

# Socio-cognitive perspectives on IT- enabled change in organizations

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Mikko Valorinta



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**Mikko Valorinta**

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**Abstract**

This dissertation examines the long-term evolution of information technology (IT) in organizations from a socio-cognitive perspective. The socio-cognitive perspective on IT-enabled change analyzes the individual and collective processes that are required to process information and to carry through concerted commitments in the organization. Specifically, this study addresses two questions related to the adoption of IT in organizations: (1) "Why organizations have difficulty bringing about IT-enabled change?", and (2) "How can organizations nurture IT-enabled change?"

The dissertation is composed of an introduction and four individual studies. In the first paper, the concept of mindfulness is applied to analyze cognitive inertia and techno-social change processes in organizations. The second paper examines how the path dependencies of technology and power relations interrelate. The third paper explores the role of IT and IT management in the organizational search for improved organizational alignment. Finally, an historical study on the evolution of IT in retail industry provides a long term perspective on techno-social change. Using historical, quantitative, and qualitative research designs, the studies address the entire lifecycle of IT in organizations.

The dissertation contributes to the existing literature on socio-technical and socio-cognitive change by identifying the organizational processes that construct IT-enabled change in organizations. The study argues that from a socio-cognitive perspective IT-enabled change in an organization can be explored through three organizational processes: comprehension, building commitment, and coordination. The process of comprehension refers to awareness and understanding of the opportunities provided by IT. In addition to comprehension, IT-enabled change is conditioned by an organizational commitment to act. Making decisions and building commitment on IT-initiatives is associated with personal interests and political concerns. Finally, IT-enabled change also commonly cross functional boundaries and call for a coordinated effort and alignment between organizational professions and units.

The three processes of comprehension, building commitment, and coordination occur throughout the technological lifecycle and are partly overlapping. The better comprehension organizational actors have of the opportunities provided by IT, the more likely they are to make decisions and build joint alignment for the change initiative. Strong organizational commitment again enables effective cross-functional coordination for the change effort.

**Keywords** information technology, organizational change, socio-cognitive perspective, IT alignment, mindfulness, retail

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Väitöskirja tarkastelee tietotekniikan kehittymistä organisaatioissa sosio-kognitiivisesta näkökulmasta. Tietotekniikan ja organisaatioiden muutosta käsitellään analysoimalla yksilö- ja ryhmätason prosesseja, joita organisaatiot tarvitsevat tiedon käsittelyyn sekä muutosten toteuttamiseen. Väitöskirja tarkastelee kahta tutkimuskysymystä: (1) miksi organisaatioilla on vaikeuksia tietotekniikan mahdollistamien muutosten toteuttamisessa? sekä (2) miten organisaatiot voivat edesauttaa tietotekniikan mahdollistamien muutosten toteuttamista?

Väitöskirja käsittelee historiallisten, laadullisten sekä kvantitatiivisten tutkimusmenetelmien avulla tietotekniikan koko elinkaarta organisaatioissa. Väitöskirja koostuu johdanto-osuudesta ja neljästä erillisestä tutkimuksesta. Ensimmäisessä tutkimuksessa analysoidaan tietoinen läsnäolo -käsitteen (mindfulness) avulla organisaatioiden kognitiivista inertiaa ja tekno-sosiaalisia muutosprosesseja. Toinen tutkimus tarkastelee, miten teknologian ja organisaation valtasuhteiden polkuriippuvuudet kietoutuvat toisiinsa. Kolmas artikkeli keskittyy tietotekniikan ja tietotekniikan johtamisen merkitykseen organisaation yhdensuuntaisuuden ja toiminnan kehittämässä. Neljäs artikkeli on historiallinen tutkimus, jossa arvioidaan pitkittäistutkimuksen avulla tietotekniikan kehittymistä ja tekno-sosiaalista muutosta kaupan alalla.

Väitöskirjan teoreettinen kontribuutio sosio-tekniiseen ja sosio-kognitiiviseen näkökulmaan on niiden keskeisten organisatoristen prosessien tunnistaminen, joiden myötävaikutuksella tietotekniikan mahdollistama muutos organisaatiossa toteutuu. Työn keskeinen väitös on, että sosio-kognitiivisesta näkökulmasta tietotekniikan mahdollistamaa organisatorista muutosta voidaan ymmärtää kolmen organisatorisen prosessin avulla. Nämä prosessit ovat käsittäminen, sitoutuminen, sekä koordinointi. Käsittäminen viittaa tietoisuuteen sekä kykyyn havaita ja ymmärtää tietotekniikan tarjoamia mahdollisuuksia. Organisaation sisäiset valtasuhteet sekä henkilökohtaiset motiivit puolestaan vaikuttavat päätöksentekoon sekä siihen, miten eri toimijat sitoutuvat muutoksen läpivientiin. Tietotekniikan mahdollistamat muutokset myös ylittävät tyypillisesti organisaation raja-aitoja ja edellyttävät muutoksen koordinoitua yli yksikkörajojen.

Käsittäminen, sitoutuminen, sekä koordinointi vaikuttavat läpi teknologian ja järjestelmien elinkaaren ja ovat osaksi päällekkäisiä prosesseja. Päätöksentekijöiden ymmärrys tietotekniikan mahdollistamista muutoksista edesauttaa päätöksentekijöiden sitoutumista muutokseen. Laaja sitoutuminen puolestaan tukee muutoksen läpivientä sekä koordinoitua yli organisaatioyksiköiden.

**Avainsanat** tietotekniikka, organisatorinen muutos, sosiokognitiivinen näkökulma, tietotekniikan johtaminen, mindfulness, kaupan ala

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Helsinki, March 2012

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# List of publications

This dissertation consists of a summary section and four publications. The four publications are:

- I. Valorinta, M., 2009. Information technology and mindfulness in organizations. *Industrial and Corporate Change*, 18, 963-997.
- II. Valorinta, M., Schildt, H., and Lamberg J-A. 2011. Path dependence of power relations, path-breaking change, and technological adaptation. *Industry and Innovation*, 18 (8), 765-790.
- III. Valorinta, M., 2011. IT alignment and the boundaries of the IT function. *Journal of Information Technology*, 26, 46–59.
- IV. Valorinta, M. and Nokelainen, T., 2011. Introduction and early use of computers in the Finnish retail industry. *IEEE Annals of the History of Computing*, 33 (4), 45-55.

The publications are attached as Appendices 1-4.

