, advantages are more than disadvantages, especially to test the effectiveness of the Tableau de Bord and to eventually modify some dimensions, indicators and so on, to improve its capability to measure smart city performance.

To improve the efficiency and effectiveness of the Tableau de Bord, a software is suggested, able not only to collect data and to process them in order to calculate and to show the smart city performance indicators, but also to create a Smart City Intelligence System able to navigate into the indicators, the stakeholders, the topics and the evolution of the smart city and to respond to more specific needs for city government and investors.

5 Scalability and Sustainability of the Tableau: Fifth Step

The Tableau de Bord here described is a conceptual framework implemented into a software application, using a multi-dimensional set of indicators to measure the smart city performance. It is based on a theoretical idea of smart city, including several stakeholders, phases of implementation, and topics. This instrument however needs to be flexible, in order to respond to the fast evolution of the smart city strategy, supported both by the fast technology change and by the governance goals transformation. For these reasons, it is necessary to conceive a Tableau de Bord able to be flexible to accord with the smart city time evolution.

Both spatial and time flexibility should be considered.

Spatial flexibility aims to modify the perimeter and the number of indicator, according with dimensions or characteristics of the city using the Tableau de Bord. Indeed, spatial flexibility is conceived to adapt the Tableau de Bord in cities that could be very different each others; the smart city strategy is the more effective, the more is city-specific and harmonised with city goals and characteristics, such as dimensions, cultural heritage, economic and demographic profile, and so on. The software should include the possibility to switch on or off some indicators, depending on the strategy and the specific goals of each smart city program.

Time flexibility aims to support the time evolution of the Tableau de Bord, accordingly with the evolving of the smart strategy; it requires to develop a maturity model for the smart city, to support the change of the set of indicators along the time, depending on the progressive implementation of the smart city strategy and the different focus and goals pursued each time.

All these aspects should be for the first examined from the theoretical point of view, and finally implemented both in the conceptual Tableau de Bord and in the Smart City Intelligence System.

6 Conclusions and Further Steps

The measurement of Smart City performance is nowadays a strong challenge, because cities are involved and committed in large smart projects and initiatives, but they are not able to understand if their choices are the better ones and if their investments in smart programs are able to generate the expected returns, both for

the investors and for the citizens. The Tableau de Bord suggested in this work aims to furnish a universal, extendible instrument to local and central governments, able to support strategic decisions, to drive investments, to measure reached goals and to compare different smart solutions each others. Till now, the author developed only the theoretical instrument; further step will be to test the Tableau de Bord about Genova, one of the smarter city in Europe, at present involved in implementing a large smart strategy funded by three European Fund Projects. The use of statistical data from the municipal database could be the best way to reduce time to obtain a first evidence about the effective and appropriateness of this measurement framework and to understand if it is adapt to be applied to the worldwide smart cities.

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Understanding Different Organizational Roles in Smart City Platforms: Preliminary Evidence and Emerging Issues

Paolo Canonico, Stefano Consiglio, Mario Pezzillo Iacono, Lorenzo Mercurio, and Alessia Berni

Abstract This study presents preliminary evidence of an ongoing research on smart city platforms. In particular we investigate different organizational models and roles delivered by actors which are involved in such initiatives. We depart presenting the main issues nowadays at stake when smart cities are launched (technology, domain of application, stage of development). Then, we introduce our case studies of smart city applications in several countries. We analytically present the case studies and then analyze and compare them across multiple dimensions.

1 Introduction

In recent years many cities around the world are experimenting innovative ways of using digital technologies to enable competitiveness and sustainability. More generally, a smart city strategy aims at using technology to increase the quality of life in urban space, both improving the environmental quality and delivering better services to the citizens [1].

Smart cities are more and more considered as an interesting topic for organizational studies, since they bring about powerful implications in terms of issues such as coordination, incentives, design, behavior. In fact, smart city platforms typically

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require cooperation of a plurality of organizational actors to manage effectively collective interdependences through innovative ICT devices.

They are developed on an evolving technological and economic scenario which provides at the same time an opportunity in terms of new entrepreneurial initiatives, but also constraints in terms of the availability of financial and knowledge resources needed to fully grasp their potentialities.

In this paper we investigate different organizational models and roles delivered by actors in smart city platforms.

Initially we go through the main issues nowadays at stake when smart cities are launched (technology, domain of application, stage of development). Then, we introduce our ongoing research related to case studies of smart city applications in different countries. We analytically present the case studies and then analyse and compare them across multiple dimensions.

Our case study analysis takes place within a research project (*Orchestra—ORganization of Cultural HEritage for Smart Tourism and mobility and Real-time Accessibility*) meant to develop a set of technological and organizational solutions designed to foster the smart, sustainable and ecologically compatible exploitation of cultural heritage and touristic resources in the city of Naples.

2 Smart City Platforms and Stages of Development

According to Dameri [2]: "A smart city is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development".

Following Komninos instead [3, p. 6], the debate on smart cities belongs to the wider discourse on innovation and knowledge management; in fact, smart cities may be referred to as "territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management".

Sometimes, "smart" is used interchangeably with terms such as intelligent, wired and digital. A few authors have progressively criticized this approach claiming that "the disjuncture between image and reality [...] the real difference between a city actually being intelligent, and it simply lauding a smart label" [4, p. 5].

Building on Hollands, Caragliu et al. [5] claim that smart cities embody specific characteristics that include digital infrastructure and ICT usage, emphasis on business-led urban development, the social inclusion agenda via e-governance, concern with high-tech and creative industries in urban growth, the importance of

Table 1 A model of the phases of maturity in the development of integrated smart city applications

Field of application	Level 1 (informative)	Level 2 (final transaction)	Level 3 (high integration)
Orientation/ location	Map	Maximizing itinerary	Comparative use of location application to decide different uses on the platform
Tourist resources	Information service about point of interest	Tickets for attractions	Enlarged fruition and augmented reality through smart city services
Public transport	Timetable and availability of transports and parking	Tickets of TPL	Planning itinerary and purchasing of integrated tickets
Public administration services	Information about potential services	Informative transactions and records on demand	Integrated access to PA information in relation to platform services
Buying goods and services	Showcase	Purchase, payment system	Integration of merchant of different types
Customer loyalty	Business proposal	Booking, discounts	Integrated access to a wide range of services
Financial services	Information related to financial service	Purchase related to specific financial services	Electronic money to buy services of the platform

social capital in urban development and the inclusion of environmental and social sustainability.

In terms of ICT, smart cities are mostly related to the applications of ICT both as infrastructure (platform) and ICT usage. Digital network infrastructures are used as a means to improve economic and political efficiency and at the same time to enable social, cultural and urban development.

In terms of domains of application, in the following table we put forward a tentative taxonomy of potential fields in which it is possible to deploy smart city applications, and their levels of maturity, seen as different levels of integration, ranging from a purely informative role (diffusion of information) to a fully fledged integrated platform in which services are mutually embedded to deliver a high level of service to citizens (Table 1).

In order to classify the different smart technology solutions, Ondrus and Pigneur [6] propose a framework based on a matrix, using as dimensions of analysis the service providers and technology adopted. Payment service providers are financial institutions, such as banks and card issuers, or mobile network operators, or Independent intermediaries (such as transport operators). They also differentiate solutions based on the different physical support such as card (Cell I and III) and phone (Cell II and IV). In Fig. 1, we present this matrix.

In the following paragraphs we will be presenting our ongoing research and interpret different case studies using as dimensions of analysis both the stage of

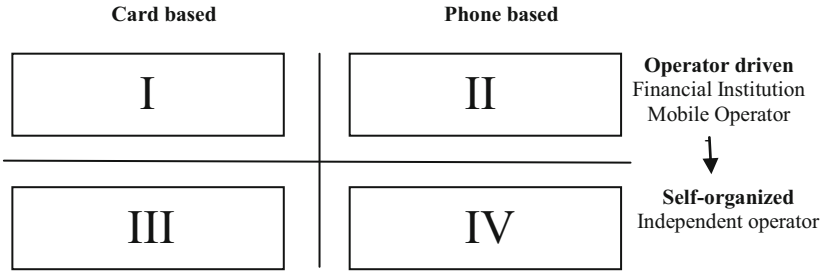

Fig. 1 Classification matrix

development of the smart city platform and the service provider/technology diagram.

3 Data Analysis

Our research was based on a qualitative investigation. As the case study approach refers to an in-depth study or investigation of a contemporary phenomenon within the real-life context, we set up six descriptive case studies, using theoretical replication logic [7]. In particular in this paper we selected six case studies, within a set of 15 international cases analyzed during a research project funded by the Italian Ministry for University and Research. We present the main evidences related to the cities of Songdo, Nice, New York, Amsterdam, Dublin and Barcelona. The selected cases are representatives of different governance structures, technologies adopted and phases of maturity in the development of integrated smart city applications.

The collection of empirical data was carried out using a plurality of instruments. Methods included: document analysis (relying on official sources of information), semi-structured interviews and participant observations (in some cities only). Fieldwork was carried out between September 2012 and early July 2013. The interviews were guided by a questionnaire of wide-ranging, including questions about: the governance model, the fare structure and the fare evasion, the transportation demand trend, the key element of the technological side, the problem of revenue distribution (clearing), the response of some managers to the application of electronic ticketing, and the socio-technical interplays within the network.

3.1 Songdo

The concept of Ubiquitous Computing Environment leads new paradigm change in urban space creation [8, 9]. In recent years, in Korea, new concept of Ubiquitous-

City (U-City) are at the core of urban development, trying to fuse high-tech infrastructure and ubiquitous information service into the urban area. It is also thought to bring innovations of urban functions, delivering information anytime, anywhere to anybody, via interconnected information systems and ubiquitous ICT solutions over the city. New Sondgo is the first U-City case, where ICT are applied during urban development rather just being applied in the city, suggesting that future urban planning will possibly set ICT as a priority. In particular, Songdo International Business District is a U-City underway from scratch on 1,500 acres of land along Incheon's waterfront, 65 km southwest of Seoul, and connected to Incheon International Airport by a 12.3 km highway bridge [10, 11].

The city is planned as a hub for international business, high-education, new high tech industries, and also port facilities: schools, hospitals, apartments, office buildings and cultural amenities are to be built in the district. Even if it is under continuing construction, there are signs that it is becoming an important business and residential hub. When completed in 2015, it is estimated that this $25 billion project will be home to 65,000 people and that 300,000 will work there. It is being developed as a sustainable city with more than 40 % of its area reserved for green space, including the park, 26 km of bicycling lanes, numerous charging stations for electric vehicles and a waste collection system that eliminates the need for trash trucks. The green infrastructure of the new city is to be enhanced by the provision of extra services that combine ICT as well as digital networks to ideally create harmony among the environment, society, and technology. Computers have been built into the houses, streets and offices as part of a wide area network. It can be described as a merge of information systems and social systems, where virtually every device and service is linked to an information network through wireless networking and RFID tags and sensors.

For example, crime prevention camera systems have been installed, as well as an Intelligence Traffic System that gives services to traffic controllers in Songdo from Incheon Traffic Information Center's Network, lowering operation costs. There is also a traffic light system that uses sensors on vehicle detectors. Moreover, citizens will use U-mobile services to get traffic and weather information through their smart-phones. The school zone safety services in particular will have a speed warning system and smart curb system in place for drivers, which use facial emoticons to send warning messages. The most eye-catching item from all these efforts has to be the U-disaster services. On top of the 68-floor Northeast Trade Tower a thermal imaging camera has been placed, in order to gather temperature, humidity, wind direction, and wind speed information all across Songdo. If there is a big fire or any pollutant agent being released, or significant changes to standard conditions, the system is able to sense this and alert the appropriate emergency vehicles like police cars, ambulances, fire trucks, etc.

In terms of organizational actors, relevant social groups around the development of u-city can be categorized into three groups: (1) initiators: Ministry of Information and Communication (MIC) and Ministry of Construction and Transportation (MCT); (2) industry providers of electronics conglomerates system (development companies, telecom equipment manufacturers and service providers, such as LG,

KT, and Samsung) (3) host municipal authority. Along with MIC, MCT is a major initiator in u-city projects with the main responsibility of implementing the infrastructure. They have been key players in pushing ahead nationwide u-city, coordinating the actions of both public (local) and private stakeholders.

3.2 Nice

Cityzi project (the integrated platform for mobile devices in use in Nice) started in 2005 in Japan with a research carried out by the third French largest mobile operator, Bouygues Telecom. At that time, in Japan, an "electronic portfolio" was already used for small payments, to buy train tickets and flights, travel titles. While the Japanese solution with proprietary technology was deemed unfit for European customers, Bouygues Telecom was convinced that the phone in the future could have been a payment instrument.

In France Bouygues Telecom had developed an interest in technology NFC in public transport (NFC cards were already in use in 35 cities) and payments (some French banks were interested in using NFC for small amount transactions). It was clear to Bouygues Telecom that, being only the third largest telecom operator, it would not have been able to begin such a demanding initiative alone. In addition, Bouygues Telecom had understood that banks and public transport operators prefer technical solutions that can be used by all operators and on all handsets. As a result, Bouygues Telecom shared all the information in its possession with Orange, the leader in the field of mobile telephony, to convince them of the importance of undertaking the NFC initiative, but, more importantly, to emphasize the fact that, in order to be successful, would have had to work together. In addition, the president of Bouygues Telecom—having previously worked for banking groups and for Visa, was considered as the right person to convince these players that it was preferable to collaborate rather than seek each proprietary solution. Also public transport operators, manufacturers and retailers joined this collaboration that in April 2008 would have given life to AFSCM (French association for the diffusion of technology NFC). When the French mobile operators began to collaborate to develop an understanding on NFC there were no technical specifications for NFC mobile services. The first step was the creation of these specifications. Between 2006 and 2008, tests were being carried out in the cities of Paris, Caen, Grenoble and Strasbourg. In addition to testing the technology, these pilot tests served to verify the assumptions about consumer behavior. Initially, young people were seen as the target segment for services NFC mobile since they are good users of public transport, spend most of their income, rather than save, and are accustomed to electronic payments. However, during the pilot tests it became clear that the focus was too limited. Bouygues Telecom decided to extend the range of age to include older people: the objective was the segment of the population that potentially buy phones equipped with technology NFC. The collaboration within AFSCM developed in a positive way. However, some problems took place between Visa and

AEPM (European Association for mobile payments), due to the potential overlap of interests between Visa and banking institutions. Only after several months of negotiations, the French banks and the telephone operators managed to convince Visa Europe of the value of the solution during implementation. After the pilot phase, the members of the AFSCM have realized that it was important to organize a final test before the launch; it was necessary to involve real customers that could have used phones to make shopping, offering them the download of real services to use.

Cityzi nowadays represents the main scheme of integrated services of mobility platform on ICT in Europe, through the use of technology NFC. Users can exploit their smartphones to access to a variety of services, including payments by credit cards, tickets of the urban network of TPL, discounts and coupons for shops, museum services, and information services on the city. The costs of the system are supported through installments paid by those who deliver a service. In particular, the actors which deliver services are charged a monthly fee. End users do not bear any charge. Veolia Transdev manages the entire network of local public transport. Therefore, the revenues from public transport are transferred to the transport operator diminished of the fees needed to conclude the transaction on the smartphone platform. The system operates in a similar way with regards to the payments made toward other types of retail outlets.

3.3 New York

There is an integration system in New York that mainly concerns transport and also partly relates to tourism. It is a centralised and relatively traditional system, run by a focal organisation (a transport authority) which also makes the technological service-related decisions and develops partnerships with financial or tourism entities (in the latter case, mainly through a series of discounts and agreements).

The institutional player that governs the public transport system is the Metropolitan Transportation Authority (MTA), that operates the subway, buses and trains to Long Island and to the north (it is the biggest local transport network in North America with 16 railways lines , 24 subway lines and 338 bus lines, providing these services for a population of 15.1 million people). The MTA is governed by a board of 17 members: five members, as well as the Chairman and Chief Executive Officer, are directly appointed by the Governor of New York. All members of the Board are confirmed by the U.S. Senate.

Since 1994, the MTA has introduced a payment system called the *MetroCard*, which allows passengers to use magnetic cards which "contain" the exact value of the amount paid to the seller or electronic machine. Each MetroCard is assigned a specific serial number and transactions are recorded in the Automated Fare Collection Database: in this way the typical features of a Transaction Processing System are associated with those of a Management Information System (which acquires and processes the data collected, aggregating and compressing it and submitting it

in systematic reports). In 2006, the MTA signed a deal with MasterCard to test a new payment system (*Paypass*), an alternative to the MetroCard, with RFID technology that allows direct payment by credit card. The contactless MasterCard card has an embedded chip and antenna. Placing the card near the specific reader allows a wireless exchange of payment details without there being any need to swipe the card or insert it into a terminal. Information regarding the account is transferred from the reader and processed through the MasterCard Acceptance circuit. Starting in 2010, this solution has been extended to smartphones via an application that uses Visa pay Wave. With both methods, in order to buy a ticket for a ride you just have use the "*Slyde to pay*" method, or place your iPhone or credit card near the device, a kind of contactless reader, capable of detecting devices in relation to "non-contact" payments. The processing of the purchase is then handled in the same way as any other Visa or MasterCard transaction. The purpose is to speed-up the movement of people to the line and thus minimise payment waiting time. Despite the widespread positive response from users, the test is still being carried out for only 28 stops along the Lexington Avenue line.

The MTA has also created several smartphone applications that are freely downloadable on the App Store platform, which allow you to always have a subway map at hand and calculate the time required to move from one station to another with relative indications (iTrans NYC and NYC subway). In addition, in 2012 the MTA completed its "MTA subway time" application that allows you to check the times of all incoming and outgoing subway trains and delays.

The MTA is developing an integration system, that from 2015 that will allow users to use the MetroCard as well as the bike sharing system (Citi bike), which has already been available in cities since 2012 with more than 10,000 bikes. The MTA is also developing the *Pay By Phone* system that allows citizens to pay for their parking via NFC technology. After registering your vehicle and your credit card on the service's website, you can pay for parking services by touching the relevant parking meter. This system is being developed in collaboration with the supplier of *Pay By Phone* mobile payments, a *Pay By Phone* company providing a service similar to other cities in the world, such as Miami, San Francisco, Vancouver and London.

Finally, from the point of view of integration with the tourism system, it should be noted that with the purchase of a weekly or monthly MetroCard you are entitled to a discount for the New York Pass, New York City and the New York Explorer Pass. It is a magnetic card that allows discounts of up to 50 % to visit the most important sights of the city of NY (the most complete one allows visits to 80 attractions). In particular, New York Pass is a "smart card" which allows you to visit more than 80 New York attractions without having to buy a ticket. The smart card records when and where you used the pass for the first time and displays the expiry date.

3.4 Barcelona

In Barcelona the integration system concerns all means of transports. In late 1990s, the organisation of the public transport system required the creation of a metropolitan public transport coordinating agency, the ATM, by local government. Barcelona ATM is the governing body for integrated fare collection covering the metro system, railways, tram systems, buses, and other forms of public transport within Barcelona and the 250 towns in the surrounding area. The agency coordinates approximately 74 transport operators in the Barcelona metropolitan region, which covers 3,240 km^2 and serves more than 5 million residents. More than 70 % of the journeys made by customers are paid with integrated tickets. In its function as regional mobility authority for the metropolitan region of Barcelona, the ATM is responsible for the following main functions: (1) drafting, processing and evaluation of the mobility steering plan; (2) issuing reports with regard to the urban mobility plans, the services plans and the evaluation studies of the mobility generated; and fostering the sustainable mobility culture among the public.

The Integrated Fare System was implemented in 2001. It is a zonal fare system (concentric crowns divided each into sectors): the fare zone is the area resulting from the intersection of 6 crowns and 33 sectors. Zone 1 includes the city of Barcelona and 17 other municipalities. Revenue from integrated tickets collected by ATM and paid monthly to all operators as established in the contracts. Private operators are paid according to concession contracts. Renfe is paid by ATM as a result of the increase in passengers following fare integration (limited in time).

ATM is now deploying a full NFC-contactless solution for ticketing, based on open standards and ISO-CEN compliant, which is intended to be a significant step towards the deployment of contactless services across the rest of Catalonia, as well as interoperability with transport systems in other regions. ATM is also building on the momentum of Barcelona City Council's TAP@GO project, which is enabling NFC-payments and municipal services within the city.

In other words, the ticketing system is based on data stored on portable devices that can be used as a bank card as well as a phone. This would mean moving beyond the ticket with a magnetic strip to employ the new contactless technology; the "bus or train ticket" would thereby become a "transport application", which can be used in a range of bank cards and telephones.

At the moment, the only integration with the tourism system is the "Barcelona card", developed by the Tourism de Barcelona Consortium. It is valid for unlimited journeys 2, 3, 4 or 5 days in the zone 1, and for free admittance in 25 touristic attractions. Furthermore the card includes many discounts in several museums, shops, restaurants.

3.5 Amsterdam

The OV-chipkaart is a contactless smart card system for all public transport in the Netherlands valid since 2011. The OV-chipkaart was first introduced to the Rotterdam Metro in April 2005. Since 2005 have been sold 6,800,000 cards on 16,500,000 people, 412 cards every 1,000 people. The OV-chipkaart is a collaborative initiative of many actors. Five large public Dutch transport operators: the main rail operator NS, the bus operator Connexxion and the municipal transport operators of the three largest cities (GVB, HTM, and RET). These five actors established the joint venture Trans Link System to develop and implement the card. The OV-chipkaart uses the MIFARE technology and three versions of the card are available: the disposable card, the anonymous card, and the personal one. The latter two types are valid for between 5 and 6 years, and can store credit. The disposable card, used mainly by tourist or by people who don't use often public transport, is thrown away after use. It can only be used for simple travel products and cannot be topped up with credit since it does not feature an electronic feature. The anonymous card, reusable and used by people who travel more frequently, has an electronic purse feature and the balance of the card is topped up at vending machines or at manned kiosks. The card is transferable and cannot be used to hold season tickets longer than a few days in duration. Anonymous cards are obtainable from vending machines, kiosks and a special website for a fee but can be used immediately, unlike a personal OV-chipkaart. The personal OV-chipkaart used by residents, is similar to the anonymous version though it is possible to store season tickets and other travel products of a period longer than a single month. Other advantages of the personal card are that it can be blocked if it is lost or stolen, and it can be set to automatically "top up" when the electronic purse credit drops below a certain level.

3.6 Dublin

The introduction of an integrated transport system in the Greater Dublin Area was part of a wider project. Transport 21 was an Irish infrastructure plan, announced in November 2005. Its aims to greatly expand Ireland's transport network encouraging use of public transport providing an integrated pricing system through the use of a smart card. A cost estimate of €34 billion was attached to the plan at the time. The plan includes continuing investment in Ireland's road network, along with investment in public transport in the form of buses and rail. In 2008 the Railway Procurement Agency, the State Agency of the Department of Transport charged with the development of light railway and metro infrastructure is appointed for the development of an integrated smart card system. The RPA has been a crucial role in implementing key rail elements of the Irish government initiative, Transport 21. It will be responsible for the planning, coordination and procurement through conventional means, and through Public Private Partnership. On 12 December 2011

was introduced the leap card, a form of integrated ticketing. The card can be used on DART, Dublin bus, Iarnród Éireann and Luas; minimum top up for the card is currently €5. The Leap card is the result of many years work by the Railway Procurement Agency to get an integrated ticketing-scheme for the public transport in Dublin city. Initially it only offers a pre-paid electronic wallet system to buy single trip journeys on Luas, DART/Commuter and Dublin Bus but there are plans to also offer week, month and year subscriptions on the card. It is also planned to extend the capabilities of the card. Introducing transfer rebates, monthly and yearly passes Even though the Leap card is usable on the bus, tram and local railway lines, it can only be used for single journeys within one of the systems. Any form of subscription/multi-day offerings are not (yet) possible with the Leap card: Even though tickets bought with the Leap card are cheaper than single journeys bought with cash money, using the Leap card for frequent travellers is more expensive than using the different weekly or monthly cards. There are plans however to extend the functionalities of the card, like the ability to "upload" a week, month or year-card to a Leap card. The Leap card uses a chip inside the card then can be read from and written to without direct contact: a so-called proximity card or RFID cards. As far as concern the actors involved in the integrated system. Several companies offer public transport in the larger Dublin area. Apart from several private companies transport is offered by Veolia Transport which operates with two tram-lines (Luas); Dublin Bus, the state owned bus service operating lines in the greater Dublin transport area, Iarnród Éireann, the national railway company (DART). In addition, Hewlett Packard Ireland/Payzone, IBM.

4 Discussion and Conclusions

By presenting the cases, it is possible to formulate some thoughts with regards to the different lines of development of the smart cities applications linked to the various spheres of citizens' lives, and more specifically, to local mobility and tourism.

In some of the world's major cities, the diffusion of integrated tariff schemes and mechanisms for using local public transport and having access to the city's major attractions has not yet been accompanied by a widespread use of smart city applications that employ ICT for shared and integrated access to a wide range of resources and services. However, in some cities, this potential is becoming clear, and players and services have been converging towards unitary platforms. Finally, in other cities, the situation is at an intermediate stage and some attempts in moving toward integration of the services offered have been successful.

Table 2 summarizes our empirical findings and highlights the level of complexity and progress for each of the situations surveyed, with respect to the following aspects:

Table 2 The level of complexity and progress for each of the situations surveyed

Case study	Integration	Task environment links	Number of actors	Collaborative partnership	Governance model	Intelligent technologies
New York	Medium	Medium	High	Medium	Low	Medium
Barcelona	Medium	High	High	Medium	Low	Medium
Dublin	Medium	Low	Medium	Low	Low	Low
Amsterdam	Medium	Low	Medium	Medium	Low	Low
Nice	High	High	High	Medium	High	High
Songdo	High	High	High	Medium	Medium	High

- Number of services covered by the smart city application evaluated (range of the application's portfolio of services);
- Number of connections to the reference environment (network of relationships with local stakeholders);
- Number of players involved (those who have played or play a role in the application under examination);
- Specificity of the inter-organisational coordination mechanisms (establishment of site-specific, administrative and trade agreements or relationships, or agreements that can be effortlessly replicated elsewhere);
- Specificity of the integrated system business model (design of a mechanism for economic and financial equilibrium of the platform, relying on more or less innovative logic);
- Presence of technologically relevant aspects (presence of cutting-edge technologies).

We identified low-medium-high categories relying on (respectively): scarcely significant presence (or no presence), basic/acceptable presence; advanced presence of the item under scrutiny.

Furthermore Fig. 2 also displays the positioning of the cases under examination in comparison to the other two key dimensions: the range of services offered by the *card* or the platform and the level of integration between the services themselves.

The different business solutions [12] are also positioned according to the scheme provided by Ondrus and Pigneur: therefore, starting with the characteristics of the *payment service providers* and the technological solution employed. As is clear, the majority of the cases are positioned in box III (bottom left—*Independent Payment Schemes based on Smart Cards*). In fact, these are "independent" solutions in which payment cards are issued by the entity that governs the integration system (the operator that plays the role of focal organization or authority), with a technological solution that is largely based on smart cards. In box IV (bottom right—*Independent*

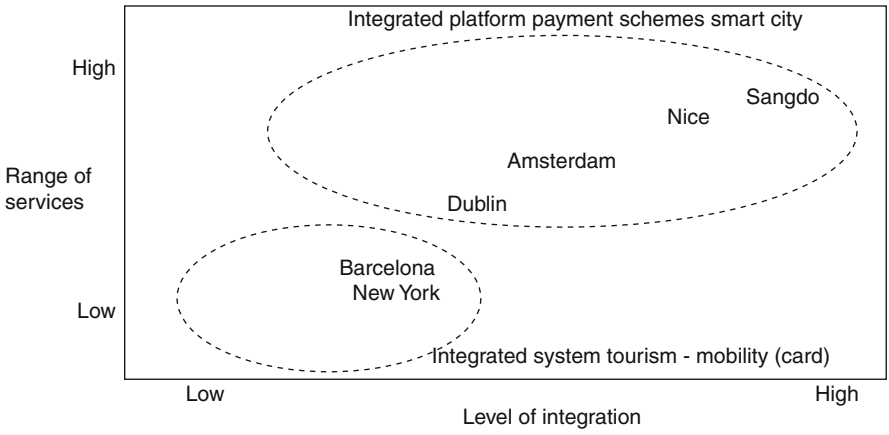

Fig. 2 The positioning of the cases

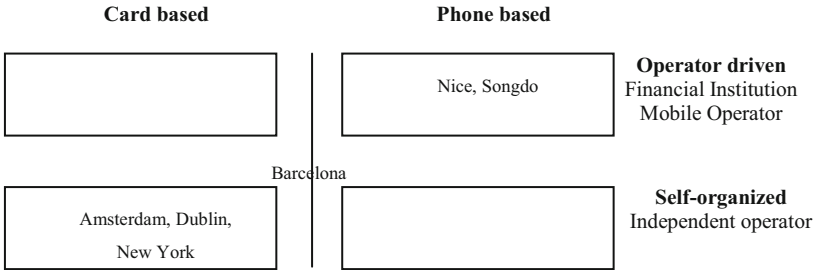

Fig. 3 The positioning of the cases according to the Ondrus and Pigneur model

Mobile Payment Solutions that employ Mobile Handsets), the most commonly used technology is NFC. Finally, in the box in the upper right, we find the cases (Songdo and Nice) where NFC applications have been activated through a partnership between financial institutions, a telecom and the entity that manages the transport service (see Fig. 3).

Ultimately the level of integration [13] (understood as the functional and technological convergence between the areas covered by a given smart city platform) is the frontier towards which the most advanced experiences are moving, in an attempt to offer citizens a variety of jointly designed services equipped with commercial synergies and aimed at homogenous groups of users).

Therefore, a model of the phases of maturity in the development of integrated smart city applications could be defined as follows.

- An initial phase of basic use of the features offered by smartphone technology to facilitate a purely informative access to application domains, such as localization, access to tourism and mobility resources, public administration services, and business and financial services.
- An intermediate phase of transactions that stand alone in their respective application domains without sharing databases and information resources.
- An advanced phase represented by those integrated platforms for joint delivery of synergically designed services connected to a multitude of application fields.

The following table illustrates the levels just described, highlighting their respective potentials (Table 3).

We can therefore provide a summary of useful observations for interpreting the future development paths of smart city platforms.

First, from the analyses carried out, it would seem that models for development of integrated systems for smart city tourism-mobility, while representing the frontier toward which to strive, are still under developed. In other words, the applications available in many cities are still at an embryonic stage and are not integrated schemes that are actually in use when compared to the city's mechanisms of use. Moreover, in many cases, "archipelago" logic of specialization seems to prevail, with the proliferation of separate and distinct applications for application domains rather than aiming towards integration.

