PARADOXES IN THE DEVELOPMENT OF A BUSINESS CRITICAL INFORMATION SYSTEM

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Abstract

The object of this grounded theory study was an information system development (ISD) project. The project included two private sector organizations. The data were collected by 15 in-depth interviews. Glaserian grounded theory method was used as the technique for theory building. The main contribution of this study is a substantive theory of 'Paradoxical views of strategic ISD and change management', presented in the form of propositions. Theory includes the analysis of managerial and organizational contradictions when aiming at coping with changes and decreasing uncertainties during the ISD project. The theory explains also how the trust-based collaboration formed during the years enabled an excessive optimism among the decision makers. The pre-existing ISD structure did not fully support the actions required for the strategic Information System (IS) change which polarized the decision making and management. We argue that the findings of this study have some valuable implications to researchers who aim to understand the emerging issues and tensions in the development of a business critical IS product.

Keywords: Grounded theory, Substantive theory, Paradoxes, Change, Strategic Information System Development

1 INTRODUCTION

Many business critical information systems (IS) development (ISD) projects are constantly coping with different kind of changes and uncertainties as the business environment is getting more and more dynamic (e,g. Galliers 2006). Top management is in a key role in a process of sensegiving (Whetten 1984) through which a 'vision' of IS change can be concretized with the symbolic actions (Gioia & Chittipeddi 1991). Also the development of business and IS strategies has to be bound realistically into the goal setting and evaluation of success of ISD and organizational change (Keen 1981). In an ISD project tensions and ambiguities emerge easily if collaborating parties have conflicting goals (e.g. Jarzabkowski et al. 2013). This can complicate management of the strategic ISD change further. Recent paradox studies (Smith & Lewis 2011) have emphasized the abilities of organizations to make sense of organizational paradoxes which typically are results from the conflicting management strategies in an aim to achieve the sustainability. As ISD projects have become more and more strategic with their purposes to create business values with information technology (IT), the paradoxical challenges in the context of ISD project is worth studying in detail.

This study focuses on an ISD project where a business critical IS product is developed in collaboration with two private sector organizations. The 4-year old project was in its initial rollout phase at the beginning of the year 2013 when the data was collected by 15 in-depth interviews from both customer and vendor organizations. Glaserian grounded theory (GT) (Glaser 1992; 1998) was used as a technique for theory building. Our substantive theory *'Paradoxical views of Strategic ISD and Change Management'* includes the description of managerial and organizational contradictions when aiming at coping with changes and decreasing uncertainties during the ISD project. Additionally, the analysis illustrates the dynamic nature of ISD projects, as perceived by different stakeholders. We argue that to cope with both the management level and operational level tensions, which are ordinary, mundane and evident in the ISD projects, requires efficient and deliberate collaboration acts. Those acts can be facilitated only when shared values, norms, and beliefs can be established across the organizational boundaries (c.f. Levina & Vaast 2008).

The paper is organized as follows. In the next section, relevant literature is briefly summarized. Then the research case and methodology are presented. Finally, the substantive theory is formed and discussed. The paper ends with implications and conclusions.

2 LITERATURE REVIEW

First two relevant streams of literature, a strategic IS management and change, and a management of uncertainties and tensions in ISD, are briefly presented. We acknowledge the need to link emergent theory with the literature after the theorizing (e.g. Urquhart et al. 2010), hence extended literature review is elaborated at the end of the paper.

2.1 Strategic IS management and change

ISD projects are typically triggered by the organizational initiatives to build new information processing capabilities, to increase operational performance, and to gain competitive advantages (e.g. Melville et al. 2004; Melville 2010). Hence, ISD projects are closely tied to an IS strategy development (e.g. Galliers & Leidner 2013). Aligning the IS strategy with the dynamic business environment is a multi-facet activity that varies from a business context and project phase to another (Karpovsky & Galliers 2015). Systematic strategy-based management of complex and plural ISD projects benefits from proactive planning techniques and situational awareness (e.g. Galliers & Sutherland 1991; Salmela et al. 2000). The fuzzier the ISD project and more turbulence the business

environment, more inevitable changes and uncertainties emerge during the project. Galliers (2006) argues that agility, i.e. ability of proactively react to the changing business environment, is needed for gaining the sustainable business-IT alignment in these situations.

Punctuated equilibrium change model (Tushman et al. 1986; Gersick 1991; Romanelli & Tushman 1994) has been used for making sense of the dynamics of alignment (e.g. Sabherwal et al. 2001). There the phases of stability (equilibrium) and upheaval (revolutionary change) occur periodically. In ISD projects, critical incidents trigger misalignments between different interdependent elements, causing ambiguities and uncertainties about the ISD outcomes and project progress (e.g. Lyytinen & Newman 2008). At the phase of upheaval, the ISD project needs to be reoriented (Tushman et al. 1986) in order to reach desired outcomes. Through the revolutionary change process, also the ISD project base and fundamentals are modified (e.g. Gersick 1991). The IS strategy should steer these modifications. Often dialectic ISD projects face conflict struggles when confronting with opposites and resolutions (Van de Ven & Poole 1995). Key stakeholders and their collaborative actions resolve and decrease these tensions (Van de Ven & Poole 1995; Gersick 1991). Revolutionary change processes create pressure and force different actors to adjust their behavioral models. For example, a design of new business processes typically follows a strategic vision (Davenport 2013). A radical change can be painful for the individuals without collective, interactive and emergent processes of learning and sensemaking (Bartunek 1984; Gioia & Chittipeddi 1991; Huy 1999).