# 1. Introduction

The search for cost reduction, more efficient internal and external coordination, enhanced information processing, higher quality of operations, and increased operational effectiveness have resulted in an intensive use of information technology (IT) in contemporary organizations (Argyres, 1999; Bakos and Treacy, 1986; Mata et al., 1995; Mittal and Nault, 2009; Mukhopadhyay et al., 1997). Respectively, information technology has become an integral element of organizational activity and a mediator of work in organizations. Whether a manufacturing firm, retailer, or an insurance company, many of the critical business processes within and across organizations are enabled by IT.

With the growth of IT, organizational processes and knowledge have become codified into the structures of the digital information systems, which have come to constitute an important source of automated and routinized organizational behavior (D'Adderio, 2003; Pentland and Feldman, 2005; Zuboff, 1988). Respectively, digital computing has led to the congruence of organizational and technological change. In IT-intensive organizations, the organizational change efforts have come to require changes in the underlying IT systems and structures. At the same time, while organizational innovations increasingly rely on IT capabilities, empirical research suggests that organizations have trouble changing their practices and structures through a more effective use of new information technologies (Kling and Lamb, 1999; Mitchell and Zmud, 1999; Weill et al., 2002).

Despite the pervasiveness of digital computing, it has been proposed that technology is still underrepresented in organizational studies, and that future research should apply additional conceptual lenses and alternative research approaches to study the relations between information technology and organizational change (Dewett and Jones, 2001; Leonardi, 2011; Orlikowski and Scott, 2008). Especially, it has been proposed that studies on technological change have been focusing on the development and exploitation of IT-based systems, and that more complete models on change with greater emphasis on the cognitive and social processes of the

## Introduction

IT innovation are required (Avegrou, 2001; Winter and Lynne Taylor, 2001).

This thesis builds on the socio-technical view of organizations. The socio-technical view sees organizational work as a combination of social and technical dimensions where organizational change comes about through congruent social and technical effort (Appelbaum, 1997; Trist, 1981). Resting on the socio-technical view, this thesis focuses particularly on the social and cognitive processes in organizations. The socio-cognitive view examines the individual and collective processes that influence beliefs, behavior, and change in the organization. The extant literature provides socio-cognitive perspectives on IT adoption and use by exploring areas such as organizational coordination (Argyres, 1999), IT alignment (Henderson and Venkatraman, 1993), organizational politics (Keen, 1981), beliefs and attitudes (Karahanna et al., 2006), learning and human agency (Bourdeau and Robey, 2005), and mindfulness and IT innovation (Swanson and Ramiller, 2004). This dissertation aims to complete this literature by analyzing from a socio-cognitive perspective the organizational processes that drive, or impede, IT-enabled change.

Extant research on information technology and organizational change has been criticized for concentrating on only a limited part of the technological life-cycle, namely the implementation of the technology (Bourdeau and Robey, 2005). As an example, a typical study would focus on the impact a new technology has on the organization without much attention to the long-term evolution of technology and the organization (see for example Barley, 1986). While the period of deployment of a new technology is undoubtedly a critical event in the change process, it provides only a transitory perspective on the relationship between the technology and organizational life. Respectively, researchers have been encouraged to pay more attention to the entire lifecycle of IT in an organization (Bourdeau and Robey, 2005). This dissertation addresses the relationship of information technology and organizational change by examining the long-term evolution of information technology in organizations from a contextual, socio-cognitive perspective. Specifically, this study addresses from a socio-cognitive perspective two important questions related to the adoption of IT in organizations: (1) “Why organizations have difficulty bringing about IT-enabled change?”, and (2) “How can organizations nurture IT-enabled change?”

As discussed above, it is proposed that research on the relationship between information technology and organizational change would be enriched by the use of multiple levels of analysis and different theoretical perspectives. This dissertation is composed of four individual studies on the socio-cognitive perspectives on IT adoption. First, the concept of

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mindfulness is applied to analyze cognitive inertia and techno-social change processes in organizations. The second paper examines how the path dependencies of technology and power relations interrelate. The third article explores the role of information technology, and IT management, in the organizational search for improved organizational alignment. And finally, an historical study on the evolution of IT in a specific industry provides a long term perspective on techno-social change and reveals the influences of initial conditions, i.e. ownership and governance structures, on organizational level technological changes.

The paper is structured as follows. I will start by outlining key concepts and theoretical background on the relationship of IT and organizational change. Next, I will discuss the methodologies applied in the four studies and present the key results and contributions of the studies. Finally, I will conclude the paper by discussing the findings. The individual studies are attached as Appendices 1-4.

## 2. Theoretical background

### 2.1 Definition of information technology

The Oxford English Dictionary defines 'information technology' as "the branch of technology concerned with the dissemination, processing, and storage of information, especially by means of computers" (<http://www.oed.com:80/Entry/273052>, [accessed 24 May 2011]). Other definitions applied to 'information technology' in the literature include "computers as well as related digital computing technology" (Brynjolfsson and Hitt, 2000, p. 24), "hardware, software and related technical routines" (Willcocks and Lester, 1997, p. 1082), or the mechanisms that are used "to organize, store, manipulate, present, send, and retrieve information" (Yates and Van Maanen, 2001, p. xii). More elaborate definitions describe information technology as "a broad array of communication media and devices which link information systems and people including voice mail, e-mail, voice conferencing, video conferencing, the internet, groupware and corporate intranets, car phones, fax machines, personal digital assistants, and so on" (Dewett and Jones, 2001, p. 314) or "capabilities offered to organizations by computers, software applications, and telecommunications to deliver data, information, and knowledge to individuals and processes" (Attaran, 2003, p. 442).

In addition to 'information technology', 'information systems' and 'information technology infrastructure' are sometimes applied to refer to the specific dimension of digital computing systems. Here, 'information systems' refers to "organisational applications, increasingly IT-based, that deliver on the information needs of an organisation's stakeholders" (Willcocks and Lester, 1997, p. 1082) or the "many different varieties of software platforms and databases" encompassing "enterprise-wide systems designed to manage all major functions of the organization" and the "more general purpose database products targeted towards specific uses" (Dewett and Jones, 2001, pp. 313-314).

