

PARADOXES OF CHANGE MANAGEMENT IN INFORMATION SYSTEM DEVELOPMENT

Complete Research

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Abstract

This interpretive grounded theory (GT) study describes and analyses the experiences of information system development (ISD) project members. The project included two private sector organisations. The customer and the vendor had developed an old IS, that was supposed to be renewed, already over ten years ago. The renewal project was put on hold several times because of the financial uncertainties. The project was re-started in June 2010 when the final investment decision was made. New actors and the vendor organisation joined to it. The data was elicited by means of 15 interviews after the project restarted. This study shows how GT can be used to gain new insights into a case study, and generate new concepts. We identified seven selective codes: 1) Clarification of the ISD goal periodically, 2) Maintaining the overall system view, 3) Making sense of the IS model, 4) Making the evolving system parts and progress visible, 5) Coping with the change, 6) Being aware of the informality, and 7) Enhancing the collaborative ISD culture which formed the one main category 'Management of Change in ISD'. This study aims to enrich the existing ISD change literature by providing the paradoxical perspective on the management of change structures.

Keywords: Change, information system development, grounded theory study, paradoxes

1 Introduction

In the information systems development (ISD) context, the change and different solutions to explain the change phenomenon, has been studied extensively (Ahmad et al., 2011; Heiskanen et al., 2013; Leavitt, 1964; Markus and Robey, 1998; Newman and Robey, 1992). Those include, for example, analysing the relationship between information technology and organisational change (e.g. Markus and Robey, 1988), analysing different types of processes in organisations (e.g. Sabherwal and Robey, 1995; Van de Ven and Poole, 1995), presenting new process models (e.g. Lyytinen and Newman, 2008), and examining change as a continuous process (e.g. McLeod and Doolin, 2012). Gersick (1991) has highlighted that it is important to understand the changes, no matter their size, as they can be very painful and emotionally difficult, potentially leading to failures (c.f. Allen et al., 2000). Although ISD has been recognised as an intensely political and technical process (Markus and Robey, 1998), changes in ISD continue to present challenges to researchers and practitioners (e.g. Lyytinen and Newman, 2014; McLeod and Doolin, 2012).

Lyytinen and Newman (2008) emphasise the sequences of critical incidents that link different antecedent conditions with their outcomes. Some of these incidents can occur unexpectedly. Also, they

can have a significant influence on the project performance if the project has not mechanisms to react to them because of uncertainties in tasks, technologies, or partner relations (Bensaou and Venkatraman, 1995). Prevailing uncertainty may also decrease the willingness of actors to share their knowledge in the inter-organisational relationships (Hsu and Chang, 2014). This can lead to asymmetric information and knowledge structures (Ring and Van de Ven, 1992) in which the management of changes and uncertainties is more challenging.

In this paper, we study how the management of change occurred in an ISD project. The customer and the vendor have been developing an old IS already since the end of 90's. Their relationship can thus be called 'critical dependency partnership'. The project targeted to the renewal of the aging IS in the customer organisation. The project started in 2007 but was put on hold because of financial uncertainties. The project re-started in June 2010 when the final investment decision was made.

We approached the ISD research context with the classic grounded theory (GT) method (Glaser, 1992; Glaser, 1998) with three coding phases (open, selective, theoretical) (Urquhart and Fernández, 2013). Orlikowski (1993) argues that the GT is useful for investigating change because of its inductive, contextual and procedural characteristics. GT is thus suitable and systematic tool for exploring and analysing both the relationships between individual, group and organisational level concerns, and the tensions that emerge in this particular context. In this paper, we seek answer to the following question: *What kinds of challenges emerge when the ISD organisation aims to manage changes during the ISD project?*

By conducting 15 in-depth interviews we identify two main categories, 1) 'Management of Change in ISD' and 2) 'Uncertainty in ISD'. This paper focuses only on the former category. The study contributes by constructing a theoretical model for understanding different paradoxical views on the management of change in ISD.

The paper is organised as follows. In the next section relevant literature is summarised. Third section outlines the research settings and methods used. Fourth section presents the findings of our analysis, and fifth discusses the implications of our findings in relation to the literature. We conclude with a brief summary of our contributions.