2.2 Management of uncertainties and tensions in ISD

Management of uncertainties is one aspect in a project management (Ward & Chapman 2003; Atkinson et al. 2006). Uncertainty is often related to the complexity and ambiguity of the project tasks since the objectives and relations are intangible, and their management across organizational boundaries is difficult. In ISD context, uncertainty is emphasized as many projects are run in an ecosystem in which leaders, experts, users and technology providers from different organizations collaborate to achieve a shared goal (e.g. Dittrich 2014). Cultural and socio-economical conflicts cannot be avoided if the trust-based collaboration suffers from negative incidents (Ring & Van de Ven 1994; Koeszegi 2004). Trust between the participating actors is essential for knowledge sharing and decreasing uncertainties (Hsu & Chang 2014).

Management of tensions is probably one of the key managerial challenges for future IS businesses (Smith et al. 2013; Smith & Lewis 2011). Dynamic capabilities (Teece & Pisano 1994), alignment (Galliers & Leidner 2013) and agility (Galliers 2006) have become the key elements for building IT capabilities and adapt business models to the market needs. Tensions in customer-vendor relationships can emerge, for example, when negotiating about the customer and market needs (e.g. Leonard-Barton 1992; Sawyer 2001). Also, sustainability in the business can only be achieved by managing both internal and external tensions of an organization. Smith and Lewis (2011) state that *"tensions are inherent and persistent and depicts how purposeful and cyclical responses to paradox over time enable sustainability—peak performance in the present that enables success in the future*". This is aligned with the punctuated equilibrium change model where the responses to the misalignments occur periodically. An intuition of a right timing for reorienting is critical for having the appropriate balancing act (Tushman et al. 1986; Smith & Lewis 2011). Consequently uncertainties and tensions are specifically inherent in any change process in organizational contexts. Understanding the sources of uncertainties and tensions is needed in order to lead the ISD projects to right direction.

3 THE RESEARCH CASE

The studied ISD project was established as a renewal project with the aim to update current technical platform and to implement new business models. Customer organization wanted to achieve scalability,

usability and interoperability benefits with the new information technologies. Two participating organizations (Table 1) had already been collaborating for 13 years since the vendor had developed and customized the earlier system. The ISD project was on hold for a couple of years because of financial uncertainties. New actors joined when the project was restarted in June 2010. At the time of the study, initial system rollouts had just started, and some changes in the management had taken place.

Customer	Global service provider in retail business (over 1000 employees) aims to renew the business critical IS covering the business critical functions such as customer service, maintenance, inventory control, resource planning, and finance in 180 user organizations. Some customization needs in all the modules. E.g. a critical business process goes through all the functions. A significant investor in this ISD project.
Vendor	National IS provider in enterprise resource planning business for accounting, retail and chain of shops (over 80 employees in one country and distant contractors abroad). Module-based IS product development supports an incremental approach in customer projects. Developing a new IS product on a commercial platform in this ISD project.

Table 1. The main participating organizations.

4 METHODOLOGY

The Glaserian GT method (1978; 1992; 1998; 2002) was applied to the theory building. This data-centric method supports insightful and systematic analysis for revealing new meanings of occurrences in an ISD change process (e.g. Orlikowski 1993). We applied theoretical sampling for selecting the right interviewees, and enriching the data. Our data collection consisted of 15 qualitative interviews. The interviews were conducted in the period from January 2013 to April 2013 in Finland where the initial rollouts were in progress at the time. By interviewing 16 key actors (Table 2) with different expertise and project roles through the 15 in-depth interview sessions we had rich data to finalize the analysis and theory building.

Organization	**Interviewees (16) and their roles**
Customer (11 interview sessions)	**Peter,** CEO, Member of ISD project steering group; **John**, CTO at the group level, Member of ISD project steering group; **Jacob**, Former IT/Project manager, Member of ISD project and product development steering groups; **Philip**, IT manager, Member of ISD project steering group; **David**, Business area lead, Participant in requirements workshop; **Aiden**, Functional area lead, Participant in requirements workshop; **Matthew,** Concept owner, Participant in requirements workshop; **Mary**, Controller, Participant in requirements workshop; **Cecilia**, User support in IT team, Member of ISD project group; **Joseph**, Technical specialist in IT team, Member of ISD project group; **Charlie**, Lead in the user/initial rollout organization, Participant in requirements workshop; **William**, User in the user/initial rollout organization
Vendor (4 interview sessions)	**Christian,** CEO, Member of ISD project and product development steering groups; **Daniel**, Product development lead, Member of product development steering group; **Sophia**, Customer support, Member of product development steering group; **Anthony**, Lead designer, Member of product development steering group

Table 2. The inteviewees and their roles in the ISD project.