'IT infrastructure', on the other hand, refers to the shared, tangible IT resources, including hardware and operating systems, network and



## **Theoretical background**

telecommunication technologies, key data, and core data-processing applications, that provide a foundation to enable present and future business applications (Duncan, 1995), “the base foundation of information technology portfolio including both technical and human assets, shared throughout the firm in the form of reliable services, and usually coordinated by the information systems group” (Broadbent et al., 1999, p. 163) or “shared IT resources consisting of a technical physical base of hardware, software, communications technologies, data and core applications and a human component of skills, expertise, competencies, commitments, values, norms, and knowledge that combine to create IT services that are typically unique to an organization” (Byrd and Turner, 2000, p. 172).

In this study, unless otherwise noted, I will use ‘information technology’ to cover computer hardware, software, communications technologies, data and core applications applied in digital computing. In addition to information technology, the analysis also covers areas such as the management of IT, IT architecture and standards, IT-related organizational processes, and IT skills and knowledge.

## **2.2 The socio-technical view of IT-enabled change**

The socio-technical view originates from the studies of the Tavistock Institute in the British coal mining industry in the late 1940s and early 1950s (Trist, 1981). The studies observed that the Tayloristic concept of scientific management, Weber’s model of bureaucracy, as well as the tenets of the technological imperative could be disobeyed with positive economic and human results. The principles of the socio-technical perspective included focus on organizations as open rather than closed systems, on joint effort rather than single jobs, on groups rather than the individual worker, and on the individual as complementary to the technology rather than as an extension of it (Trist, 1981). With the increasing infiltration of technology into organizations, the socio-technical perspective has since been widely recognized across a wide range of research on technological change in organizations, including that related to the design and deployment of IT systems in organizations.

The socio-technical view is based on the premise that organizational work is a combination of social and technical elements which must work together to accomplish positive outcomes (Appelbaum, 1997). Respectively, the overall productivity of a new system is directly related to the accurate analysis of the social and technical needs and requirements (Cherns, 1976).

Here, the technical subsystem encompasses the devices, tools and techniques required to perform the organizational tasks, and the social subsystem covers individuals responsible for accomplishing these tasks as well as their skills, interpersonal relationships, attitudes, and beliefs (Palvia et al., 2001; Ryan and Harrison, 2000). The socio-technical literature proposes that, by ignoring the social subsystems and the human perspectives related to IT investments, organizational decision-makers presume that the social and human dimensions do not exist or are insignificant (Ryan and Harrison, 2000).

The socio-technical view underlies the importance of the social dimension of organizational life by suggesting that IT-enabled change is accomplished through aligned social and technical events. In the IS research, the socio-technical view has been applied in areas such as IT-related decision-making (Ryan and Harrison, 2000), design and implementation of new information systems (Bostrom and Heinen, 1977), IS innovation (Avgerou and McGrath, 2007), business process reengineering (Grover et al., 1995), user acceptance (Dillon and Morris, 1996), and post-implementation evaluation of information systems (Palvia et al., 2001). One salient line of the socio-technical IT research has examined the interaction between the technological and social domains through the lens of structuration. The structurational model of technology recognizes that human action is enabled and constrained by structures, such as technological systems, but that at the same time these structures are the result of previous (human) action (Orlikowski, 1992).

The socio-technical view and how it appears vis-à-vis other central perspectives on IT-enabled organizational change is summarized in Table 1.

### **2.3 The socio-cognitive perspective**

What we label here as the socio-cognitive perspective on IT-enabled change resides in the socio-technical view of organizational change, and shares a similar focus on multidimensional aspects of organizational life. However, while the socio-technical view of IT-enabled change focuses primarily on the duality of technological and social subsystems in an organization, the socio-cognitive perspective is particularly interested in the micro- and macro-level processes in organizations that shape the individual and shared realities (Garud and Rappa, 1994, p. 344). Here, the focus is on individual as well as organizational level sensemaking, boundedly rational decision-making, and organizational efforts to enact change. Instead of considering IT-enabled change as emergent, on-going improvisation or as an outcome

<i>View</i>	<i>Level of analysis</i>	<i>Actors in the change process</i>	<i>Logic behind IT-enabled change</i>	<i>Drivers of IT-enabled change</i>	<i>Impediments of IT-enabled change</i>	<i>Predictions about the outcome of IT-enabled change</i>
Socio-technical change	Individuals, units, organization	All organizational actors, including management and users of IT	Change is accomplished through aligned social and technical efforts	New technological innovations and people who are responsible for driving the innovations in the organization	Ignorance of the social dimension of IT-enabled change	Sub-optimal outcome if the social dimension is overlooked
Strategic choice	Organization	Management	Change unfolds as a result of calculative and rational managerial decision	Rational decision-making, identified and qualified opportunities	Unattractive benefit-cost ratio, high risks	Improved organizational performance
Technological imperative	Technological environment, organization	N/A	Technology is the exogenous, autonomous driver of change	New technological innovations	Resistance from management – change is likely to be only delayed, not avoided	New technologies will be taken into use, no predictions of the performance implications
Emergent change	Organization, individuals	Organizational actors, users of IT	Change occurs through improvisations and as side effects and unanticipated consequences of action	Goal seeking, improvisation, learning, use of IT	Inflexible IT, mandated routines	Incremental changes and incremental performance improvements
Institutional change	Environment, industry, organization	N/A	Organizations conduct change processes that are legitimated externally rather than in terms of efficiency	Institutional forces, concerns of legitimacy, norms, rationalized myths	Lack of legitimacy associated with a technology	Organization adopts externally legitimated technologies, no predictions of the performance implications

**Table 1** Key theoretical views of IT-enabled organizational change

## **Theoretical background**

of rational management decision, the socio-cognitive perspective analyzes the individual and collective processes that are required to detect unexpected situations, to effectively process information, and to carry through concerted commitments in the organization. While it could be argued that the socio-technical view itself encompasses the mechanisms that drive individual and shared cognitions and commitments in organizations, we decided to prefer the term “socio-cognitive perspective” herein in order to underline the social and cognitive constructs in our research.

The socio-cognitive approach to change suggests that organizations possess cognitive and social impediments as well as enablers to organizational decision-making and action. The cognitive impediments are caused by limitations of organizational sensemaking and rationality. As defined by Weick, Sutcliffe, and Obstfeldt (2005), sensemaking is about the interplay of interpretation and action, and about the way people organize to make sense of equivocal inputs and enact in a sensible way based on these inputs. In addition to sensemaking, the socio-cognitive perspective examines psychological and sociological constructs such as organizational decision-making, information processing, bounded rationality, mindfulness, beliefs, situated cognition, schemas, social norms, and politics (Elsbach et al., 2005; Garud and Rappa, 1994; Ginsberg, 1994; Levinthal and Rerup, 2006; McKinley et al., 2000).