2 Theoretical Background

In this chapter, relevant literature is reviewed. Following grounded theory approach, this 'preliminary literature review' (Urquhart and Fernandez, 2006) has not been imposed on the data analysis but has been composed afterwards. There is almost always a need to link emergent concepts or theory with the new literature, and often this involves adding extra literature once concepts from the data are known.

2.1 Nature of change in organisations for an ISD research

Information systems development (ISD) has some specific characteristics for an organisational change. By introducing an IS, the organisation typically tries to change existing structures, processes and tasks so that operational effectiveness is increased (e.g. Markus and Robey, 1998). Current technologies and systems offer many alternatives with the diverse set of information processing and storing capabilities for the business needs (e.g. Da Xu, 2011). Hence, to find the right technological configuration to support specific organisational processes, the ISD change has become a complex process to understand and manage.

There are both external and internal factors of an organisation that have influences on the ISD change process. Strategic initiation and wide scope of the ISD change typically leads to the presence of 'organisational inertia' (Mintzberg and Westley, 1992; Stacey, 1995) which means "*inability for organisations to change as rapidly as the environment*" (Pfeffer, 1997). It forms one of the basic assumptions for an episodic ISD change process from the perspective of external market environment (Weick and Quinn, 1999). As a result of the inertia ISD change process seeks for a replacement, including a right configuration of strategic choices, which supports organisational learning (e.g. Schein,

1996) toward the altering ISD change goal. Moreover, many internal factors of an organisation explain the episodic nature of the ISD change. For example, the outcomes of the ISD change can be constrained with the antecedent conditions that are dependent on the nature of building system, working system, and organisational environment (Lyytinen and Newman, 2008). A critical incident causes the phase of 'upheaval' (Gersick, 1991; Tushman and Romanelli, 1985) when the ISD organisation is internally dealing with inconsistencies and instabilities. Both project and organisational level management mechanisms are needed for equilibrium and stability phases (Gersick, 1991; Lyytinen and Newman, 2008; Romanelli and Tushman, 1994).

2.2 Paradoxes in an ISD

It is believed that to gain competitive advantages with the IS, the ISD project organisations need to be capable on simultaneously exploring new opportunities and performing efficiently – despite the changes in the business environment. Consequently current ISD projects (Da Xu, 2011) need to be both explorative and exploitive at the same time (March, 1991; Smith and Tushman, 2005). This makes the ISD project management paradoxical phenomenon (Lewis et al., 2002; Smith and Lewis, 2011). For example the ISD projects need to concurrently consolidate the perspectives at both macro and micro levels, enable and support individual and group actions for performing tasks toward the goals, and develop a specific part of the IS, and keep up the vision for overall IS. Competing demands may cause tensions (Lewis, 2000) and inability to manage the uncertainties (Bensaou and Venkatraman, 1995).

Large ISD projects need to manage divergent goals and motives as having the participants from different organisations (Koeszegi, 2004). Increasing number of participants and their diverse skills, miscellaneous new set of technologies, and complicating decision making make the ISD projects more uncertain, ambiguous, and complex (e.g. Owen and Linger, 2011). By building the information processing capabilities (Bensaou and Venkatraman, 1995) and enhancing the mutual trust between the actors in the inter-organisational collaboration, the uncertainties can however be decreased (Hsu and Chang, 2014). For example, an ability to share the knowledge about novel technologies (Carlile, 2004), coordinate interrelated tasks across the organisational boundaries (Cheng and Fu, 2013; Pee et al., 2010), and grow the expertise needed for the business target (Bassellier and Benbasat, 2004) improve an information processing view (Galbraith, 1977) in the project organisations.

Capabilities for managing uncertainties (Bensaou and Venkatraman, 1995) need to become more dynamic and responsive to changes when the project and market environments change. From the strategic perspective, the project needs a continuous control over the environmental demands in order to build right capabilities dynamically (Tece and Pisano, 1994). In this vein Lewis et al. (2002) used paradoxical lens when studying tensions in the product development. Paradoxical lens provided a conceptual framework for explaining the dynamics and nature of contrasting project management styles. They argued that in the course of time, also project management activities require updating. With the dynamic arrangement of project roles and responsibilities the sustainability can be achieved in the ISD project areas where it is needed for a good performance and a high quality result. For example, Van de Ven and Polley (1992) have shown the meaning of learning models and processes in the product development while innovating for a novelty.