One interview session endured 49 minutes on average during which an interviewee was spurred to describe her/his experiences in the ISD project. The narratives also report "story telling" throughout the whole project. Tracking the incidents in the project timeline and elaborating accurate timing was done. Also challenges were clarified in a detailed manner.

The data collection was linked inseparably with the data analysis (open, selective, and theoretical coding) in which the concepts are allowed genuinely emerge from the data (Glaser 1992). The open coding was done by the first author by using Atlas.ti software tool for a qualitative data analysis. An example of the open coding stage is given in Figure 1.

'We are in the middle of a big transformation [including group and subsidiary organizations] toward a service providing business.' (John, CTO, Customer). Coded as the open code *'**Business criticality**'*.

'Core thing, which we build now with this IS project and the [customized] services, is to reach a competitive advantage... With these additional services we are one jump ahead our most challenging competitors.' (Peter, CEO, Customer). Coded as the open code ***'Desire to be a pioneer'***.

'This [IS] certainly will have much more [features] when all the services are linked to the IS… when this program [IS] is perfect, in practice, user can open only one browser page which consists of links to all the others [web applications/programs].' (William, User, Customer). Coded as the open code *'**Easy data access and integration**'*.

'If thinking of the group [including business representatives] who participated in the IS specification, of course, it became passive after the phase of IS specification. Although the new comments were asked on the [IS specification] documents, very few actors [from the business side] bothered to read and comments again on the documents at the later phases.' (Jacob, Former IT/project manager, Customer). Coded as the open code *'**Unconnected business view**'*.

'It is sometimes frustrating to negotiate how something should be specified… a discussion is much more acrimonious if the vendor argues something that is conflicting with our opinion on how something should work… and then [an exact specification] is missing on which we could be leaned [in the argumentation].' (Cecilia, User support in IT team, Customer). Coded as the open code ***'Ambiguity'***.

'At the phase when the system was under the development, I think, the vendor had not any idea what eventually is amount of work required to [the whole system]… actual work amount was almost a double of that it was originally thought.' (Peter, CEO, Customer). Coded as the open code ***'Schedule'***.

'Of course now that Jacob (Former IT/project manager, Customer) left, that has changed the modes of operating, because he has been so strongly involved. And many things have been behind Jacob, in a way, in [the leading country, name] but also in [the country, name] and [the country, name]. So now we are both learning new models of operation regarding how we can take things forward in the future.' (Sophia, Customer support, Vendor). Coded as the open code ***'Changes in key roles'***.

'During recent three months [when I've been a part of this IS project] a thing has been fairly obvious: the needs emerge from windows and doors… There is a huge amount of all kind of pent-up needs…' (Philip, IT manager, Customer). Coded as the open code ***'Pent-up needs'***.

'Maybe three or five years can be looked ahead in this kind of IS project… It is not reasonable to plan any longer because the technologies and business change during the journey. (Also) the growth of the company brings some new things and needs from different areas. I do not think that any longer an IS project could be planned in the current world.' (Jacob, Former IT/project manager, Customer). Coded as the open code ***'Dynamic nature of project environment'***.

'All the needs cannot be estimated when the requirements specifications are done… the [firm's] strategy also can change… [The customer's view] need to be considered in the prioritization, as those have changed after the first specification round...' Sophia (Customer support, Vendor). Coded as the open code ***'Evaluating the real needs of the customer periodically'***.

'[The customer wants] the system to include as many standard features as possible, and also features that provide competitive advantage' (Jacob, Former IT/project manager, Customer). Coded as the open code ***'Managing the customized and standard IS features'***.

'It's good to hear when [early-adopter users] say "hey, you can do this with the system". It's a step in the right direction, even though… we haven't implemented all the features yet.' (Sophia, Customer support, Vendor). Coded as the open code ***'Concretizing the design and getting feedback'***.

'We try to improve things continuously. Last time we sat down was today, and we thought for hours on… things relating to testing and automating that… we're going to focus on heavily next.' (Christian, CEO, Vendor). Coded as the open code ***'Evolving quality assurance'***.

'I was aware of the work still needed. Before my participation [in the product development steering group of the vendor] it was much more challenging to keep track of the real work amounts.' (Jacob, Former IT/project manager, Customer). Coded as the open code ***'Observing trusted actors and knowledge asymmetries'***.

'Sophia (Customer support, Vendor) has asked our challenges enthusiastically on a daily basis. She has taken care of going forward with those… all the time we've received very encouraging messages that we've coping with the challenges well… a lot of thanks belong to our own staff who have coped so well with the piloting use without starting to complain.' (Charlie, Lead of the user organization, Customer). Coded as the open code ***'Spurring actors in the IS piloting use'***.

'I communicated with the vendor, and with own colleagues in [the country, name] and [the country, name] as they are responsible for informing local teams/user organizations and collect data accordingly… Of course, I kept [the customer's] managers aware of the status of the project by participating in the management steering group. Plus the customer has events where the business management from all the countries meet… Hence, information is shared to this direction too.' (Jacob, Former IT/project manager, Customer). Coded as the open code ***'Situational knowledge sharing across the organizational boundaries'***.