Table 3 The positioning of the cases in comparison to the phases of maturity

Field of application	Level 1 (informative)	Level 2 (final transaction)	Level 3 (high integration)
Orientation/location	Dublin, Amsterdam	New York, Barcelona	Nice, Songdo
Tourist resources	Dublin, Amsterdam, Barcelona	New York	Nice, Songdo
Public transport	–	New York, Dublin, Amsterdam, Barcelona	Nice, Songdo
Public administration services	–	–	Nice, Songdo
Buying goods and services	Dublin, Amsterdam	New York, Barcelona	Nice, Songdo
Customer loyalty	–	New York, Dublin, Amsterdam, Barcelona	Nice, Songdo
Financial services	Dublin, Amsterdam	Barcelona, New York	Nice, Songdo

In more detail, in Europe there is a prevalence of anarchistic models while in Asia, a more centralized set-up prevails (for example, Hong Kong or Songbo). In many of the cases analyzed, we find a hurdle to spreading integrated schemes that interface with payment systems, probably due to the delay in collaboration between telephone services providers and global financial traders, still lagging behind in terms of the potential of smart city applications. The exception is France (and in particular, Nice) where the telcos have been a driving force in terms of launching platforms integrated with payment systems.

With regard to the spread of technologies, NFC, an integrated smartphone technology, is definitely the one most widely used for payments, despite discounting Apple's choice not to install NFC tags in their iPhone.

The development of inter-organizational relationships [14] with service and technology providers by local public transport companies has proved much easier, as there is a strong *incumbent* operator with consolidated experience as a catalyst for innovation.

The existing smart city applications also seem to show a very limited connection with the logic of *user generated content*. For this purpose, one of the central aspects should consist in the assumption that people should be able to participate actively in the design of the services and content that they are accessing. In fact, the delay in the synergy between *user generated content* and integrated mobility-tourism applications can essentially be explained by the limited availability of sensory, ICT and modelling infrastructures that can gather real-time input from citizens and adapt to those requests. This last point is perhaps the most challenging because it calls for flexible services, but it is the key to setting in motion the "*resource on demand*" mechanism to provide the service at the exact place in time and with the required intensity. In the early stages of application development, design tended to be self-referencing, generating a number of various initiatives with technical solutions and economic feasibility of an alternative rather than synergic nature.

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Social Equity and Ecological Sustainability: New Framework and Directions for the IS Community

Claudio Vitari

Abstract Ecological sustainability and social equity are among the United Nations' Millennium Development Goals—but, unfortunately, as the years pass, they are still far from being reached. But concern about these issues has made its way to industry and the IS community. IS play a central role in companies as they are cross-functional and have a strategic role in our current information society.

We argue that it is our responsibility, as IS scholars, to dedicate some of our research efforts toward environmental sustainability and to social equity, and that our teaching, our journals and our associations should also address these two objectives. This article proposes a new framework to facilitate the inclusion of both ecological sustainability and social equity concerns within the IS discipline.

1 A Human and Natural Challenge

Ecological sustainability and social equity are among the Millennium Development Goals officially established by the United Nations (UN) in 2000. Unfortunately several years have passed, but the goals originally set for 2015 are far from being reached. The UN Development Program affirms that environmental sustainability and social equity "*are critical to expanding human freedoms for people today and in generations to come. The point of departure is that the remarkable progress in human development over recent decades* [. . .] *cannot continue without bold global steps to reduce environmental risks and inequality*"—a conclusion that is supported by many indicators of our unsustainable ecology and social inequity, like the fact that Ecological Debt Day falls earlier every year, the annual increases in atmospheric CO^2, the depletion of our fossil fuel reserves, the growth in the numbers of both hungry and overweight people, and of revenue inequality.

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Ecological Debt Day (the notional day in the year on which the total resources consumed by mankind exceed the Earth's capacity to generate those resources in that year) fell on November 1st in the year 2000, but had moved to August 22nd by 2012. The annual growth rate of atmospheric CO^2 had increased to 2.36 ppm by 2010, raising the atmospheric CO^2 concentration from around 370 ppm in 2000 to 389.6 ppm in 2010 and reflecting the rate of fossil fuel depletion, with conventional crude oil production peaking in 2006. The number of hungry people in the world was 868 million in 2010–2012 (having been 919 million in 1999–2000), but even more people were overweight. In terms of comparative income levels, the number of 'high net worth' individuals increased from 7.2 million in 2000 to 11 million in 2011—but at the same time, 50 % of the world's population survives—somehow—on less than $2.50 a day and 80 % manage on less than $10 a day. These concerns have trickled through to industry, e.g. with increasing numbers of commercial organizations signing the UN Global Compact that requires them to embrace the UN's universal principles and run their businesses in globally enlightened ways. At the same time, Information System (IS) people have also become more concerned: some have responded to the issue of ecological sustainability via 'Green IT' initiatives [1]—although we argue that the contribution IS makes to ecological sustainability could go much further than Green IT [2]—while others have responded to the social equity issue via 'Free Software', although other IS initiatives exist in this area too [3]. Given this context, we question under what conditions and to what extent IS can increase ecological sustainability and social equity.

IS play central roles in companies, as they are cross-functional and have very high strategic value in contemporary human society—which has been called the "*information society*" [4]—and so are in a favorable position to help transform both business and society at large to make them more compatible with the aims of ecological sustainability and of social equity. The academic IS community has already received a call of duty to address ecological sustainability issues [1], but cannot afford to be only thus engaged: we argue that IS scholars should also enhance their sensitivity about social inequity and act in consequence. This article proposes the launch of an initiative for the IS community to engage in *both* ecological sustainability *and* social equity.

If "it is our responsibility, as IS scholars, to dedicate some of our research efforts to better understand the role of IS in tackling environmental sustainability" [3], the recognition that ecological sustainability cannot be separated from social equity—enshrined in the UN Development Program—extends our responsibility to dedicate at least an equivalent research effort for social equity. Such efforts should also be supplemented by teaching the potential of IS in both social equity and ecological sustainability, and IS journal editors and IS association leaders should get involved, too, in leading the radical change required to achieve these two ambitious objectives.

Our article first describes a novel conceptual framework which could facilitate the reflection and action needed for ecological sustainability and social equity. Second, we propose some research questions that need to be addressed and, finally,

advance some ways in which these issues could be incorporated in teaching, in publishing and in the activities of our academic associations.

2 IS Framework for Social Equity and Ecological Sustainability

IS are involved in organizations, organizations in society and society in nature—so IS are at the heart of our framework through which ecological sustainability and social equity could be tackled more effectively.

2.1 Nature and Ecological Sustainability, Society and Social Equity

Clearly, nature (N)—the world's material and energy, the necessary precondition for living organisms to exist—is the founding element of any consideration of ecological sustainability (ES). This paper takes the planet Earth as its reference system in thinking about nature, because the ecological sustainability issue is now a planetary issue [5]. Of course, our planet Earth is not isolated in the universe and the exchanges taking place with the outside are necessary for living. For example, Earth receives a huge amount of solar energy every day and radiates heat out into space. But for many other materials and energies, modeling the planet Earth as in isolation does not distort reality too much, in particular when pursuing sustainability.

Ecological sustainability describes the capacity of biological systems to remain diverse, robust and productive over time. Humans are part of these biological systems and need them to live—but at the same time we are changing them at an increasing rate, to the point where a shift in the Earth's biosphere is approaching [6]. But if humans need biological systems to live, the opposite is clearly not true: nature does not depend on humans for its sustainability.

If humans need nature to live, it is also true that they need to gather into societies to live successfully. A society (S) is an ensemble of people who share the same natural environment and enjoy patterns of inter-relationships, and who can benefit from living together, within nature, in ways that would not otherwise be possible on an individual basis. In thinking at the planetary level, our reference society is the world's human society, which shares the environment of the planet Earth.

Social equity (SE) is inextricably linked with society, and describes a social acceptability sentiment which is based on the recognition that all humans should enjoy equivalent human rights, without them necessarily being enshrined in specific laws and regulations. Social equity differs from social equality, in that social equity accepts some level of inequality when strict equality is not socially acceptable.

2.2 Organizations, Information Systems and IS Processes

Within society, individuals gather into diverse organizations (O)—social entities of humans who have collective goals which they pursue in interaction with the rest of society. For our purposes, an organization can be a government, a corporation or a NGO—so there are actually millions of them, which overlap each other: they all exist within nature, and within human society, without which no organization could survive.

Within organizations, information systems (IS) are particular structured combinations of material and energy, data, information, processes and people, which allow those involved in ISs (hereinafter 'IS people') to use the available material and energy to process incoming data (directly or indirectly) to produce information—the output such systems pursue.

These IS processes treat data in various ways (like storing, displaying, transmitting them) so information outputs have higher levels of abstraction than those of data inputted into the IS. Such processes can vary considerably, impacting the amount and the kind of data, material and energy inputs required and the amount and kind of material and energy—as well as of information outputs—the IS produces. The way IS processes are organized and performed determines the IS's effectiveness (doing the right thing) and efficiency (doing the thing right) [7].

For our purposes, we stress that this information output is always at the cost of some degradation in the organization's stock of material and energy. Although we distinguish data and information from material and energy, in physical terms information and data remain material and energy—they are just codified in ways that humans can interpret, so we give them special attention as informational level of an IS.

2.3 Data and Information Respectively as Informational Level Input and Output of IS Processes

Data (D) are the informational input of an IS, and are characterized by a being at a level of abstraction that is lower than that of the output (i.e., information)—although the level of abstraction is relative to a specific IS, so the information output of one IS can be the data input for another. Data can come directly from inside the IS (ISD)—for example where data are stored as software application parameters—or can come from within the organization (OD), as when, for example, data are the prices a sales manager sets, which are then stored in the IS to inform sales staff. Data can also come from society (SD)—for example a government's decisions about levels of value added tax on an organization's products—or from nature (ND), as when air temperature measurements need to be factored in. In practice, the data, required by the average IS, actually come from all these sources:

some parts from within the IS, others from the organization, from the society and, finally, from nature.

Information is the informational output of the IS, and it is characterized by being at a higher level of abstraction than that of the input data. As with data, information can remain inside the IS (ISI), for example when information about hardware failure is captured by the IS administrator to assist in that hardware's repair. Information can exit the IS but remain inside the organization (OI), for example when the sales manager receives reports about company sales, or it can exit the organization to the society (SI)—for example when stock price fluctuations are publicly broadcasted by stock exchange organizations. Information can also be directed to nature (NI), for example when instructions are given to police dogs. As with data, some pieces of information from the average IS remain within the IS, others are diffused as far as the organization, some are publicized in society and the final pieces transmitted to nature.

2.4 Lower and Higher Entropy Material and Energy Respectively as Physical Level Input and Output of IS Processes

In physical terms, the IS requires the input of a particular combination of material (such as hardware) and energy (e.g., electricity) in order to process data and so produce information. Beyond information, the IS also outputs some material, such as printed paper, and energy, such as heat. The processes that take place in an IS reduce the system's initial state of order, making the material and energy available in the system less effective or useful. The hardware input can breaks down, the electricity input is converted in heat, the white paper is covered with ink. Even if the paper, or other outputs, is recycled, the recycling system cannot be 100 % physically efficient. Moreover, anyway these recycling processes will require more input, for example energy. This new input, to bring back the IS to its initial state of order, raises the issue of the availability of the energy and material outside the IS, thus simply pushing the boundaries of the reference system out.

Entropy is the metrics measuring the level of system's state of order, i.e. its usefulness or effectiveness [8]. A system's entropy increases as its levels of order—and thus the availability, usefulness and effectiveness of its material and energy—decrease, and entropy decreases as they increase. The processes taking place in a system will increase or decrease its Entropy—but processes that take place in isolated systems can only reduce the initial system's state of order, i.e. raise its entropy level. The slower the processes will reduce the initial system's state of order, the longer the system will function over time.

Hence, concerned about Ecological sustainability, questioning the functioning of our systems over time is crucial. The isolated system perspective facilitates the development of thinking to reduce as far as possible this ineluctable increase in

Entropy. For our specific purposes, we talk about Lower Entropy (LE) when we refer to a system's initial state of order, and Higher Entropy (HE) when referring its later or final state of order.

The concept of entropy comes originally from thermodynamics, where is used to explain why some processes—like ice melting in a glass of water—occur spontaneously while others—such as the electrolysis of water—do not. By extension, it explains why processes in isolated systems are not reversible: ice and water do not naturally separate again without new energy input. The entropy in such systems can only remain constant (if nothing happens) or increases, if a process takes place. Although first used to describe energy issues [9], the entropy concept has since been applied to the physical world [5], to information theory [10] and also to economic processes [3].

Given this wide possible applicability, we decided to employ the entropy concept to the physical level of an IS, so that its material and energy inputs carry Lower Entropy (LE) than its material and energy outputs, which hence carry Higher Entropy (HE). The material and energy transformations of physical input into physical output that change (i.e., rise) the entropy level of the information system as a whole. Entropy levels relate to specific systems (here, Information Systems), but (as noted above) the material and energy outputs of one IS can be the material and energy inputs for another—so the HE outputs of one IS can also be LE inputs into another.

LE material and energy are the physical means employed to process data into information. Among the material, we will certainly find Information and Communication Technology hardware, and, typically, the energy will be electricity. As with the informational level, LE material and energy can be provided from within the IS (ISLE), for example when old hardware is reused for less demanding tasks; from outside the IS but still within the organization (OLE), for example when empty rooms are used to host an organization's data center; from the society (SLE) beyond the organization, for example when hardware and electricity are purchased from the market, or directly from nature (NLE), for example when the organization harvests photovoltaic electricity to run its computers directly. Thus, in more or less the same way as for data and information, LE material and energy are likely to come from a combination of sources: nature, society, organization and the IS itself.

Higher Entropy (HE) material and energy are the physical outputs of an IS, and their entropy levels are higher than those of its material and energy IS inputs. As with LE material and energy, HE material and energy can remain inside the IS (ISHE), for example when the heat generated by a central processing unit is diffused to adjacent hardware components; can exit the IS but remain inside the organization (OHE), for example when the heat from computers warms the air in offices; can exit the organization and impact society (SHE), such as when obsolete hardware is sold on the second-hand market, or can reach nature directly (NHE), e.g., when broken hardware is allowed to decompose naturally. As for other IS components, in general, part of these HE material and energy outputs remain within the IS, some exits the IS but remains within the organization, some is expelled into

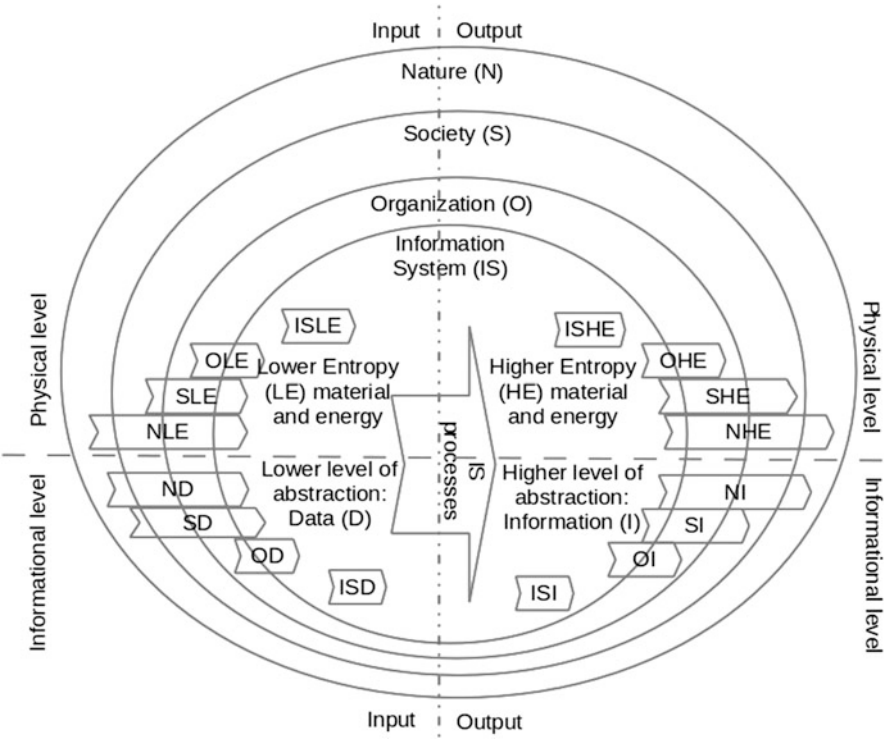

Fig. 1 The IS framework for social equity and ecological sustainability *Notes*: the figure shows that the Information System (*IS*) is within the Organization (*O*), and within the Society (*S*) and within Nature (*N*). It separates the two levels of the IS: informational and physical, and the Input and Output of the IS processes, too. In addition, it models how IS transform Lower Entropy (*LE*) and Data (*D*) into Higher Entropy (*HE*) and Information (*I*). Lower Entropy can come from Nature (*NLE*), the Society (*SLE*), the Organization (*OLE*), the IS itself (*ISLE*). Data can come from Nature (*ND*), the Society (*SD*), the Organization (*OD*), the IS itself (*ISD*). Higher Entropy can go to Nature (*NHE*), the Society (*SHE*), the Organization (*OHE*), or stay within the IS itself (*ISHE*). Information can be diffused to Nature (*NI*), the Society (*SI*), the Organization (*OI*), or, again, remain in the IS itself (*ISI*)

society, and the last portion is released to nature (Figure 1 shows the whole IS framework for social equity and ecological sustainability.)

3 Concluding Thoughts

The UN has called everyone to contribute to fulfilling the Millennium Development Goals, and to recognize that social equity is inextricable interwoven with ecological sustainability. While social equality is still not a reality, some people have more power than others to help reach these objectives. Through their research, teaching,

political influence and media exposure, scholars can play a key role in this ecological and social revolution, by including both environmental sustainability and social equity directly in our research, in our teaching, in our publication outlets and in our academic associations. About research, clear scientific evidences on the roles that IS have to play are still missing, but as far as IS are central in our society, we propose the IS community should develop a new research IS sub-field to tackle the subject and to show under what conditions and to what extent IS can increase ecological sustainability and social equity.

Beyond research, changing our teaching is imperative. Many higher education institutions have already created sustainability departments, or now include ecological sustainability on their curricula [1]—but fewer explicitly include the study of social equity. Educational institutions including both sustainability and equity on their IS courses are even rarer. While some initiatives specifying ecological sustainability in IS have been identified—such as at Baruch College, City University, New York [11]—we found none that consider the link between IS and social equity. Environmental sustainability and social equity must not be confined to ecology and public policy scholars respectively, but should be seized on as relevant study areas by the whole teaching community.

Finally, those IS leaders who embrace issues of ecological sustainability have been able to propose changes that have reverberated around the entire IS academic community [1], so the same could be true for those who take up social equity questions. In line with the previous pleas for giving ecological sustainability priority, we urge our leaders and our journals' and associations' board to guide IS colleagues towards the quest for social equity, too.

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Part III
Countries, Societies and Public Sector

Overcoming the Digital Divide in Europe: Let's Learn from Emerging Countries!

Giuliana Vitiello, Monica Sebillo, Genoveffa Tortora, Pasquale Di Giovanni, and Athula Ginige

Abstract During the last decades Europe has witnessed a societal progress supported by the adoption of information technology in daily activities. Yet, 30 % of Europeans have never used the Internet and lack digital skills to perform tasks which are expected to be carried out online. Bridging that gap is one of the key goals of the European Research and Innovation programme, Horizon 2020 (H2020).

Many developing countries are fighting against digital divide adopting successful strategies that rely on the use of mobile technology and smartphones to improve people's quality of life. In this paper we suggest that similar strategies could be profitably adopted in European countries to capture the 30 % portion of illiterates. We therefore propose a community-oriented mobile interaction design methodology to enhance digital literacy and inclusion in Europe, starting from a deep understanding of target users and of their needs.

1 Introduction

During the last decades Europe has witnessed a societal progress supported by the adoption of information technology in daily activities. Yet, 30 % of Europeans have never used the Internet and lack digital skills to perform tasks which are expected to be carried out online. Those people are therefore unable to get full participation in society. One of the key goals of Digital Agenda for Europe and the EU's new Research and Innovation programme, Horizon 2020 (H2020), is to enhance digital

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literacy, skills and inclusion to help all citizens get new opportunities and improve quality of their lives.

People who suffer from the digital divide are usually individuals either aged 55–74 or with low education or unemployed or inactive or retired, besides people with disabilities. The Internet usage to those people is often hindered by their reluctance to make use of personal computers, in a way similar to the case of emerging countries, where, although for different reasons, common people have little acquaintance with information technology and personal computers have never reached the masses. Many developing countries are fighting against digital divide adopting strategies that rely on the use of mobile technology and smartphones to improve people's quality of life. In this paper we suggest that the successful strategies adopted in those countries to foster e-development could be profitably adopted in European countries to capture the 30 % portion of illiterates. We report on some interesting case studies of countries where the e-development process yielded positive results, thanks to the use of mobile applications. We show that for all the proposed applications a deep understanding of the target users and their needs laid the basis for design.

Such understanding is only partly related to the specific problem domain, whereas common characteristics of the target community, such as social habits, culture, religious beliefs, etc. usually complete requirements analysis. It is therefore reasonable to divide the ethnographic study into two separate phases, namely the community profiling phase and the problem domain analysis. In this paper we propose to adopt this approach to address the challenge of fostering the use of mobile technology among 30 % of illiterate people in Europe. We argue that the overall inclusive design process would be expedited if designers can rely on existing knowledge about the users' socio-cultural context. As a proof-of-concept, we present the design of an application for a community of elderly people.

2 The Importance of User-Centered Design in Emerging Countries

The potential of mobile technology as empowering platform in emerging countries is widely recognized and several projects have started with the goal to create mobile applications that enhance people's quality of life [1]. In most cases mobile technology represents the means for information literacy, enabling people to use their mobile device to access and share information about their health, their environment, their education and work. However, the success of such projects primarily relies on the correct identification of users, of their context and of their requirements. In this section we report on a few case studies that prove the importance of a thorough preliminary analysis of the target users' needs, conducted through ethnographic studies and contextual enquiries, as central activities in User Centered Design (UCD) [2–4].

Case Study 1: The e-Sri Lanka Initiative In Sri Lanka, mobile technology is occupying increasing importance in society, while the era of personal computers has been skipped by most population. During the last 4 years, after the civil war ended, the government has promoted several initiatives with the goal of supporting social, cultural and economic development. One of the major challenges has been to find strategies to solve digital divide directly by the use of mobile technology and smartphones.

People from Government, private sector and other stakeholders have been firmly convinced that ICT may lay the foundation for a society with equitable distribution of opportunity and knowledge. ICT is therefore considered a key determinant for the competitive advantage of nations.

Rural Sri Lanka, where nearly 70 % of the population lives, is yet to profit from these developments. The overall goal of the so called e-Society Programme is to promote the innovative use of ICT to meet the social and economic needs of the most vulnerable communities in Sri Lanka; to develop approaches to scale up successful applications; and to empower civil society with affordable access to information, communication, and relevant local content. The Department of Agriculture (DOA) whose main focus is to "achieve an equitable and sustainable agricultural development through development and dissemination of improved agriculture technology" [5], invests heavily on the farmer community to attain this mission. Conducting awareness seminars, providing seeds and subsidiaries for a nominal cost and establishing new acts and regulations are some of such services rendered to the farmer communities. However, though such processes have been carried out for the last few years, still farmers face difficulties at different stages in their farming career causing frustration and poverty.

An international collaborative research program started in 2011, the Social Life Networks for the Middle of the Pyramid (SLN4MoP), considered Sri Lanka as the country where a pilot research study could be carried out with local farmers. The aim of SLN4MOP was to provide real-time information to support activities related to livelihood delivered by mobile phone applications targeted to meet the needs of people in developing countries [6–9]. The ultimate goal was to leverage the enormous reach of mobile phones equipped with myriads of sensors such as GPS and camera, to develop the next generation of social networks that not only connect people to people, but also have the capability of providing real-time, context-sensitive local information by aggregating data from a variety of sources.

A survey was conducted with local farmers, which let researchers understand the factors that may affect the crop selection phase, including weather, type of soil, and, most important, expected profit. From the survey, it was also learnt that farmers' knowledge is mainly gained from the practical experience coming via ancestors. Moreover, a social phobia and the competition among farmers limit farmer's awareness of what others grow to the cultivated land they can see directly in their neighborhood, whereas they are reluctant to get this information by formal communication.

The field study allowed to derive important claims about the observed domain specific issues, such as the very low level of trust among the members of the same community and farmers' reluctance to share basic information about their crop production. The solution proposed uses an ontological knowledge base to provide static information such as crop types, cultivars, suitable pesticides and fertilizer. Designers received strong endorsement and many suggestions from the farmers that took part in that field trial, meant to improving the application.

Case Study 2: The Yoza Project in South Africa The Yoza Project, originally known as m4Lit (mobile phones for literacy) was set out to explore the viability of using mobile phones to support reading and writing by youth in South Africa [10]. If mobile phones proved to be a legitimate alternative and complement to printed literature then their potential for increasing youth literacy practices of reading and writing in the country, and indeed the developing world, would be significant.

The pilot phase of the project was aimed to contribute to the understanding of youth mobile literacies. A mobile novel (m-novel) was written and published in September 2009 on a mobile website and on MXit. The story, called Kontax, was published in English and in Xhosa, the official language of South Africa. Readers were invited to interact with it as it unfolded—teens could discuss the evolving plot, vote in polls, leave comments, and finally submit a written piece as part of a competition for story sequel ideas. A few months later, a second Kontax m-novel was published. The uptake was tremendous, in just 7 months the two stories were read over 34,000 times on mobile phones. This proved to be a good strategy to build knowledge about target users and identify their needs in the context where they live.

Case Study 3: Illiterate Blue Collar Workers of Mumbai, India A study with illiterate blue collar workers from Mumbai, a large metropolis in India, was conducted to investigate the design of a mobile phone for illiterate persons [11]. The study was a single long term study that adopted an incremental design strategy and was divided into two broad phases: the first focused on the phone features and their relative usability, the second focused on the context of use and explored the possibility of an adaptive interface incorporating features considered in the first phase. In both phases, a needs analysis stage was followed by prototype development and testing. Needs were identified through semi-structured interviews and exploration exercises. A participatory design session was also conducted in the first phase to understand how participants perceived certain concepts. While different sets of participants were recruited in both phases, they had a similar profile. Most participants did not know their actual ages and gave approximations ranging from late teens to late fifties. They had come to Mumbai looking for work and kept in touch with family back in their villages. Most lived in a rented room with family members or friends from their village. Some participants had attended elementary school. They could not read or write, a few stated that they did not recognize numbers, but most could calculate by using their fingers. Most married women said that their husbands and children were educated. Also for this case study, analyzing

the life experiences, needs and expectations of non-elite and illiterate populations in developing nations was considered a primary activity for the design team. A thorough investigation into people's worlds, lives, relationships and concerns formed the basis for a correct design process, which involved the user throughout the design process and helped in progressively testing and fine-tuning the prototypes by exposing the shortcomings and strengths in the design.

Case Study 4: Mobile Phone Users in Kyrgyzstan Kyrgyzstan is a small, mountainous country, located in Central Asia. It has had economic difficulties since independence from the Soviet Union in 1991. This is not surprising considering that in 1990, 98 % of Kyrgyz exports went to parts of the Soviet Union. Unemployment is high: it is estimated at 18 %. As in the case of Sri Lanka, agriculture is a key sector of the economy, accounting for about a third (35.6 %) of the gross national product and about half of the employment. A design ethnography and a large scale survey conducted in Central Asia revealed three main findings:

1. Lack of easily accessible, reliable and free information about phone numbers,
2. Strong reliance on social networks to accomplish tasks in everyday life,
3. Strong upward trend in mobile phone use and ownership.

The ethnography findings laid the basis for the design of the MoSoSo (Mobile Social Software) information directory meant to allow people from Kyrgyzstan free access of information about phone numbers [12]. Again, the user requirements were generated and aggregated using User Centered Design methods.

3 A Community: Centered Design Approach to Address the Digital Divide in Europe

The previous case studies represent a small sample of the several mobile technology initiatives that have taken place in emerging countries in recent years. They show that the interaction design of mobile applications for a specific community of users, requires a deep knowledge of that community in order to establish appropriate usability requirements and tune the subsequent development activities.

In [9] we introduced a 'community-centered' design approach, where the social, cultural, technological and economic aspects of a community are used to formulate adequate usability goals and are taken into account throughout the design, prototyping and testing phases, so as to ensure the actual deployment of the application by users of that community. The method is based on the idea that relevant aspects of the community can constitute a bulk of knowledge upon which mobile interaction designers can build appropriate solutions to a specific problem. We now suggest that the same mobile design approach could be fruitfully adopted to enhance digital literacy and inclusion in Europe, starting from a deep

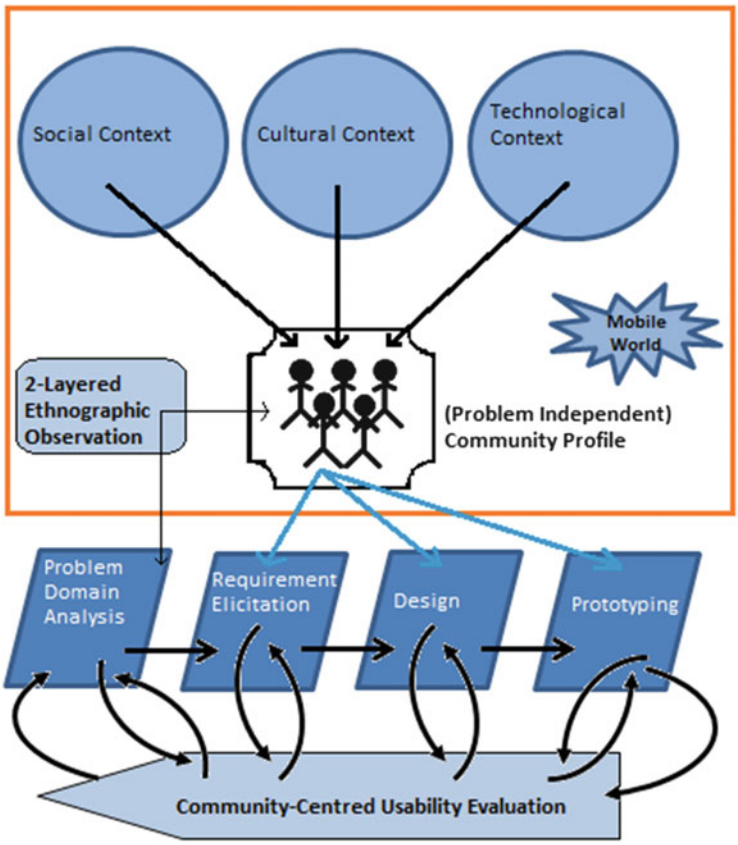

Fig. 1 Community-centered design

understanding of target users and of their needs. Figure 1 depicts the two-layered ethnographic observation method which characterizes the proposed approach.