3 Research settings and methods

This study focuses on an ISD project with two private sector organisations (the main actors). Their characteristics are summarised in *Table 1*. The motive for the ISD project was the strategic initiation of the customer to renew their aging IS, being developed in the collaboration with the same vendor. The project faced several critical incidents from its very beginning. For example, it was put on hold several times because of financial uncertainties. The project was re-started with the requirements analysis phase in 2010. The customer decided to invest in the new IS to gain competitive advantage.

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 organisations. Some customisation 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 organisations.*

The customer had a vision to transform their business from the manufacturing business to service business, where they are offering a growing number of product-service combinations. This underlines the criticalness of integrations and customised features. At the same time, the vendor had their own IS product development plans. They aimed at a standardised product, which is customised only marginally. The customer's requirements were thus evaluated from the IS product perspective. The vendor planned the management of IS product development with the scaled number of the customers.

To study the case, we conducted 15 interviews (16 interviewees, one session with two interviewees) three years after the project restarted. Each interviewee was asked to describe the project, its progress, and challenges from his/her perspective. In other words, they told stories that were later analysed. The interviewees and their roles are described in *Table 2*.

Organisation	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 ISD 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 organisation, Participant in requirements workshop; William , User in the user/initial rollout organisation
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. *Interviewees and their roles in the ISD project.*

The GT was used for data analysis (Glaser, 1978; Glaser, 1998). Glaser (1992) recommends that the researcher need to take an open approach in order to ensure that concepts genuinely arise from the data as opposed, for example to preconceived categories and hypotheses. Glaser (1992, 1998) also recommends the collection of rich data, for example in the form of interviews, and the linking the data collection inseparably with the data analysis. We followed Glaserian GT coding stages – open coding, selective coding and theoretical coding for the analysis. The first author of this paper conducted all these coding phases. Methodological claims and findings were discussed collectively with all authors. At the open coding stage, the interview data was analysed line by line in Atlas.ti software tool for a qualitative data analysis. During selective coding and through many iterative processes, emergent categories were discovered. Then the relationships were considered between selective codes as a part of theoretical

coding phase. Analytic memos (Glaser, 1992) assisted with this process. *Table 3* later summarises open and selective codes.

4 Findings

This section presents the findings from the core category ‘Management of Change in ISD’. The emergent category indicates the importance of the following seven selective codes: 1) Clarification of the ISD goal periodically, 2) Maintaining the overall system view, 3) Making sense of the IS model, 4) Making the evolving system parts and progress visible, 5) Coping with the change, 6) Being aware of the informality, and 7) Enhancing the collaborative ISD culture. The process of construction of ‘Management of Change in ISD’ category is shown in *Table 3*.

Open codes	Selective Codes
Aligning with the dissenting business views, Evaluating the real needs of the customer periodically, Reconsidering the ISD goal and scope	Clarifying the ISD goal periodically
Making decisions based on the overall system view, Building on the fit, Managing the customised and standard IS features, Right timing for the change	Maintaining the overall system view
Being innovative when designing for the desired IS model, Concretising the design and getting feedback, critical and explorative attitude when using the IS piloting version	Making sense of the IS model
Mapping the ISD road, Evolving quality assurance, Time needed for the machinery tuning	Making the evolving system parts and progress visible
Observing the trusted actors and knowledge asymmetries, Centralising the issue management, Documenting consistently	Being aware of the informality
Spurring actors in the IS piloting use, Mindfully with temporary challenges, Learning on the way and wishful thinking	Coping with the change
Managing interrelated tasks in the distributed ISD organisation, Situational knowledge sharing across the organisational boundaries, Systemising the ISD without losing the agility	Enhancing the collaborative ISD culture

Table 3. Construction of ‘Management of Change in ISD’ category through open and selective codes.

4.1 Clarifying the ISD goal periodically

The selective code ‘clarifying the ISD goal periodically’ consists of three open codes 1) ‘aligning with the dissenting business views’, 2) ‘evaluating the customer needs periodically’, and 3) ‘reconsidering the ISD goal and scope’.