Figure 1. Examples of open coding based on the interview transcripts.

The first author sorted open codes into selective codes, where coding proceeded according to the most important codes identified. It was then gone forward to theoretical coding, where the relationships between selective codes were considered and the core category emerged. Analytical memos were used for theorizing (Glaser 1978; 1992). The memos resulted in the formulation of a substantive theory about *'Paradoxical views of Strategic ISD and Change management'* consisting of two categories: *'Uncertainty in ISD'* and *'Management of Change in ISD'*. The process of constant comparison (Glaser 1992; 1998) required going back to the data several times, where data were compared with all existing concepts to see if it enriched existing categories.

5 THE SUBSTANTIVE THEORY

This chapter presents the substantive theory, which was derived from the Glaserian GT study. The theory indicates the specific paradoxes when aiming to manage strategically ISD and change processes in an uncertain project organization. The theory also constitutes a new perspective on strategic ISD and change management.

5.1 The Substantive Theory: Paradoxical views of strategic ISD and change management

The emergent categories of the theory and their respective selective and open codes are showed in Table 3. We show how selective codes are linked to each other later in this paper (Figure 2).

Categories	Selective codes	Open codes
Uncertainty in ISD	Leading the way "strategy"	Business criticality, Desire to be a pioneer, New product development, Business processes steer
	Expectation	Customization, Easy data access and integration, Scaling opportunities

	Tensions in the ISD collaboration	Long and emotional collaboration, Funding the product development, Dependency, Ambiguity, Recruitment
	Inconsistency between the knowledge and business view	Limited participation of the actors, Unconnected business view, Asymmetrical knowledge and structure
	Decision making	Prioritization, Control, Distributed project organization
	Excessive optimism	Pre-existing ISD collaboration, Using novel technologies, Schedule, Piloting phase
	Dynamic nature of the ISD	Changes in key roles, Pent-up needs, Dynamic nature of the project environment, Prolonged project
	Instability	Incomplete system, Interoperability of systems
Management of Change in ISD	Clarifying the ISD goal periodically	Aligning with the dissenting business views, Evaluating the real needs of the customer periodically, Reconsidering the ISD goal and scope
	Maintaining the overall system view	Making decisions based on the overall system view, Building on the fit, Managing the customized and standard IS features, Right timing for the change
	Making sense of the IS model	Being innovative when designing for the future IS model, Concretizing the design and getting feedback, Critical and explorative attitude when using the IS piloting version
	Making the evolving system parts and progress visible	Mapping the ISD road, Evolving quality assurance, Time needed for the machinery tuning
	Being aware of the informality	Observing the trusted actors and knowledge asymmetries, Centralizing the issue management, Documenting consistently
	Coping with the change	Spurring actors in the IS piloting use, Mindfully with temporary challenges, Learning on the way and wishful thinking
	Enhancing the collaborative ISD culture	Managing interrelated tasks in the distributed ISD organization, Situational knowledge sharing across the organizational boundaries, Systemizing the ISD without losing the agility

Table 3. The core categories and their respective selective and open codes.

5.2 The Substantive Theory as a set of Propositions and Theoretical Integration

This section is concerned with conceptualisation and relationships between different selective codes. A reasoning process how the selective codes are interrelated is described as a set of propositions. This phase was conducted in an iterative manner by the first author. It forms a foundation for the theoretical framework presented in Figure 2. Altogether 23 propositions were identified. However, due the lack of space, we can only give nine examples of the propositions, presented in Table 4.