The method relies on a set of guidelines for community profiling in the mobile world that can be used to separate the 'once-for-all' activity of community observation from the specific problem domain analysis.

3.1 Guidelines for Community Profiling in the Mobile World

The human/sociological/behavioral aspects which characterize a community of people are usually derived from the observation of their Cultural, Social and Technological contexts [13]. In the following table, we summarize the set of guidelines described in [9] for profiling a community of people using mobile devices, independently of the specific problem domain (Table 1).

Table 1 Guidelines for profiling a community of people

Social context (social organization, ethical beliefs etc.)	– Consider the social organization of the community. It "describes the collection of values, norms, processes and behavior patterns within a community that organize, facilitate and constrain the interactions among community members" [14]
Cultural context (language, Education)	– Consider the average cultural level of the target community. The designed interface should be easily understood by any stakeholder – Consider the average education level of community members. Never make a design choice based on incorrect knowledge assumptions about the user – In some regions (e.g., boundary areas) more than one language is spoken. So, consider the necessity to design a multi-language interface – Consider the semiotics of the target community. Signs, colors, symbols, metaphors can have different meanings in different environments
Technological context (available technology, familiarity with mobile devices)	– Consider the technological means available in the geographic area of the community. Also consider the average degree of familiarity with the mobile technology you are planning to use and the attitude to learning new technologies – Mobile devices operations often depend on remote services. Therefore connectivity issues are paramount in this context – The application should run on the majority of the devices available in the community. The world market trends can suggest some devices, however in specific communities particular technological ecosystems could be found – Consider the device models available to that community. Advanced devices may be present in rich communities (but this is not a rule), in some countries some models could not be available

3.2 Problem Domain Analysis

Differently from the traditional approach, the analysis of current practices aims at observing people from the target community within scenarios related to the specific problem domain [4, 6]. Therefore, the knowledge of the common characteristics of users and of their general needs with respect to the mobile world allows designers to focus on the following points:

– What is expected from the target mobile application? (what tasks are currently performed? what roles? what artifacts? what interactions?).
– Why do users need the application? (motivations for adopting a mobile application supporting current activities).

– What is the temporal context of interaction? (when is each task accomplished? when should the system be deployed?).
– What is the geographical context of interaction? (where do the observed activities take place?).

Requirements elicitation will come out of the answers to the above questions. In the following section we describe the community-oriented design methodology applied on a concrete application.

4 Experience with a Community of Elderly People

There is a general consensus about the usefulness of providing elderly people with technological instruments. In this section we briefly describe how our approach has been used to design a suitable mobile interface driving older citizens through dedicated e-government services provided by their municipality.

First of all we had to identify the general profile of a community made of elderly people who are still active. After that, we could focus on the analysis of the specific problem.

4.1 Community Profiling

We performed an inquiry on the elderly community of volunteers for school safety and other social services, known in Italy as 'urban grandparents'. This community is usually joined by retired people who are highly motivated in keeping an active role in society, and usually don't suffer from serious diseases, which may hinder their activity. In spite of their motivation, they are not able to use mobile technology in the way young people do, in fact being subject to a digital divide.

During the contextual inquiry we observed 25 people from the association of "Nonni Civici" in Salerno during their everyday activities. The goal of the investigation was to understand to what extent the members of this community use technology and how they are perceiving it. The observation and the follow-up interviews allowed us to identify the community profile independently of a specific problem to be addressed, in agreement with the proposed methodology. We present some relevant aspects of the community profile, which later impacted some of the design choices made for our test application.

- Cultural Context
  - Most urban grandparents are aged retired people, with some level of background education that allows them to learn rules and guidelines needed to offer their service. However, their way to perceive the surrounding environment is different from that of younger generations and their vocabulary does

not include all modern neologisms, especially those coming from the digital world, such as 'app', 'geobragging', 'spam' etc.

- Social Context
  - Physical and social activity is closely related to elderly people's well-being. Activating elderly people in an organized fashion may greatly improve their life quality and prevent the common disease of depression. Most urban grandparents are well-motivated in being active citizens and keen to learn the use of mobile technology.
- Technological context
  - The use of mobile technology by elderly people may allow greater social inclusion, greater ability to inform and better living conditions. However, the first hurdle is often represented by the user interface of modern devices such as tablets or smartphones. Such interfaces are in most cases quite complex to use for these people offering too much functionalities that lead to confusion and increase the fear of making mistakes. Therefore, designing for older persons requires special focus on possible sight limitations and other physical as well as cognitive constraints. So, for instance text editing should be minimized and large keys provided on the (possibly virtual) keyboard, displays should be not too small, text and icons should be large enough, menus should be user-friendly, available functions should be easily detected and enabled services apparent.

4.2 Problem Domain Analysis: e-Government Services for Older Citizens

In the proposed two layer design approach, the general profile of the target community represents a common bulk of knowledge, which may be shared for the design of different mobile applications conceived for that community.

As a concrete example, we briefly report the results of a contextual inquiry we carried out for the development of a suitable application drawer, displaying apps for e-government services installed on a mobile device as a support to older citizens (Fig. 2).

Being aware of the common characteristics of the community of users and of their general needs with respect to mobile technology, the design could be focused on the following points:

- What is expected from the target mobile application?
  - What government services are commonly used by older citizens?
  - What artifacts are currently handled by citizens for service requests?
  - What interactions happen between citizens and the offices involved?

Fig. 2 E-government services for older citizen

- Why do users need the application?
  - Motivations for adopting a mobile application drawer facilitating the access to e-government services.
- What is the temporal context of interaction?
  - When is each task accomplished?
  - When should the system be deployed?
- What is the geographical context of interaction?
  - Where do the observed activities take place?

To answer the above question a field study was performed, observing the activities of three offices of Salerno municipality, during repeated sessions. Citizens entering the office were notified that a survey was going on and were asked permission to annotate the service they were requesting and to observe the tasks they had to perform for the service to be delivered. Aged citizens were also requested to stop for a few minutes and reply to a small number of questions about the possibility to use a mobile phone to perform the same requests. We clarified that we wished to understand their expectation as well as their concerns with respect to a tool that might expedite the current procedures, through the use of a smartphone.

As a result of the study we were able to derive the set of application-specific requirements, which were combined with the knowledge about the community to which those citizens belong, in order to make appropriate design choices.

5 Concluding Remarks

The described community-centered mobile design methodology was initially conceived to address the societal needs of emerging countries, starting from a deep understanding of the target community and their needs, which we have shown to be a key issue in designing for people in those countries. We believe that the same approach could be adopted to reach the 30 % of Europeans, who have never used the Internet and lack digital skills to perform tasks which are expected to be carried out online. These include people with low education or unemployed or inactive or retired, besides people with disabilities. The Internet usage to them is often hindered by their reluctance to make use of mobile technology, in a way similar to the case of emerging countries. The experience reported in the paper with a community of elderly people in Italy demonstrates the feasibility of the approach and encourages further investigations to validate it, designing different mobile applications for the same community.

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Strategies and Policies to Avoid Digital Divide: The Italian Case in the European Landscape

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Abstract The digital divide is a phenomenon that affects, with different intensity, several European countries, including Italy. Public policies, at the European and Italian level, play a relevant role in reducing the gap among countries with different level of digital development, and need to cope with its multifaceted nature. Currently both a European strategy for digitalization and an Italian digital agenda have been issued as policies to tackle the problem. This paper analyses from an exploratory perspective the strategies and policies issued by the Italian government to address the digital deployment of ICT infrastructures in the public administration, specifically targeting the education sector, within the background of the European context.

1 Introduction

Information and Communications Technologies (ICT) infrastructures play a relevant role in the management of services delivered by public administration (PA). They enrich the service portfolio the latter might offer to citizens and, in the end, they also act as leverages for economic development. The digital divide, intended as the separation of a part of the population/industry that has access to ICT infrastructures, particularly the Internet [1], from the part that has not, raises a barrier for the achievement of these benefits.

Both at the European and Italian level, strategies and policies were issued to tackle the problem and to further develop and complete the deployment of crucial ICT infrastructures, like the Internet. Within the context of the European 2020 strategy, the Italian government recently issued a set of public policies to tackle the digital divide issue [2], and to make progresses in the digitization of the Italian public administration. To this regard the paper presents an exploratory case study

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discussing the Italian policies on the deployment of ICT infrastructure with specific reference to the education sector (i.e. schools and universities).

The remainder of the paper is structured as follows: Sect. 2 provides some remarks on the research design and the methodology, while Sect. 3 discusses the digital divide phenomenon under a theoretical point of view. The Italian case within the European context will be described in Sect. 4, and discussed in Sect. 5. Some final remarks conclude the paper in Sect. 6.

2 Research Design

This paper aims at describing and discussing the recent policies issued by the Italian government on the deployment of ICT infrastructures in the PA, and more specifically in the education sector. In such sector we include both schools (primary and secondary), and universities. The paper adopts a qualitative approach based on the case study methodology provided by Yin [3]. The information sources used to describe and discuss the case are mainly formed by official documents and bills released by the central European and Italian regulatory institutions. In reading and analysing the sources we particularly draw our attention on European policies and their application in Italy obtained through projects devoted to the innovation of the education systems and the introduction of ICT infrastructures.

3 Digital Divide and Public Policies

The digital divide problem is long documented [4, 5]. Traditionally the digital divide is defined as the difference existing between those people who have access to the Internet and those who have not [6–8]. With the diffusion of broadband Internet, and with the increased requirements in terms of bandwidth of web 2.0 technologies and modern software platforms, this traditional view of digital divide was eventually extended to the difference existing between those people who have access to a broadband connection and those who have not. Research on this phenomenon contributed to identify different forms of digital divide [9]:

- Problems related to the ability of users to understand and use technologies (technology literacy);
- Problems related to the ability of a person with specific physical disabilities to be actually able to access contents through technologies, and to be able to access ICT based services;
- Problems related to the more or less intuitive design of the technology that allows users to be able to use it to achieve its goals;

– Problems related to the functionalities and the features available in the technology that might, or might not match the desires of the user.

The digital divide is not only a pure technological phenomenon, but it also involves human and social related aspects [10]. While it is important to deploy technologies that, considering the above-mentioned aspects, can be used by as many users as possible, it is at the same time relevant to provide training and to build competencies to let users use them. IT literacy is indeed seen both as a form of divide, and as a source of the divide itself [11].

The presence of individuals that are in a condition of divide with regards to technology obviously create a social inequality issue [11]. More important than this, it also has consequences in terms of competitiveness of a nation or of a territory [12], especially in a globalization perspective.

Currently different views on the digital divide are available in literature. A first view concerns the basic distinction between those who have and those who have not access to technology, which corresponds to the traditional definition previously mentioned. In this view the focus is on the technology itself, and the possibility for people to access it. According to this view the reduction of the digital divide requires actions to increase and improve the availability of the technologies for people [13, 14].

A different perspective moves away from this dualistic view and treats the digital divide as a multi-dimensional phenomenon. Under this perspective is not the access to the technology that is relevant, which in this view is somehow taken as granted, but it is more important to focus on the way people make use of the technology [15] and on other aspects, like for example IT literacy [16, 17]. According to this view, actions devoted to improve the availability of the technology will not tackle the digital divide problem, since this is not technologically related, but user related.

Finally a third and different view also encompasses the presence of generational differences in the digital divide phenomenon [18, 19], recognizing that different groups use the technology in different ways [20, 21], and that among these groups a certain difference in their use behavior can be seen. Furthermore, this view moves away from the technology, and takes into consideration human and social aspects.

4 Public Policies for Digitalization

This section describes the case of the public policies for the deployment of ICT infrastructure in the public sector environment. The section is divided into two subsections. In the first one the European strategy for digitalization is described, while in the second one the application of such a strategy made by the Italian government through its policies in the education sector is described.

4.1 The European Strategy

Following the Lisbon strategy the European Union started the Europe 2020 initiative to foster and incentivize the digitalization of PA. The current financial crisis has challenged the achievement of the objectives of the strategy, that recently, re-oriented towards the following three priorities: (1) a knowledge and innovation based economy, (2) a sustainable growth through a green economy, (3) a growth through incentives to employment, social, and territorial cohesion. These priorities imply investment plans towards education, innovation, digital society, energy, mobility, competitiveness, and social inclusion, which are promoted by the European Union, but have to be put into action by individual member states.

The strategy underlying these priorities is the European Digital Agenda [22], which aims at developing a digital single market to generate smart, sustainable, and inclusive growth in Europe. This ambitious objective is contrasted by several obstacles: the presence of fragmented digital markets, the lack of interoperability, the rising cybercrime and risk of low trust in networks, the lack of investment in networks, the insufficient research and innovation efforts, the lack of digital literacy and skills, and the missed opportunities in addressing societal challenges.

The achievement of the objectives of the European Digital Agenda will require a strong commitment, not only to the government of the European Union, but also to the member states. Investments in research and innovation, the diffusion of ICT literacy, and the deployment of smart technologies for society are seen, amongst others, as necessary actions by the European Union to achieve the objectives of the Agenda.

4.2 The Italian Public Policies

The deployment of digital technologies for PA in Italy falls under the broader policy for national development devoted to reach the European targets aiming at creating a knowledge based economy. The European Digital Agenda was signed by all member states in 2010, and applied in Italy in 2012 with a decree of the Ministry of Economic Development known under the name of “Growth 2.0”. This decree specifies the conditions for the application of the European digital agenda and more precisely on the topics of: digital identity, digital PA, open data, digital education, digital healthcare, digital divide, electronic payments, and digital justice. Concerning this strategy, evidences from OECD reports [23] certify that the Italian digital eco-system cumulated relevant delays, especially on the infrastructural side, also considering that no significant changes were made since 2006 to it.

To coordinate the action of the central and local administrations in the endeavour to achieving these objectives, the Italian government created a steering committee for the digitization of PA divided into six different workgroups corresponding to six strategic axes of intervention:

- Infrastructures and security;
- E-commerce;
- E-government and open data;
- Digital literacy and competences;
- Research and innovation;
- Smart cities and communities.

This steering committee acts with the regulation power for the application of the European digital agenda in Italy. With regard to the interest of this paper, the main policies for the deployment of ICT infrastructures in the education sector are contained in the e-Gov 2012 plan, the Growth 2.0 plan, and the national plan for a digital school.

4.2.1 The e-Gov 2012

The Italian government in 2009 started the e-Gov 2012 plan as a part of a broader action targeted to innovate and modernize the Italian PA. The plan had the merit to contribute to diffuse ICT technologies in schools and universities with specific regard to the improvement of administrative processes, the promotion of transparency and efficiency, and to the strengthening of PA's capability of offering better services to citizens. Cornerstones of the e-Gov 2012 plan were the initiatives to foster the deployment and the development of ICTs. In total 539 actions were executed in a programme composed by about 80 projects developed by local administrations.

With regards to the education sector, the plan contributes to diffuse Internet technologies in schools and universities to provide better services to schools/universities, but also to families and students. In particular at the primary and secondary school level a set of priority projects were started for:

- Offering all schools an Internet connection;
- Including digital contents into education processes, also involving publishers;
- Offering a set of web-based services to ease the interaction between the families and the schools through the use of several different digital media;
- Creating a public on-line registry in which performance evaluations of single schools shall be made transparent and available to citizens;
- Providing students with a personal computer as a personal tool to support their learning activities.

A brief overlook of the actions performed within the activities of the e-Gov 2012 plan is available in Table 1.

At the level of the universities the main actions were related to the use of the Internet and of digital media to promote administrative simplifications. All universities had to be provided with a set of digital services for faculties, students, and technical and administrative personnel to reduce paper based documental

Table 1 State of the e-Gov 2012 plan [24]

	2009	2010	2011	2012	Tot. prog.
Networked schools					
Connection of plexes	11	14	14	14	53
Connection of classrooms		5	15	20	40
Intenet in classrooms	5	10	10	10	35
Digital didactic project					
Computer labs	25	20	10		55
Platform Innova Schola	4	6	9	10	29
Project school–family services via web					
Development and diffusion	4	4	6	6	20
Project "Compagno di Classe"					
Tutoring ad communication	1				
Project national schools registry office					
Development and diffusion	2	2	2	2	8
Total	52	61	66	62	240

exchanges between universities and families, and to ease and speed up the processes. The main interventions in this case focused on:

– The deployment of WIFI networks;
– The deployment of VOIP technologies;
– The development of on-line enrolment services;
– The development of on-line records for exams;
– The simplification of some regulations of the PA;
– The redesign and the improvement of internal operative processes;
– The reduction of administrative costs for citizens and enterprises;
– The reduction of PA operative costs;
– The certification of time and promptness of the services offered.

4.2.2 The Growth 2.0 Plan

The Growth 2.0 plan is part of larger action of the Italian government, which focused on the empowerment of digital services and infrastructures, on the stimulus to the creation of innovative start-ups, and on the attraction of foreign investments. With regards to the aim of this paper, the plan posits that from the academic year 2013/2014 all Italian universities shall have an electronic record for each student containing all the documents and the data pertinent to his/her academic curriculum. This record will be used to manage the entire academic career of the student in a digital way, without using paper, and making the transition of students from different universities easier. For the same period, the plan specifies the possibilities, for Italian schools, to use e-books, and to transmit documents through digital media

to other PA bodies. Specific policies on the usage of certified e-mail, on the creation of open data, and on the respect of accessibility criteria are also provided.

These measures promote a renewal in the education system, and are necessary steps for a transition to a complete use of ICT technologies by students, families, and administrations. The plan also fosters the development of mobile and landline telecommunication infrastructures with a budget of 150 M€ in 2013.

A specific agency for the promotion of the digital technologies in the PA, the Italian Digital Agency, was created unifying pre-existing agencies (DigitPA, the Agency for the diffusion of technology and innovation, and the Department for Digitization and Technology Innovation) with a governance role for the overall ICT infrastructure in the PA. Within the responsibilities of this agency falls also the promotion of ICT culture to improve ICT literacy devoted both to citizens, and employees of the PA.

4.2.3 The National Plan for Digital Schools

The national plan for digital schools was originally started in 2007/2008 to reduce the digital divide inside the education institutions in Italy. Besides this, the plan was also devoted to support teachers' lifelong learning, and to promote the deep modification of traditional learning environments.

The plan saw the presence of the following actions, which are necessary to achieve the stated objectives:

- Interactive and multi-media board: to introduce digital media in education practice, especially through the use of the interactive and multi-media board in classrooms;
- Cl@assi 2.0 (cl@assrom 2.0): to promote the diffusion of learning environments that exploit digital media capabilities;
- Scuol@ 2.0 (schools 2.0): to change the education strategy, ensuring that both curricular and extra-curricular activities support a student focused learning.

Some key figures regarding this plan are shown in Table 2.

Table 2 Synthesis of the actions of the national plan for digital school

Actions	Financial resources	Rooms/schools	Students involved	Teachers involved
Interactive board	93 M€	322,000 rooms	1,000,000	83,000
Cl@ssi 2.0	10 M€	416 rooms	8,600	3,160
School 2.0	3.7 M€	15 schools	13,500	1,350

5 Discussion

The information regarding the Italian policies provided in Sect. 4 depicts an improving situation. Notwithstanding the action, in recent years, of different governments, the policies dedicated to the deployment of ICT infrastructures in the PA to reduce the digital divide show a coherent attention towards the reduction of the gap currently existing between Italy and the average of the European countries. With regards to the education sector, we can state that the current Italian policies are sharply focusing more on the building and the deployment of the ICT infrastructure, like the diffusion of broadband connections in Italy, rather than on a strategic and systemic use of ICT. Just to cite the example of broadband connection, currently Italy is below the European average on landline connections, but has indeed fairly good results for broadband over mobile phones connection. These resources could have been more exploited in the national policy plan, but it is, currently, not the case.

This strategy is coherent with the dualistic view of digital divide that sees the technology as the main point of action to avoid the divide. Obviously, the starting point is to provide educational institutions, being them schools or universities, with the necessary ICT infrastructures (when and where not available) to allow them to provide innovative services. But, as theory shows, other forms of divide are still possible even in the abundant presence of technology. For example, some of the Italian policies are devoted to the adoption of e-learning in the education environment [24]. But moving to e-learning is not just a matter of moving paper contents to a digital media. A strategy to support the learning process is necessary, and attention to digital literacy, both of students and instructors, is equally important [24].

On the administrative side, the stress on PA innovation to be achieved through the use of digital media instead of paper (for example) would better provide a stronger coordination effort with other regulations affecting public administrations (thence also the public education sector) that, especially for privacy and performance evaluation, require further changes. A stronger coordination of these heterogeneous initiatives would be desirable to make the change process easier, and not to hamper it under the heavy burdens of excessive regulatory fulfillments. To this regard, a stronger action of the steering committee of the digitization of PA, together, with the other regulatory bodies in charge of PA change and innovation, would be advisable, and in the end potentially beneficial.

6 Conclusions

In this paper we described and discussed Italian policies for the deployment of ICT infrastructures in the education sector (schools and universities) within the context of the European regulation. The paper illustrates the strong focus of Italian policies

on the deployment of technology, and suggests the need of a more strategic intervention and a stronger coordination with other regulatory initiatives on transparency and performance that affect PAs in this moment. The Italian policies are currently aligned to the European context, but a strong effort is necessary for Italy to recover the gap increased over the years. A more systemic approach to the deployment of ICT infrastructures would therefore be advisable.

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Communication Web 2.0: An Attempt to Understand the Gap Between Italian Law and Accounting Firms and the International Environment

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Abstract The development of Information and Communication Technologies (ICT), and recent communication regulatory framework innovations for law and accounting firms are the main drivers for the redefinition of communication processes. Nevertheless, in Italy there is reluctance in adopting communication strategies focused on advertising, public relations and Internet tools (e.g. social media, email, blogs, and so on). Some causes should be seeking in the consolidation of deontological codes, in the size of firms that is usually small, and in the communication processes used which is purely based on word of mouth and personal relationships. The aim of this article is to understand the role of ICT as a potential strategic tool for communication in the law and accounting firms, investigating the gap between the national and international context. In order to answer to the research questions, we used a field case study (ALFA), and a qualitative survey that was conducted on 105 firms in the Northeast of Italy. Results from this research show, is the existence of a resistance to implement and use ICT tools such as strategic channel of communication for the Italian context.

1 Introduction

In Italy law and accounting firms belong to two important industries, that represent about 1.5 % of gross domestic product (GDP). Currently, these industries have approximately 325,000 employees, the average income for those involved are

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60,000 Euro, and have revenue of 245 billion Euros [1]. Usually, law and accounting firm are small enterprise, and the average number of employees is 5. Hence, law and accounting firms have an important role in the Italian economic scenario.

According to Oliver [2], in the last decade two main drivers have had modified Italian enterprises: Information and Communication Technologies, and the communication regulatory framework.

In the same way, Gullkvist [3] underlined that ICT and in particular Internet, allow firms in rethinking their services developing the electronic services (e-service), that in literature are define as "the provision of service over electronic networks (Internet)" [4, 5].

Despite Oliver's study (2010), in Italy, the availability of new Information and Communication Technologies are not the most important factor that are taken into account in order to reshape communication practices for these firms. What really matter is the national regulatory framework which has provided several changes for these industries.

Although the rapidity of changes in ICT technologies and the communication regulatory framework [6], most of the Italian law and accounting firms are lagging behind in adapt their communication strategies that are still focused on traditional advertising and communication channels. According to Iasevoli and Michelini [7] the main causes are: the deontological codes that these firms have being using for more than 80 years (since 1913 for accounting firms and since 1933 for law firms), firm size (as 95 % of low and accounting firms count less than five people), and, finally, the communication activities of the firms is "relational", i.e. based on "word of mouth" and personal relationships.

The aim of this article is, therefore, to understand the role of ICT as a potential strategic tool for communication in the law and accounting firms, investigating the gap between the national and international context.

In order to answer to the research questions, we adopted a qualitative methodology and the field case study as a method of analysis. According to Collis and Hussey [8] the codes found in the case study analysis, were used to do a qualitative survey applied to the Northeast of Italy.

2 Background

According to Oliver [2], the development of ICT and legislative changes influenced the provision of services and the communication of law and accounting firms. Web tools and Internet based technologies allow professional firms to enhance communication with clients [3], both in terms of reduction of time, and either by dropping the constraint of the presence of provider and client in the same space [4].

Wessels [9] before and after Oliver [2] showed the central role of ICT in increasing communication efficiency. Nonetheless, we noticed a different approach in the Italian context. In Italy ICT cannot be considered the main driver for changes

in the advertising and communication practices [2]. Furthermore, Web 2.0 communication tools are not so used in the law and accounting firms.

According to Tuunainen [10] "information communication technologies (ICTs) such as the Internet or mobile communications are having a dramatic effect on how services and especially knowledge services are innovated, designed, produced, and distributed".

In this perspective, ICT and marketing should be considered as new tools for improvement and renewal of communication processes in the Italian law and accounting firms.

Moreover the diffusion of digital environments (social networks and blogs), has changed the expectations of the clients that are often inserted in online community of consumers that are witnessing the rise of "virtual contexts" aimed at the socialization of knowledge and experiences among users [11–14]. For those clients the use of sophisticated communication Internet-based tools is taken for granted. Elfrink [15] and Roxas [16] highlighted the importance of Website and Internet, as an important channel of communication, which allows companies to meet client expectations supporting the traditional communication channels helping to improve the reputation of the firm, the services offered and attracting new customers.

On the other side in Italy, law and accounting firms seems to show a high degree of resistance in adopting new way of communication. The main driver that influences those organizations is constituted by the communication regulatory framework (law n. 248/2006—the so called "Bersani law" and the n. 183/2011) rather than the opportunity of increasing efficiency and efficacy adopting ICT [17].

These communication regulatory framework changes should have facilitated the meeting between professional skills and marketing, assisting the assertion in the last decade, the market prospect in the world of professions that highlights a historic change of context [18]. Therefore, the competitiveness, innovative technologies and a more conscious consumer, have affected the relationship professional-client pushing the first to adapt to the needs of the latter [19, 20].

3 Methodology

This paper was undertaken on accounting and law firms (a subgroup of professional service firms) for two key reasons. First, these firms are not only growing in terms of their contribution to GDP, but also in terms of employment. Second, these industries face different marketing and organizational issues and challenges to other types of service firms. Inside the professional services firms, Sweeney and Soutar [21] noted that law and accounting firms were the most representative firms (almost 40 %). Hence, the primary objective of the study was to provide an in-depth description of the focal phenomenon: the analysis of how law and accounting firms revise their communication process toward the adoption of ICT technologies.

To answer to the research questions we adopted a qualitative methodology, and the main method of analysis was the field case study [22, 23].

In doing so, we followed Yin's approach [24], adopting semi-structured interviews, observation and an exploratory survey.

Twelve interviews were undertaken within "Alfa", a law and accounting firm and each interview last on average 40 min. Two researchers interviewed the participants adopting the protocol suggested by Arksey e Knight [25]. Data analysis and storage have been facilitated by AtlasTI, a CAQDAS (Computer Assisted Qualitative Data Analysis Software). The coding procedures were conformed to those found in grounded theory [26–28].

This implied an initial open coding process to identify the major variables of interest. The subsequent downloads enabled refinement of the core constructs. Selective coding was utilized to identify relevant sub-categories and finally, theoretical coding allowed linkages with theory. To confirm the reliability of these findings, two research assistants conducted separate coding of the same data [29]. The results of the three processes were consistent.

The codes which have been identified through the interviews analysis have been adopted to elaborate the questions for the survey. According to Collis and Hussey [8] "exploratory research is conducted into a research problem or issue when there are very few or no earlier studies to which we can refer for information about the issue or problem".

This was addressed by phone [23, 30] to a total sample of 500 law and accounting firms based in the Northeast of Italy, particularly in Verona, Vicenza and Bassano. A sample of 105 firms answered to the survey, reaching 21 % of the redemption rate. The focus was to understand the state of art related to the adoption of digital contexts and ICT and social networks for professional purposes.

The survey was composed by 31 questions and was divided into three main sections: demographic information about the firm (number of employees, establishment year, activities and services provided to customer, role and age of the interviewed, etc.), Information about the communication tools companies adopt and the role of the website in their communication process (aims, contents, communication process management). Finally one section was addressed to understand the adoption of law and accounting firms of Web 2.0 and particularly social networks, about how these tools might have a strategic role in value creation.

4 Scenario

ALFA is a medium law and accounting firm (about 50 employees) located Veneto. It was founded in the early 1980s. Alfa is mainly composed of Chartered Accountants. ALFA provides the following services: auditing, performance management, economical and financial planning, accounting, and so on. In addition, ALFA also offers legal advice to companies. Until now, this firm has managed the communication both internally and externally in the "traditional way", where word of mouth and professionalism were the principal "tools" used.

In recent months, ALFA has invested in the modernization of the website and the introduction of some social networks (Twitter, Linkedin and Facebook) in order to increase its visibility and reputation.

5 Findings

From the data analysis, the state of art related to the development of communication and organizational process of Italian organizations, with the advent of Internet and more in general ICTs, seems to be far to be at the level of the international context [7, 15, 31].

In fact, the majority of the respondents for the company ALFA, has often underlined the importance of personal networks, of face to face word of mouth, as the main tools to communicate to customers and to colleagues.

For example an interviewed (senior partner) told that: "*... a potential client does not come to us spontaneously, but led by his/her advisors. Hence, for me it is not very important to be visible on the Web or social networks...*".

Hence, word of mouth represents the main tool for external communication toward actual and potential customers (see Fig. 1). In this way, an other interviewed (partner) underlined that: "*...We mainly use word of mouth as advertising... then we also have a Web site, that honestly I hardly know. There are all our information...*".

The findings of the interviews have been confirmed from the results of the survey, where 89.5 % of the sample indicated word of mouth as the main tool to communicate to the customers (in several cases this was the only one tool). In addition, another way to communicate is represented by the professionals' knowledge and capabilities of managing her/his personal networks.

Elfrink et al. [13] and Roxas et al. [14], highlighted the importance of the website and at a general level, Internet, as an important channel of communication which allows to support the traditional channels helping to improve the image of the firm, the services offered and attracting new customers.

These assumptions are partially not confirmed by this study. In some cases, from the interviews of firm ALFA, very few respondents have supported the idea that ICT could become a strategic tool to enhance the firm's visibility and image. The 14 % of the sample and three out of twelve respondents of the study ALFA indicated this need. The same evidence came from the survey, where only 35 respondents have implemented a web site, and only 30 % of them update it frequently.

However, despite the main results, there is a little willingness to change, confirming Morris and Venkatesh perspective [32], stating that younger employees and professionals are potentially more predisposed to change and to adopt ICTs both for external and internal communication.