The first open code (*‘aligning with the dissenting business views’*) describes how people-related changes (Jacob leaving, Philip joining) complicated the practices of aligning different business views towards a common goal. The customer expected business benefits with customised functionalities while the vendor aimed at scalable IS product with minimal configurations. As there were only one customer representative in the IS development team, prioritisation decisions were not fully transparent. The representative was Jacob (Former IT/project manager, Customer). He was a member of the vendor’s steering group for the product development so he “*was able to emphasise the development orders from the perspective of the customer. [He] was leading the opinions when there was a decision point, for example, if it is worth putting effort on this or that based on what are our expectations.*” (Jacob). When he resigned, this transparency disappeared, distorting the ISD goal. There was no a shared queue of IS requirements, aligned with the business decisions.

The second open code (*'evaluating the real needs of the customer periodically'*) highlights the importance of evaluating the customer's needs and priorities periodically, as the business environment changes. For example Jacob (Former IT/project manager, Customer) stated that *"all the needs cannot be estimated when the requirements specifications are done... the (firm's) strategy also can change... [The customer's] view needs to be considered in the prioritisation, as those have changed after the first specification round..."* Sophia (Customer support, Vendor) tried to solve this by establishing a new collaboration practice: *"I suggested a solution (for the prioritisation). We should have meetings at short intervals. As our release cycle is two weeks long, we could get to know what to plan for the next release and what are the most important points there."* However, as long as the prioritisation meetings focused on the overwhelming list of defects, a proper evaluation of the customer needs was challenging.

The third open code (*'reconsidering the ISD goal and scope'*) manifests how prolonged project, changes in priorities and business environment, knowledge sharing issues, and emerging customer needs enforced the goal and scope reconsideration: *"There are still lots of customer wishes about what they want. After the turn of the year, during the piloting, that they want this and that, but we've gone a bit backwards, and customer understands it and agrees that we should focus on fixing these."* (Sophia, Customer support, Vendor). Despite the participation in the defect investigation and solving, managerial effort was not sufficient for establishing practices for reconsidering the project goal and scope.

4.2 Maintaining the overall system view

The first selective code **'maintaining the overall system view'** consists of four open codes 1) 'making decisions based on the overall system view', 2) 'building on the fit', 3) 'managing the customised and standard IS features', and 4) 'right timing for the change'.

The open code (*'making decision based on the overall system view'*) emerged as the means to manage changes when developing the IS incrementally. It turned out to be very difficult. For example decision makers did not share the vision for what, how, and in which order the development proceeds. *"The pilot rollout was arranged in a way that only one module was implemented at the time. Other functionalities were still used from the old system... A (standard) module was easy to implement separately from the rest."* (Cecilia, User support in the IT team, Customer). Technology selection led to a situation where the vendor was leading the development, and making decisions how the system should be standardised and how the development tasks are organised. Obviously this was not an easy situation for the customer as they did not know possible technical constraints for example. Another issue affecting the maintenance of overall vision is related to technical platform and its development.

The second open code (*'building on the fit'*) refers to the vendor's absolutely minimal development work and excessive trust on the configuration possibilities with the new technologies. Yet they knew little about these when the project started. For example, the vendor trained employees by using Powerpoint presentations. This approach, understandably, received criticism. Similarly, some non-technical customer representatives believed that the old IS could somehow be reused: *"There were some specifications for the customised features. In our old IS, most of those were already implemented... we planned to move those [from the previous to new IS] as is."* (Matthew, Concept owner, Customer). These defects, misunderstandings, architectural fit-based concerns, and the customer's insufficient technical competence blurred the vision for the desired IS and the actions required for the overall ISD.

The third open code (*'managing the customised and standard IS features'*) describes the vendor's aim to commercialise the new system as a service. However, the customer expected to get a customised IS with high-quality customer-specific features. As the customer was unsatisfied, a requirements specification workshop was arranged to find a solution for this dilemma. The customer wanted *"the system to include as many standard features as possible, and also features that provide competitive advantage."* (Jacob, Former IT/project manager, Customer). To the vendor, it was a challenging task to figure out how the customised functionalities would be implemented to a general product platform.