It is important to note that the socio-cognitive perspective addresses both the cognition and behavior in an organization. Moreover, the socio-cognitive perspective on IT-enabled change concentrates on the duality of beliefs and behavior throughout the entire lifecycle of IT adoption, starting from planning and design to the implementation, deployment, use, and eventual disposal of IT.

## **3. Research design and key results**

In order to capture the multiple views of socio-cognitive processes in organizations, I chose to apply historical, quantitative, and qualitative research designs in the four individual studies. The historical studies explored the antecedents and consequences of IT-enabled change and the change process itself (see: Van de Ven and Huber, 1990). The quantitative research tested the sources of variation in socio-cognitive processes. Finally, the qualitative study focused on the rhetorical commitments and concerns of organizational actors and the ordinary events in the case organizations (see: Miles and Huberman, 1994). I will next introduce the four articles that address the socio-cognitive aspects of IT and organizational change. A summary of the articles is provided in Table 2.

### **3.1 Article 1: The role of mindfulness in IT-enabled change**

#### **3.1.1 Premise of the article**

This paper concentrates on the concept of mindfulness. Mindfulness refers to processes that keep individuals and organizations sensitive to their environment and ready to effectively contain and manage unexpected events in a prompt and flexible way (Langer and Moldoveanu, 2000; Levinthal and Rerup, 2006). Mindful organizations are constantly open to unfamiliar interpretations of their environment, and are able to quickly respond to early signs of trouble (Rerup, 2005). The paper examines how IT impacts organizational mindfulness and the mechanisms through which complex organization-wide information systems impact mindfulness and adaptive processes, as well as the practices the organizations promote to increase the levels of mindfulness.

<i>Article title</i>	<i>Research design</i>	<i>Data</i>	<i>Data analysis &amp; tools</i>	<i>Key findings</i>	<i>Practical implications</i>
Information technology and mindfulness in organizations	Qualitative dual case study	Interviews of 19 people in the two case organizations Archival data, such as annual reports, strategic plans, process descriptions, IT architectures, IT strategies, project plans, project reports, internal memos, internal presentations, and press releases	Qualitative data analysis process developed by Strauss and Corbin (1988) to build grounded theory, coding supported by ATLAS.ti software	IT promotes mindfulness by engaging organizations in more extensive search processes and by fuelling organizational innovations with a repertoire of readily-implementable routines. IT decreases mindfulness and impedes organizational adoption by promoting cognitive inertia and challenging the enactment of change	IT can be promoted as source of incremental and radical innovations in organizational routines People's negative attitudes and affections towards IT may affect their inclination to consider new IT-enabled solutions IT projects can be considered an opportunity for a mindful and collaborative exploration of new innovative ways of conducting organizational work
Path dependence of power relations, path-breaking change, and technological adaptation	Historical study of four Finnish retailers	Historical studies on IT in the Finnish retail sector, company histories, published academic studies, annual reports, newspaper articles, industry studies, press releases Nine interviews of IT professionals with careers in the case organizations	Event Structure Analysis (ESA), with ETHNO software	Path-dependence of power and technology are interdependent Organizational power relations impact the evolution of new techno-political paths Path-breaking changes are required to reconfigured the path-dependent power-technology relationships	New IT innovations may threaten the status and position of decision-makers Political coalitions are likely to be conscious of their power and may use their power to influence IT adoption Technological path dependencies may be trivial in comparison to the path dependence of power relations Managers, and owners, should consider intervening and creating a path-breaking change when crucial technological adaptation is prevented by the prevailing power relations

<i>Article title</i>	<i>Research design</i>	<i>Data</i>	<i>Data analysis &amp; tools</i>	<i>Key findings</i>	<i>Practical implications</i>
IT alignment and the boundaries of the IT function	Quantitative study	Survey data collected from the CIO's and IT managers of Finland's 500 largest companies The sample consisted of 99 usable surveys from 96 different organizations	Structural Equation Modeling (SEM) with the AMOS 7.0 software	Alignment of IT and business requires effective, on-going management of both internal and external boundaries of the organization Sustaining alignment is a continuous activity	Outsourcing of IT may enable the IT function to increasingly direct attention to organization-specific business issues Outsourcing arrangements may be inflexible in turbulent environments Enterprise architecture may facilitate the collaboration between the IT and business functions Reporting relations between the CIO and CEO can be established, also as a provisional solution, to improve the alignment between IT and business
Introduction and early use of computers in the Finnish retail industry	Historical study of four Finnish retailers	Historical studies on IT adoption and use in Finland, historical studies on IT adoption and use in the Finnish retail industry, studies of the Finnish retail, corporate histories, annual reports, corporate archives Nine interviews IT professionals in the retail industry	Historical narrative, comparative analysis	Three primary reasons drove computer adoption in the Finnish retail: the need for more efficient processing of data-intensive routines, a trend towards more efficient and centralized logistics necessitating more advanced information processing, and the need to increase quality in reporting and invoicing The prerequisites for computer adoption in the Finnish retail sector were prior experience with punch card systems and concentrated industry structure	Organizational governance and ownership structures may influence the timing and the way organization adopts new IT innovations An organizational crisis can also be seen as an opportunity to implement path-breaking changes in technological systems

**Table 2** Summary of the individual articles.

### **3.1.2 Data and analysis**

The study focuses on two North European retail organizations and their organization-wide ERP systems. Both of the organizations belonged to major retail groups and had outsourced the majority of their IT operations. The study adopted a qualitative data analysis process (Strauss and Corbin, 1988) where the collected interview data was analyzed line-by-line and the findings gradually integrated into generic aggregated concepts.

### **3.1.3 Key findings**

The results of the study suggest that IT can set conditions for both increasing and decreasing levels of mindfulness. IT-related problem-solving and the concerted work on IT issues were found to promote increasing levels of mindfulness in the organizations. On the other hand, information systems were found to create monotonous and repetitive routines where manual intervention was only required to manage errors or to develop the routines. Respectively, the findings of the study suggest that people may be less inclined to reflect on their work and environmental stimuli when they have become accustomed to conducting their work with IT systems.