Another insight that might be useful, is that both from the interviews and from the survey, the main aims of the website for professional purposes should be the

Code	*Code description*	*Frequency*	*Number of interviewed people*
Traditional communication	Traditional communication is based on professional capabilities as well as word of mouth and personal networks.	50	12
Strategic value of ICT (-)	ICT are considered as not strategic for communication or to enhance the image and visibility of the company.	18	9
Change propensity (-)	There is an overall resistance to change both in the organizational structure that in the communication process..	14	7
Change propensity (+)	There is a propensity to change, most among young professional, particularly related to new tools that might help to improve the communication.	14	5
Strategic value of IT manager (-)	IT manager is not seen as a useful role within the firm.	13	10
Strategic value of ICT (+)	ICT are a strategic tool to improve the communication and to enhance the overall visibility and image of the firm.	11	3
Strategic value of social network (-)	Social networks are considered not strategic for doing business as they do not create value.	10	9
Web trust (-)	Web is risky as it does not guarantee privacy and might increase misunderstanding between the firm and customers.	8	4
Motivation (Image)	The web site might increase visibility and improve the image of the company and professional working for it.	8	11
Motivation (Service)	The web site might be structured in order to show all the services the firm can offer.	7	9
Motivation (improvement in external communication)	The web site should be improved in order to increase customer loyalty and firm reputation.	6	7
Information sharing	The web site might help to share information among the firms employees through private sections and also to provide more information to customers.	6	10

Fig. 1 Main codes from the interviews in "Alfa"

following: to inform customers about professional services, to create the image and enhance the firm visibility, to share information with customers but also among colleagues.

Regarding Web 2.0 technologies, particularly blogs and social networks, almost the whole sample of firm Alfa declared that they are not strategic for the communication and are not suitable for business purposes.

The same perceptions come out from the survey where only 10 % of the sample had implemented a professional account in at least one social network (primarily Facebook and Linkedin). From the other 90 % of respondents, 29 % declared that social networks might become useful to enhance the firm visibility and image.

6 Conclusion

In contrast to the international context [2, 13, 14], from this research emerges that law and accounting firms are still linked to traditional communication channels. In this way, customer satisfaction plays a fundamental role, because clients become first through for the acquisition of new ones through word of mouth. From the case study analysis, but also from survey appears that the communication is based mainly on personal relationship based on face to face communication.

Despite Elfrink et al. [13] and Roxas [14], in these firms the communication is mainly face to face with professionals who show a lack of trust on the Web tools, and social networks. In fact, the interviews showed how Internet and social media were perceived as dangerous for the reputation of the professionals. Hence, most of the interviewers define social media as: "playful tools, not suitable for the development of the business" (interviewer n. 2, 5, 9, and 10).

Nevertheless, the 40 % of respondents expressed the wish to improve communication and services provided thanks to Internet, even if they are not able to define and/or understand the potential of these tools.

Internet, but especially Web site are not considered useful for improving communication, or services [33]. Only 35 firms (33 %) have implemented a Web site, and only 30 % (10 firms) of them update it frequently. Despite the results found by international research [2, 3, 12, 13, 16, 29], in the Italian law and accounting firms, the Web site is not a strategic communication tools (30 of 35), but it is a mere window, where present their services. Furthermore, only 10 % (ten firms) of the sample using one or more social media to interact with their clients in order to increase services and consequently customer satisfaction.

Probably these industries do not yet have the awareness to know that their clients need to use these Web tools and social media in order to gather new information or fulfill their requirements. Therefore, there is a gap between the international literature and the (communication) practices used in these Italian industries.

In conclusion, the adoption of "Web 2.0" communication tools in these firms still remains a "mirage".

This study has a limitation determined by the applied research methodology. We analyzed a single field case study and we used a qualitative survey that was conducted in a sample of firms belonging to only two industries.

Future research aims to overcome this limitation by extending the sample of firms. Furthermore, in order to generalize the results and highlight any differences and commonalities, the next studies should analyze other services industries.

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From the Blogosphere into Real Politics: The Use of ICT by the Five Star Movement

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Abstract Research on ICT and the public discourse often focuses on how ICT can be used to increase citizen participation in political decision-making processes. The Italian Five Star Movement (5SM) represents a novel approach to using ICT to include citizens, and a big challenge for the traditional political actors. The 5SM was initiated outside the established political systems, with the use of Internet tools as cornerstones to promote political actions based on the directly expressed will of citizens. In this paper, based on an exploratory case study approach and informed by the introduction of E-Democracy models, we investigate the role of ICT in various phases of the 5SM, from its birth through the current stage. The focus here is on the transformation from a protest organisation outside the established political processes to being the second most voted party within the Italian parliament.

1 Introduction

In the last two decades, information and communication technologies (ICTs) have been used increasingly in the political field to involve citizens and to combat the decline in both interest and participation in democratic processes. The term E-Democracy is used to identify, in a very broad way, the different roles ICT can play in the relationships between citizens and central or local governments, and to stimulate citizens' involvement in political processes [1].

Many different examples of ICT involvement in the political field can be seen in practice. For example, some politicians make use of existing Internet platforms, like Facebook or Twitter, to involve citizens, to stimulate their participation and to win support in electoral processes. This is the case for the mayor of Bari (Italy), who uses his own Facebook profile to communicate with citizens, and who asked

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his councillors to do the same [2]. In other cases, organisations rather than individuals might act to support candidates in an election, as in the case of www.mybarackobama.com, the blog created and launched by a non-profit organisation established to support Obama's electoral campaign in 2012 [3]. The European Commission has initiated a web space called "Your Voice" (http://ec.europa.eu/yourvoice/index.htm), which involves citizens in European political processes through consultations, debates and information sharing, similar to the US White House's platform called "We the People" (http://petitions.whitehouse.gov), which allows any citizen to create online petitions. The application of ICTs in these political processes was originally seen as opportunity to improve and modernise democratic systems by increasing transparency in politics and involving citizens in decision-making. So far, however, it seems that this goal has not been reached, at least not on a large scale [4].

The Italian "Movimento 5 Stelle" (Five Stars Movement; from now on 5SM) is an interesting example to analyze, due to the speed and scope of the achieved results, of an ICT application to political processes that started from people's actions first, outside the traditional political environment. The 5SM attracted activists from different areas of Italy. ICT played a relevant role in this process, as it provided the main communication channels for the 5SM (its headquarters is said to be its blog). In a short time, the movement entered the Italian political sphere, achieving significant results in elections, both at the local (municipalities, regions) and central (parliament) level. For all these reasons, the 5SM is a subject of great interest to many international observers [5–7] because it represents a big challenge to established political structures and traditional actors. One of the cornerstones of the 5SM is the use of simple Internet tools to allow citizens to express their will with regard to which political actions to promote. In this paper we aim to investigate the 5SM using an exploratory case study approach to investigate and reflect on the role of ICT in various phases of the 5SM, from its birth to the current stage, focusing on the transformation from a protest organisation outside the established political decision-making processes, to being the second most voted party in the Italian parliament.

2 Theoretical Framework

Ideas and ideals of democracy vary between societies, communities and even between stakeholders within one community. The idea of democracy leans fundamentally on effective communication and informed decision-making about public issues among citizens, politicians, officers and other stakeholders who may be affected by the decisions [8, 9]. Democratic models are idealised forms of democracy with a set of ideals about how democracy should take place, whereas E-Democracy models discuss how information and communication technologies may be used to shape democracies [10]. Many E-Democracy initiatives have remained rather unclear about the democratic model or specific goals, and mixed

expectations among citizens and politicians with respect to E-Democracy have been reported [11]. As already mentioned, most E-Democracy projects are launched in order to involve more citizens in the existing political structure and decision-making processes [12].

Päivärinta and Sæbø [10] suggested an inclusive but simplified comparison of various E-Democracy models based on two fundamental dimensions: inclusion in decisions and control of the agenda [13]. Inclusion refers to the idea of whether or not all members of a society are able to participate in current debates and decision-making processes. Control of the agenda is related to the issue of who influences the political agenda in the first place. The resulting four stereotypical models are: Liberal, Deliberative, Partisan and Direct E-Democracy.

Liberal E-Democracy involves government-based initiatives and citizens' implicit connection to the decision-making process. The aim is to inform citizens (especially during elections) and gather informative feedback. Citizens participate less in the decision-making processes as such, since democracy is regarded as occurring after the citizens have been informed of the candidates' viewpoints before the elections, and about the decisions made in between elections. The main role of ICT is to improve the amount and quality of information exchange between government and citizens.

Deliberative E-Democracy connects citizens more explicitly to decision-making processes. Politicians and citizens share interest in dialogues and discourse leading to the formation of political opinions. Citizens have good reason to expect that their voices will be heard concerning a particular matter initiated by the government. In this model, ICT is developed to increase citizen participation and involvement in decision-making processes.

Partisan E-Democracy is characterised by citizen-initiated participation with no explicit connection to existing governmental or political decision-making processes. Citizens may influence the agenda for public discussion by their mere presence. In this model, ICT seeks to obtain visibility for alternative political expressions uninterrupted by the political elite.

Possibilities for Direct E-Democracy have been recently highlighted. Here, citizens online are directly affecting the decisions to be made. Citizens set the agenda both for public discussion and for decision-making. The presence of ICT is a crucial pre-condition for direct democracy to support coordination among decision makers.

Transparency is a key concept in the political scene, which has to be regarded as a multifold theme, with different and sometimes contradictory views. Transparency, with the meaning of richer and clearer information about government actions made available to every citizen, is generally seen as a way to improve the quality of a society (for a more profound discussion, see [14]). But, on the other hand, scholars referring to critical management studies see transparency as a fashion and are skeptical about its impact on government [15], even suggesting that greater transparency could result in reduced independence for organisations acting on the political scene [16]. Finally, when looking into organisational structures, building on Foucault [17], in terms of targets, performance tracking and exhibition of rule

infringements, transparency is mostly seen as a devious but highly effective means for controlling the dependents by exerting a continuous tacit pressure on them. When ICTs support transparency in this sense, it begins to look something like an "Electronic Panopticon" [18].

3 Research Design

We apply an exploratory design to discuss the case of the Italian 5SM and investigate the use of ICT tools to involve citizens in political discourse [14]. The aim is to reflect on the role of ICT in the various phases of the transformation of a citizens' protest organisation into one of the largest parties in the Italian parliament. The unit of analysis for this case [19] is the 5SM. We chose this unit pertinent to the aim of the research because it is a novel case where the use of ICTs allowed individual citizens, who originally started a protest movement, to gather together, organise and participate in political life, achieving nation-relevant results.

The data for investigating the case are composed of a mix of direct observation and information available on websites, blogs, books, newspapers and magazines. Regarding the information available online, the sources most frequently used for the case study are the website of the 5SM itself (www.movimento5stelle.it), and the blog of Beppe Grillo (www.beppegrillo.it). Investigating the 5SM, we focus on the people, as well as the actions, ICT tools and organisational settings that were used to participate in traditional political processes. The result of the exploratory case will be the formulation of propositions to be tested and investigated in future research projects.

4 The 5SM Case: The Primordial Soup

The 5SM is an Italian political movement recently founded by a former prominent Italian comedian (Beppe Grillo), and by an Italian entrepreneur (Gianroberto Casaleggio). The 5SM was founded after a political action stimulated by Grillo himself. This movement sharply distinguishes itself from traditional parties, claiming to be more open, transparent and representative. The 5SM's activists depict the 5SM as a 'non association' with a 'non statute' [20], having its headquarters on the web. Thanks to his profession as a comedian, Grillo has been widely popular in Italy since the 1980s. He also became known for his strong critical stances against the institutional and political establishment. His critical thoughts have been diffused through his personal blog since 2005. The blog allows visitors to post comments and to share its content on the most popular social networking platforms. The popularity of Grillo on the one hand, and of his blog on the other, have reinforced each other through the years. The blog became so popular that

Grillo was listed as the seventh most influential person on the web by the Forbes magazine in 2009 [21].

4.1 Initial Line Up: The Partisan Phase

Following the popularity of Grillo and of his blog, an increasing number of citizens started to follow him and his ideas, and to discuss politics. However, it was only in 2008 that the blog (i.e., Grillo) and its followers explicitly declared that they were politically active. Participation on the blog increased and soon it could not support the large group of followers. People wanted to be active not only on the blog, but also in their territories, discussing real social and political problems that were really close to them.

In order to organise the actions of individual groups in the territories and to coordinate their activities, Grillo proposed adopting Meetup (www.meetup.com), a social networking platform created by a North American company, which had already been used by Howard Dean to successfully run against John Kerry in the 2003 US primaries. The platform was adopted with the original spirit of getting together to formulate opinions and proposals on topics of civic relevance, and to improve the world, starting from the single territories where each group was active. Initially, 40 groups were created on Meetup, but this number grew to 472 by 2012 [22], and to 1,250 with 109,999 members in 1,038 cities from 20 different countries as of this writing (an updated list of the groups is available at: http://movimento-5-stelle.meetup.com).

At this stage, Grillo's groups were not connected with the traditional political representation processes. The groups were active in the territories and at the national level just to promote discourse on topics of civic interest, which was by that time separate from the political discourse carried out at the institutional level.

4.2 Stepping into Political Processes: Forms of Direct and Deliberative Democracy

At the end of 2007, Grillo started to provide open and self-organised spaces to the local Meetup groups during his performances around Italy. The aim was to further disseminate their activities, and those of their attendees, and to attract more people. Later the same year, a nationwide event called V-Day was launched. Although the 5SM was not yet established as a movement at that time, this event was the first when a mass of activists mobilised by Grillo's blog and by the local groups had entered into the traditional institutional process—though in a traditional (non ICT-based) way. During this event, signatures were collected from citizens to promote a law of popular initiative to modify regulations for candidacy to the

parliament. A similar event was also promoted the following year. The political action of people involved in the Meetup groups started to enter institutional political processes in 2008. With the intent to participate in administrative elections, some of the Meetup groups started local civic lists following a set of common rules that Grillo had established for them. At this stage, a specific area of Grillo's blog was dedicated to these lists. Through this area, individual citizens could participate in the political life of their region or territory.

The 5SM was formally founded as an association in 2009, with the anticipated intention of promoting and coordinating the activities of the civic lists, and of running for the parliamentary elections. To do so, Grillo registered the 5SM trademark. The statute of the 5SM (art. 3) [20] limits all rights to the use of this trademark to Grillo himself. The statute also states that the Internet plays a crucial role for the 5SM, and that it is used to let citizens enter into the movement for consulting, deliberating, decision-making and electing purposes. Furthermore, the statute of the movement recognises that all Internet subscribers play a role in governance that is normally assigned to only a few people in a traditional party. The headquarters of the 5SM is the blog itself, in a special section of Grillo's blog (http://www.beppegrillo.it/movimento), which remains significant in this new phase.

After this phase, the blog was often used as a discussion forum (contents are readable by anyone, but contributions are restricted to citizens members of the 5SM) in the agenda-setting process. The blog was also the location in which direct democracy processes took place. This was the case, for example, for the online vote to choose the candidates that had to be in the 5SM lists for the parliamentary elections. In this regard, the statute specifies that the online voting system works according to rules that might be better decided on each occasion, and adjusted according to each experience. Grillo diffused generic rules on his blog before the online voting for selecting members to lists for parliamentary elections. The same system, but with a more deliberative nuance than a direct democracy one, was also used during the election of the president of the Republic in 2013, when, through an online vote, citizens nominated the candidates for the Italian Republic presidency that 5SM parliamentarians had to support in the election process.

In February 2013, the 5SM succeeded in gaining seats in the two chambers after the parliamentary elections, and a code of conduct was disseminated for its parliamentarians. Amongst other things, the code explicitly states that law proposals can be promoted by citizens through an online voting system. Each citizen's proposal that gets at least 20 % of the online votes will be presented by the 5SM parliamentarians in the parliament. Citizens shall also be consulted when parliamentarians have to be excluded from the 5SM group. The 5SM parliamentarian group can vote for the exclusion of a member in case of a violation of the code of conduct, but such exclusion must be confirmed by the online votes of the followers.

The 5SM statute also states that parliamentarians elected to the 5SM lists shall form a 5SM group in each of the two chambers of the Italian parliament. Each group is entitled by law to receive funds from the parliament for communication and study tasks. The statute states that two communication groups (one for each chamber) will

be formed, and Grillo will appoint the staff of these groups. The funds for communication and study activities received by the Italian parliament shall be devoted to supporting this communication staff, and candidates to the parliament must confirm this by signing a written agreement before participating in the elections.

Finally, other examples of ICT use by the 5SM involve streaming technology to broadcast their meetings on the Internet, or meetings with other political forces (i.e., for example, the meeting during the consultation process that led to the formation of the current Italian government). The 5SM parliamentarians also use their own Facebook and Twitter channels to disseminate their activities. The communication groups in the parliament also use a YouTube channel and the blog to periodically inform the citizens about the activities performed by 5SM parliamentarians.

Notwithstanding its strong profession of transparency and direct open participation, the 5SM is also subject to many severe criticisms, about just these issues. Some examples in this regard, include:

- A huge number of critical posts removed from the 5SM website. The criteria or motivations for such removals were not disclosed, so an external website (http://nocensura.eusoft.net/) was created by a private blogger to track and enumerate all the posts banned from the 5SM website;
- Decisions to banish some 5SM activists, autonomously made by Grillo. Since Grillo is the owner of the trademark and Casaleggio maintains the website, they can proceed by warning an activist through a formal legal notice not to use the 5SM mark anymore, and by removing his/her account;
- Recurrent blackmails by Grillo, threatening retirement of the blog and withdrawal of the mark, in order to prevent followers from voting on possible coalitions with other parties;
- Often incomplete streaming of the internal meetings, or not streaming them at all.

5 Discussion

The 5SM case exemplifies the use of ICT for a movement that started as a partisan E-Democracy initiative without any direct influence on formal decision-making processes. Differently from most E-Democracy initiatives promoted by institutions to involve more citizens in the political processes, the 5SM originated outside the traditional systems and became a political force through the will of the citizens. In other words, it was citizen-driven rather than party-driven.

In its move towards a position with more explicit political influence, the 5SM used ICT to establish direct democracy processes within the movement's internal decision-making processes. Currently, the 5SM has gained formal decision-making power through its seats in the national parliament. The case is interesting from a research point of view for several reasons. The shift from a movement that was outside the political system to a movement with seats in parliament, and the critical

importance of ICT in order for the movement to exist are quite extraordinary and represent something new within the research field.

The use of ICT proved crucial for the development of the 5SM: to acquire attention, to arrange for the development of the movement's politics and to coordinate its activities. But, despite the importance of the technology itself, the 5SM exemplifies the importance of context and structure to understand the use of the IT-application (such as the blog and the Meetup system). Grillo had already gained popularity and established a role as an opponent of the public elite before initiating his blog. He spent time and effort to increase his impact and the number of his followers. Thus, when the economic crisis really hit Italy (and Europe), Grillo already had his speaker's platform to criticise the established elite, holding them responsible for the lack of political accountability.

The 5SM makes use of ICT for internal direct democratic processes, allowing the (registered) members to participate in decision-making, including decisions on how representatives should vote in parliament. Simultaneously, the 5SM challenges some democratic ideals concerning both internal and external processes, and there could be some concerns regarding how transparent the use of ICT actually is. Internally, communication is to be conducted through the movement's blog, which is highly influenced by Grillo himself. The two founders privately own the 5SM trademark and website. Consequently, they could control (and monitor) online activities if they wish, possibly applying internal transparency in the sense evoked by critical scholars; that is, to exert tacit pressure on members. This point should be further investigated.

Only scattered information is available on issues such as the possibilities for censoring, procedures for complaints and the delineation between the movement's 'official' information and Grillo's private communications (if such a delineation exists). Somewhat related to this, is the only-partial availability of streaming from internal meetings. Such external opacity on internal events and behaviours could possibly be associated, according with critical theories, with the preservation of independence by organisation acting on the political scene.

Externally, the movement's representatives have not participated in any public debate, and are not allowed to negotiate with representatives from other parties, since the 5SM politics are to be decided by the members. More research is needed to explore the duality of highlighting internal democratic processes (despite some challenges) while ignoring participation in the public discourse and negotiations within the established political system. Also, the capacity of ICT to actually warrant that transparency and openness exist in all circumstances, to correspond to what promised in advance, should be further investigated.

The 5SM is still in its initial phase, and more research is needed to explore the consequences of its appearance in the established political system, as well as the critical importance of ICT. Future research should look into the implicitly democratic influence the use of ICT may have. For instance, ICT with the set of norms and regulations it has applied may foster transparency by allowing everyone to access information, but, on the other hand, the adopted rules may also withhold information from the citizens (and members) by hiding information regarding who

is in charge of making a decision, what the routines are for censoring and monitoring, and by automatically performing processes and routines that may influence decisions to be made.

6 Conclusions and Limitations

This paper analyses, through an exploratory case study, the 5SM case with respect to the role that ICT played in its transformation from a protest movement born outside the political system to a relevant political force with representatives in the Italian parliament.

The case points out the need to further investigate issues related to the use of ICT, not only focusing on the technology itself, but also on the surrounding organisational environment (i.e., roles and rights, regulations and norms) that shapes the way people use the technology to participate in democratic processes. The case also raises questions on the challenges a political force that heavily bases its political processes on the Internet poses to those more traditional ones that do not.

The 5SM case is an on-going phenomenon, and some of the issues discussed in this paper are also elements of discussion within the movement itself. Future research will be addressed to investigate the issues identified and discussed here.

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Transforming Government Agencies' Approach to eParticipation Through Multiple Social Media Exploitation

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Abstract The emergence of Web 2.0 social media offers big opportunities for widening and enhancing e-participation in government agencies' decision and policy making processes. However, it is necessary to conduct extensive research in order to develop advanced methodologies and practices of social media exploitation in government for the above purposes. This chapter contributes in this direction by presenting a methodology for the efficient exploitation of multiple Web 2.0 social media by government agencies in order to broaden and enhance e-participation. It is based on a central platform which enables posting content and deploying micro web applications ('Policy Gadgets'-Padgets) to multiple popular Web 2.0 social media, and also collecting users' interactions with them (e.g. views, comments, ratings) in an efficient manner using their application programming interfaces (API). These interaction data undergo various levels of processing, such as calculation of useful analytics, opinion mining and simulation modelling, in order to provide effective support to public decision and policy makers. A first evaluation of the proposed methodology in a series of pilot applications gave positive results as to its capabilities and value, and at the same time revealed some critical preconditions for its successful application.

1 Introduction

Government agencies have been making for more than a decade considerable efforts and investments for exploiting the capabilities offered by information and communication technologies (ICT), and especially the Internet, to increase citizens' engagement in their decision and policy making processes. This has lead to a big increase of e-participation research [1–3] and practice [4–11]. This first generation of e-participation has been characterised by the development of many 'official' e-participation spaces operated by various government agencies, which offered to

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citizens extensive information on government activities, decisions, plans and policies, e-voting and e-survey tools, and also e-consultation spaces, such as e-forums, where citizens could enter opinions on various topics under discussion, or on other citizens' opinions. The need for increasing the quality of these e-consultations lead to the development of more structured types of e-forums [12–14], which impose the semantic annotation of users' postings (e.g. as issues, alternatives, pro-arguments, or contra-arguments), and allow only some predefined relations among them (e.g. an alternative can be related only with an issue, etc.). A first evaluation of these more structured types of e-forums has shown that they facilitate and drive a more disciplined, focused and argumentative discussion; however, they are more difficult to use and demanding, so they are appropriate for more knowledgeable and educated citizens' groups, and might exclude less educated and sophisticated ones.

The outcomes of this first generation of e-participation were much lower than the initial expectations (e.g. [15, 16]). The use of these official e-participation websites by the citizens has been in general limited. Governments expected citizens to make the first step, moving from their own online environments to these official e-participation websites, in order to participate in public debates on various proposed public policies or legislations, getting adapted to the structure, language and rules of these websites, but this happened only to a limited extent. Also, most of the topics discussed there were defined by government and very often did not directly touch citizens' daily problems and priorities, and were more appropriate for experts. Furthermore, many of the ICT tools they adopted were not sufficiently user-friendly and appropriate for wide citizens' participation. Gradually it was realized that the design of e-participation spaces 'for all' was not an easy task, due to the heterogeneity of real or potential online users with respect to educational level, ICT skills and culture. Another problem was that the methodologies used for e-participation were not scalable, so they could be used for pilot trials, but they were not appropriate for large scale e-participation.

The emergence of Web 2.0 social media offers big opportunities for overcoming the above problems, and proceeding to a second generation of broader, deeper and more advanced e-participation. It allows government agencies to transform their approach to e-participation: instead of hosting it exclusively on their own official e-participation websites, they can exploit popular Web 2.0 social media as well, which attract numerous visitors; also, many of them can attract quite different groups of visitors from the ones usually visiting the official e-participation websites (e.g. with respect to educational level, ICT skills and culture). For this reason Web 2.0 social media have recently started being exploited by government agencies, both for broadening and enhancing their interaction with citizens and for internal coordination and knowledge exchange [17–19]. So while previously governments moved towards the creation of more structured e-consultation spaces, as mentioned above, currently they tend to move in the opposite direction and reduce the structure they impose on their interaction with the citizens: instead of inviting the citizens to interact with government in the official e-participation spaces in accordance with their rules and structures, it is now the government that goes to the electronic spaces where citizens prefer to have discussions, create content and collaborate with

others. However, government agencies should address successfully many challenges in order to use efficiently Web 2.0 social media for the above purposes. While previously they had to manage a unique e-participation space (e.g. make postings to it, process postings of the citizens, reply to them, etc.), in this new approach they have to manage concurrently many Web 2.0 social media (e.g. publish content to them, retrieve from them data on users' interactions, such as views, comments, ratings, votes, etc., integrate and process them and draw conclusions, based on these conclusions publish new content in each of them, etc.); this needs much more effort and therefore requires more human and financial resources.

This chapter aims to contribute to addressing these challenges. It presents a methodology for the efficient exploitation of Web 2.0 social media by government agencies in order to broaden and enhance e-participation overcoming the above challenges. It is based on a central platform which enables posting content and deploying micro web applications (termed as 'Policy Gadgets'-Padgets) to multiple popular Web 2.0 social media simultaneously, and also collecting users' interactions with them (e.g. views, comments, ratings, votes, etc.) in an efficient manner using their application programming interfaces (API). These interaction data undergo various levels of advanced processing, such as basic processing resulting in the calculation of useful analytics, opinion mining and simulation modelling, in order to provide effective decision and policy making support. The proposed methodology leads to a transformation of the existing government agencies' single channel approach to e-participation, towards 'hybrid' multi-channel approaches, which combine the use of interconnected 'official' e-consultation spaces (both unstructured and structured) and Web 2.0 social media. It has been developed in the PADGETS ('Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media'—www.padgets.eu) research project, which has been supported by the 'ICT for Governance and Policy Modelling' research initiative of the European Commission.

The chapter is structured in five sections. In the following Sect. 2 the theoretical background of the proposed methodology is outlined, while in Sect. 3 a description of it is provided. Then in Sect. 4 the core technologies employed are reviewed. The results of a first evaluation are presented in Sect. 5. Finally in Sect. 6 the conclusions are summarized and future research directions are proposed.

2 Theoretical Background

According to [20] (a highly influential paper on the 'Dilemmas in a General Theory of Planning') public policy problems tend to change dramatically after the World War II. Previously, they were mainly 'tame', this term denoting that they had clearer and more widely accepted definition and objectives, so they could be solved by professionals using 'first generation' mathematical methods; these methods aim to achieve some predefined objectives with the lowest possible resources through

mathematical optimization algorithms. Though for long time this approach has been successful in solving well defined problems associated with basic needs and problems of society (e.g. creating basic infrastructures) the evolution of the society makes it insufficient. The societies tend to become more heterogeneous and pluralistic in terms of culture, values, concerns and lifestyles, and this makes public policy problems 'wicked', this term denoting that they lack clear and widely agreed definition and objectives, and are characterised by high complexity and many stakeholders with different and heterogeneous problem views, values and concerns. In [20] are identified some fundamental characteristics of these wicked problems, which necessitate a different approach than the ones used for the tame problems:

- There is no definitive formulation of a wicked problem.
- A wicked problem usually can be considered as a symptom of another 'higher level' problem, so defining the boundaries and the level at which such a problem will be addressed is of critical importance.
- Solutions to wicked problems are not 'true-or-false', but 'good-or-bad', and this judgement is not 'objective', but highly 'subjective', depending on the group or personal interests of the judges and their values.
- Every wicked problem is essentially unique; despite seeming similarities among wicked problems, one can never be certain that the particulars of a problem do not override its commonalities with other problems already dealt with.
- Wicked problems have no stopping rule, so planners stop for reasons which are external to the problem (e.g. running out of time, or money).
- Wicked problems do not have an enumerable set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the solution plan.
- There is no immediate and ultimate test of a solution to a wicked problem, since this requires examination of several types of impacts on numerous persons or groups, and for a long time period.
- Every solution to a wicked problem is an 'one-shot operation'; every attempt counts significantly and there is no opportunity to learn by trial-and-error.

For these reasons the wicked problems cannot be solved simply by using mathematical algorithms which calculate 'optimal' solutions, since they lack the basic preconditions for this: they do not have clear and widely agreed definition (with each stakeholders' group usually having a different view of the problem) and objectives that can be used as criteria for evaluating possible solutions. So [20] in the above paper suggest that wicked problems require a different 'second generation' approach, which combines public participation in order to formulate a shared definition of it with subsequent technocratic analysis by experts. In particular, its first and fundamental phase is consultation among problem stakeholders, during which discourse and negotiation takes place, aiming to synthesize different views and formulate a shared definition of the problem and the objectives to be achieved. Having this as a base it is then possible in a second phase to proceed to a technocratic analysis by experts using mathematical optimization algorithms for the well defined at that phase problem.

Subsequent research on this participative approach to the solution of public policy problems has revealed that it can be greatly supported by the use of appropriate information systems (e.g. [21–23]), which allow problem stakeholders to enter 'topics' (meant as broad discussion areas), 'questions' (particular issues-problems to be addressed within the discussion topic), 'ideas' (possible answers-solutions to questions) and 'arguments' (evidence or viewpoints that support or object to ideas). Such a system is termed as an 'Issue Based Information Systems' (IBIS), and according to [21] can 'stimulate a more scrutinized style of reasoning which more explicitly reveals the arguments. It should they help identify the proper questions, to develop the scope of positions in response to them, and assist in generating dispute'. The emergence and rapid penetration of the Internet and the Web 1.0 has created big opportunities for a wide and cost effective application of such ICT-based participative approaches to the solution of public policy problems, and has lead to the development of e-participation. The emergence of the Web 2.0 and the relevant social media creates even more opportunities for a wider and more inclusive application of participative approaches to the solution of public policy problems, which engages more social groups than ever before. It enables a wider and more inclusive synthesis of views of many different and diverse social groups on a public policy problem that government faces, and therefore a better and more balanced and multi-dimensional formulation of a shared definition of the problem and the objectives to be achieved. Therefore adopting such a new e-participation approach exploiting the Web 2.0 can broaden and enhance e-participation, and contribute to better and more socially-rooted acceptable public policies.