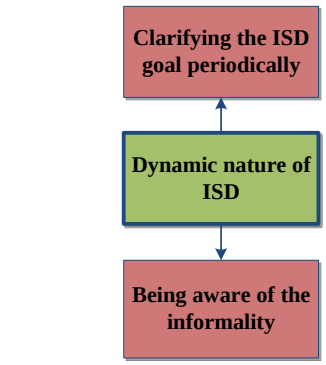
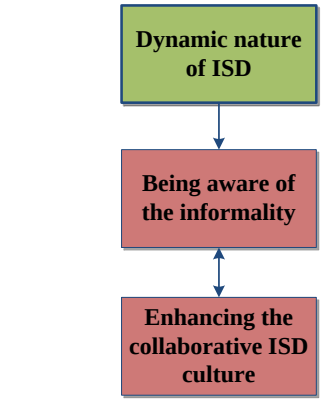
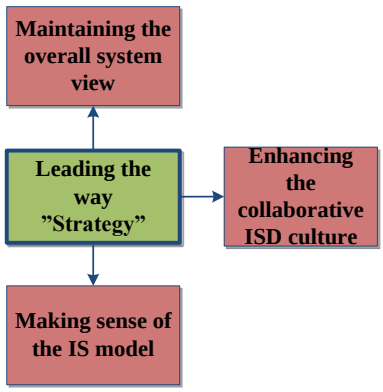
Interrelated codes	Propositions
	1. The **dynamic nature of ISD** leads to changes in project aims, structures and processes. It creates **needs for change management mechanisms to clarify the ISD project goal periodically**. For example, **aligning** actions are needed for making sure that **dissenting business views** can be **evaluated** in design and prioritization of the IS features. 2. The **ISD goal** becomes more **concrete** on the way when the knowledge of technologies and business context has been accumulated in the actors. Moreover, **changes in key roles, IS vision**, and **requirements** impact on the goal setting and schedule of the project. Hence, the **reconsideration** of ISD goal and scope is needed. 3. **Being aware of the tacit knowledge** and being able to **build back-up mechanisms** to safeguard the specific skillset is important in the dynamic ISD project. For example, the actors could be trained to be more multi-skilled and responsive.
	4. There is not time to document all the changing parts in the ISD. Instead, the reasons for decisions made during the path should be **documented consistently** for avoiding conflicts in the later phases of the ISD project. 5. Depending on the organizational culture and applied ISD processes, there are different ways to manage changes. **Shared practices and consistent ways to do things** support an efficient collaboration in an inter-organizational ISD project setting. Trust building, which can be a part of informal processes, cannot be ignored when aiming at the **situational knowledge sharing** across the organizational boundaries. 6. There is **a limitation in numbers of specialized experts** who can manage the most complex tasks. This resource limitation and changes in key roles (when the project is prolonged) often lead to **an asymmetrical knowledge and structures** in the ISD project. By enhancing the collaborative ISD culture, also the critical knowledge can be safeguarded better.
	7. The vision of this **strategic IS change** has to be communicated by the management in a way that the **meanings of this "leading the way"** can be concretized in the practical actions toward the desired IS outcome. **Making sense of the IS model** is thus a mechanism for supporting appropriate group actions and sensemaking processes among the stakeholders toward the desired state. 8. There has to be mechanisms to **enhance the collaboration efficiently** across the geographical boundaries in order to lead the ISD project toward the leading the way strategy. Added to skillset to be visionary, **situational communication and knowledge transfer** skills are needed between the distant teams/units. 9. **Maintaining** the **overall system view** continuously aligned with the leading the way strategy is challenging, especially, as implementing the IS **incrementally**. Decision making structures should support the leading the way strategy to **build on fit** and **management of the customized and standard features**. Overall system view also supports an awareness of **right timing to make changes in the ISD** without disturbing an operational performance.

Table 4. The set of propositions how the selective codes are related to each other.

Figure 2 shows how the selective codes form a theoretical framework. This substantive theory with its interrelated codes is explained, with the support of related literature, after the figure. In the GT process, this is the phase to show how the emergent framework/theory confirms, contradicts, or extends existing literature.

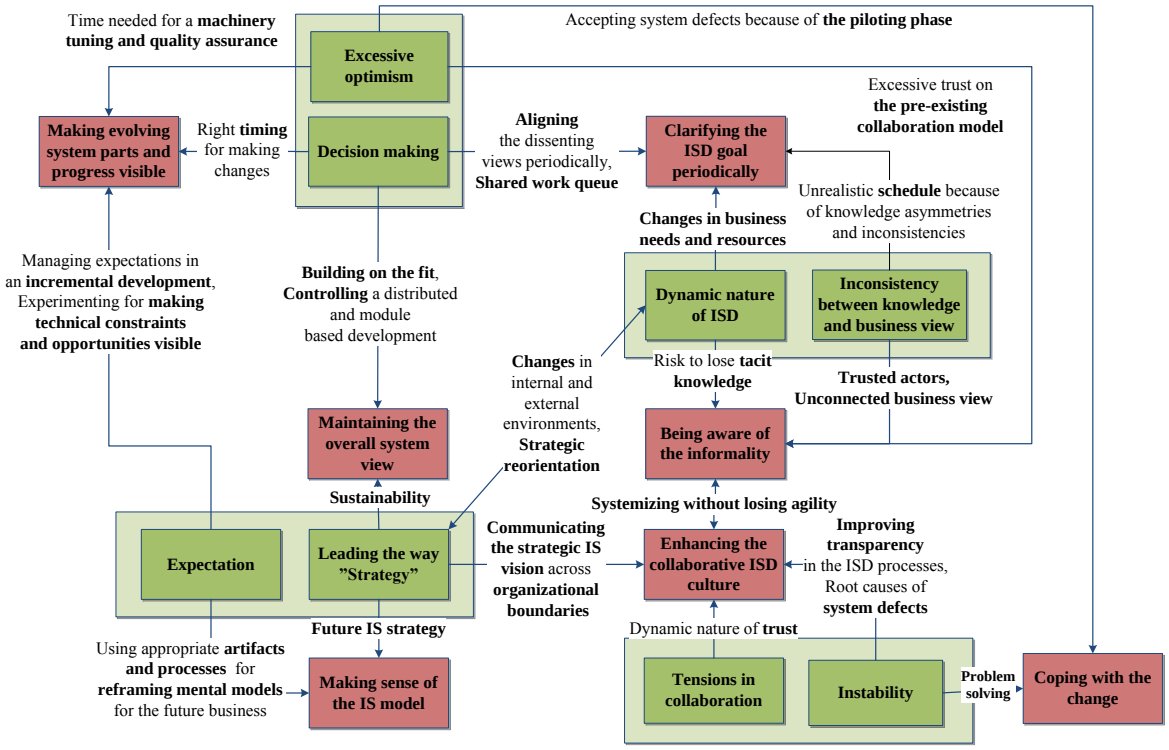


Figure 2: The substantive theory: Paradoxical views of Strategic ISD and Change Management.