The fourth open code (*'right timing for the change'*) illustrates problems for finding right moments of time to make decisions, and freeze or unfreeze the development. It was, for instance, recognised that the requirements specification was not good enough. Yet it was not possible to delay the project: *"At this phase, when I've been involved, the decision has been that the requirements specifications are frozen until the production use. The IS product will never be delivered if new (requirements) are added constantly."* (Jacob, Former IT/project manager, Customer).

4.3 Making sense of the IS model

The selective code **'making sense of the IS model'** consists of three open codes 1) 'being innovative when designing for the desired IS model', 2) 'concretising the design and getting feedback', and 3) 'critical and explorative attitude when using the IS piloting version'.

The first open code (*'being innovative when designing for the desired IS model'*) refers to mental stubbornness where old habits and thinking needs to be geared towards desired change. Although the vendor targeted new product for creating business benefits for future businesses, requirements and user scenarios were formed from the perspective of a certain IS model. Also new technologies limited the evaluation of technical constraints. More expertise was simply needed for facilitating the mental shifting and reframing away from the current IS logic. Anthony (Lead designer, Vendor), who joined in the project after the requirements workshops, pointed out the challenge: *"This project is partly easy and partly difficult. When the customer's been using the old version, and when the specifications have been fixed, many things have been left unspecified. Of course it's been assumed, by default, that they will be the same as earlier."*

The second open code (*'concretising the design and getting feedback'*) describes how well-written requirements specification did not guarantee alone the successful design from the perspective of users. Daniel (Product development lead, Vendor) claimed that *"requirements specification, in general, is something where there's certainly room for improvement."* Using the first IS version in the piloting phase provided valuable feedback for the further development. Sophia (Customer support, vendor) highlighted *"that piloting shows how people use the system in different ways..."* and continued telling about the benefits of the user feedback: *"Of course it's good to hear when they 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..."* However, a lot of design choices were concretised only via email between the designer and user representatives without the shared documentation practice.

The third open code (*'critical and explorative attitude'*) touches the mindset for using the first IS version. In Charlie's (Lead of the user organisation, Customer) words: *"Many users have been scared for failing when using the previous system... For those (less explorative) users, it is very important to show what different kinds of opportunities the new IS offers."* William (User in the first piloting organisation, Customer) enjoyed investigating and reporting defects: *"(From my viewpoint) the engine (IS) does not bite anyone. Although the system is used in different ways, it cannot be messed up. And if [the user] knows something how the system should be used, it is much easier. But if you ask that from someone else, the opinion will be different... I'm the one who has mostly sent emails (and report about the defects)..."* Few actors in the IS piloting phase went into the details of defect investigation, and proposed quality improvements for the new system.

4.4 Making the evolving system parts and progress visible

The selective code **'making the evolving system parts and progress visible'** consists of three open codes 1) 'mapping the ISD road, 2) 'evolving quality assurance', and 3) 'time needed for the machinery tuning'.

The first open code ('mapping the ISD road') emphasises the importance of a situational communication across geographical boundaries: *"Our steering group was very close to the (executive) management group. There different country level managers were present. When some information about (the real*

progress of) the project was not available, dissatisfaction started to prevail among the management in the other countries. From the start, they had some fears of too [the country name removed for anonymity] driven project. They have some specific needs as well...” (Matthew, Concept owner, Customer). The developers focused easily only on the functionalities of the next release, while the decision makers needed information about the long-term release planning. In fact, release planning was recognised as a weakness. Jacob (Former IT/project manager, Customer) proposed a road map for visualising milestones for all stakeholders: “*Phasing was challenging because the vendor was not able to present a road map... (Phasing) was done as hand-to-mouth (in a short term)...*”

The second open code (*‘evolving quality assurance’*) was observed in the piloting phase when a significant amount of defects was found. It was claimed that the reasons were the speed-up of development and a not-comprehensive testing environment. Consequently automated testing procedures were identified one of the main development areas. In the words of Christian (CEO, Vendor): “*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...*” Yet the fault is not only on the vendor-side. They expected much more effort from the customer when developing the user scenarios used in the testing. Many customer representatives, meanwhile, wanted to validate the requirements against a completed IS version.