In the same direction are the conclusions drawn by [19] from an analysis of cases of successful Web 2.0 use in government that Web 2.0 technologies might have stronger transformational effects on government than previous ICTs, driving significant changes at the organizational, cultural, technological and informational changes. They argue that this strong transformation potential is due to the lower technical know-how requirements, and therefore the lower cost, for both government organizations and individual citizens, that characterises these Web 2.0 technologies in comparison with the previous generations of ICT used in government (e.g. internal systems, Web 1.0 Internet, etc.). These lower requirements for know-how and for human and financial resources allow a much quicker and easier deployment of Web 2.0 based solutions to meet various external and internal communication needs at various organizational units and hierarchical levels of government agencies. The same paper also suggests that government agencies can exploit Web 2.0 for 'crowdsourcing' [24, 25], defined as "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined large group of people in the form of an open call", in order to mine fresh ideas from large groups of people for addressing various social needs and problems or for improving public services, transforming radically their ways of interacting with citizens. Also, [15, 26] elaborates the seven basic principles of Web 2.0 proposed by [27] for Internet politics as follows: "the Internet as a platform for political discourse; the collective intelligence emergent from political Web use; the importance of data over particular software and hardware applications; perpetual experimentalism in the public domain; the creation of small

scale forms of political engagement through consumerism; the propagation of political content over multiple applications; and rich user experiences on political Web sites". He suggests that both the research community and government practitioners should take seriously into account the above principles, the opportunities they create and the evolutions they drive in the political domain.

3 Methodology Description

The proposed methodology for efficient exploitation of Web 2.0 by government agencies is based on a central platform, which enables posting policy-related content to multiple social media simultaneously, and then retrieving users' interactions with it (e.g. views, comments, ratings, votes, etc.), in an systematic and centrally managed machine-supported automated manner through their APIs. It also allows policy makers to create graphically micro-applications, termed as 'Padgets' (Policy Gadgets), which can be deployed in many different Web 2.0 social media that allow such applications in order to convey policy messages to their users, interact with them and receive their opinions. It should be noted that the above content and the Padgets to be deployed in several social media can include a link to a relevant e-consultation conducted in the official website of the competent government agency, to be used by citizens having a strong interest in the policy under discussion. Each of the targeted social media will have a different audience, so that we can finally reach various groups of citizens, which are quite different from the ones who visit and use the official government-initiated e-participation websites.

This Padget concept that our methodology is introducing is an extension of the concept of the 'gadget' applications in web 2.0, which use services and data from heterogeneous sources in order to create and deploy quickly applications, adapted to the needs of public policy formulation. In particular a Padget is composed of four elements:

1. A policy message associated with a public policy in any stage of its lifecycle (e.g. a policy white paper, a draft policy plan, a legal document under formulation, an EU directive under implementation, etc.), which can include various kinds of information, such as text, images, video, etc.
2. An interface allowing users to interact with the Padget, which may give users the capability to access policy documents, be informed on relevant news, vote on some issues, rate various aspects of the policy, express opinions, upload material, tag other people opinions or content as relevant, etc.
3. Interactions of the users with this policy message in various social media, e.g. blogs, YouTube, wikis, social networks, etc., which are retrieved by the central platform.
4. A decision support module, which performs three levels of processing of these users' interaction data in order to provide useful information that assists and supports the policymaker for making decisions, and has the architecture shown below in Fig. 1.

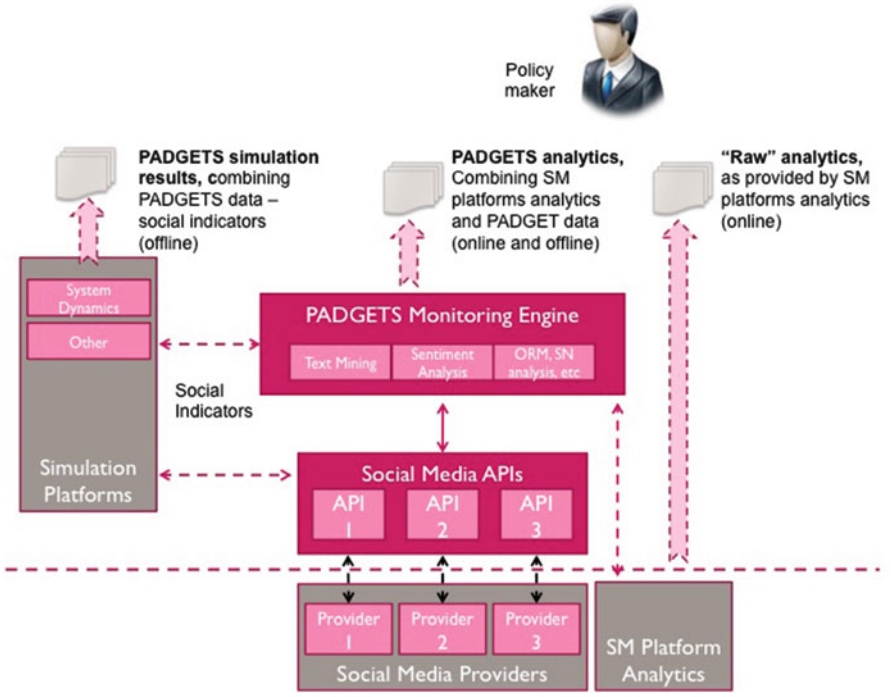

Fig. 1 Architecture of the decision support module

Content or Padgets can be deployed in many different categories of Web 2.0 social media, such as:

- Platforms for Communication, such as Blogs, Internet forums, Presence applications, Social networking sites, Social network aggregation sites and event sites.
- Platforms for Collaboration, such as Wikis, Social bookmarking (or Social tagging) sites, social news and opinion sites.
- Platforms for Multimedia and Entertainment, such as Photo sharing, Video sharing, Live casting and Virtual World sites.
- Platforms for News and Information, such as Goggle News, Institutional Sites with high number of visitors (i.e. EU, Human Rights and WWF sites) and newspaper sites.
- Platforms for Policy Making and Public Participation, such as governmental organisations' forums, blogs, petitions, etc.

From each category will be chosen the most appropriate social media, taking into account the particular public policy under discussion and the audience we would like to involve in the discussion.

A typical application of the proposed methodology in the policy making processes would be initiated by a policy maker wanting to "listen to society's input" in order to make decisions about a future policy to be introduced, or possible modifications of an already implemented policy. The process to be followed consists of four steps shown in Fig. 2.

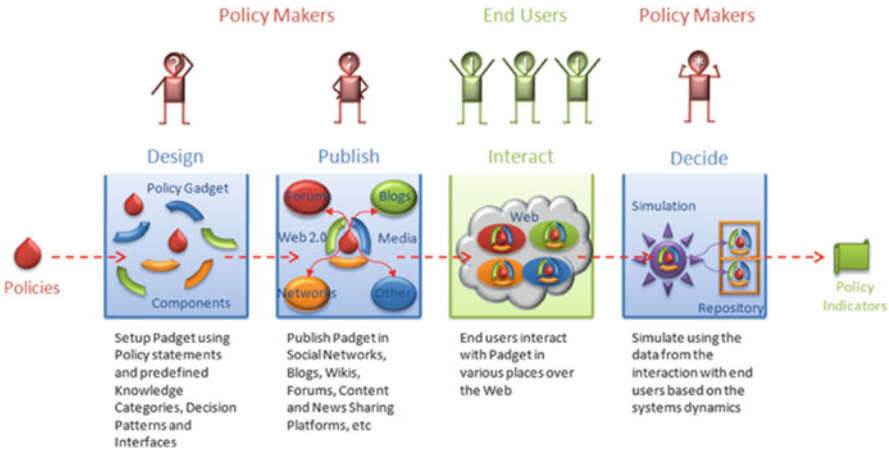

Fig. 2 Typical application process of the proposed methodology

1. The policy maker designs a campaign using the platform capabilities through a graphical drag-and-drop user interface similar to the one of existing mash up editors. The policy maker can add content to this campaign (e.g. a short textual description of the policy, a longer text describing it in more detail, a video and a number of pictures) to be published in Web 2.0 social media not allowing the deployment of applications. Also, he/she can formulate a Padget application (including some content and also e-voting and/or e-survey functionalities) to be deployed in social media allowing it. Finally the targeted social media will be defined.
2. The execution of the campaign starts by publishing the above content and deploying the Padget in the defined target Web 2.0 social media using their API.
3. The users of the above social media interact in various ways with the content and the Padget. This means that users access them, see the policy message, vote in favour or against it (e.g. using like/dislike capabilities), rate it, stipulate opinions, add material, etc. The above will be performed in a privacy preserving manner and in accordance with the privacy preferences of each user and the privacy policy specified for the Padget.
4. At the last stage the above interactions of users are retrieved from all these social media, together with relevant analytics provided by them, using their API. Advanced processing of them is performed at the three levels mentioned above and shown in Fig. 1, in order to provide to the policy maker information about the attitudes of the society about the particular policy and the main issues raised (e.g. remarks, advantages, disadvantages, suggestions for improvement). This can be the end of the campaign, or if the policy maker needs more information and insight on the attitudes and opinions of the citizens he/she can go back to step 1 and start a new iteration.

4 Core Technologies

4.1 Social Media Application Programming Interface

It is of critical importance for the proposed methodology the central platform to provide interoperability with many different Web 2.0 social media, enabling both posting and retrieving content from them in a machine-supported automated manner through their API. In order to assess the existing capabilities in this direction were examined in detail the API of the following ten highly popular Web 2.0 social media: Facebook, Youtube, Linkedin, Twitter, Delicious, Flickr, Blogger, Picasa, Ustream and Digg. In particular, for each of them we examined the following characteristics:

- Available APIs and types of capabilities they provide.
- Capabilities for pushing content in them through their API, where the term "push" reflects any kind of activity that results in adding some type of content in these platforms, such as posts, photos, videos as well as ratings, requests, approvals, intentions, etc.
- Capabilities for retrieving content from them through their API, where the term "retrieve" reflects any kind of activity that results in acquiring some kind of information from these platforms representing activities that have occurred in them, such as comments on a post, photo or video, approved requests, manifested intentions, re-publication activities, etc.
- Capabilities for deploying applications (gadgets/widgets) in their environment and having users interact with them.

From this analysis it has been concluded these Web 2.0 social media have a clear strategy to become more open and public and conform to open API standards. In this scope they provide more and more functionalities through their API for posting and retrieving content, in order to attract third parties to develop applications. The general trend is exposing methods through their APIs that "go deeply" into their innermost functionalities and provide developers with an ever growing set of capabilities. This includes on one hand content push functionality (this content can be text, images, videos or have more complex forms, such as "events", "albums" etc.). A large portion of the API is dedicated to the creation, uploading, modification and deletion of such content. On the other hand API also provide functionality that supports the direct retrieval of various types of content generated by users, such as "user ratings", "unique visits" or "retransmissions" (to other nodes of a social network). However, only Facebook and Linkedin allow deploying applications in their environment, while all the other eight examined social media do not. This means that only in these two social media padgets can be deployed, while in the remaining only content (e.g. postings, images, video, tweets, etc.) can be published.

4.2 Opinion Mining

Considerable research has been conducted in the area of opinion mining, defined as the computational processing of opinions, sentiments and emotions found, expressed and implied in text [28–33]. Its initial motivation has been to enable firms to analyze online reviews and comments entered by users of their products in various review sites, blogs, forums, etc., in order to draw general conclusions as to whether users liked the product or not (sentiment analysis), and also more specific conclusions concerning features of the product that have been commented (features extraction) and the orientations (positive or negative) of these comments. From this research considerable knowledge has been generated in this area, consisting of methods and tools for addressing mainly three problems:

1. Classification of an opinionated text as expressing as a whole a positive, negative or neutral opinion (document-level sentiment analysis),
2. Classification of each sentence of such a text as objective (fact) or subjective (opinion), and then focus on the latter and classification of each of them as expressing a positive, negative or neutral opinion (sentence-level sentiment analysis),
3. Extraction from a set of opinionated texts about the topic under discussion of the particular features/subtopics commented by the authors of these texts, and for each of them identification of the orientation of the opinions expressed about it (positive, negative or neutral) (feature-level sentiment analysis).

The above methods and tools enable us to analyze the textual feedback on a proposed public policy, which is provided by the users of the social media where we have published messages or deployed padgets concerning this policy, and to draw conclusions on: (a) the general sentiments/feelings of the users on this policy (whether they like it or not), (b) the main particular issues that are raised on this policy and the main aspects of it that are commented, and also the sentiments/feelings (positive, neutral or negative) on each them. These conclusions can be combined with the ones from the analysis of users' non-textual feedback (e.g. numbers of users who viewed, liked and disliked the message, ratings of it, etc.), so that a more complete picture on the attitudes on this proposed public policy can be formed. It should be noted that for the practical application of the above opinion mining methods it is of critical importance to have sufficient language resources, such as lexicons of 'polar words' (i.e. words with positive and negative meaning to be used for classifications of opinions as positive or negative), synonyms and antonyms.

4.3 Simulation Modelling

Law and Kelton [34] define simulation modelling as the research approach of using computer software to model the operation and evolution of "real world" systems. Such a model can be viewed as an artificial world giving the unprecedented opportunity to intervene and attempt to make improvements to the performance of a system, and then estimate the effects of these interventions and improvement on various critical performance variables. As such it is a laboratory, safe from the risks of the real environment, for testing out hypotheses and making predictions [35]. In particular, simulation modelling involves creating a computational representation of the underlying logic and rules that define how the real-life system we are interested in changes (e.g. through differential equations, flow charts, state machines, cellular automata, etc.). These representations are then coded into software that is run repeatedly under varying conditions (e.g., different inputs, alternative assumptions, different structures) calculating the changes of system's state over time (continuous or discrete) [36]. While other research methods aim to answer the questions "What happened, how and why" (trying to understand the past), simulation modelling aims mainly to answer the question "What if?" (i.e. what will happen if some particular changes of system structure or rules take place, trying to "move forward" into the future).

According to Borshchev and Filippov [37] based on the level of modelling detail/abstraction (we can have modelling with high abstraction/less details, medium abstraction/details or low abstraction/more details) and on the way time is modelled (as continuous or discrete) we can distinguish between four main paradigms of simulation modelling (Fig. 3):

1. Dynamic Systems (enabling high detail simulation in continuous time and used mainly for technical systems),
2. Discrete Events Modelling (enabling high detail simulation in discrete time),
3. System Dynamics (enabling simulation in medium or high level of abstraction in continuous time),
4. Agent-based Modelling (enabling modelling the behaviour of the individual 'agents' forming the system [at various levels of granularity, e.g. citizens, groups, firms, etc.] and then from them the system's behaviour is derived).

By comparing them we came to the conclusion that Systems Dynamics (SD) [38–40] is more appropriate for the analysis of public policies, because this usually requires high level views of complex social or economic systems in continuous time, and also such systems include various individual processes with various types of 'stocks' and 'flows' among them, which are influenced by a public policy. For these reasons Systems Dynamics has been successfully used in the past for estimating the evolution of a number of critical variables for society under various policy options, such as unemployment, economic development, taxation income, technologies penetration, pollution, poverty, etc. and for the analysis of various types of public policies (e.g. [41–44]). It focuses on understanding initially

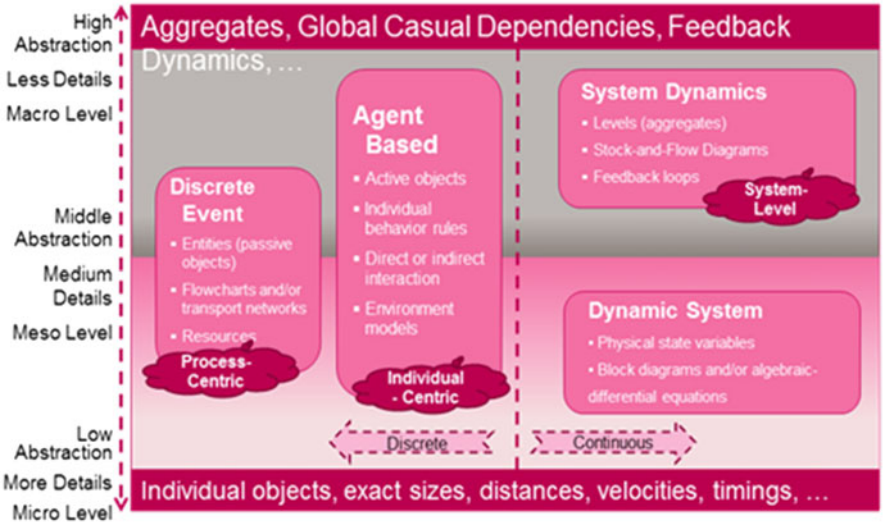

Fig. 3 Main paradigms of simulation modelling (*Source*: Borshchev and Filippov [37])

the basic structure of a system (i.e. its main stocks, flows and the variables influencing them) and then based on it estimating the behaviour it can produce (e.g. exponential growth or S-shared growth of the basic variable), and also how this behaviour will change if various structural changes are made.

5 Evaluation

For the evaluation of the proposed methodology ten pilot applications of it were conducted as part of the abovementioned PADGETS project. They concerned multiple social media consultations on the following topics:

- "Media freedom",
- "Corruption",
- "Cooperative institutes' contribution to poverty reduction, employment generation and social integration",
- "Tax evasion and fraud",
- "European year of citizens and citizenship",
- "Employment, entrepreneurship and freedom of speech for European youth",

(the above six pilot applications were organized and conducted by the Center for eGovernance Development, Slovenia, which was one of the partners of the PADGETS project, in cooperation with Slovenian Members of the European Parliament [MEP]),

– "Under-representation of women executives in the higher management of enterpriseses",
– "Financial crisis in the Southern European countries",
– "Exploitation of wind energy",

(these three pilot consultations were organized and conducted by University of Aegean, partner of the above project, in cooperation with a Greek MEP),

– "Large-scale implementation of tele-medicine in Piedmont region",

(this pilot consultation was organized and conducted by Torino Polytechnico, partner of the above project, in cooperation with Piedmont Regional Government).

After the end of these pilot applications, semi-structured focus group discussions were conducted for evaluating them, in which participated the involved personnel of the corresponding government agencies and MEP assistants. There was a wide agreement that the proposed methodology constitutes a time and cost efficient mechanism of reaching wide and diverse audiences, and stimulating and motivating them to think about social problems and public policies under formulation, and also to provide relevant information, knowledge, ideas and opinions. Furthermore, it enables identifying the main issues perceived by citizens with respect to a particular social problem or domain of government activity, and collecting from them interesting ideas on possible solutions and directions of government activity. However, our pilot applications have shown that the above information generated from such multiple social media consultations might not be at the level of depth and detail required by government agencies. So in order to achieve a higher level of detail, and more discussion depth in general, a series of such multiple social media consultations might be required, each of them focused on particular sub-topics and/or participants' groups. Another risk of this methodology is that it can lead to unproductive discussions among like-minded individuals belonging to the network of the government policy maker who initiated the consultation; such discussions will be characterised by low diversity of opinions and perspectives, low productivity of knowledge and ideas, and in general limited creativity. Therefore for the effective application of the proposed methodology it is of critical importance to build large and diverse networks for these social media consultations; for his purpose we can combine networks of several government agencies, and also politicians, preferably from different political parties and orientations, and also invite additional interested and knowledgeable individuals and civil society organizations. A more detailed description of the process and the results of this evaluation is provided in [45, 46].

Furthermore, from these focus group discussions it has been concluded that this new hybrid multi-channel approach to e-participation in order to be put in practice by government agencies will require significant changes at the organizational, cultural and technological level. First it will necessitate the creation of new organizational units to manage the above new e-participation channels, and also to analyze the large quantities of both structured data (e.g. citizens' ratings) and unstructured data (e.g. citizens' postings in textual form) that will be created by

them. The personnel of these new units must have specialised skills concerning these electronic modes of communication, and also a quite different culture from the dominant 'law enforcement' culture of government agencies. Also, the analysis of the large quantities of unstructured data in textual form that will be collected from the above channels (e.g. hundreds or thousands of postings) cannot be performed manually, as this would require a lot of human resources (increasing the costs) and also long time (which might cause delays in the decision and policy making processes of government agencies); therefore it is necessary to use highly sophisticated technological ICT-based tools that implement complex opinion mining methods. These tools will have to be integrated with the technological infrastructures of the above channels increasing technological complexity; also, the use of these tools is not easy, and requires extensive adaptations and language resources, such as lexicons of polar words, synonyms and antonyms. Furthermore, new processes should be established for the integration of the results and conclusions of the analysis of the above structured and unstructured e-participation channels' data in the decision and policy making processes. Finally, the government agencies should get accustomed to the style and language of interaction in Web 2.0 social media, and the whole culture that characterises them, which are quite different in comparison with the official e-participation spaces or the other modes of interaction with the citizens.

6 Conclusions

In the previous sections has been presented a methodology for the efficient exploitation of Web 2.0 social media by government agencies for achieving a wider interaction with more and diverse groups of citizens and broadening and enhancing e-participation. It is based on a central platform, which allows publishing content and deploying micro web applications (Padgets) to multiple Web 2.0 social media simultaneously, and also retrieving users' interactions with them (e.g. views, comments, ratings) in all these social media, in an efficient systematic and centrally managed machine-supported automated manner using their API. This central platform also performs various levels of advanced processing of these interaction data, such as calculation of useful analytics, opinion mining and simulation modelling, in order to extract from them information appropriate for supporting substantially government decision and policy makers. A first evaluation of this methodology in a series of pilot applications gave positive results as to its capabilities and value, and at the same time revealed some critical preconditions for its successful application.

The proposed methodology leads to a transformation of the current government agencies' approach to e-participation, which is based on the provision to the citizens of a single e-participation channel (i.e. an official e-participation space), into a 'hybrid' multi-channel one. This new approach, instead of the 'one channel for all' logic of the current approach, uses a series of interconnected e-participation channels with quite different characteristics, levels of structure and target groups:

1. an official highly structured e-participation space (e.g. a structured forum that imposes the semantic annotations of users' postings, according to a predefined discussion ontology, and allows only some predefined relations among them [12–14]), to be used mainly by a small group citizens with good knowledge on the policy under discussion, high education and willingness to spend considerable time and effort for it; the access to it can be controlled and limited to invited persons, such as representatives of main stakeholders and widely recognised experts, or free,
2. an official unstructured e-participation space (e.g. a usual forum) to be used by a wider group of citizens with some knowledge on the policy under discussion, sufficient education for entering in such an e-consultation, and also have some familiarity with such tools and are willing to spend some time and effort for it,
3. and also a system like the one described in the previous sections, which allows exploitation of various Web 2.0 social media for e-participation purposes, by publishing content on the policy under discussion, deploying relevant micro web applications (Padgets), and then retrieving and processing centrally all citizens' interaction data; this lower structure channel will allow reaching a much wider and diverse group of citizens than the other two channels, who are not familiar with the operation, the style and the language of the abovementioned types of e-consultations, or cannot spend much time for participating in them, or even do not have sufficient knowledge on the policy under discussion.

It should be mentioned that the above channels should be interconnected, so that a user of one of them can easily move to the others, e.g. a citizen who reads some content about a policy under formulation in a Web 2.0 platform, has a first level of interaction with it (e.g. a simple rating of it), and gets interested in it, can be easily be linked to the official e-participation space of the competent government agency, in order to participate in a more structured relevant consultation.

Further research is required for the evaluation of the proposed methodology from different perspectives, in various types of government agencies and for different kinds of policy consultations, which might lead to modifications and improvements of the methodology, its application process and supporting technological infrastructure. Also, our research has focused on the exploitation of social media by government agencies as a means of more intensive 'external communication' with their external environment (e.g. with the society—civil society organizations and individual citizens); so further research is required on the exploitation of social media as a means of more intensive 'internal communication' among different government agencies (or even among different departments of the same government agency) for the design and implementation of public policies.

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Interweaving Temporal Qualitative Comparative Analysis with Necessary Conditions Analysis: An Empirical Application in the European Monitoring Systems Context

Federico Iannacci

Abstract There are very few empirical applications of Temporal Qualitative Comparative Analysis (TQCA). By interweaving TQCA with the necessary condition analysis stepwise procedure, I endeavour to compare instances of cheating and non-cheating practices within the European Social Fund context and unravel the multiple sequences of events leading to the outcome of interest. Implications for theory and practice are discussed by shedding a new light on the non-trivially necessary causes for both cheating and non-cheating activities.

1 Introduction

The issue of time is the central span of process theories as such theories specifically look at the unfolding of events in a diachronic fashion. Process theories show how specific combinations of events cause specific outcomes through the unfolding of events in a particular sequence. Each event in the process is necessary but not sufficient to cause the outcome [1, 2] and "time ordering among the contributing events is generally critical for the outcome" [3, p. 38]. Though process theories employ eclectic designs that identify or reconstruct the process under investigation through in-depth case studies, multiple case studies, time series analysis or a mix of qualitative and quantitative data analysis methods [4], to date there are virtually no studies deploying set-theoretic approaches in general and Temporal Qualitative Comparative Analysis (TQCA) in particular. Yet deploying a set-theoretic approach to model process theories can bring added value as it can identify multiple sequences of events leading to the outcome of interest whilst shedding a new light on the non-trivially necessary causes for the unfolding of these sequences [5, 6].

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To be sure, embedding time in Qualitative Comparative Analysis (QCA) is not an easy matter. Some scholars, for instance, have argued that set-theoretic approaches "lack an explanation for the longitudinal 'how' of causal explanation. . . they also have a temporality problem. . . [and] they are inherently unable to track shifts over time" [7, p. 840]. Other scholars have argued that "QCA fails to take account of time. Variables and cases [ ] are frozen in time" [8, p. 149]. Given these limitations, QCA scholars have endeavoured to enhance the set-theoretic approach in a diachronic fashion either by developing a modified version of Boolean algebra that relaxes its commutative property [5, 8] or by analysing cross-temporal variations of the data [9] or by accounting for co-occurrences and absences within temporally-ordered configurations [10]. In this paper, I interweave TQCA with the Necessary Condition Analysis (NCA) informing [10] study. Rather than using [10] approach in a fully-fledged fashion, I only use the stepwise procedure underpinning NCA [6] because my empirical data cannot be rank-ordered in a temporal fashion. Unlike time series QCA which views changes in conditions between given time points as causes of the outcome [9], I study the sequence of occurred events (or states) as causes of the outcome [5, 8]. My objective is to study the causes leading to cheating (or non-cheating) practices in the context of European Regulation 1260/99 with an eye towards understanding the multiple sequences of events to the outcome of interest and the non-trivially necessary causes for the outcome of interest. The remainder of this paper unfolds as follows. Section 2 outlines the regulative context where this study is conducted and shows that Regulation 1260/99 has introduced several regulatory requirements that have constrained European Union (EU) Member States with regard to their submission of monitoring data. Section 3 elaborates the methodology being deployed to study necessity and sufficiency when adding the temporal dimension to QCA. Section 4 captures the monitoring routines being studied in an appropriate data matrix. Section 5 analyses the data matrix in a TQCA fashion. Section 6 discusses the results of the TQCA analysis by interweaving them with the NCA. Lastly, Sect. 7 highlights the limitations of this research, as well as its theoretical and practical implications.

2 Background

The research reported in this paper was informed by the need to evaluate the monitoring systems deployed by various EU Member States to track European Social Fund (ESF) allocations and check the veracity of claims for funding [11]. The ESF is a structural fund aimed at achieving economic cohesion across the EU Member States. Partly supported by the European Commission, the ESF funds, amongst other things, training projects with the aim to match labour market supply and demand and reduce unemployment. Since large sums of money are being allocated to EU Member States, funding allocations are systematically subjected to monitoring. To endorse these monitoring activities, EU Member States must periodically report to the European Commission the amount of financial

resources used to activate a training project, the number of training hours delivered, the number of successful trainees and the long-term indirect effects of training projects. With the enactment of Regulation 1260/99, the European Commission has prescribed the use of both physical and financial indicators, the former referring to synthetic summary metrics tracking project and programme implementation (e.g., number of training places, number of training hours, number of successful trainees, etc.), the latter referring to financial resources used to implement projects (e.g., financial inputs, eligible costs, etc.). Essentially, the purpose of these monitoring activities is to cross-check that claims for funding stemming from various training providers match physical data so as to ensure that only eligible costs and financial inputs are covered with public sector funding.

Since covertly breaking the rules with the purpose of benefiting from public sector money with little or no expenses is a serious possibility, in this paper I undertake a TQCA of the causes leading to cheating (and non-cheating) practices. I conceive of cheating as a practice aimed at breaking EU Regulations in a covert fashion. By asking what sequences of occurred events lead to the outcome of interest (i.e., cheating or, conversely, non-cheating) and how such occurred events combine to determine this outcome, I aim to apply TQCA to empirical rather than hypothetical data. Whilst extant TQCA approaches are biased toward the study of sufficiency, I use a stepwise NCA to identify non-trivial necessary conditions for the outcome of interest (i.e., cheating or non-cheating) and develop modest generalisations that apply to the whole universe of EU Member States.

3 Methodology

I used a two-pronged research strategy that interweaves within case analysis with cross-case analysis. In the first stage, data were collected with regard to the monitoring and reporting procedures enacted by eight EU Member States. Data were collected by means of desk reviews, peer observations and semi-structured interviews conducted by country experts. Each country expert produced a country report which was subsequently analysed to generate an in-depth within case analysis of the Member State in question. This analysis helped unravel the key events involved in the monitoring routines enacted within Regulation 1260/99. Subsequently, I used TQCA to conduct a cross-case analysis to identify similarities and differences across cases. TQCA was aptly corroborated with the necessary procedure outlined below in order to identify non-trivial necessary conditions amongst the multiple sequences of events leading to the outcome of interest.

3.1 TQCA

Though the importance of causal ordering has been highlighted in the literature [12, 13], TQCA expands QCA original principles internally to address the issue of time head on. Premised on the idea that the temporal sequence of events (or conditions) matters, TQCA introduces the logical operator THEN (symbolised by a slash sign in [5] formalisms) to account for the temporal order of conditions. Thus, a configuration A/B (read A THEN B) indicates that A occurs before B (or, conversely, that B cannot occur before A). Based on the THEN operator, TQCA adds three minimisation rules.[1] First, the THEN operator (/) can be replaced with the AND operator (*) if A/B and B/A lead to the same outcome and if other attributes are identical (C, D, etc.). Second, within a temporal block, the normal minimisation rules apply. If both A/B*c and A/B*C lead to the same outcome, then condition C is redundant and, therefore, can be minimised away. Third, conditions (or events) can be factored out as long as temporal boundaries are respected. For example, A/B*C + A/D*E could be factored out as follows: A/[(B*C) + (D*E)] which would be interpreted as A, THEN B AND C OR D AND E. Since accounting for the temporal order of events produces a geometric explosion in the number of configurations (from 2k to K! * 2k where K = number of attributes or conditions), TQCA introduces two important caveats. First, researchers can "fix certain variables as occurring first, last or setting the context for other variables" [8, p. 158]. Second, and as an extension of TQCA stemming from [5, p. 432], "the event order is relevant only if the events actually occur". Thus, the sequential notation (/) is eliminated from absent attributes because the order of events matters only when they are coded present. Should one or more events (or conditions) be coded absent, the temporal order does not matter because the order of events that did not occur is impossible to predict.