As described in Figure 2, a **dynamic nature of ISD** triggers a need to **clarify the ISD project goal periodically** that the pre-planned scope and goals can be reconsidered according to changes, for example, in business requirements, resources, and project structures within the project timeline. The clarification of the ISD goal periodically is thus a change management mechanism developed for reacting proactively to both business and project level changes in a dynamic ISD environment. Meanwhile, an increasing awareness of a change process with its critical incidents (Lyytinen & Newman 2008; Lyytinen & Newman 2014) supports the decisions about what kind of resource allocation is needed and how to reorient the project when needed. A strategic reorientation is necessary for the project long term surviving and success at the phase of upheaval, especially, if the fundamental structures are at risk to be changed (Gersick 1991; Tushman et al. 1986). These *'deep structures'* include strategically meaningful *'fundamental choices'* such as the selection of a platform and development models. The strong support of top managers with a collective mindfulness can be critical at the phases of reorientation for maintaining the high performance in the ISD project (Khan et al. 2013). The new IS product development requires time enough for learning such as reframing and establishing the new ways of doing things (Tushman et al. 1986; Khan et al. 2013; Lüscher & Lewis 2008).

Leading the way strategy in the ISD project was based on the top management vision to improve traditional business model to more dynamic business model with agile, scalable and flexible operations. As described already in the traditional engineering problem (Miles et al. 1978), a management aims to operationalize a strategic vision of IS change to practical actions somehow.

Typically a creation of appropriate mechanisms is needed. In this case, mechanisms (artifacts and processes) evolved for **making sense of the** desired **IS model** and the prioritization of work tasks aligned with the future business requirements. However, a managerial sensemaking competence (Lüscher & Lewis 2008) was culminated in one mid-management person (Jacob, Former IT/project manager, Customer) only. Also business representativeness was limited and asynchronous for aligning different aspects throughout the ISD project. Collaborative actions were searched for enabling the cross-functionality and knowledge sharing (**Enhancing the collaborative ISD culture**). These include mechanisms to make sure that the whole ISD project is going to the desired 'Leading the way' direction.

Experimenting desired system features (**expectation**) from the future IS model perspective was a slow process – partly because of an incremental change approach and new technologies. **Making sense of the evolving system parts and progress** was observed as a critical mechanism to the expectation management. Top managers were willing to **maintain the overall system view** in order to find a right configuration of customized and standardized features. However, incremental change approach and informality in processes led to sub-optimization. There can be more variation in the processes and intermediate products in incremental change approach (e.g. Orlikowski 1993). Also the radical process change (included to the IS model change here) requires a broad definition of the desired processes (Davenport 2013). It was not possible in this case because of limited resources and expertise in this area. Competitive advantage features provided by the IS was delayed what made the realization of the business benefits difficult.

The top managers' vision and **expectations** promoted a strategic benefit and information processing capabilities (Tushman & Nadler 1978; Henderson & Venkatraman 1993; Davenport 2013) with new technologies for the usable and scalable IS product. However, as the requirements were presented from the perspective of current operations and current IS, concrete design artifacts and feedback mechanisms (Lohmann 2013; Wieringa & Moralı 2012) were needed to validate the requirements from the future business model perspective (**Leading the way**). In this case, the design artifacts applied did not enable the reframing of mental models in the requirements workshops (**Making sense of the IS model**). From the perspective of **decision making,** distributed project structure did not support the development of business critical IS change completely. Firstly, in the vendor organization there were challenges to involve the customer's business views into the new IS product development. **Maintenance the overall system view** and **Clarification the ISD goal periodically** were needed in order to make decisions from the perspective of 'Leading the way'. The validation of customer's requirements was mostly done in the initial rollout organizations by the early-adopter users, who lacked a comprehensive business view. Secondly, from the project management perspective, there was challenges to consolidate both micro (IS product development) and macro (leading the way strategy) level views of the project – although steering groups were established for both perspectives. Knowledge integration competence (Mitchell 2006), that culminated in a role of the former IT/project manager (Jacob), was not safeguarded. **Enhancement of the collaborative ISD culture** was recognized as the only way to reduce uncertainties, because of the lack of real time information in the asymmetric project organization (**Being aware of the informality**). Also the maintenance of overall system view had to be arranged with the supportive organizational structure.

In this ISD project, because of informalities and inconsistencies in the documentation and practices, it was difficult to assess the real project state so that right decisions can be made at the time. Incomplete knowledge created even "*an illusion of control"* (Taylor & Brown 1988; Mitchell 2006). **Excessive optimism** was prevailing when making decisions, for example, about the rollout schedule. Any project can end to the crisis because of too much trust on so called *"shadow organization"* (e.g. Allen & Pilnick 1973), formed in the interactions of individuals (e.g. Glick 1988). As there also was an **excessive optimism** about the development model, which was a result of the long term collaboration, formalizations of communication and development practices (**being aware of the informality**) was a slow process. The pre-existing ISD structure encouraged and maintained trust-based informal

interactions (Sitkin & Pablo 1992; Zucker 1986) in which also less traceable processes for decision making were applied.