### **3.1.4 Key contributions**

The paper extends the way mindfulness has been addressed in organization studies by proposing that mindfulness provides valuable insights on organizational adaptation and IT-enabled change processes. Concerning the focus of this dissertation, the study identifies how IT can promote both habituation to prevailing routines as well as novel interpretations and questioning of existing practices. The study also highlights how commitment to new IT-related change activities may be impacted by existing personal perceptions and prejudice on IT.

## **3.2 Article 2: Interrelated path dependence of technology and power relations**

### **3.2.1 Premise of the article**

This paper focuses on the path dependence of power relations, path-breaking change, and technological adaptation. Existing research has highlighted the importance of the social and political dynamics of technological change (Vanloqueren and Baret, 2009) as well as technological change as a driver of social and political change (McGuire et



al., 2010; Reinstaller and Holzl, 2009). However, the interactions across the evolutionary processes of power and technology remain poorly understood.

### **3.2.2 Data and analysis**

The study examines path-dependence of technological systems and power relations in four Finnish retail organizations between 1959 and 2005. The historical analysis was initiated by composing historical accounts of all four case organizations. Subsequently, we conducted an Event Structure Analysis (ESA) on the data to explicate the path-dependent processes taking place in the organizations (Heise, 1989). We concluded our analysis with comparative analyses of the four retail corporations in order to identify the common characteristics and key differences.

### **3.2.3 Key findings**

We found considerable path dependence in the power relations of headquarters and the local actors (retailers, regional wholesalers, local co-operatives). Organizational actors that held powerful positions defended their own interests by preventing or postponing decisions that would weaken their positions. As we expected, the path-dependence of power and technology were also interdependent. We found that power structures had a consistent impact on technology adoption of IT systems that had political implications. For example, when the central organization had inferior power in a relationship compared to the 'local' parties (i.e. independent retailers, cooperatives and warehouse companies), the adoption of IT applications that constrained the independence of local organizations was delayed.

The changes in technology also influenced power relations. The introduction of POS systems in the late 1970s diminished the dependence of headquarters on the expertise and support of the retailers as well as the local/regional functions by increasing information flows to headquarters. This new information about the store-level operations allowed the headquarters to exert bureaucratic control over retailers and other local actors. As an example, using up-to-date data of sales, the central organization was able to take over category planning operations, reducing the dependency of HQ on non-central actors.

### **3.2.4 Key contributions**

The study shows that the marriage of power interests and technological systems may create strong processes of path dependence where the self-reinforcing effects are combined with mutual reinforcement of the evolutionary paths. The study contributes to the socio-cognitive perspective on IT-enabled change by exploring how the political alignment required to drive IT-enabled change may itself be deconstructed by the emerging change as the constitution of organizational power structures re-forms.

## **3.3 Article 3: IT alignment and organizational boundaries**

### **3.3.1 Premise of the article**

The third paper addresses IT alignment and the boundaries of the IT function. The alignment of IT and business means that the strategy, structures, and processes of the IT organization are aligned with those of the business functions so that the IT function and the rest of the organization are working towards the same organizational goals (Chan, 2002). The concept of organizational boundaries, on the other hand, is applied in the knowledge and resource-based views of the firm and in transaction cost economics to analyze how knowledge and resources are located and transferred within and across organizations. Despite the extensive literature on IT alignment, as well as on organizational boundaries and boundary management, the concept of boundary remains absent from the literature on IT alignment (Chan and Reich, 2007a, 2007b).

### **3.3.2 Data and analysis**

The data for the study was collected from the CIO's and IT managers of Finland's 500 largest companies in 2006. To test our model we analyzed our data with structural equation modeling (SEM), a method for analyzing covariance structures among observable and latent variables (Hoyle, 1995). We also applied statistical remedies to cope with a potential common bias that might have affected our data.

### **3.3.3 Key findings**

Outsourcing is found to enable organizations to shape their external boundaries so that the focus of IT governance can be directed away from technology-specific issues toward more value-adding activities. Concerning

the management of the organization's internal boundaries, this study examines the role of boundary spanners and boundary objects. The CIO is proposed to act as the potential knowledge broker between IT and the business organization. Also, enterprise architecture is found to serve as a boundary object and be associated with improved IT alignment. Covering a number of dimensions of organizational activities and IT assets, enterprise architecture helps transmit plans across the organization in a way that is comprehensible in both the IT and business contexts.

#### **3.3.4 Key contributions**

The study suggests that sustaining alignment through boundary management requires continuous organizational effort. Transmitting knowledge across teams, functions and organizations requires ongoing effort from boundary spanners and organizational knowledge brokers. Likewise, the boundary objects need to be constantly updated as the organizational, and technological, characteristics evolve. The study contributes to the socio-cognitive perspective by proposing that boundary management strategies drive organizational comprehension and commitment on IT-related questions and decisions. Respectively, the study reminds us that IT-enabled change initiatives often require coordination both across functional and organizational borders as well.

### **3.4 Article 4: The impact of governance models on IT-enabled change**

#### **3.4.1 Premise of the article**

The Finnish retail industry was at the national forefront in terms of computer adoption in the late 1950s and early 1960s. Our paper addresses this early adoption of computers in the four major retailing organizations in Finland. The paper pays special attention to the political dimension of IT-enabled change in the organizations as well as the societal, industry-specific, and organizational developments in the early years of computing. The study also reveals the drivers, the prerequisites, and the organization-specific idiosyncrasies for computer adoption in Finnish retailing.

#### **3.4.2 Data and analysis**

We applied a historical research design to examine the early use of computers in the Finnish retail industry between the 1940s and 1970s. Based on the empirical data and existing literature, we first created

historical narratives on the evolution of IT in the Finnish retail organizations. We then identified the key milestones and developments in all four organizations. Finally, we compared the differences and similarities in the evolution of IT, and organizations, between the retailers, and analyzed the key drivers, and enablers, during the early adoption of digital computing in the industry. In our narrative, we focused on organizational “appropriation”, referring to the way the organizations turn external practices into something of their own (Alberts, 2010).

### 3.4.3 Key findings

While the Finnish retailers adopted punch card technology nearly three decades after the national adoption started, they were pioneers in electronic computer adoption. Indeed, three of the four retail organizations ordered a computer within three years after the first electronic computer in Finland entered operation in 1958. Also, the first retailer to do so, Elanto, was the first non-governmental organization to acquire a computer in Finland. The first applications included computerizing administrative routines (e.g. payroll computation) and supply chain management (e.g. inventory tracking and invoicing). Thus, it was not the stores, but the central retail organizations and their needs that mainly drove computerization in the industry.