TQCA formalises the techniques needed to analyse temporal sequences of events within the logic and principles of QCA. However, TQCA is geared towards the analysis of sufficiency at the expense of necessary conditions. Yet the managerial relevance of necessary conditions should not be underplayed not least because the absence of necessary conditions guarantees failure [6]. For example the absence of necessary conditions for cheating warrants the failure of cheating practices. Yet their presence will only make such practices possible. In addition, within the realm of necessary conditions one must distinguish between trivial and non-trivial conditions, the latter being critical or essential for achieving a particular result. For example, the presence of gravity is a trivial necessary condition for successful monitoring systems because gravity is always present [6, p. 1176]. On the contrary, being associated with a governing party may turn out to be a

[1] Please note that the basic operations in QCA include the following notations: AND (*) which stands for a conjunction or intersection of events or sets; OR (+) which stands for their union; NOT (~) which stands for their negation or complement. Please note additionally that the negation of a set can also be indicated with lower-case letters.

non-trivial necessary condition for breaking extant rules and regulations in order to embezzle public funds. These simple examples show that the pursuit of necessary conditions is a worthy enterprise because it discloses which conditions are crucial for achieving a specific goal.

3.2 The Stepwise Procedure for NCA

Dul et al. [6] have formulated a stepwise procedure for building or testing necessary conditions. Given the exploratory nature of this research, I shall only highlight the key steps involved in the theory-building procedure.

- Step 1: Select cases on the basis of the presence of the outcome (i.e., successful cases);
- Step 2: Formulate necessary condition hypotheses to check the presence of the condition in all instances of the presence of the outcome;
- Step 3: Assess trivialness by checking whether there are cases without the necessary condition. Such cases must not have the outcome.

In the presence of dichotomous variables, this stepwise procedure can be illustrated as in Fig. 1.

4 The Data Matrix

The in-depth comparative analysis of the cases at hand helped me unravel the following sequence of events (see Table 1):

1. Keying data in the monitoring system: the first step Member States must undertake is to enter both physical and financial data into relevant computer systems;
2. Validation: the next step is to validate (or verify) these data either with automated or manual procedures;
3. Disbursement of funding: pending the veracity of the data previously keyed into the system, the European Commission will disburse relevant funding to the

• 1= Present • • Y Variable • • • 0= Absent	• Not Possible • •	• Possible	**Legend:** X= Independent Variable Y= Dependent Variable
	• Possible • •	• Possible	
•	• 0= Absent	X Variable	1= Present

Fig. 1 The 2 × 2 matrix representing the necessary condition (adapted from [6, p. 1172])

Table 1 TQCA configurations for cheating practices (K = Keying; V = Validation; F = Funding)

Number	Combination	Cases	Cheating
1	K/V/F	5	0/5
2	K/F/V	1	1/1
3	K/V*f	0	?
4	K/v*F	0	?
5	K/v*f	1	1/1
6	k/V/F	0	?
7	k/F/V	0	?
8	k/V*f	0	?
9	k/v*F	0	?
10	k/v*f	1	0/1

Member States and, indirectly, to the training providers which undertook the training activities.

Each Member State was subsequently coded in a dichotomous fashion with regard to the above events. Table 1 reports the codings for each Member State. Only 8 Member States were analysed in-depth and the "keying" condition was fixed in the initial position, thus letting "validation" and "funding" vary between the second and third position.[2]

As it can be gleaned from Table 1, only four configurations have empirical cases. These configurations encompass the following event sequences:

- Configuration 1: Five cases fall within the configuration "keying" THEN "validation" THEN "funding". None of these cases is an instance of cheating;
- Configuration 2: One case falls within the configuration "keying" THEN "funding" THEN "validation". This case is an instance of cheating;
- Configuration 5: One case falls within the configuration "keying" THEN "non-validation" AND "non-funding". This case is an instance of cheating;
- Configuration 10: One case falls within configuration "non-keying" THEN "non-validation" AND "non-funding". This case is an instance of non-cheating.

The remainders (i.e., configurations with no empirical cases) have been labelled with a question mark as they boil down to theoretical possibilities with no actual instantiations (for example, there can be no validation of non-keyed data). Thus, it is difficult to predict whether cheating will take place within these specific sequences of events.

[2] Please note that the order of events matters only when both validation and funding are coded present. Therefore, I have replaced the THEN (/) operator with the AND (*) operator in those configurations where at least one condition (or event) which is allowed to vary is absent. Please also note that upper-case letters indicate the presence of a condition and lower-case letters indicate its absence. By the same token, one indicates presence and zero absence of the outcome (i.e., cheating).

5 Analysis

Using the fsQCA software, [5, 14] procedure yields the following Table 2. As before, one indicates presence and zero absence of a particular condition or outcome variable.

Essentially, I have addressed the order of validation and funding by creating an additional condition designated "Validation_B4_Funding" (i.e., validation before funding). This condition was coded one if validation of monitoring data occurs before funding. Conversely, if funding takes place before validation, it was coded zero. In addition, I coded this condition as a "don't care" (using the dash sign) whenever either validation or funding (or both) were absent because, as I stipulated above, the temporal order of events does not matter when one or more events (or conditions) are absent. By using the "Crisp Set/Quine" procedure and by setting positive cases to "true" (cheating) and negative cases to "false" (i.e., non-cheating), I obtained the following paths to cheating:

$$\begin{aligned} \mathrm{CHEATING} = {} & \mathrm{KEYING} * {\sim}\mathrm{VALIDATION} * {\sim}\mathrm{FUNDING} \\ & + \mathrm{KEYING} * \mathrm{VALIDATION} * \mathrm{FUNDING} \\ & * {\sim} (\mathrm{VALIDATION\_B4\_FUNDING}) \end{aligned} \tag{1}$$

By using sequencing notation and by factoring "keying" out, Eq. (1) can be represented as follows.

$$\begin{aligned} \mathrm{CHEATING} = {} & \mathrm{KEYING}/[(\sim\mathrm{VALIDATION\ AND\ }\sim\mathrm{FUNDING}) \\ & + (\mathrm{FUNDING}/\mathrm{VALIDATION})] \end{aligned}$$

Thus, cheating can occur in two configurations (or types of cases): first, Member States key monitoring data in the computer system which is subsequently non-validated, thus leading to the interruption of funding (see Configuration 5); second, Member States key monitoring data in the computer system and obtain corresponding funding but subsequent validations show that these funding disbursements were illegitimate (see Configuration 2). Examples of these two configurations can be outlined as follows. In one instance serious deficiencies in the realisation of controls and the certification of expenses triggered a suspension of funding from the European Commission. Given that monitoring functions were not clearly defined and given that there was a lack of guidance as to the procedures to follow, data entered in the system was not subjected to rigorous controls, thus leading to an interruption of funding (Configuration 5). In another instance a Member State discovered through ex-post validation that the veracity of monitoring data submitted by a training provider was questionable as they had inflated the number of people who found a job at the end of the training programme, thus claiming funding for a physical target they did not achieve (Configuration 2).

Conversely, the paths leading to non-cheating can be represented as follows.

Table 2 Truth table for cheating and non-cheating configurations

Case ID	Keying	Validation	Funding	Validation_b4_Funding	Cases	Cheating	Non-cheating
1	1	1	1	1	5	0	1
2	1	1	1	0	1	1	0
3	1	1	0	–	0	?	?
4	1	0	1	–	0	?	?
5	1	0	0	–	1	1	0
6	0	1	1	1	0	?	?
7	0	1	1	0	0	?	?
8	0	1	0	–	0	?	?
9	0	0	1	–	0	?	?
10	0	0	0	–	1	0	1

$$\begin{aligned}\text{NON-CHEATING} = {} & \text{KEYING} * \text{VALIDATION} * \text{FUNDING} \\ & * (\text{VALIDATION\_B4\_FUNDING}) \\ & + \sim\text{KEYING} * \sim\text{VALIDATION} \\ & * \sim\text{FUNDING}\end{aligned} \tag{2}$$

Once again, Eq. (2) may be re-written as follows.

$$\begin{aligned}\text{NON-CHEATING} = {} & \text{KEYING/VALIDATION/FUNDING} \\ & + \sim\text{KEYING/}\sim\text{VALIDATION AND } \sim\text{FUNDING}\end{aligned}$$

Essentially, two non-cheating typologies can be envisaged according to whether validation of keyed data takes place before funding (see Configuration 1) or there is no keying of monitoring data and, therefore, no subsequent validation and funding for the simple reason that there is no claim for funding on behalf of the Member State (see Configuration 10). Five cases followed the standard route, thus being instances of funding training projects providing the European Commission with validated data (Configuration 1). One case in the data set was yet to comply with Regulation 1260/99 because it was yet to implement physical indicators (Configuration 10).

6 Discussion

TQCA is a useful strategy for studying the multiple sequences of events that lead to the outcome of interest (i.e., cheating and non-cheating). My findings resonate with monitoring practice. However, TQCA neglects the role of necessary conditions. For instance, keying seems to be a necessary condition for cheating. Yet TQCA is silent about necessary conditions and their relevance (or trivialness). Given the managerial relevance associated with necessary conditions [6], it is worth undertaking a study of relevant (or, conversely, trivial) necessary conditions to understand whether keying is a core requirement for cheating. [6] procedure entails three steps to assess trivialness:

- Step 1: Select successful cases (i.e., cheating cases). These are the positive cases corresponding to configurations two and five;
- Step 2: Formulate necessary condition hypotheses. Keying data in the monitoring system is present in all instances of cheating. Thus, cheating requires keying data in the monitoring (or computer) system;
- Step 3: Assess trivialness. Since a check on trivialness requires the identification of cases without the condition and since such cases do not lead to cheating, one can safely argue that keying data is a non-trivial necessary condition for cheating. Conversely, non-keying data in the system whilst making claims for funding is a clear violation of Regulation 1260/99.

1= Present	Not Possible to covertly break the rules without keying data in the system – zero instances	Possible because a training provider may submit unchecked data and, hence, break the rules – two instances discussed above (see positive cases corresponding to configurations 5 and 2)
CHEATING 0= Absent	Possible: some data may genuinely not be keyed into the system because of lack of relevant indicators – one instance where physical data were not being keyed into the system because only financial data were collected (configuration 10)	Possible because training providers are submitting validated data (hence, their claims for funding are genuine) – five instances were genuine claims for funding (see negative cases corresponding to configuration 1)
	0= Absent KEYING	1= Present

Fig. 2 The 2 × 2 matrix in the monitoring systems context

Figure 2 captures this reasoning.

7 Conclusion

Admittedly, the TQCA procedure deployed in this paper suffers from three limitations. First, it assumes that sequences stem only from occurrences of events. However, non-occurrences may originate events (and, therefore, outcomes) as much as occurrences. For instances, remainders (i.e., configurations with no empirical cases) may generate events and outcomes as much as non-remainders (i.e., configurations with empirical cases). Second, I have investigated only sequences involving two events (i.e., validation and funding). In fact, event sequences may involve variation amongst three or more events (or conditions). Third, and last, I have restricted the event sequences by assuming that "keying" is always first. Whilst relaxing this restriction is unfeasible in this context, [13] argue that such clear-cut restrictions are not always feasible in research practice.

These limitations notwithstanding, this paper has methodological, theoretical and practical implications. Methodologically, there is a paucity of empirical applications of TQCA. Not only does this paper apply TQCA. It has also enhanced it with the NCA to uncover multiple event sequences leading to the outcome of interest and shed a new light on the core conditions for the emergence of the dependent variable. Theoretically, this paper casts a new light on process theories where the ordering of events matters a great deal. In a process theory every single condition is necessary but not sufficient for the outcome of interest [1, 2]. Yet not all necessary conditions are the same. Some necessary conditions may be trivial whilst others may be core for the emergence of the outcome of interest. Understanding

which conditions are relevant and which conditions are trivial may help one discriminate between core and peripheral necessary conditions.

Deeply interconnected with the previous point, this paper has also practical implications. Given the managerial relevance of core necessary conditions [6], management should endeavour to satisfy such conditions since their absence may well spell out the absence of a coveted result. While in some cases managers may want to prevent the absence of necessary conditions, in other cases the presence of core necessary conditions may be the default path to unwanted results (as one can easily glean from the cases discussed in this paper). In these situations management must be aware that follow-up steps are required to prevent the unwanted result from materialising. After all, the presence of the necessary condition makes the unwanted result possible but unlikely if such follow-up steps are undertaken (e.g., ensuring keyed data are promptly validated to prevent cheating from occurring).

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Evaluating Open Government Initiatives

Jan Huntgeburth and Daniel Veit

Abstract The advent of social media opens up unexpected new opportunities of engaging the public in government work. While research on Open Government has produced conceptually interesting models that describe how the initiative will or should evolve based on anecdotal evidence from best practice cases, our systematic analysis reveals that previous work on Open Government evaluation has a strong bias in favour of implementing Open Government, while the negative consequences or limitations are not fully incorporated. Seeing this as a major limitation, we highlight why future research should produce more rigorous and relevant knowledge for overcoming practitioners' concerns of implementation. Moreover, we present the first study examining the consequences of implementing an Open Government initiative at a German university. The results suggest that Open Government initiatives may very well backfire on governments. Thus, as a research community, we should not simply propose new artefacts or solutions how to open up government but should be very explicit about the consequences for the authorizing environment (in particular minorities), government organizations, politicians and the political system as a whole. By the end, the paper presents a research agenda for future research on the evaluation of Open Government initiatives.

1 Introduction

Since the widespread diffusion of personal computers and internet access, researchers and practitioners have developed an in-depth understanding on how information and communication technology (ICT) in particular the internet can be used to improve the relationship between government and society [1]. While e-government research during its early days was primarily concerned with

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improving the efficiency and effectiveness of government service provisioning ("managerial approach"), the advent of social media has opened up unexpected new opportunities of engaging the public in government work ("participatory approach") [2]. Within the last years, governments around the world have started several open government initiatives which aim to transform the relationship between government and society by "establish[ing] a system of transparency, public participation, and collaboration" [3].

At its core, the Open Government initiative is manifested under three integrating themes [4]. First, Open Government aims at increasing information transparency. By providing citizens with access to government information, the public may better understand the workings of their government [5]. At the same time, having access to Open Government data empowers the public to hold government accountable for its policy and service delivery performance. Thus, increasing accountability is another key theme of Open Government. Third, Open Government aims at increasing public engagement [6]. Social media-based citizen-sourcing strategies can be utilized to engage the public in governmental policy processes and service delivery programs [7]. Through participation and collaboration governments can give the public the opportunity to exert influence on the outcomes of government processes [8]. Research on Open Government has produced conceptually interesting models on how Open Government initiatives will or should evolve using mostly anecdotal evidence from best practice cases. E.g., Lee and Kwak [8] prescribe government organization to conduct "ubiquitous and continuous engagement" with the public. In this mode, the public engages in various government activities through multiple social media channels. Thereby, "Open Government becomes the norm for government culture" and the benefits of transparency, participation and collaboration are fully realized [8]. Similarly, Kalampokis et al. [5] propose that government organization should integrate their data with non-government formal and social data to improve the overall transparency of government activities (more examples are provided in the next section).

While this guidance might be to an extent useful for practice, most research on Open Government assumes that more Open Government is always better without reflecting the assumptions and implications underlying this new "system of transparency, public participation and collaboration" and the consequences of the IT artifacts themselves [9]. We argue here that in order to empirically evaluate Open Government initiatives—which we believe should be a central concern of research in the future—we should rethink the assumptions underlying our models in order to produce more rigorous and relevant Open Government research. The goal and expected contribution of this paper is threefold. First, we aim to critically reflect previous research and uncover biases in favor of implementing Open Government. Second, by using empirical evidence from the field we show that Open Government portals have an impact on the perceptions of people and that this effect may be also negative. Third, we conclude that we need more research that evaluates the impact of Open Government for the authorizing environment (in particular minorities), government organizations, politicians and the political system as a whole and come up with a research agenda for evaluating open government initiatives.

The remainder of this paper is structured as follows. First, we introduce two distinct and opposing political perspectives on how government can retain legitimacy and support which we assume is the central goal of public managers. Based on these perspectives, we analyse previous research with respect to the perspectives employed. In section three, we introduce the case of an Open Government initiative at a German university to illustrate why we need more research on the consequences of implementing Open Government and need to provide more rigorous and relevant knowledge for overcoming practitioners' concerns. The last section introduces our ideas for a research agenda on how the identified gap in the literature could be successfully addressed.

2 Evaluating Open Government Initiatives

2.1 The Kantian Perspectives

In his book "Groundwork of the Metaphysic of Morals", the renowned philosopher Emanuel Kant (1724-1804) provides major insights into the relationship between morality and politics [10]. Kant describes two different strategies for retaining legitimacy and power—two pertinent goals of governments. On the one hand, he describes the character of the "political moralist" who focuses on getting people to do things with specific ends in view. This view allows a power holder to manipulate, lie or deceive people in order to achieve certain outcomes (such as peace or political stability). On the other hand, the "moral politician" is a character assuming that moral actions will necessary lead to moral ends. Kant argues that the position of the moral (or honest) politician is superior to the "political moralist" since straying from morality requires that "empirical conditions which permit the proposed end to be realized can be assumed to exist" [10, p. 122]. Thus, because of the unpredictability of achieving beneficial outcomes through immoral means (e.g. concealment of government data to deceive the authorizing environment (citizens)), straying from morality (i.e. openness and transparency) during political activity cannot be justified [11].

The normative implication of Kant's view on politics and morality is that transparency, accountability and public engagement in government work should be categorical imperatives for a public administration if legitimacy and retention of power are central goals of decision-makers as we assume in the following.

2.2 The Machiavellian Perspective

A political philosopher who would not agree with Kant is Niccolo Machiavelli. In his famous book "The Prince" he acknowledged that a power holder who is honest

and faithful to his word will be admired by the society but that this admired authority is not always the most successful [12]. Compared to Kant, Machiavelli has an opposing view on the prospect for the "political moralist" and clearly prioritizes the individual benefit of the power holder above the collective benefit of society. If we take this self-serving perspective, we have to consider the individual advantage that public manager have when adopting Open Government initiatives.

Compared to their private sector counterparts, public managers have to cope with the misalignment of financial performance, organizational survival and social value [13]. Private companies can focus solely on their financial performance and in doing so be sure that they guarantee their survival and the production of social value. In contrast, a focus on financial performance is not sufficient for public managers. Moore's [13] strategy framework for the public sector suggests that managers should focus on three different calculations. First, the value propositions should be clearly formulated and disseminated, that is the social mission plan of the public administration. Second, public managers have to ensure that they have sufficient legitimacy and support in the authorizing environment for their value proposition and how the organization operates. Third, governments have to ensure that sufficient know-how and capability (sourced from inside or outside the organization) are existent to achieve the desired results.

The implication of the Machiavellian perspective is that Open Government initiatives aiming at transparency, accountability and public engagement by the means of open data or citizen-sourcing strategies are not good by default but have to be evaluated based on their consequences for government (cf. Fig. 1).

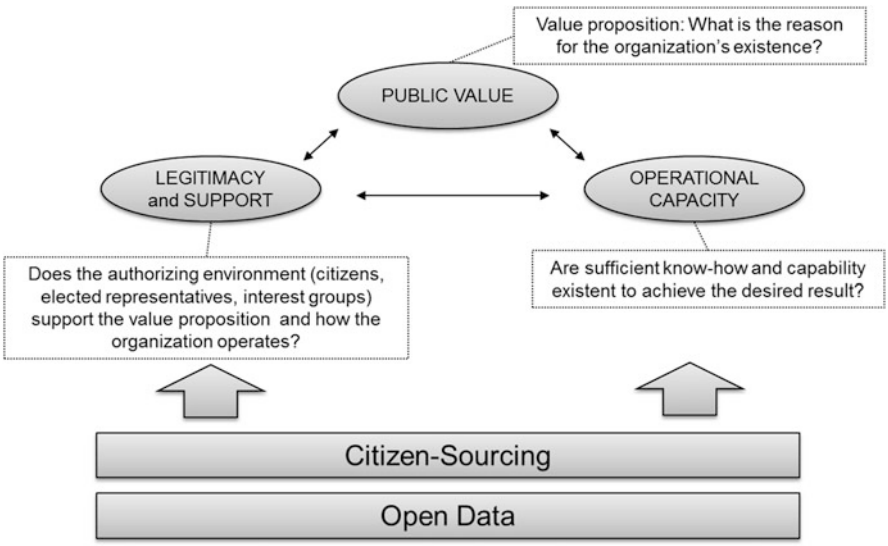

Fig. 1 Open government strategy framework (inspired by [14])

2.3 Previous Research

We conducted a structured literature review to create a full picture of previous literature on the evaluation of Open Government initiatives (cf. Table 1). Our search was conducted within the core outlets of e-government research [15]: *Electronic Government—An International Journal; Electronic Journal of E-Government; Government Information Quarterly; Information Policy; International Journal of Electronic Government Research; Journal of Information Technology and Politics; Transforming Government: Process, People, and Policy; E-Government track at Hawaii International Conference on System Sciences; DEXA EGOV; and DBSNA's dg.o conference*. Overall, only five papers have been found that directly address the evaluation of Open Government initiatives. Papers on the adoption (why is Open Government adopted?) were excluded from the analysis. We used a concept matrix [16] to structure our findings.

Our results suggest that both open data and citizen-sourcing have been in focus of previous research. Access to public data (Open Data) is valuable for citizens, organizations, and businesses for both democratic as well as economic reasons. On the one hand, open data is expected to improve the public's ability to hold government responsible. Accountability portals such as Recovery.gov report how public funds are being spent by recipients [5]. This allows citizens to monitor how their money is spent and may better legitimize the collection of taxes at the end. On the other hand, open data is expected to foster the creation of innovative products and services. Data portals such as data.gov provide raw data about unemployment statistics, traffic, job offers or geographical data [17]. By inviting private companies to access and use government data, society can benefit from new value-added services and products provided to citizens for marginal costs. In the light of these expected benefits, Kalampokis et al. [5] provides guidance on how to aggregate and integrate government data and increase the value for the public. A cross-country comparison of the accessibility of public data is presented by Alanazi and Chatfield [18].

The term citizen-sourcing was introduced by Nam [7] but principally captures all participatory and collaborative elements of Open Government initiatives. Citizen-sourcing refers to the process operated by governments that involves out-sourcing certain tasks to a distributed group of citizens. According to Nam [7], there are two main purposes for government to outsource small tasks using ICT. On the one hand, citizen-sourcing initiatives can be used to improve the image of government as an adopter of modern ICT such as wikis, forums or social networks. On the other hand, government can benefits from citizens' enthusiasm to participate in mass collaboration projects [7]. Thereby, government can crowd-source their problem to citizens and benefit from the wisdom of the crowd.

Apart from Nam [7], all studies at least implicitly assume that more Open Government is better (Kantian perspective) indicated by the fact that the frameworks assessing the initiatives using metrics such as number of functionalities

Table 1 Current research on the evaluation of open government initiatives

#	Reference	Focus		Perspective		Research approach	Content
		Open data	Citizen-sourcing	Kant	Machiavelli		
1	Alanazi and Chatfield [18]	X		X		Website survey	Comparison of the level of maturity of governments in the Middle East plus explanation of observed differences **Assumes that more functionalities are better**
2	Bertot et al. [17]	X	X	X		Conceptual	Proposes a measurement tool to assess Open Government initiatives based on the constructs of awareness, use and impact **All metrics assume that more Open Government is better**
3	Kalampokis et al. [5]	X		X		Conceptual	Consolidation of existing E-Government stage models in literature in terms of proposed Open Government Data stage model **More sophisticated Open Government data is better**
4	Lee and Kwak [8]	X	X	X		Case study	Proposes an Open Government maturity model based on five field studies with U.S. healthcare administration agencies **More Open Government maturity is better**

(continued)

Table 1 (continued)

#	Reference	Focus		Perspective		Research approach	Content
		Open data	Citizen-sourcing	Kant	Machiavelli		
5	Nam [7]		X		X	Conceptual	Proposes a frameworks for assessing current citizen-sourcing initiatives with regards to design and outcome evaluation **Emphasize that citizen-sourcing should be evaluated with respect to the outcome, but only conceptual**
	Our case (cf. Sect. 3)	X			X	Survey among students	**Examines the impact of an Open Government data initiative on two relational outcomes (trust in government, procedural fairness)**

(Alanazi and Chatfield [18]) or number of search engine results (Bertot et al. [17]) or propose maturity models (Kalampokis et al. [5]; Lee and Kwak [8]). Only Nam's [7] evaluation framework emphasizes that citizen-sourcing should be evaluated with respect to the outcome. However, the paper is only conceptual with only a short sketch on how the outcome should be precisely evaluated. In a nutshell, no empirical study exists that evaluates the consequences of Open Government initiatives. Our assertion is that public managers will tend to resist implementing Open Government if the impact on relevant outcomes such as legitimacy and support as well as operational capacity is widely unpredictable (Machiavellian perspective).

3 Limitations of the Kantian Perspective: The Case of Open Government at a German University

3.1 Methodology

Case Background The introduction of tuition fees in Germany has been a controversial political issue. Particularly controversial is the question of whether tuition fees are socially acceptable and to what extent students should share in the funding of research and teaching. In 2007, the state of Baden-Württemberg introduced tuition fees of 500€ per semester for all students with few exceptions. The primary objective of the funds is to improve conditions for studying and teaching. In 2010, the University of Mannheim—a public university—received around six million euros from tuition fees. The primary objective of the funds is to improve conditions for studying and teaching. A focus of the measures financed by tuition fees is to increase the range of courses and supporting social events. At the Faculty of Social Sciences, for example, additional teaching assistants were hired to reduce the size of the group seminars. Students of the Department of Law were able to benefit from free scripts and economics students benefited from extended opening times to work in their computer lab.

With the introduction of tuition fees, the university administration has gathered all the information about how the funds from the tuition fees were used. Similar to activities by the US federal government (cf. recovery.org), the information about the use of tuition fees for improving studying and teaching conditions has been made available to the public through an Open Data portal. Through the website, students were able to monitor how their tuition fees were spend and whether they were spend for the intended purpose, i.e. the improvement of studying and teaching conditions at Mannheim University. The goal of the initiative was to increase transparency, accountability and public engagement in the tuition allocation process. Thus, the insights gained in this context can also be informative for future open government initiatives with similar objectives.

Survey Development and Deployment In order to evaluate the impact of the Open data portal, an online questionnaire among students who paid tuition fees at the university was admitted. Inspired by Bertot et al. [17], we asked students about their awareness and degree of use of the Open Data portal but also their evaluation of the tuition fee allocation process. Awareness was operationalized as the degree to which users were conscious that the information about the allocation was provided online. Use was measured as the degree to which users have visited and used the platform. Users' evaluation of the tuition allocation process was assessed based on the extent to which students belief that the administration has attributes that are beneficial to them (trusting beliefs, cf. Pavlou et al. [19]) and the extent to which they belief that the process of allocating tuition fees was fairly governed (procedural fairness, cf. Herian et al. [20]). Thus, the survey intends to explore the impact

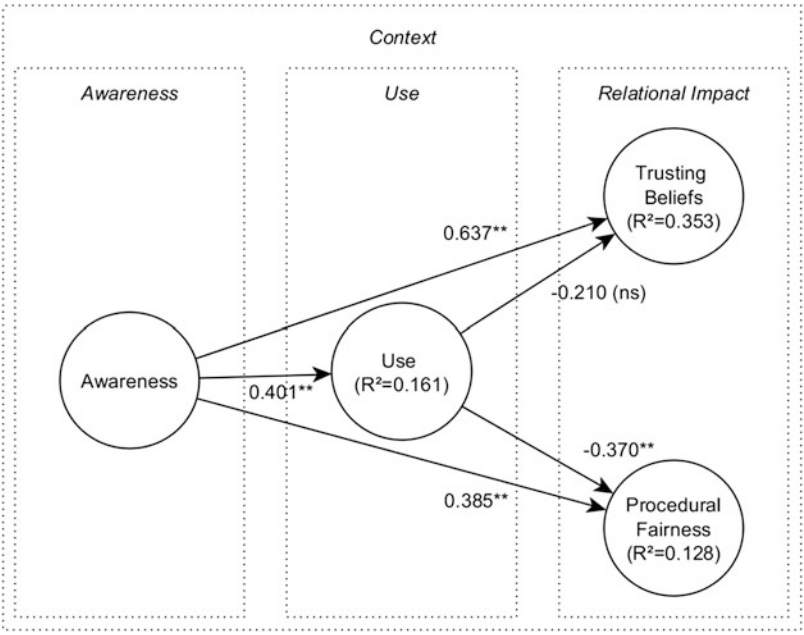

Fig. 2 Relational impact of open data initiative (*Note*: ** = $p < 0.001$)

of the awareness and use of the open data platform on relevant relational outcomes and on the overall evaluation of the allocation process (cf. Fig. 2).

The measurement scales were developed based on previous literature and pilot tested with 20 participants (cf. Appendix → Table 4). After the pre-test, respondents were asked for their feedback regarding comprehensibility of instructions and questions, overall time, and other issues they experienced. Based on the results of the pre-test, the measurement instruments were shortened, revised, and validated for its statistical properties.

The final survey was conducted online in October 2012 and was sent out to members of a university Facebook group composed of Bachelor, Master and PhD students from the University of Mannheim. An Amazon voucher was set as an incentive to participate in the survey. Overall 83 responses were collected. Furthermore, students which had never paid tuition fees at the University of Mannheim were removed. In the end, 70 responses were assessed as usable for further analysis. Respondents were 43 % female (67 % male) between the ages of 19 and 34 (mean: 24.5).

Data Analysis and Results The descriptive statistics, correlations and average variance extracted for all constructs are depicted in Table 2. Our statistical tests suggest that the measurement models are valid and reliable [21–23]. For all constructs, composite reliability is above 0.9 which indicates a satisfactory level of internal consistency reliability [23]. The validity at the construct level is assured

Table 2 Descriptive statistics and average variance extracted

Construct	Mean (STD)	Reliability	1	2	3	4
1. Awareness	4.78 (1.82)	0.9516	**0.8932**			
2. Use	3.71 (1.40)	0.9562	0.4013	**0.9021**		
3. Procedural fairness	4.09 (1.54)	0.9784	0.3011	−0.0550	**0.8973**	
4. Trusting belief	3.75 (2.00)	0.9476	0.4882	−0.1144	0.7875	**0.8855**

Note: The diagonal elements (*in bold*) represent the square root of AVE

when the latent constructs account for the majority of the variance in its indicators on average. Accordingly, average variance exceeds even 0.7 for all constructs [22].