The third open code (*‘time needed for the machinery tuning’*) shows the importance of comprehensive development environment with the efficient quality assurance methods. Especially tight schedule forced to keep the release cycles smooth and the focus on the piloted version. Yet the vendor was not able to make their processes visible enough. The lack of visibility of actions stimulated negative rumours about the low performance of the new system: “*(Instability of the system) is irritating from the perspective of users. It also decreases the motivation (and mood) to use the IS. And then the rumours start to spread out. For example, a representative in a user organisation can call to other users with a warning: don't take it in use.*” (Cecilia, User support in IT team, Customer).

4.5 Being aware of the informality

The selective code **‘being aware of the informality’** consists of three open codes 1) ‘observing trusted actors and knowledge asymmetries’, 2) ‘centralising the issue management’, and 3) ‘documenting consistently’.

The first open code (*‘observing trusted actors and knowledge asymmetries’*) describes how the management’s observations supported the understanding of the knowledge gaps and the identification of improvement mechanisms for those. As Jacob (Former IT/project manager, Customer) had been active in the requirements specification, he was knowledgeable and able to represent both business and IT views when communicating with others: IT managers, top managers, and steering groups. Over the years Jacob became as a trusted actor, able to understand the dynamics of the ISD at many levels. For example: “*I was aware of the work still needed. Before my participation (in the product development steering group) it was much more challenging to keep track of the real work amounts.*” (Jacob). As long as only a limited number of people were able to participate in the project, the power of some individuals strengthened naturally.

The second open code (*‘centralising the issue management’*) refers to activities to manage different issues and defects. It was a challenging particularly at the beginning because the prevailing informality. The pre-investigating an issue was a multi-phased process including a lot of tacit knowledge. With the words of Cecilia (User support in IT team, Customer): “*I test an issue (or a defect reported in a user organisation) for replicating it (in our test environment). Then I take pictures with [a cutting tool] to illustrate how it occurs... we have a customer extranet (offered by the vendor) where all defect reports are recorded... the customer support can collect the right experts to investigate and fix the defect ... I collect the pictures with a form so that one defect is reported in one form.*” Tracking the progress was possible with less formal manners when the issues were reported only from five user organisations.

Future global scale rollouts increase the formality in the issue management: *“On my part, I’ve tried to deliver the message that we should get them as much as possible through our customer extranet to keep it in control.”* (Sophia, Customer support, Vendor).

The third open code (*‘documenting consistently’*) manifests the need to make documentation consistently in different tasks and phases. Several important details were missed in the documentation: *“A use of system is based significantly on the search of the products... around 90% of all operations... the biggest problem was that the search function implemented did not support the real needs (of users).”* (Charlie, Lead of the user organisation, Customer). Incomplete documentation and documentation practices were not realised until personnel changes occurred. Cecilia (User support in the IT team, Customer) started persuading that every decision made during the project should be documented: *“Particularly, I’ve joined in the middle of the project and I have not any information of what have been agreed earlier. [...] it is difficult to dig out that information as there is not one specification document how a specific module is supposed to be used, and how the module has been implemented... I’ve observed that the specification done with the vendor has been insufficient.”*

4.6 Coping with the change

The selective code **‘coping with the change’** consists of three open codes 1) ‘spurring actors in the IS piloting use’, 2) ‘mindfully with temporary challenges’, and 3) ‘learning on the way and wishful thinking’.

The first open code (*‘spurring actors in the IS piloting use’*) describes mechanisms to cope with changes in individual and group actions. The piloting rollout was challenging as the system was incomplete and instable. Participating user organisations also needed encouragement as their normal operations were not as smooth as usually. Charlie (Lead of the user organisation, Customer) praised the attitudes of IT representatives and his team/staff during the rollout phase: *“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.”* Despite the challenges, spurring helped the users to remain committed to the change process.

The second open code (*‘mindfully with temporary challenges’*) describes the individual coping mechanism to overcome temporary challenges. Especially those who participated in the first piloting rollouts reacted to change mindfully. Also early-adopters had some experiences in the IS piloting use. They counted on the fact that the overall system is not working perfectly at this point. *“But we just knew it... problems belong to a piloting phase of a new system.”* (Charlie, Lead in the user organisation, Customer). The managers were also aware of the consequences of the changes in the work routines of individual actors: *“When moving from the familiar and safe [old system] to a new one, user satisfaction inevitably decreases because of losing a touch in the routines learnt ... new routines have to be learnt.”* (Jacob, Former IT/project manager, Customer).