According to our research, three primary reasons were driving early computer adoption in the Finnish retailers: (1) the need for more efficient information processing of high-volume repetitive routines; (2) a trend, triggered by deregulation and societal changes, towards more efficient and centralized logistics which necessitated more advanced information processing; and (3) the need to increase transparency and quality in reporting and invoicing for different organizational stakeholders. Our study also identifies two important prerequisites for computer adoption, namely (1) prior experience with punch card-based information processing and international access to follow retail industry computerization elsewhere; and (2) concentrated industry structure with four relatively large and well-resourced organizations.

### 3.4.4 Key contributions

Overall, the Finnish retail industry in the late 1950s was well positioned to adopt computers, and changes in the operating environment provided additional stimulus to do so. However, due to differences in organizational politics and alignment, the retailers followed relatively dissimilar approaches and paths in their computerization. Respectively, the paper

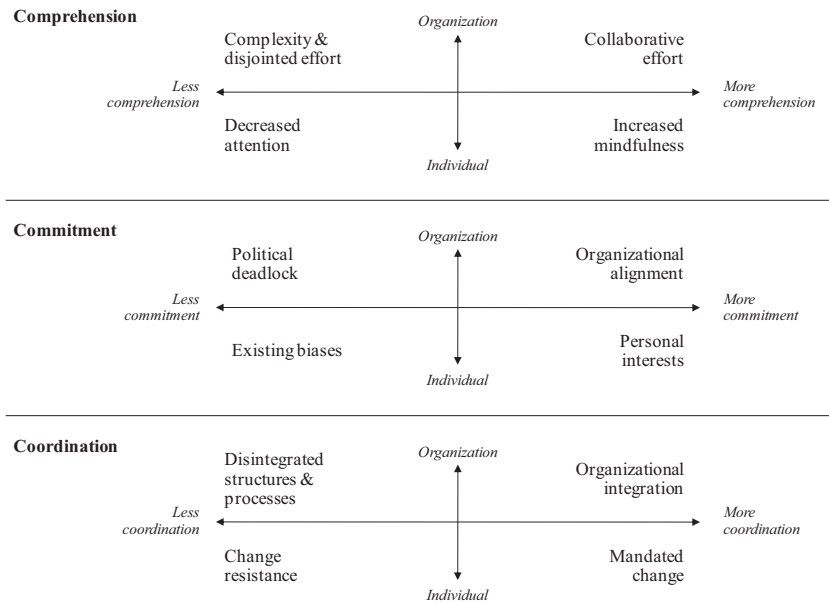
contributes to the socio-cognitive perspective on IT-enabled change by elaborating how the lack of alignment and organization-wide commitment can impede the organizational change process. At the same time the paper suggests that the initial conditions are likely to be overridden by institutional pressures and contingent events.

## 4. Discussion

This study presents the socio-cognitive approach as an important perspective on understanding IT-enabled change processes in organizations. More specifically, the study constructs the socio-cognitive logic for IT-enabled change by addressing from a socio-cognitive perspective two important questions related to the adoption of IT in organizations, namely (1) “Why organizations have difficulty bringing about IT-enabled change?”, and (2) “How can organizations nurture IT-enabled change?”

This study contributes to the existing literature on socio-technical and socio-cognitive change by identifying the organizational processes that construct IT-enabled change in organizations. The study argues that from a socio-cognitive perspective IT-enabled change in an organization can be explored through three organizational processes: comprehension, building commitment, and coordination. The processes and underlying mechanisms are summarized in Figure 1. The X-axis describes how the mechanisms either slow down or accelerate IT-enabled change. The Y-axis illustrates whether the mechanisms operate mainly on an individual or an organizational level, while acknowledging that for some of the mechanisms the distinction is not explicit.

This dissertation argues that the three processes of comprehension, building commitment, and coordination occur throughout the technological lifecycle and are partly overlapping. The better comprehension organizational actors have of the opportunities provided by IT, the more likely they are to initiate IT-enabled change processes. Respectively, shared comprehension across the organization is an important requirement for building joint commitment for the change initiative. Strong organizational commitment again enables effective cross-functional coordination for the change effort.



**Figure 1** Socio-cognitive processes driving and impeding IT-enabled change

This dissertation argues that the three processes of comprehension, building commitment, and coordination occur throughout the technological lifecycle and are partly overlapping. The better comprehension organizational actors have of the opportunities provided by IT, the more likely they are to initiate IT-enabled change processes. Respectively, shared comprehension across the organization is an important requirement for building joint commitment for the change initiative. Strong organizational commitment again enables effective cross-functional coordination for the change effort.

The identified socio-cognitive mechanisms operate on various levels in the organization, as well as beyond organizational boundaries. Literally, the social mechanisms such as politics, organizational alignment, joint effort – or lack thereof – and integration take place within groups and organizations, as well as between organizations. The more cognitive mechanisms such as attention, beliefs, attitudes, and personal interests occur at the individual level. However, existing research on socio-cognitive phenomena in organizations proposes that many of the group-level mechanisms related to sharing knowledge and beliefs function in similar ways as the individual mechanism (Davidson, 2002).

We will next elaborate in more detail the three processes that can both impede or promote IT-enabled change. Finally, we will discuss the limitations of the study and considerations for future research.

### 4.1 Comprehension

Organizational change is proposed to start with the perception of its need (Del Val and Fuentes, 2003). In order to purposefully initiate IT-enabled change, organizations need to *comprehend* the IT-enabled means needed to accomplish the change. The process of comprehension requires both an awareness as well as an understanding of the opportunities provided by IT. Mindfulness refers to enhanced attention to and increased awareness of present reality (Brown and Ryan, 2003). In IT-intensive organizations the challenge related to mindfulness is that IT-enabled automation of organizational routines decreases task complexity and variance and can make individuals less contemplative towards their own work. This reduced mindfulness makes organizational actors work on “auto-pilot” modes where they refuse to “acknowledge or attend to a thought, emotion, motive, or object of perception” (Brown and Ryan, 2003, p. 823). It is especially the continuing use of IT that may become habitual, so that well-learned action sequences are repeated without conscious intention (de Guinea and Markus, 2009). Respectively, IT-enabled automation can make people in organizations less alert to external stimuli and less reflective on their tasks so that the search processes become shorter or are completely prevented (Valorinta, 2009). This implies that decreased levels of mindfulness in an organization tend to favor the status-quo, increase cognitive inertia, and inhibit organizational change processes. Concerning on-going organizational improvisation, the findings suggest that, while users may still overcome the restrictions imposed by IT systems (Bourdeau and Robey, 2005), organizational actors are less likely to explore work-arounds for automated procedures than for non-automated ones.