Discriminant validity of the constructs was confirmed by two methods. Fornell and Larcker [21] suggest that the square root of the average variance extracted for each construct is higher than the variance that the construct shares with every other construct in the model. This criterion was fulfilled for every construct (cf. Table 2). Furthermore, we conducted the between constructs test recommended by Anderson and Gerbing [24]. The differences between the two chi-square statistics for each pair of constructs were significant ($\alpha = 0.01$), implying that the constructs are empirically distinct.

Bootstrapping with 200 subsamples was conducted to estimate the significance of the PLS path coefficients and to compare the path estimates statistically. The results of the structural model testing are presented in Fig. 2. Apart from the relationship between use and trusting beliefs in administration (-0.210; $p > 0.01$), all assumed relationships were highly significant.

3.2 Discussion

Our results suggest that the deployment of an open data platform has a significant impact on relevant relational outcomes in the context of a German university administration. While this finding might be not surprising, we try to show how we can differently interpret the results depending on the political perspective adopted.

The Kantian Perspective The positive influence of awareness on trusting beliefs and procedural fairness shows that students reward the deployment of an Open Data portal. Students who know about the possibility to monitor public spending have a better trust and fairness perception than those students who are not aware of this possibility. Society's trust and confidence in government is important for many reasons. Trust and fairness perceptions are crucial for the legitimacy and stability of the political system [2]. If people's distrust or feel treated unfairly, their willingness to accept the government authority will also decline. Trust in government also encourages people to comply with laws and regulations. Overall, if we believe in the integrity, competence and benevolence of processes, we are much more willing to accept the outcome.

The negative influence of use on trusting beliefs and procedural fairness (although the latter is not significant) suggests that students who were actually engaging with the allocation of tuition fees were very dissatisfied with how the university administration operates. However, from a Kantian perspective the inappropriate allocation of funds from tuition fees would have come out anyway, at least in the long run. Recent phenomena such as Wikileaks—organization publishing classified media from anonymous news sources and whistleblowers—show that the widespread use of ICT in government make it harder for government to keep information secret. In fact, the lesson of Wikileaks might have made power holders aware that no secret is safe and that the only efficient defense against leaks is transparency and openness. Seeing it from this Kantian perspective, we should see the negative influence of use on trust and fairness perceptions as an alarm signal for government to improve the allocation processes and include students directly in decision-making in order to retain their legitimacy. Public manager following this logic would view Open Government as a tool for receiving direct feedback from the public on their work.

The Machiavellian Perspective The Machiavellian evaluation and interpretation of our result is quite different. The positive influence of awareness on trusting beliefs and procedural fairness suggests that Open Data can be used as a tool that improves the legitimacy and support of government. However, public managers have to be aware that the implementation of Open Government may very well backfire. The introduction of tuition fees in Germany was highly controversial. Therefore, the allocation of these resources is subject to critical public scrutiny. A potential threat for Open Government initiatives is that these projects can also get out of control. The challenge lies in finding the right balance between government control and public autonomy. As our case shows, public engagement (use of open data portal) does not always lead to intended results (increase of legitimacy and support). One potential explanation is that students are misinterpreting the information provided by the administration or have only limited capacity to understand the legal or practical context of the resource allocation process. In that case, the administration could oppose the problem by improving the design and content of the open data portal. Another much simpler explanation is that the resource allocation is in fact unfair. The administration might misspend the public funds for useless activities. In that case, the government should stop or change back to the mode of secrecy before the students withdraw their confidence in the university administration and their bodies.

4 Towards a Research Agenda for Evaluating Open Government Initiatives

Our structured literature analysis reveals that research on the evaluation of Open Government initiatives in still at an emerging state. Moreover, the frameworks developed for evaluating Open Government initiatives assume that more openness in government is always better. Seeing this as a major limitation (cf. also the arguments provided by Coursey and Norris [9]), we argue here that previously developed evaluation frameworks (adopting a Kantian perspective: cf. Kalampokis et al. [5]; Lee and Kwak [8]) are only of limited practical relevance. Rather, practitioners strive for understanding the individual short- and long-term consequences of openness and transparency in government enabled by IT. As a research community, we should not solely focus on proposing new IT artefacts or solutions how to open up government but should be very explicit about the consequences for the authorizing environment (in particular minorities), government organizations, politicians and the political system as a whole. A similar perspective on the goal of IS research is proposed by Agarwal and Lucas [25] who request IS researchers to "focus on the impact of the IT artifact rather than the artifact itself" [25].

Based on our insights from previous Open Government research, we derive a research agenda that is twofold (cf. Table 3). First, we focus on who has actually access to Open Government services (who is affected?). Thereby, we can build on digital divide research which might provide the conceptual and theoretical basis for this avenue [26]. Second, we focus on direct consequences of offering Open Government services (how is the impact on those who are affected?). As our literature analysis shows, there is a lack of empirical research on the ultimate consequences of Open Government services on the behaviour and perceptions of society towards government. We believe that the understanding will provide a more accurate and useful guidance for practice in starting and developing Open Government initiatives than the guidance that maturity models provide which assume that transparency, collaboration and participation are categorical imperatives.

In order to estimate the impact of Open Government initiatives we first need to understand who has actually access to Open Government services and is thus, affected. Thereby access to Open Government services can be seen a "process with many social, mental and technological causes and not [...] a single event [...]" of using a particular Open Government service [27, p. 224]. Before people get access, they have to first recognize that it is available to them and then determine whether Open Government services are relevant to their interests or purposes. In von Dijk's [27] framework, motivational access is placed in front of physical access (which can be neglected in our context) followed by skills access and usage access. Thus, users need also sufficient skills to make use of Open Government services. Taking this view, researchers should analyse the social, mental and technological causes of access to Open Government services. Moreover, we have only limited knowledge about who are the active users of Open Government services. Having elaborated the meaning of access to Open

Table 3 Towards a research agenda for evaluating open government initiatives

Theme	Topics	Exemplary research questions
Who is affected?	Social, mental and technological causes of access to Open Government services	• Motivational access: What motivates users to use Open Government services? • Skills access: What user skills are needed to use Open Government services? To what extent do Open Government initiatives discriminate users with low IT skills? • Usage access: Why are users using Open Government services? What are drivers or barriers of usage access?
	• Ways to characterize advantaged and disadvantaged groups	• Which socio-demographic groups are left out? • What types of technological capital [28] determine participation?
	• Ways to overcome inequalities	• How can motivational access be increased? What are effective campaigns? • How can we equip users with relevant IT skills to democratize Open Government initiatives? • How can we increase the usability and the use of Open Government services?
How is the impact?	• Quest for dependent variable	• What are relevant outcomes (e.g. legitimacy, trust, operational capacity) of Open Government initiatives and what are the underlying assumptions? • Are there major differences between open data and citizen-sourcing with respect to the intended relational impact?
	• Context for "successful" Open Government initiatives	• What are the consequences of Open Government initiatives? • In what kind of scenarios can Open Government positively influence relevant outcomes? • Have decisions that fully incorporate the outcome of Open Government initiatives more legitimacy and support in society? • Can Open Government increase the operational efficiency of government?

Government, research should also investigate the factors that determine why some groups engage more successfully with Open Government, whereas others do not. Informed by this understanding, guidelines should be developed on how Open Government initiatives can be better democratized so that all groups of society have the same capabilities to benefit from and participate in government work.

Having examined who is affected, we need to focus on the consequences of Open Government initiatives on those who are aware and participate in Open Government. Therefore, we need a more explicit and elaborated discussion on the desired outcomes of Open Government initiatives. On the individual level, trust in

government or procedural fairness might come into question as proposed in our study [2]. Moreover, one might have to distinguish between different types of Open Government initiatives. While data portals might aim at fostering innovative information products and services to boost the information economy, responsibility portals might aim to improve trust in government. A more elaborated taxonomy of Open Government initiatives could be a first step to systemize evaluation frameworks. Moreover, once the quest for the dependent variable is resolved and assumptions are reflected and made explicitly, research should focus on the different contexts that Open Government initiatives operate (e.g. low or high public scrutiny) and the variations of success with respect to the pre-defined outcomes in these different contexts.

5 Limitations and Concluding Remarks

The goal of this paper was to propose a research agenda for evaluating Open Government initiatives. Therefore, we critically analyse previous Open Government research with respect to two distinct and opposing political perspectives. Our argument is that we need to conduct more research on the impact of open government initiatives in order to provide more rigorous and relevant insights for practitioners. The proposed ideas aim to be the basis for a fruitful discussion at the conference in order to develop a more comprehensive agenda for future research on the evaluation of Open Government initiatives.

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Typical Perception and Usage of Computers Amongst the Public Sector Officials in a Least Developed Country: Bangladesh Study

Ahmed Imran

Abstract While there has been a considerable attention given to individual computer use in the developed world, studies on least developed economies are very limited, where the circumstances, context and issues are very different. Due to the further differences and typical characteristics of public sectors, the variations are often far more acute than general and private sector use of information and communication technologies. The paper explores the typical pattern of individual computer usage of the public servants in a least developing country, Bangladesh with the help of descriptive data from 251 survey respondents. The broad picture emerging from this descriptive study expected to help in understanding the perception and pattern of computer use in such a special context, which likely to contribute in strategizing and designing appropriate information systems and approaches.

1 Introduction

ICT use in the public sector of least developing countries (LDCs) is a recent evolving phenomenon, which is being recognized as an important agenda for these countries to survive in the twenty-first century's knowledge economy. ICT investment in infrastructures, training and learning can enable developing countries to increase their competitiveness as external and internal service provider [1]. However, its adoption and use in LDCs are not well studied. A stream of growing research on ICT in developing countries are currently emerging [2].

However, a large number of these researches focus on socio-economic and socio-cultural artifacts of ICT at country or organization level. While previous studies on ICT adoption in public sector or e-government mostly focused on organizational capabilities, strategies and leadership issues, little is explored on how the public sector officials interact with computers at individual level. Many failures in the area of e-government [3, 4] reiterate the fact it is not the machine but man behind the machine is crucial for technology adoption in the organization.

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Successful e-government is often attributed to 20 % technology and the rest 80 % about people, processes, and organizations [5].

Further, while the individual user pattern in developed countries is well documented, the picture of LDCs is still scarce [6]. Again, the pattern of individual usage is also different, because of the sharp differences in the context between developed and developing countries [7]. Also the context in each LDC is unique in nature [8], implying uncertainty in terms of successful application of existing theories, developed and tested in western or developed country context [9, 10]. As such, context plays a predominant role in studying IS in developing countries [6, 11, 12], where a closer look towards the nature of current use and perception is necessary for understanding the environment within which IT innovation takes place [13, 14]. It was often noted that human infrastructure concerning the attitudes, knowledge and skills, particularly within the public sector are crucial to initiate, implement and sustain e-government initiatives [5, 15, 16]. Knowledge on individual usage and perception of important stakeholders is therefore important for researchers and practitioners.

One of the other motivations was the absence of empirical studies, which describe the context sufficiently enough to undertake more in-depth and focused studies. The descriptive data helps to paint a contextual picture, which not only detects important issues but also contributes in designing culturally appropriate strategies and information systems for LDCs. The study is thus aim to provide a rich picture—on how public sector officials of a least developed country make sense of ICT tools and how it is positioned within their daily business interactions. Very limited statistics are available and produced from national or international statistics to capture ICT readiness on a social scale of this nature, which is also difficult to gather because of structural complexity. This survey is expected to make some contribution in filling that gap, particularly for Bangladesh and similar countries.

The data used in this study were collected as additional data as part of a wider study [17] on ICT adoption in the public sector of Bangladesh, from the 251 public sector officials of different ranks and ages.

2 Background

The entrenched attitude, values and characteristics of public sector officials on least developing countries can be drawn from the Pre and Post-colonial theory [18–20] and cultural theories [21]. Most of the LDCs have inherited the public sector culture from the colonial era with its strict hierarchical structure and complex multilevel channels of bureaucracy, where the relationship with the citizen is still mostly "govern and rule" [9, 22, 23]. Under the strict regulatory frameworks, perceived 'risks' serve as an instrument to manage any institutional threats to the prevailing status quo [20].

While the differences in infrastructure, skill, uptake and literacy are commonly understood, the differences in government structure, government culture and

business processes that have been institutionalized through historical process are rather difficult to understand and explain. Often such differences are overlooked by IS practitioners, who adopt their familiar terminologies of management roles from the dominant organizational type IS research [24]. A particular cultural group is likely to act and behave based on their underlying values, which may be different than other cultural group in similar situations [25].

Culture remains the inherent characteristic which differentiates organizations significantly [26]. Of three cultures of organizations described by [27], the developing countries have the traditional type with paternalistic leadership, rigid rules and lack of boundaries between organizational and non-organizational roles. According to various cultural theories, a number of organizational variables including motivation, innovation and change, and communication are culture-dependent [28–30]. For example, in collective societies like most of the LDCs, face-to face contact is more preferred than other forms of communication in official dealings [9, 31].

In particular, the typical nature of public service culture inherited from the colonial era makes it quite distinct from other organizational innovation research [16]. Analysis of the case study data also shows that personal attributes such as age, education background and skill influence the attitude and mindset of government officials and people in general for ICT adoption and its use. Rogers [32] also suggests personal attributes and individual characteristics such as age, gender and level of education often play an important role in the innovation process.

2.1 Country Context: Bangladesh

Bangladesh, one of the 48 LDCs,[1] is a thickly populated (162.2 million) small south Asian country. The history of Bangladesh dates back through 400 years of British influence started through the East India Company in 1612. Bangladesh was officially under British rule from 1858 to 1947 as part of Indian sub-continent. The British colonial administration which was imposed from the top concentrated on establishing a centralized and strong executive administration. The administrative culture of Bangladesh has some important characteristics that affect innovation like ICT initiatives. These characteristics stem from the fact that the bureaucracy of today's Bangladesh inherits its traditions and practices from the colonial period.

After the long British rule, no substantial reforms have been carried out by any government, whether in the Pakistan period (1947–1971) or in Bangladesh since liberation from Pakistan in 1971. Political parties in power were reluctant simply because they could use the established institutions as tools for their own narrow and

[1] LDCs are distinguished by the Economic and Social Council of the United Nations based on three criteria: per capita gross national income (GNI) under $905, human assets Index (HAI) and composite economic vulnerability index (EVI) (UN OHRLLS 2012).

partisan purposes [33]. For example, the parliamentary system in Bangladesh works in a very presidential manner. All the governments tended to evoke the imperial style of rule (as distinguished from governance) of the pre-colonial history [33].

In Bangladesh especially in the public sector, ICT is not necessarily seen as a strategic resource, where its use and perception mostly remained within word processing, as a replacement to manual type-writers. Prior research shows an incorrect perception about the novelty of ICT still persists on a large scale [16]. Initiatives were done in a piecemeal or on an ad hoc basis. Comprehensive planning and strategy is missing as regards to how to address the whole issue. It was seen, senior and mid level public servant/managers play a key role in the successful implementation of new systems [34]. They can significantly influence in developing and shaping an organizational culture which is receptive to new ways of working within the organization [35, 36].

Since a majority of the decision-makers in the Bangladesh public service are in the older age groups (above 45 group) with longer length of service, their perception and existing patterns of computer use is crucial for adoption and implementation of ICT in the public sector in Bangladesh, which is still struggling to have a workable modality or clear road map for ICT. As a result, outdated laws of eighteenth century and the age old record keeping with stacks of paper and files still a common picture in Bangladesh's public service (Fig. 1).

Fig. 1 An office desk of a clerk in a government office in Bangladesh (Photo source: author, date 04/07/2007)

3 Method

A descriptive survey method was employed in this study with a view to draw a picture of readiness and current environment in relation to ICT adoption and use in Bangladesh. The advantage of using such survey is that they can accurately document the norm [37].

The descriptive questions were designed based on a prior study consisting of a series of focus group discussion [16]. The issues emerged in the focus group were divided into two categories, underlying issues and surface issues. While underlying issues were tackled in another paper, the surface issues are further pursued through this descriptive survey.

3.1 Materials

Most of the questions were multiple-choice; where the questions required an answer on a Likert type five-point scale. Some questions involved respondents' views on how eGovernment and ICT are impacting on working practices or the organization' structure and what is needed to improve its adoption and effective use.

The survey questions were developed, improved and verified based on the previous findings and also through consultation with research panel experts. The questionnaire was prepared in English as the target audiences of the survey understand basic English. A summary of the survey questions is appended in Table 1.

3.2 Participants and Data Collection Procedure

The survey was targeted towards the educated government officials (of various professions) who have some understanding and influence in the decision-making process in a least developed country, Bangladesh. In general, they are important stakeholders both from the receiving and delivery point of view for initial adoption of ICT in the public sector. Because it is usually the educated and upper class society who spearhead any innovation like ICT [32]. It is seen in countries like Bangladesh, the vast majority of the population who are mostly illiterate with almost nil or very minimum perception about ICT, usually follow the trend that the educated and the decision-makers set for them.

The survey respondents represent a wide range of individuals from government officials belonging to different ministries and agencies. The survey questionnaire was disseminated only in a paper version because of the low accessibility to computers and cultural habits of the participants. Survey procedures were designed to assist in maximizing the response rates. Many of the survey forms were filled in instantly sitting face to face and some were handed over to be filled in later.

Table 1 Summary of survey questions

Questions	Indicators	Purpose
Demography/personal characteristics (Section 1)	• Profession • Age • Length of service • Field of study • IT orientation	Description of samples
Organizational readiness (Section 6)	• The goals and objectives of the organization • IT policies and plans within the organization • Existing information systems applications within the org • The potential for IT to achieve a competitive advantage • Management/organization support • Top management encouragement • Computer usage in organization • Service/expert support • Purpose of using a computer in organization	Organizational readiness Individual IT usage and habit Picture of ICT environment
Individual opinion (Section 7)	• Identify most important barrier/issue • Identify crucial factor in organization • Who should be responsible to manage IT in organization • Type of Human resource needed	Views on important influences

However, some had to be pursued and some were not returned within the time frame of the researcher's stay in the field of study.

The survey was primarily targeted towards government officers, which made it further difficult to have more in numbers. However, with the help of the senior and few influential representatives of the government office (who were motivated and willing to help), 251 completed survey forms were collected from government servants between August 2007 and Jan 2008, with a response rate of 46 % (=251/550).

3.3 Analysis

Data was analyzed using SPSS which identified specific variables, missing value considerations, and formatting needs. Frequencies and percentages were calculated for different categories based on split files and cross tabulation. Some basic statistics such as the differences between percentages of a particular group and the reference group is used to illustrate the ICT readiness in Bangladesh. For clarity and better representation some graphs were produced using Microsoft Excel, after transferring data from SPSS. The report outputs as well as the derived variables, were described, reviewed, and validated using a standard SPSS features.

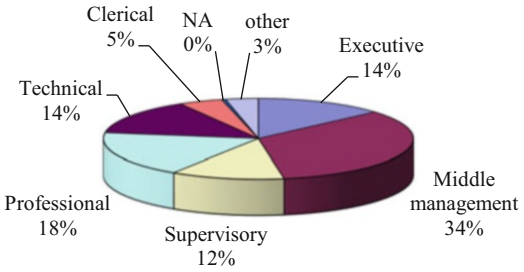

Fig. 2 Distribution of job role

4 Results and Discussion

4.1 Respondents' Demographics

Of the total 251 survey respondents, distribution of their job role shows the majority were from the middle-management group (34 %) followed by professional (18 %) and executive roles (14 %) (Fig. 2).

More than 50 % of these respondents are aged above 35 and only 6.10 % of respondents are within 25 years of age. While the majority of the respondents can be considered as highly educated, they are found to have very limited exposure to ICT and computers. The survey shows that about 60 % respondents are Masters degree holders and another 40 % are graduates. Most of them are graduated from the public universities of Bangladesh (71 %) with the rest graduated from private universities, colleges or overseas.

4.2 Computer Education and Skill

Amongst 251 educated government officials about 32 % of them have not used a computer in their educational institution at all, while another 24 % had only little interaction. Only 6 % of overall respondents had significant computer training as part of their education.

If we dig deeper we can see most of the aged populations have not received any computer education as a part of their education program. However it is good sign that the most the young generations are receiving IT/Computer training. From Fig. 3 we can see around 40 % of the age group less than 25 has received significant amount of IT/Computer training as a part of their education program. This demonstrates that the country is increasingly emphasizing IT in their educational curriculum (Fig. 4).

Overall, computer skill training and its use, whether as part of education or formal training later is extremely poor (Fig. 4).

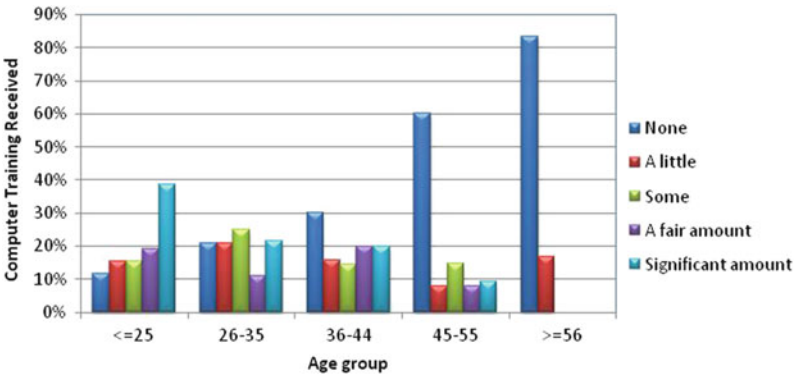

Fig. 3 Computer education received by different age groups

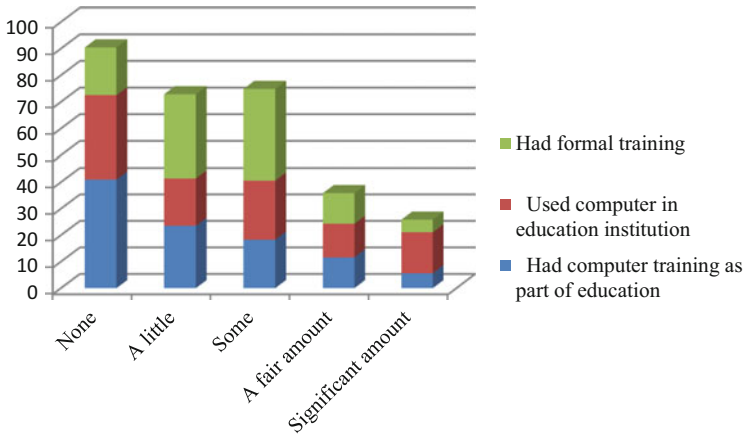

Fig. 4 Computer skill training and use as part of education and formal training

From another perspective, if we look at their sources of computer skill (ranging from little to significant), predominantly it is driven by self initiative rather through existing education system or organizational and vendor training (Fig. 5). This highlights the lack of supply side training as well organizational effort on capacity building of public sector officials in the area of IT.

4.3 Individual Interactions with Computer

While a large number of respondents (32 %) did not receive any computer training nor used computers during their education, interestingly a large number of these respondents (71 %) have a computer in their home and in the work place (71 %).

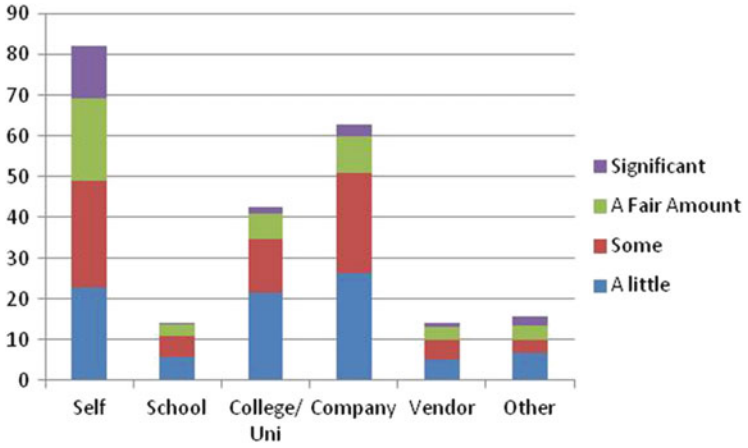

Fig. 5 Source of existing computer skill amongst public sector officials

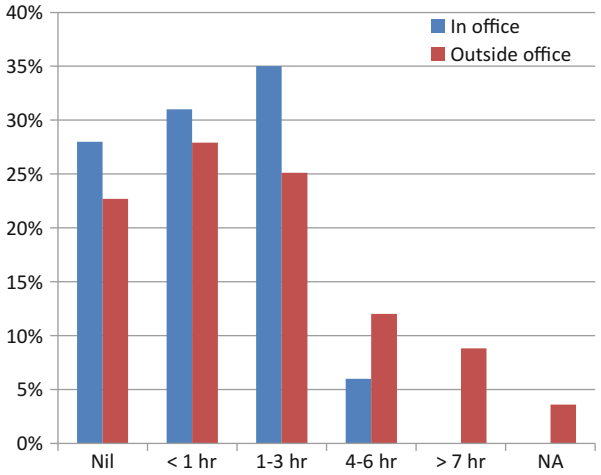

Fig. 6 Computer use in a day (inside and outside office)

This reflects that the computer is becoming essential home and office equipment in most of the educated and moderately solvent household and offices in Bangladesh. However, the question remains about its effective use and purpose, which is discussed in the following sub section.

4.3.1 Use of Computer

Daily usage of computers across the office and out of office hours is shown in Fig. 6. Government employees are found to be far lacking in this regard, where their

Table 2 Main reasons for you not using a computer at work

Reason	Percentages
a. My organization does not provide me with a computer	64.9
b. I do not know how a computer could help me in my organization	1.3
c. I think computers cost too much to purchase	5.2
d. I do not have the skills or training to be able to use a computer	11.7
e. It would take too much of my time to learn to use a computer	9.1
f. Other reason	7.8

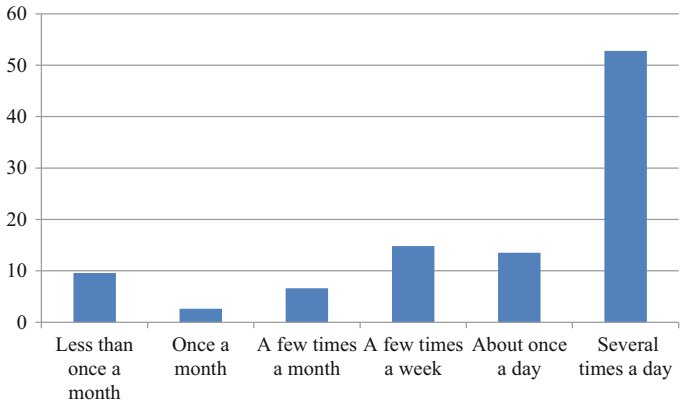

Fig. 7 Use of computer for job-related work

highest percentage of use in the office (35 %) is confined within 1–3 h in a day. If office hour in Bangladesh is 8 h a day, it is only one third employees spend their quarter of office time with computer related work.

However, a good number of government officers spend time with computers beyond their office hour (1–3 h, 25 % and <1 h 27 %). Still a significant number of government officials do not use computer at all either at office (23 %) or outside the office (28 %). The reasons for not using the computers are dealt later in Table 2.

Another statistical measure (not shown in figure) reveals that 72 % (174) of respondents used a computer in the work place for the last 5.9 years (on average). This reflects computer use is a recent trend. But their pattern of use widely varies where 9.6 % of respondents use it less than once in a month, 6.6 % few times a month, 14.8 % few times a week (Fig. 7).

Table 2 identifies the main reasons for not using computer in the work place, where government servants' use of a computer has been hindered by lack of individual allocation and provision of computers (64.9 %) followed by lack of computer skill and training (11.7 %). The low percentage of category b and c (1.3 and 5.2 %) is encouraging where government officials demonstrated a positive attitude towards computers. However, a number of people (9.1 %) are concerned about the time and effort needed to develop skill in using computers. This suggests

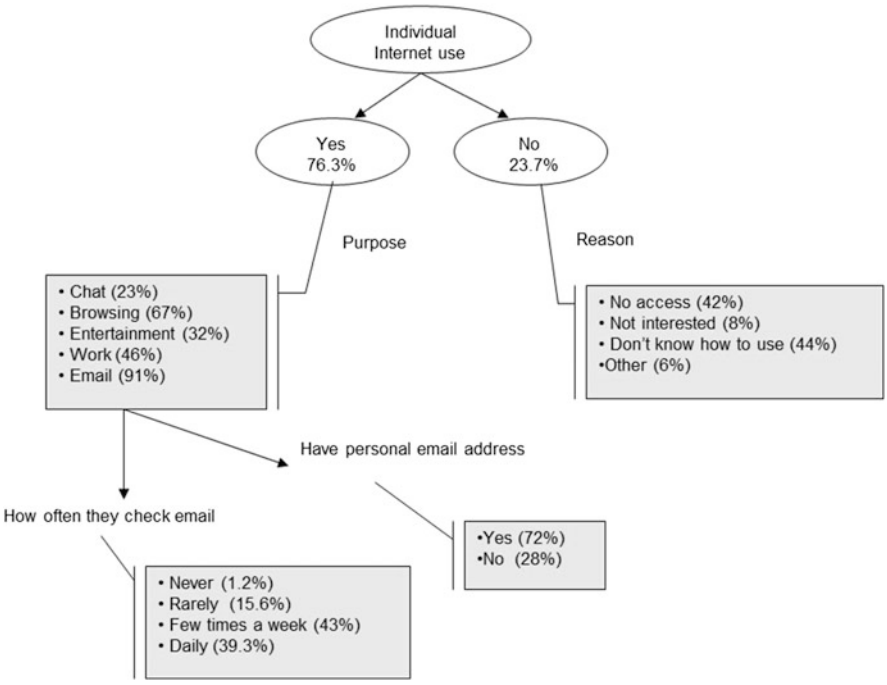

Fig. 8 Classification tree of Internet use by the respondents

a more user friendly approach is needed to lower the burden of learning to use a computer.

It is interesting to note while the highest computer users in the work place is the above 45 age group ($m = 1.35$), they are the lowest in their use of computers in job related work ($m = 4.75$). This statistic implies the above 45 age group can afford more to have computers in their office, although not always they use it for any official purposes.

4.3.2 Use of Internet

The statistics associated with the use of the Internet are provided in Fig. 8. Use of the Internet did not vary significantly with the younger group however, 23 % of total respondents still do not use the Internet at all for any purpose. Email was found to be extremely popular for Internet users, where only 46 % use the Internet for work purposes. However, about 60 % of them do not use it on a daily basis. The non-users were mostly divided between 'no accessibility' (42 %) and their 'ignorance to use it' (44 %), when asked about the reason for not using Internet. Only 8 % were found not interested.