Decision makers were very **optimistic** about the original project schedule because of a lack of knowledge about the technical constraints and uncertainties. Management mechanisms to **make the evolving system parts,** such as quality assurance, **visible** were demanded by the customer's top management. Yet quality problems emerged. One proposal for improving an **expectation** management was a road map for visualizing the milestones and progress. **Tensions** in the long term **ISD collaboration** started to emerge when the pilot IS version was **instable**. There were conflicting views about the right path to choose and priorities of the project tasks. Tensions in the collaboration were aimed to solve by **enhancing the ISD collaboration** with the appropriate systemizing actions without losing agility in a trust-based collaboration. According to the earlier studies (Zucker 1987; Bachmann & Inkpen 2011; Heiskanen et al. 2008) the institutionalization actions are easier to establish when the people trust on each other. Interpersonal trust also has been recognized as a facilitator for a knowledge sharing (Hsu & Chang 2014). As a result of **instable** outcome, with the significant amount of system defects, the early-adopter users started developing mechanisms to **cope with the change** over the tricky IS piloting period. Spurring the actors was necessary when they used incomplete IS product. However, as only limited amount of spurring partners participated in the piloting rollouts, it was more or less the individuals' responsible to find ways to cope with the change. The first rollout user organization had more spurring support than the others. No wonder that the frustrating feelings about the instabilities started to dominate the more organizations were involved. This fed **the tensions in ISD collaboration** further, especially in a situation when some of the user organizations did not believe in the future success of the business critical IS product.

6 DISCUSSION

As a result of the comprehensive data analysis (through the coding phases of open, selective and theoretical) a substantive theory in a form of theoretical framework was created (Figure 2: *Paradoxical views of Strategic ISD and Change Management*). The substantive theory shows how uncertainties and tensions in the ISD collaboration set requirements on the strategic change management mechanisms (identified by the key actors) for improving the ISD project performance. The managerial aims were to achieve a situational awareness, control and planning abilities for the ISD project activities that the strategic IS vision (Leading the way) could be realized in the near future. However, as our findings point out, there were numerous paradoxes rooted from current development model and long term collaboration. That was why the establishment of the change management mechanism became polarized in project actions. For consistency with GT, we now examine our substantive theory in light of existing theories.

Lewis et al. (2000; 2002), Smith and Lewis (2011), and Lüscher and Lewis (2008) among others have developed theories for understanding paradoxes in organizations. Smith and Lewis (2011) for example emphasize the existence of a paradox in organizing the activities within the competing goals and managerial strategies. Hence, for solving the paradox it often has to be worked through the process of sensemaking (Lüscher & Lewis 2008; Weick 1993). We found that it is useful to apply the theoretical lens *"Organizational change paradoxes"* developed by Lewis et al. (2000, 2002, 2008, 2011). Each pre-defined organizational change paradoxical dimension (Learning, Belonging, Organizing, and Performing) are explained and discussed in relation to the substantive theory (Figure 2) next.

Learning paradox means *"efforts to adjust, renew, change, and innovate foster tensions between building upon and destroying the past to create the future"* (Senge 1990; March 1991; Smith & Lewis 2011)**. Leading the way** strategy was culminated in the **expectations** of the stakeholders. Mechanisms were needed to **make sense of the IS model** that would realize the requirements with the selected technologies. Technology learning should have been tightly bounded into the sensemaking process

toward the desired IS model so that also possible technical constraints can be considered. Thus, interrelation between the **expectation** and **making sense of the IS model** can be seen as a *learning paradox* because of the need for renewing the existing IS model by considering all the context specific requirements. These include, for example, learning the context of users, support the users and decision makers to make sense of the future business model, thinking of ways to react changes in the business environment, and accepting the limitations with the selected technologies and knowledge on the new technologies. Management mechanisms should be developed for understanding the *learning paradox* when aiming to develop an IS on the different expectations of the stakeholders.

Belonging paradox means *"Identity fosters tensions between the individual and the collective and between competing values, roles, and memberships"* (Badaracco 1998; Brewer 1991; Markus & Kitayama 1991; Pratt & Foreman 2000; Huy 1999; Smith & Lewis 2011). Individual coping mechanisms evolved in the middle of instabilities and uncertainties during the IS piloting phase. Actors in the first piloting user organization satisfied with their participation in the IS rollouts (more spurring support – trustworthiness). The significant role of the leaders in the user organizations was also emphasised for maintaining the wishful atmosphere and problem solving attitude despite the potential challenges. For example, the collective belief that *'But we just knew it… problems belong to a piloting phase of a new system.'* (Charlie, the lead of the user organization, customer) was prevailing. All early-adopter users shared this belief in order to cope with the tricky piloting phase. As the coping with the change mechanisms was not extended to cover the whole project organization (a result of excessive optimism in the resource allocation), it remained mostly in few early-adopter user organizations instead of becoming a collective action. In practice, few actors shared a mindfully attitude in their individual level actions. Thus, interrelation between the **excessive optimism** and **coping with the change** can be seen as *a belonging paradox*.