However, adoption of IT is also proposed to disengage organizations from automatic habits and practices. Especially the implementation of IT-enabled change is found to increase mindful contemplation on organizational structures and ways of working (Valorinta, 2009). Designing changes in IT-enabled processes requires examining and questioning the existing practices and increasing collective interaction and problem solving. In a way, the implementation of IT-enabled change provides people in the organization an opportunity to more carefully contemplate their own tasks and organizational processes as they stop what they are doing and jointly investigate improvement opportunities in the prevailing practices.

In addition to habituation and cognitive inertia related to mindfulness, IT-enabled change is challenged by the uncertainties and complexities related to technology that may delay or completely impede initiation of change. Dealing with uncertainty and complexity is proposed to require



accuracy of judgment, comprehension and creativity (Ginsberg, 1994). Faced with the size, technological complexity and extensive integration of IT systems, individuals in an organization, or even a single organizational unit, are challenged to comprehend the often ambiguous opportunities provided IT, as well as the broad organizational implications of new IT innovations (Valorinta, 2009). The collective considerations of IT-enabled opportunities can be further challenged by the increasing growth of IT outsourcing. With the growth of IT outsourcing organizations have yielded up technological expertise to their IT suppliers. In order to ensure effective knowledge sharing and IT decision making, organizations need to carefully manage their communications and collaboration not only internally, but also across organizational boundaries (Valorinta, 2011).

On the other hand, the complexities associated with IT may also promote organizational collaboration. IT-enabled change efforts can bring together specialists across the organization to collectively explore existing modus operandi and the opportunities provided by IT (Valorinta, 2009). The literature on IT alignment has identified a number of mechanisms, such as shared goals, boundary spanning, and appropriate governance models, which support the collective reflection and research on IT issues in an organization (Chan and Reich, 2007b).

However, while comprehension may lead to action and change in an organization, it also may not. As Weick notes (1979), cognitive processes do not necessarily precede action, as cognitions may have little or no impact on behavior, and cognitions may also follow action by making sense of what has happened instead of what is going to happen. So, while comprehension can be seen as a typical process of socio-cognitive change, it cannot be regarded as a categorical requirement for IT-enabled change.

## 4.2 Commitment

In addition to comprehension, the socio-cognitive view argues that IT-enabled change is conditioned by an organizational commitment to act. Making decisions and building commitment on IT initiatives is associated with personal interests and political concerns. IT-enabled change in organizations, including decision-making, the design of the technological systems, and the implementation of the systems within the organization, is known to be influenced by concerns of changes in power positions (Robey, 1997; Weill and Olson, 1989; Zuboff, 1988). In other words, organizational actors who are in a position to influence IT-related decisions will use their power to their own advantage (McGuire et al., 2010; Vanloqueren and

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Baret, 2009). For example, when a new IT system is assumed to threaten the status and position of decision-makers, they are likely choose not to leverage their power relations to facilitate the technological adaptation (Pettigrew, 1973; Valorinta et al., 2011). One way to avoid the potential intra-organizational conflicts associated with new IT systems is through consensus and shared commitments (Ginsberg, 1994).

This study also highlights the longitudinal impact of power positions on technological choices, as organizational power structures evolve along with technological systems. The two studies on the adoption of computers in the Finnish retail industry illustrate how organizational power relations and IT converge into mutually reinforcing power structures and technological systems (Valorinta and Nokelainen, 2011; Valorinta et al., 2011). Respectively, the two studies explore the importance of initial conditions and demonstrate how the initial conditions of organizational structures and governance models impact the process of intra-organizational technology evolution but fail to create lock-in situations. Based on these findings, the socio-cognitive view on change proposes that differences in initial organizational power positions and conditions can lead organizations to adopt technological systems at different stages and paces (Valorinta and Nokelainen, 2011). However, the results also suggest that it is unlikely that the initial conditions will impact the co-evolution of IT and the organization indefinitely. Rather, intra-organizational socio-cognitive processes and managerial choices, as well as external institutional pressures and contingent events, such as path-breaking changes, are likely to eventually rule out and overcome the path of evolution set by the initial conditions (Valorinta and Nokelainen, 2011; Valorinta et al., 2011).

In order to ensure that the entire organization works toward the same organizational goals, organizations need to ensure the internal fit and alignment of their IT operations. Fit, or alignment, means that organizational elements such as tasks, policies, structures, and resources compose coherent and effective configurations (Siggelkow, 2002). Building commitment to IT initiatives requires an effective alignment of the priorities, activities, and structures of the IT organization and those of the business units. This dissertation extends the comprehensive literature on IT alignment by suggesting that that organizations may improve their IT alignment by skillfully managing their internal and external boundaries and by supporting organizational communications and collaboration through boundary-spanning activities and with an effective use of shared boundary objects (Valorinta, 2011).

On an individual-level, IT-enabled change may be challenged by personal prejudices about the risks and benefits associated with IT. These prevailing

cognitive commitments and fixations on IT can cause people to overlook critical information and have less motivation to consider and initiate IT-related change activities (Langer, 1997; Valorinta, 2009). Again, the complexities of organizational IT systems and infrastructures may further fuel the premature judgments on the challenges related to IT initiatives.