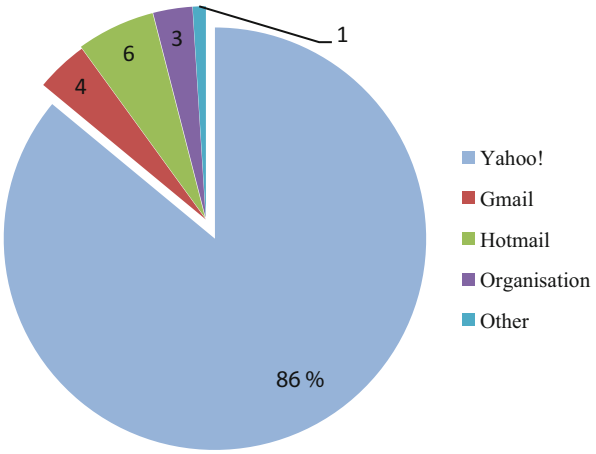

Fig. 9 Distribution of email account used by the respondents

About 72 % of the respondents have a personal email address which was not common even a few years ago. However, it was interesting to note that the majority of the government officials use Yahoo mail accounts (86 %), whereas only 6 % use their organizational email address (Fig. 9). It is common to find yahoo or other third party email domain in the official business cards of many bureaucrats and top officials.

Only 20 % respondents have rated their Email skill as high and about 21 % rated their skill as nil. Others were spread in between with low skill 11 %, medium 19 % and fair 28 %.

4.4 Views on Important Influences

Often there is significant variation on perceptions, need and potentialities of ICT in the public sector and e-government between the policy makers, implementers and the primary user groups, i.e. the public servants. This variation of concept and perception significantly impact the outcome of e-government project and often may lead to failure. This section captures the respondents' views on some important influences and issues surrounding ICT adoption in Bangladesh to confirm and increase our in depth understanding of the reality.

The respondents were asked eight questions on their personal views, which were designed based on the arguments from a previous qualitative study [17].

The respondents were asked to choose one of four different options (found from previous studies and experiences) against the question how they view ICT. The options were (1) ICT is a tool for accessing information; (2) ICT is a combination of hardware and software, (3) a tool to achieve a particular task and (4) a super type-writer.

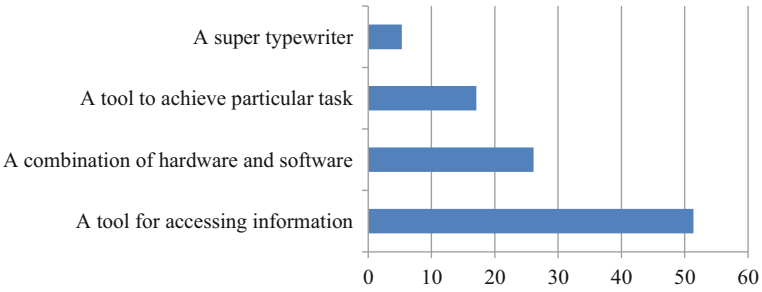

Fig. 10 Statements that best explain ICT

Figure 10 shows the majority of respondents (52 %), who are considered as the most informed population of the country of 162 million, view ICT more as a storehouse of information instead of a tool to perform a complex task. This also reflects the use of the computer in the country which is, today, at the initial level of the information stage. Still a significant number of respondents (26 %) view ICT as the combination of hardware and software only, where a portion (6 %) still think it as a super typewriter.

Although ICT use in the public sector is lagging, the basic idea about e-governance is not as bad as expected amongst the public sector officials. In response to a similar question on their view on e-government gave an encouraging impression about their awareness on this relatively new concept, where a majority of the respondents (60 %) chose the most appropriate definition out of the four, i.e. increasing the efficiency of government service through the use of ICT'. Thirty six percent of the respondents believe in the popular misconception that eGovernment activities are limited to connecting citizens through online services.

The follow-up questions regarding the objective of e-government show respondents the respondents have given priority to increasing efficiency and transparency compared to reducing corruption which was third. It is interesting to note that the traditional view of government officials (developing infrastructure/techno centric) started to shift from the pre-conceived notion that gave more importance to building institutional capacity, knowledge structures and creation of awareness. This change in their focus is encouraging (Fig. 11).

On another measure against the question (not shown in figure) what is most crucial for ICT adoption at the organizational level, top management decision was overwhelmingly regarded as the most crucial issue (50 %), followed by ICT infrastructure (20 %), financial position (10 %), demand (8 %), business goal (4 %) and rest (8 %) either don't know or chosen other.

Against the question who should develop and manage the IT system in their organization, the majority of the government respondents think a dedicated government organization should be responsible (46 %) followed by a reasonable string support for in-house IT cell (33 %) (Fig. 12).

In response to the question which ICT human resource is the most important and required in their organization, the majority (33 %) of the respondents have given the

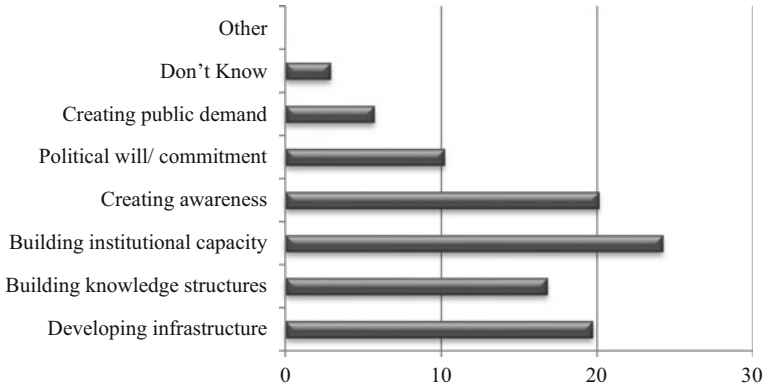

Fig. 11 The most important issue for the organization

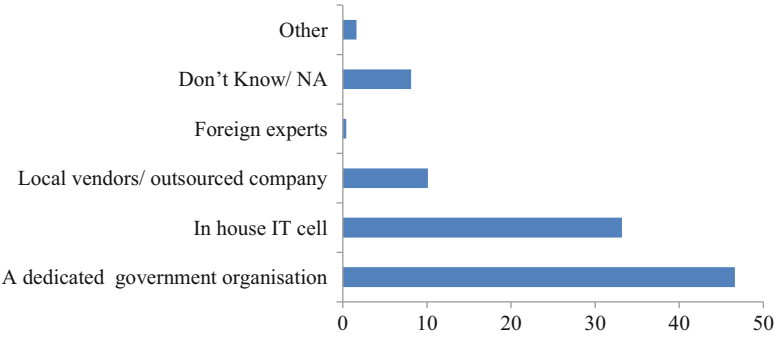

Fig. 12 Who should develop and manage the IT system in an organization

importance to software specialists, which presumably is based on the pre-conceived cultural notion that—software specialists are able to solve all ICT problems. A good number of them (18 %) however identified the need for IT Strategists and policy makers. Hardware specialists were given low preference compared to the IT project manager, and system architect, while a number of respondents also expressed their ignorance (12 %) to identify the most important ICT human resource required for their organization (Fig. 13).

5 Conclusions

The study gives a comprehensive overview on individual computer usage pattern and perception amongst the public sector in Bangladesh. Surveys of this nature are useful in portraying a snap shot of national ICT readiness and the environment prevailing in the country, which helps to address the issues more objectively.

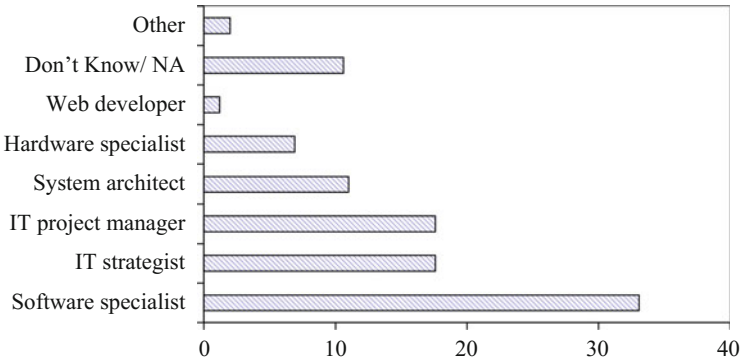

Fig. 13 ICT human resources that is the most important and required in their organization

While a cross-sectional analysis has inherent limitations, the quality of the data presented here enables to generate important insights into the reasons. The study as such was expected to serve as a source of rich detail for future studies.

While computer availability is on rise (71 %) but its use and purpose is far from satisfactory. This is largely because significant amounts of business process are still done through traditional and manual systems. Attention was usually given more on techno-centric approaches like buying hardware and computers for the office and not at the value oriented business process reengineering and system automation. A vast proportion of computer use still remained within the word processing or as replacement of typewriters.

While the lacking is huge it is not entirely uncommon for any early adopters of technology as experienced by some of the developed countries during the early adoption. However, the deep rooted culture and institutional inertia prevailing in the public sector organizations in LDCs need a long term slow institutional intervention rather than a quick win and radical change. The lack of training and lack of institutional initiative in developing proper human resources call for long term institutional approaches and strategies to overcome IT adoption problem in the public sector of LDCs.

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E-Government Implementation in Developing Countries

A Neoinstitutional Approach to Explain Failure

Antoine Harfouche and Alice Robbin

Abstract This paper presents preliminary results of an ongoing study of e-government implementation in Lebanon. Following suggestions by various scholars that students of e-government employ theory to strengthen our knowledge about ICT for development, we apply a neoinstitutional theoretical lens to understand the role of international donor agencies that led Lebanese public authorities, since 2000, to invest in e-services despite the country's serious economic difficulties and heavy debt. We situate implementation of an e-government infrastructure in the context of external pressures that Lebanese public administrators confronted. This analysis is based on the triangulation of evidence from semi-structured interviews with senior officials in government agencies who led the implementation effort, official government documents, and newspaper reports on the progress of this project. We find that the response by Lebanese public officials can be explained by the three isomorphic processes of coercion, mimesis, and transmission of norms. This case study suggests that implementing e-administration by developing countries is not necessarily motivated by a search for efficiency; under certain conditions adoption results from external institutional pressures. Nonetheless, this implementation needs to be understood as only a very small part of a larger story of the history and politics of Lebanon that contributed to what has been called the "still born" implementation of e-government in Lebanon.

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1 Introduction

Electronic government has been a priority throughout the world for more than 25 years, viewed as a critical tool for efficient and effective public services. Evidence in the developed world reveals a number of successes; various reports demonstrate that this form of government has led to improvements in economic development, services, and the quality of governance [1, 25]. However, studies also indicate that more than 85 % of e-government projects in developing countries can be classified as partial or total failures [9, 13, 17–19]. According to some studies, these failures result because the majority of their citizens do not use the Internet and thus e-services, although an infrastructure exists [5]. Heeks [18] and others contend, however, that these failures derive from the gap between design of the technology and its implementation context.

This is certainly the case for Lebanon, a developing country that, despite its serious economic difficulties and heavy debt, invested enormous sums of money since 2000 to build an e-government services infrastructure [38–40]. Internet utilization (penetration) in 2000, when the e-government initiative began, was estimated at 6 % of the population, increasing in 2008 to 24 %, and 35 % in 2011 [31], suggesting that the Lebanon was and remains far from attaining the government's goal of e-public services adoption. Indeed, some might argue that the Lebanese e-administration project arrived still-born. Why this assessment?

This paper presents preliminary findings from an ongoing study of e-government implementation in Lebanon. We examine this implementation of an e-government infrastructure in the *context of external pressures* that Lebanese public administrators confronted. We show that the objective of gaining legitimacy—eliciting support and underwriting by donor international agencies, trumped the reality of Lebanon's economic crisis, internal bureaucratic intransigence and structural incapacity, and limited ICT adoption by Lebanese citizens. It is, of course, a well-known story in ICT implementation in developing countries. This analysis triangulates evidence from semi-structured interviews with senior officials in government agencies who led the implementation effort, official government documents, and newspaper reports on the progress of this e-government project.

We respond to Yildiz's [50] call to e-government scholars to move the field forward by conducting studies that explicitly direct our attention to the "complex political and institutional environments in which e-government policy and development processes take place and to the use of process-oriented theory and methodologies and primary data gathered through interviews, participant observation, and archival analysis" (p. 660). We concur with Avergou [3] that we must understand the context of organizational change. Following Heeks [20] and Heeks and Bailar [21], we employ theory to strengthen our knowledge about ICT for development (ICT4D) by applying a neoinstitutional (aka "new institutional") theoretical lens to understand the role of external pressures that led the Lebanese public authorities to invest in information and communication technologies (ICT) and e-public services. As Powell [42] notes, "A key analytical task for institutional

analysis is to ascertain which factors are important in particular contexts and the extent to which the [regulative, normative, and cultural/cognitive] mechanisms work to reinforce the prevailing social order or undercut one another" (p. 976).

The paper is organized in the following way. Research on information technology and e-government adoption and implementation in developed and developing countries is vast and our audience well informed. We thus provide only a minimal description of what has been defined as "e-government" and its theoretical foundation of modernization and focus on the core concept of isomorphism of new institutional theory that is relevant to this case study (Sect. 2). How this case study was conducted is then described (Sect. 3). We next describe the context for implementing Lebanon's e-government project between 2000 and 2008 (Sect. 4). We then discuss the relevance of the three forms of isomorphic processes (Sect. 5) and conclude with an acknowledgement of the limitations of our explanation and future research directions (Sect. 6).

2 E-Government and Institutional Theory

2.1 The e-Government Concept as the "Modernization Effort"

The discourse of e-government in advanced and developing economies is infused with normative conceptions about government, civil society, the corporate sector, and citizens and their relationships. These may be deemed the rules and norms that shape, give meaning to, rationalize, and constrain choice by public officials. Derived from modernization theory of the 1950s, has been the presumption that "the transfer of capital goods, technologies, industries and Western norms to the developing countries would bring rapid economic productivity and social development in the developing countries, which were considered to be ancient and primitive" [37, p. 141]. The New Public Management (NPM) model was heralded as a managerial alternative to the traditional model of public administration, introducing a "performance management system (PMS) with the aim of measuring and enhancing the success of public organizations and holding public administrators accountable for their performance and elected officials accountable for their leadership" [36, p. 457].

International development donor agencies and countries advanced an e-government (ICT) implementation agenda to modernize public administration in developing countries. The World Bank [49] conceives of e-government as "the use by government agencies of information technologies. . .to transform relations with citizens, businesses, and other arms of government" in its role as service provider, from a "product- or process-centric" provider that serves citizens "to a customer-centric provider" [7, p. 267]. ICTs modernize the bureaucracy's functions of production, coordination, control, and integration through computer networks

and thus improve productivity, internal managerial efficiency, and the effectiveness of public service delivery to citizens [4]. ICT implementation (e-governance) would enable good governance.

The conclusion of analysts of modernization efforts is that information systems and ICT adoption represents the implementation of forms of "techno-economic rationality of development that stem from Western conceptions of modernity," that is, "the ultimate fundamental value" is "economic growth in a free market economy through IT adoption" [2, p. 2]. E-government represents "an organizing principle" [2, p. 2], an effort to "reorder" and "control organizational processes and structures through market mechanisms" [7, pp. 261, 262]. The emphasis is on efficiency, productivity, and transparency based on scientific (techno)-rationality. The restructuring of citizen–government relationships is governance by the marketplace according to the tenets of neoliberalism. Ciborra [7] comments that the "model is supposed to address state failures due to governance breakdown, corruption, rent seeking, distortions in markets and the absence of democracy" (p. 269). The goal is to "destroy archaic superstitions and relations" that "should be applied at whatever social, cultural, and political cost" [2, p. 6].

2.2 The Status of Public Organizations Under Pressure: Neoinstitutional Theory in Management, Information Systems, and e-Government

All organizations are subject to internal and external pressures of legitimacy and competition [6]; organizations adapt not only to internal constraints but equally to values of the external society [43, 44]. These two types of pressures may explain whether or not organizations adopt technological innovations. Studies have shown that, in general, public organizations, more than other types of organizations, are uniquely subjected to external pressures of legitimacy but not to pressures of competition due to their reliance on resources from their environment [24, 28, 41, 45]. This suggests that adoption of e-administration by government agencies is not exclusively motivated by a search for efficiency. According to Naveh et al. [34], early adopters of a management innovation act with the goal of maximizing alignment between the organization's needs and proposals for the innovation. This may explain why certain developed countries were early adopters and implementers of electronic administration. However, Naveh et al. suggest that those late adopters did so under pressure of external forces and thus imitate first adopters. This assessment is supported by Ciborra [7], above all for those countries on route to development. In effect, according to Ciborra, e-government adoption does not automatically lead to better governance, but is the result of behavior whose objective is to increase assistance received from rich countries. We can, following Ciborra and Naveh et al., hypothesize that late adoption of e-administration and

e-services by developing countries may be linked to social and institutional pressures and to imitation of other governments.

Some scholars propose a neoinstitutional theoretical lens and the concept of isomorphic processes to explain this phenomenon [11, 30]. Although use of this theoretical lens has been dominated by sociologists of organizational behavior, it is increasingly employed by researchers in management science and information systems [8, 32] to explain the phenomenon of new technologies adoption by businesses and organizations [47, 33, 23]. Students of the introduction of information technology into government also find similarities in the nature of public administration's relationship with its environment to explain new technologies adoption [12, 22, 26]. As such, these organizations, according to this theory, also conform to norms in order to convince their stakeholders.

Neoinstitutionalists consider the institutional environment as the principal explanatory factor of organizational behavior, above all if innovation adoption is not introduced prematurely [34]. Adoption, in this case, is not motivated uniquely by the search for efficiency. It can be implemented with the goal of realigning the organization with the expectations of its socio-economic environment. Meyer and Rowan [30] underscore that adoption of an organizational form, management tools, or innovations can arise independently of control and coordination problems that an organization experiences. The former may be imposed by the organization's environment. In this case, the organization adopts new management practices in order to gain legitimacy and to increase its chances for survival.

This process is tied to social and institutional pressures (coercive isomorphism), to imitation of other organizational behavior in the field (mimetic isomorphism), or to the phenomenon of professionalism (normative isomorphism) [11]. Moreover, as Mizruchi and Fein [32] point out in their trenchant analysis, one or more and all three isomorphic processes of coercion, mimesis, and transmission of norms may operate.

Coercive isomorphism results from formal and informal pressures exerted by other organizations and by "cultural expectations in the society within which the organization operates" [11, p. 150]. External influences may be direct and explicit, imposed by the external organization on which the focal organization depends or indirect when an organization itself adopts an innovation with the goal of gaining the support of other important organizations in its field. Coercive isomorphism has been used in many studies in Information Systems to explain the adoption of an innovation or an information system [14, 23, 48].

Uncertainty also encourages adoption [11]. As such, modeling (imitating) the behavior of other successful organizations that have adopted an innovation creates or enhances legitimacy [11, 16]. Adoption demonstrates that the organization is attempting to improve conditions for functioning. Imitation may be indirect or unconscious, above all when skilled employees transfer or move from one organization to another. Imitation may also be explicit when innovation adoption is the result of decision makers or employees recruited from an external organization. Consultants may also mediate certain behaviors and render them acceptable [11]. Information Systems researchers have utilized the concept of imitation to

explain the wide scale adoption of integrated management information systems [27, 47].

The third source of isomorphic organizational change is normative pressures that "stem primarily from professionalization" [11, p. 152]. The more norms are accepted by a large proportion of organizations, the more other organizations are constrained to adhere to them. Once an innovation is launched in the market, experts, consultants, producers, and professionals in the sector collectively evaluate and clarify its advantages [46]; this evaluation process takes place during the assimilation of a technological innovation [35]. In this sense, as certain studies have shown, a decision to adopt a technological innovation did not necessarily result from a search for economic optimization but rather from a search for conformity to the norms of a professional network that decision makers belong to [29].

3 Methodology

Following a case study methodology [51], this analysis is based on the triangulation of evidence from semi-structured interviews with senior officials in government agencies who led the implementation effort, government documents, and newspaper accounts on the progress of this e-government project.

These interviews were conducted in Beirut between January and December 2008 in Arabic with nine Lebanese civil servants who had been responsible for implementing e-administration between 2000 and 2008. Two were former ministers of the Office of the Ministry of Reform (OMSAR), six were directors general, and one a cabinet secretary. These civil servants represented, in addition to OMSAR, the ministries of Finance, Public Works, Telecommunications, and Economy. Interviews lasting between one and two hours were recorded and later transcribed in French. We maintain the anonymity of our informants by identifying them only with an alphabetic character and number (e.g., E1, E2).

These officials were asked to provide a history of the unfolding of the adoption of electronic government, e-services, and information and telecommunication technologies (ICT). There were questions about administrative needs and objectives, (quality and skills of) personnel required to implement the project, anticipated benefits, and resistance to the project inside the official's agency and in other agencies. Other questions asked about the role of international agencies, the European Union, and other Arab countries that underwrote funding for the e-administration project. And still other questions examined the status of ICT use and pressures for adoption by Lebanese citizens and the benefits that these officials envisioned.

The interviews were triangulated with official government reports, laws and regulations, and press releases and newspaper reports on the progress of this e-government project. Annual reports on the progress of the project were issued by OMSAR and other agencies in the Lebanese government. Arabic, English, and

French language press accounts were reviewed. Web sites of the participating international and Lebanese government agencies were examined. (Page limitations do not permit a complete bibliography.)

4 Historical Context for the Failure to Implement e-Government

Lebanon was significantly damaged by 16 years of war, between 1975 and the mid-1990s, leaving its economy, infrastructure, physical assets, human resources, governance structure, and public administration in dire circumstances. Although the government had continued to function, the system was a disaster. Chaotic procedures had been applied and information had been recorded by hand on paper that had since yellowed. By the early 2000s, little had changed [10]. For most Lebanese, public administration had always been a bureaucratic nightmare [15]. Lebanese citizens complained about the poor quality of public services, the complicated administrative procedures, arbitrary administrative decisions, slowness of decisions, and corruption. It was this situation that the reform effort was intended to alter.

Nonetheless, in spite of the economic difficulties and heavy debt, the Lebanese government did not hesitate to invest massively in implementing e-administration and e-services. As we noted earlier, studies of e-government in developing countries have shown widespread and significant failure. Lebanon's experience was not much different. Lebanon's government agency responsible for e-government implementation the Office of the Minister of State for Administrative Reform (OMSAR), had carried out tests of e-services whose outcomes ended in failure. Computers with touch screens had been installed in the offices of senior administrators, for example, but remained unused or broke down and could not be repaired for lack of funds.

International agencies, including the United National Development Program (UNDP), the World Bank, the International Monetary Fund, and the European Union (EU) committed significant funds and loans to reconstruct the country following a series of aid conferences held in 2001, 2002, and 2007 that were dubbed Paris I, Paris II, and Paris III. Aid from international agencies was designed to reform public administration and build infrastructure and was coupled with the requirement to implement a national e-government strategy and a national e-strategy, connecting greater accountability and transparency with good governance. European Union (EU) funds encouraged the Lebanese government to create the Office of the Minister of State for Administrative Reform (OMSAR) in 2000 as a mechanism for coordinating donors and the government and to serve as the locus of administrative reform and implementation of e-government.

The continued flow of aid depended on meeting what international agencies deemed "adequate progress" and later "quantitative benchmarks." Initially, rapid

privatization of the public sector was viewed as the *only* goal and a means to reimburse part of the Lebanese debt. Pressure from the United Nations Development Program (UNDP) and the European Union (EU), however, became an important element in e-administration implementation progress after 2000. Thus, according to a report issued by OMSAR: "It was widely accepted within the Lebanese government that any delay in the process of reform and modernization of the administration threatens the continuation of many programs funded by donor countries" [39, p. 6]. Reform and administrative modernization depended on implementing e-government.

Once credits were grants, projects had to be designed and presented. Donors set the rules. For example, the European Union (EU) insisted that their experts supervise and participate in projects and the United Nations Development Program (UNDP) required that it participate in recruiting new employees. E6 acknowledged that the only Lebanese e-administration success was the implementation of a Ministry of Finance web portal for businesses to make electronic declarations, due to a team created by the UNDP and financed by donations from Canada (ACDI) and UNDP, benefiting from support from the Ministry of Finances, which had installed a completely integrated system. (It received a United Nations prize in 2007.)

By 2003, the UNDP had imposed rules that the Lebanese e-government demonstrate progress in implementing e-government. And at one point, in 2004, the EU threatened to apply sanctions (withdraw funds and offer them to Jordan) if the Lebanese government did not comply with its commitments and sufficient progress were not made. It was at this moment that the Hariri government understood that action had to be taken to implement an e-government strategy or else funds would be lost.

One might conclude that, little by little, the Lebanese government was led to implement e-administration with the goal of obtaining funding support and help of funding organizations. Closer to the truth one official said was that "our objective was *not* to implement these services. The sole objective was to rapidly privatize the public sector in order to reduce the public debt" (E1). It was "the European Union that, in 1996, launched this e-government project and made available [funds] for administrative reform and information and telecommunications technologies" (E2). A third informant recalled that "these funds encouraged the Lebanese government to create the OMSAR" (E8).

We might conclude that adoption resulted from external and explicit institutional pressures of international organizations. "The United Nations Development Program (UNDP) proposed that we imagine a 'national e-strategy' that Lebanon would be part of. [This] strategy would prepare Lebanon to implement e-government" (E1). Funding was "open-ended; however, once the credits were received, presenting a project became an imperative [and] so we defined an 'e-government strategy" (E4).

But on the technical side, "We had a public administration that was very backward, completely without information systems. The funding agencies, arriving with their ideas and knowledge of the terrain, imposed their plans" (E5). Another

informant (E2) commented that "We were required little by little to introduce these systems through OMSAR and, so, OMSAR's teams went into each agency and intervened permanently [became responsible for implementation]."

In effect, "from the very beginning, the e-administration project made no progress because government support was lacking" (E1). Informant E4 explained that "We had to create an infrastructure, provide equipment, and create personnel, all without conflict." He went on to say that "Obstacles surfaced when it came time to implement e-services. We lacked qualified personnel, staff resisted because they risked losing their authority, and there was no political support."

E5 commented that management changed when the agencies got "new blood." Informant E6 went on to explain that both the UNDP and the European Union required training sessions for the new recruits and "measures were drastic. The only ones who remained were the 'cream.'" Government in-house training was then followed by training abroad, all of which took place through bilateral cooperation with Spain and bilateral agreements with France.

Influenced by and with the participation of the UNDP, "The Lebanese government recruited young, highly competent professionals. That did not exist before 1996," remarked E3. "Our personnel was relatively old; the average age of the bureaucrats was between 48 and 50 years old. . .Some division heads did not even know how to use a computer" (E5). In effect, "for many years, there was no recruitment; indeed, the last recruits date from 1986. Technology changes from one year to the next. Thus the major problem that delayed the adoption of ICTs has been the lack of qualified personnel who know how to use ICTs" (E5).

Pressure from funding agencies (UNDP) and the European Union (EU) was, however, an important element in implementing e-administration; and this pressure continued for years. UNDP "imposed rules that required us to implement electronic administration [and] the European Union (EU), in 2001, which provided assistance, also applied sanctions when our government did not follow the rules that had been laid down" (E1). At a certain moment, "when the EU was unhappy with the results, such as when the Lebanese administration did not respond to the Union's demands, it threatened to withhold funds and to provide them to Jordan, about 30 million Euros" (E2). And, as such, according to the OMSAR report published in 2001, "the government admitted that any further delay of the reform process and administrative modernization threatened a great number of projects financed by the funding agencies" [38]. Lebanese government officials were, however, able to persuade the international agencies that progress would be made and were able to mobilize a plan that resulted in significant financial assistance in international aid. The International Monetary Fund congratulated Lebanon for its economic reform and public debt reduction efforts.

"We went to Paris II (2002) with our project for modernizing public administration and adopting e-government. After having received funding and assistance, nothing was accomplished, [however]. We had to act very quickly. But the results were deceiving. And, so, just as we had done earlier, we had to increase our activities. The financing agencies demanded results. So, three weeks before Paris III (2007), we created the TRA. That's how we operated, sadly" (E9). E6

commented that "the International Monetary Fund, the World Bank, and Paris III continued to have a great deal of influence. Paris III, for example, required that we present reports about the level of citizen satisfaction with e-services. That allowed us to move in the right direction."

5 Discussion

The results of these interviews converge with studies in Information Systems that demonstrate the importance of coercive isomorphism in the adoption of a technological innovation. This case shows the importance of formal rules and sanctions by organizations in order to increase coercive pressures.

Certain elements of this case appear to reflect direct mimetic isomorphism. In effect, from the beginning, the implementation project of e-administration presented a great deal of uncertainty. Faced with pressure from funding agencies that wanted a real project and faced with the difficulty in finding solutions, the Lebanese government judged it legitimate to "do like everyone else" (direct mimetic isomorphism). The explanations by Lebanese administrators converge with findings by Teo et al. [47] and Liang and Xue [27], for example, who have demonstrated the importance of mimetic processes in this type of adoption.

Other aspects reflect indirect or unconscious mimetic processes explained by the transfer of employees and explicit mimetic processes resulting from the advice of consultants. The Lebanese e-administration project was equally influenced by experts and consultants. This case shows the value of the role of indirect mimetic processes that result from recruiting decisions made by the Lebanese who had conducted their studies abroad and who had worked in foreign public administration. The quality of work by this team encouraged other ministers. At this level, adoption can approach indirect imitation.

The UNDP and the European Union required international professional recruitment and training of the team, which led to successful completion of two e-administration projects and which suggests that the requirement had some, albeit quite modest, influence on the decision to implement e-administration. This may reflect a certain form of normative isomorphism.

6 Conclusion

We have briefly examined a puzzle that has bedeviled Lebanese public administration for more than a decade: little concrete progress to implement e-government after receiving billions of dollars, leading international agencies to conclude that insufficient progress had been made and to refuse commitment of additional resources. At the same time, however, threatened with the loss of donor funds, the Lebanese government was eventually forced to take some steps towards

implementation: trained staff was recruited and experts and consultants brought into public administration, and these actions did make a difference. As such, under certain conditions, adoption *does* result from external institutional pressures. And to coercive isomorphism, we also need to add the role of direct, unconscious, and explicit mimetic isomorphic processes, along with a search for professionalism.

Nonetheless, this research poses many questions and requires a much deeper and more extended analysis; there is much greater complexity than the story of isomorphic processes experienced by Lebanese public administration. The Lebanese government adopted e-services to demonstrate a rational approach to government decision making and to justify other business activities at the heart of the administration in order to persuade international agencies to fund its government modernization program. As applied to Lebanese e-public services, this is also a story about technology adoption as a symbolic form. We leave the role of culture, tradition, internal public administration politics, and symbolic action for a future study. This requires an analysis of the micro-level reaction to macro-level pressures experienced by Lebanese public administration.

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