The third open code (*‘learning on the way and wishful thinking’*) manifests an individual coping mechanism when negative incidents are faced: *“This kind of refining phase includes steps forward and backwards.”* Jacob (Former IT/project manager, Customer). Positive attitude was also needed as new technologies were learned: *“Requirements specifications have been changed after the vendor’s decision to purchase an element from a third party. Changes have also been made to the user interface... many alternatives were evaluated before the final decision. This sharpened and improved the design.”* (Jacob). The management’s wishful thinking kept the project ongoing although the changes occurred at many levels challenged the scheduling. Customer representatives had some optimism left: *“When this [the name of new IS product] has been under development, we have not been able to bring in any new features [to the current version]... hopefully we end to a situation where we are able to develop features for competitive advantage.”* (Peter, CEO, Customer).

4.7 Enhancing the collaborative ISD culture

The selective code ‘**enhancing the collaborative ISD culture**’ consists of three open codes 1) ‘managing interrelated tasks in the distributed ISD organisation’, 2) ‘situational knowledge sharing across the organisational boundaries’, and 3) ‘systemising the ISD without losing the agility’.

The first open code (‘*managing interrelated tasks in the distributed ISD organisation*’) emphasises efficient coordination and communication mechanism needed for managing the interrelated tasks. However, these culminated mostly to the actions of a few capable actors at the organisational boundaries. For example, Anthony (Lead designer, Vendor) had a significant responsibility for architectural decisions and modularisation so that they would support overall development: “*Part of my communication goes to [the offshore team; the distant country] where we have developers. I employ them, give them specifications what to do and make sure that they do what the customer wants... documentation has to be quite specific for them*”. At the piloting rollout, active email discussions between the boundary actors advanced problem solving.

The second open code (‘*situational knowledge sharing across the organisational boundaries*’) highlights the importance both great communication skills and situational awareness of the boundary actors. For example, Jacob (Former IT/project manager, Customer) shared information about the progress of the project throughout IT organisation: “*I communicate with the vendor, and with own colleagues in [the country] and [the country] as they are responsible for informing local teams/user organisations 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).

The third open code (‘*systemising the ISD without losing the agility*’) refers to the customer managers’ desire to enhance collaborative project culture by systemising existing informal structures, and being able to response to the changes in the design. With the words of Philip (IT manager, Customer): “*We are looking for agile processes where it is easy to go back to earlier (design) decisions...*” Change initiatives were mostly triggered by the personnel changes (Jacob leaving; Philip joining): “*Throughout the years the ways of working have evolved naturally (to the certain direction). One person may have enormous knowledge and responsibility. Changes to the current ways of working are needed... (A challenge is that) business managers have a tendency to promote the IT driven projects by passing the buck to the IT people (causing asymmetry).*” (Philip). As the project control was distributed to the customer’s IT and the vendor’s product development teams for several years, the centralisation of the activities toward the agile and systemised ISD structure took time.

5 Discussion

In this chapter, we discuss about the main contribution of this paper, a theoretical model (*Figure 1*), which presents different paradoxical views on the management of change in ISD. Selective codes presented in the previous chapter are theoretically integrated to each other within the individual, group or organisational level actions applied in the ISD project. To be consistent with the GT method, we did a theoretical integration, which is the process of comparing concepts (or a theory) generated with previously developed theories, which are at a same level of abstraction (Glaser, 1992; Glaser, 1998; Hekkala and Urquhart, 2013; Urquhart et al., 2010).