### 4.3 Coordination

Finally, on top of comprehension and commitment, implementing IT-enabled change calls for a coordinated effort in an organization. IT implementations and deployments commonly cross functional boundaries and require participation from different professions and units. In addition, IT project teams often also involve specialists from external partners. This study demonstrates how the management of both external and internal organizational boundaries improves IT alignment, enabling organizations to apply appropriate IT capabilities in a coordinated and timely way (Valorinta, 2011). Effective management of the external boundary of an organization necessitates making optimal in- and out-sourcing decisions. Boundary spanning and boundary objectives again provide organizations practices to improve the alignment of distinct organizational units and functions

With increasing outsourcing, organizational alignment is becoming more and more externally constructed. As technological expertise, IT systems, and even organizational data more often lie outside the borders of the organization, the antecedents of alignment can no longer be found exclusively within the organizational boundaries. Respectively, organizational alignment calls for the entire network of IT professionals, whether internally employed or externally sourced, to work towards the same organizational goals as the rest of the organization (Valorinta, 2011). Strong coordination of IT-enabled change is also required to manage user resistance towards new IT systems and applications. The research on the user resistance has explored how users' attitudes, beliefs, and intentions towards new IT systems impact the way they use the systems (Mathieson, 1991; Venkatesh, 1999; Venkatesh and Davis, 2000). A shared finding in the literature is that, due to the way existing IT systems are used, new IT systems are designed and deployed, and the broad individual as well as organizational implications of new systems, users do not adopt new IT systems without resistance (Taylor and Todd, 1995; Valorinta, 2009). Increased coordination can be seen as one potential mechanism to manage

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the change resistance and drive the intended adoption of IT in the organization.

On the other hand, the deployment of IT systems can also be used as a means to impose changes in organizational routines and as “an agent for unfreezing the status-quo” (McKersie and Walton, 1991, p. 254), thereby decreasing the need for organizational coordination. With mandated change, people in the organization are required to use the new information system in order to perform their tasks (Brown et al., 2002). The mandated IT systems can also impose very specific instructions and requirements for the users on how to conduct their tasks (Valorinta, 2009). Instead of being “infinitely malleable”, IT systems are known to reduce the degree of freedom available to users and organizations to experiment with and modify the technology (Bourdeau and Robey, 2005; Orlikowski, 2000). When individuals must perform their tasks in the particular way mandated by IT, the possibilities for variation and improvisation, as well as the importance of the people’s beliefs and attitudes as antecedents to their behavior, are likely to be decreased (Brown et al., 2002; Valorinta, 2009). This decreased need for coordination through forced compliance with IT is most apparent with the deployment and use of new IT systems, and less during the initiation and design phases of the IT-enabled change. However, the increasing growth of configurable off-the-shelf software and software-as-a-service delivery models that require less organization-specific modifications may reduce the coordination needs during the design of new IT capabilities as well.

## 4.4 Critical considerations and future research

While the individual papers herein all have their specific limitations, three main considerations should be paid attention to when analyzing the findings of this dissertation. First, the results are highly contextual. All the research focuses on Finnish organizations, and to a great extent specifically on the Finnish retail industry. Therefore, the findings may suffer from country-specific biases, even if the contextual concerns are attended to in all studies. Future studies could examine the co-evolution of IT and organizations in different contexts and historical settings.

Second, this study does not cover the full spectrum of socio-cognitive perspectives on IT-enabled organizational change. Rather, it focuses on a number of identified gaps in the existing literature about the antecedents and implications of the social, cognitive, and political dimensions of organizational life and IT. And while it may be infeasible to attend to all the

socio-cognitive dimensions within a single study, future work around the socio-cognitive aspects of organizing is called for to increase our understanding of how these different dimensions of organizational life both impact and are impacted by the increasing adoption of IT.

Finally, the study is conducted in an environment where the organizational IT capabilities are typically built on organization-specific, dedicated IT systems and infrastructure. However, with the increasing growth of new, externalized delivery models of IT services, such as cloud computing and Software as a Service (SaaS) (Cusomano, 2010), the interaction between IT and organizational life is likely to change. For example, the sourcing of IT services, implementation of IT-enabled routines, IT outsourcing models, and risks associated with IT are all likely to be impacted by these new delivery models. Future empirical investigations are required to understand how these new innovations in the provisioning of IT will influence the social and cognitive dimensions of organizing.

An important consideration concerning future research is also the ontological view of the relation of technology and organization. As Orlikowski and Scott (2008) discuss, research can regard technology and organizations as (1) discrete entities, (2) mutually dependent ensembles, and (3) sociomaterial assemblages. The studies that consider technology and organizations as discrete entities posit technology as an independent or moderating variable, focusing on the impact the technology has on the different analytical dimensions of an organization. In this dissertation the article on IT alignment and the boundaries of the IT function has the characteristics of the 'discrete entities' type of research, though the article strongly holds that IT alignment is a on-going, evolving process in an organization. The perspective of 'mutually dependent ensembles' views technology as a "part of the complex process through which organizing is accomplished" (p. 446, Orlikowski and Scott, 2008). The rationale here is that, while analytically separable, technology and organizations co-evolve through mutual interaction and co-dependent variations over time. The historical articles herein on the interrelated path dependence of technological systems and power and the adoption of computers in the Finnish retail industry belong to this research tradition. "Sociomaterial assemblage" refers to a relational ontology between IT and organizations where technological and social dimensions are mixed together so that the research focus is not on either of the dimensions, nor their interaction, but the inseparable techno-social ensembles. As Leonardi (p. 147, 2011) notes, "the imbrication of human and material agencies create infrastructure in the form of routines and technologies that people use to carry out their

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work". This inherent inseparability of the 'technological' and 'social' configurations is apparent in the article on IT and mindfulness, where the object of analysis is in effect the 'sociomaterial assemblage' of IT-enabled organizational routines. Future studies could further apply the palette of these three ontological approaches to examining the socio-cognitive perspectives on technological transitions in organizations.

For managers the study brings forward the observation that effective use of IT and a successful implementation of IT systems are associated with the organizational capabilities required for comprehension, building commitment and coordination. The mechanisms to drive these three organizational processes include collaboration, boundary management, and building alignment across individuals, units, and organizations. The study also reminds managers about the political dimension of IT-enabled change. Organizational decision-makers may influence decisions on new IT systems, as well as on-going IT initiatives, so that their own positions in the organization are strengthened. On the other hand, IT can also be seen as an effective means to drive change in organizational processes. For example, deployment of a new IT system may require individuals to comply their tasks with the new system and decrease variations in the process.

## 5. Conclusion

This dissertation elaborates the socio-cognitive dimensions of technological transitions in organizations. By exploiting historical, quantitative, and qualitative research designs, the studies address the entire lifecycle of adoption, use, and replacement of IT in organizations. The key findings of the research suggest that, from a socio-cognitive perspective, IT-enabled change in an organization comes about through the organizational processes of comprehension, building commitment, and coordination. These processes, and their underlying mechanisms, are sequential yet partly overlapping, and operate on both individual and organizational levels. The paper invites future research to apply diverse research designs and analytical foundations to examine how the socio-cognitive dimensions of organizational life impact, and are impacted by, IT.

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