Organizing paradox means *"Structuring and leading foster collaboration and competition, empowerment and direction, and control and flexibility"* (Adler et al. 1999; Denison et al. 1995; Flynn & Chatman 2001; Ghemawat & Ricart Costa 1993; Lüscher & Lewis 2008; Siggelkow & Levinthal 2003; Smith & Lewis 2011). As the project had a tight schedule, the activities no serious drawbacks were anticipated, especially when the first IS versions were rolled out. The ability to maintain the stability in the ISD activities was based on long term collaboration and assumption that the participants are knowledgeable about the customer's operations and able to response quickly to their demands. However, a significant amount of new knowledge had to be captured. More transparency in the development activities was needed for presenting to the top managers a real progress of the ISD project at the time. There was a suspicion of how much the vendor could control themselves their development processes if the outcome of releases were not what the customer expected. Earlier informal ways to do things hid the struggles with the new technologies and development activities. Interrelation between **excessive optimism** and **being aware of the informality** can be seen one of *organizing paradoxes*.

The initial rollouts were expected to provide information about the new technologies. Unfortunately this piloting phase was too late from the customer's perspective, as they wanted to gain competitive advantage with the highly customized IS product. The piloting phase revealed an instable IS product version. As a result, the top management of the customer wanted to systemize the development processes and structures but still maintain the high level of agility when collaborating towards new IS product. However, as the critical people changes occurred, the situational knowledge sharing across the organizational boundaries had become weaken. In practice, there was only one knowledge integrator role (Jacob who left the ISD project). He was able to enhance the collaboration with this good communication skills and peripheral understanding of the business and IT alignment challenges. Thus, the dynamic nature of ISD challenged the formalization acts toward the desired agile ISD model although there was an awareness of the prevailing inconsistencies. Interrelation between **being aware of the informality (related to dynamic nature of ISD)** and **enhancing the collaborative ISD culture** also can be seen one of the *organizing paradoxes*.

The priorities in the requirements work queue changed when the project prolonged. The customer wanted to prioritize critical functionalities for gaining business benefits earlier. The cross-functional team actions, in which all the key aspects were represented, did not continue throughout the project. For example, the validation of the requirements should have been done from the perspective of the customer's business. Also a representation of the top management's vision would have been beneficial when the development orders were planned. Thus, a part of *organizing paradoxes* are **dynamic nature of ISD, leading the way, clarifying the ISD goal periodically, decision making** and **maintaining the overall system view**.

Performing paradox means *"Plurality fosters multiple and competing goal as stakeholders seek divergent organizational success"* (Donaldson & Preston 1995; Margolis & Walsh 2003; Jarzabkowski et al. 2010; Denis et al. 2007; Smith & Lewis 2011). In a large ISD project, where new IS product is developed incrementally, the mechanisms to maintain the overall system view and make the evolving system parts and progress visible are needed for achieving a Leading the way strategy in a long run. Easily the focus of the development activities moves to a fixing of system defects for one IS version although the main target should be on testing the constraints and opportunities of the overall IS product. Thus, the part of *performing paradox* is organization's ability to **maintain the overall system view** aligned with the **leading the way strategy** that evolves over time (**dynamic nature of ISD**). Also **evolving** project **parts** have to be made **visible** throughout the project that the schedule can be set realistically. **Excessive optimism** can weaken the ability to **make** the right **decisions** during the project, especially, if the decision making structure is distributed to sub-teams without an efficient integration capability. In our case, excessive optimism for the pre-existing development model and new technologies caused significant project delays as this "illusion of control" led finally to a low performance of operations.

7 CONCLUDING MARKS AND FUTURE RESEARCH

Our grounded theory study presents the operation of two core categories: *'Uncertainty in ISD'* and *'Management of Change in ISD'*. These two categories formed the substantive theory *'Paradoxical views of Strategic ISD and Change Management'*. The in-depth interviews together with the Glaserian GT method were used to develop theoretical categories. This study has brought new insights to the strategic ISD and change management from the perspective of paradox studies. When there were not the supportive actions with the right timing and spread to the desired ISD structure the ability of the leaders to manage the ISD project strategically to the 'Leading the way' direction became weaker.

This study contributes to research by illustrating context-specific paradoxes in the development of a business critical IS product. Very few studies actually provide such in-depth understanding about emerging issues and tensions in the dynamic ISD project with the strategic aims. Similarly, we help practitioners to see possible sources of problems and uncertainties so that they can prepare correcting activities when planning and managing the business critical ISD project.

Future research: Reflecting the substantive theory in all the paradoxical dimensions including combining of two dimensions (e.g. belonging::organizing). Also other theoretical lenses could be applied from the strategic IS management and organizational change processes. As for thinking of the strategic ISD from the perspective of knowledge management (knowledge based theory of firms) (Grant 1996), the mutual trust of project actors and their ability to share knowledge is a key thing to decrease uncertainties in an organization (Hsu & Chang 2014).

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