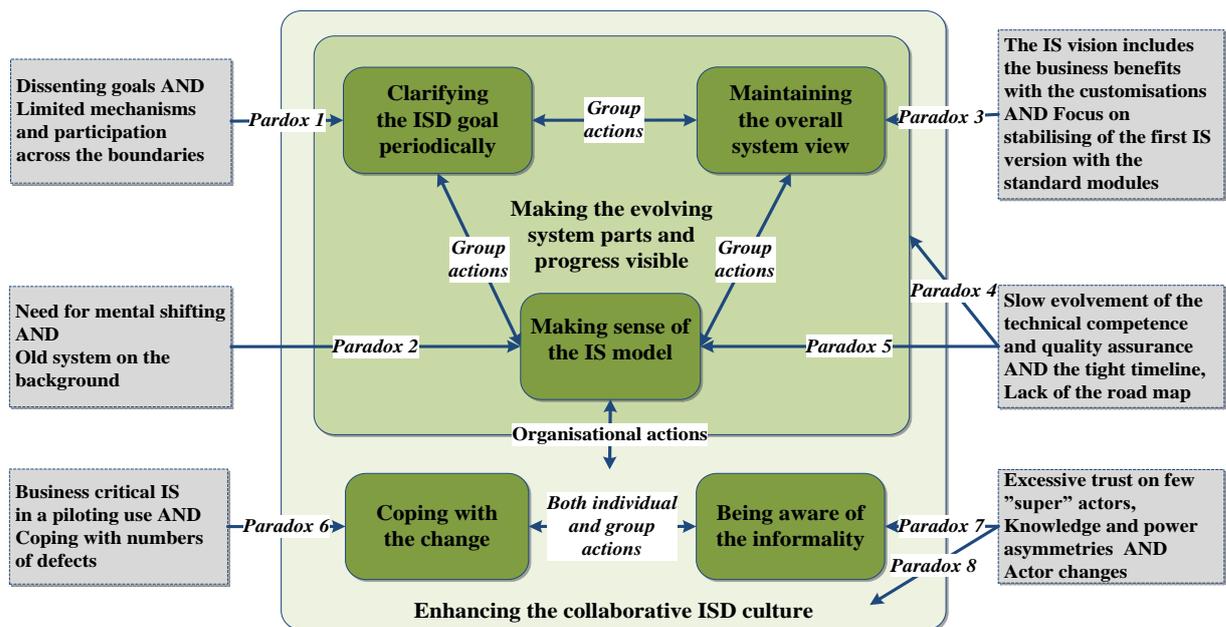


Figure 1. Different paradoxes causing tensions between 'Management of Change in ISD' construct and practical actions.

The theoretical model (Figure 1) also shows the eight context-specific paradoxes that have been identified during the in-depth analysis of the selective codes and their relations. These describe the 'polarities' of each selective code, i.e. although some aims are recognised as important issues, the choices or actions cause paradoxes, because they are not in line with the aims. Thus, for example the studies on paradoxes (Kan and Parry, 2004; Lewis, 2000; Smith and Lewis, 2011) provide a valuable theoretical lens for seeking of understanding of the tensions and paradoxes in a large ISD project. We will elaborate these eight paradoxes next.

The first paradox (Figure 1, paradox 1): The selective code, **clarifying periodically the ISD goal**, describes mechanisms to ensure that, despite the dynamic ISD project environment, different functionalities are built for the shared vision and goals. However, the shared prioritization practice for changing requirements queue was not considered and established at the beginning of the project, although it was promoted by the management later on in the project. The findings also show how artefacts were used in some email discussions between the designer and user representatives at the busy piloting phase to frame the discussion as they provided a basis for shared understanding. This increased the need for *group actions* with diverse knowledge of experts for **making sense of the IS model**. In practice, an establishment of sense making processes culminated to the role of Jacob (Former IT/project manager, customer). He was capable in boundary spanning by having a peripheral understanding of the different knowledge areas (Carlile, 2004; Levina and Vaast, 2005) and situational knowledge sharing across cultural and organisational boundaries (Levina and Vaast, 2008). As a result, he was able to act as a change agent between the top management and the front line actors across the global project organisation. Earlier studies (Lüscher and Lewis, 2008) have emphasised that mid-managers take a central role in sense-making process for the change initiatives by linking the top management vision for the target IS. As it happened in this project too, 'dilemmas' emerge in the group actions (e.g. requirements workshops) when aiming to make 'mental shifting' from 'old' to 'new' system and using previous system as a reference point (e.g. Lüscher and Lewis, 2008). This forms **the second paradox** (Figure 1, paradox 2). For example, consensus seeking 'group thinking' (Sundaramurthy and Lewis, 2003) can restrict the 'double loop learning' and 'reframing' for the innovativeness.

Gradual progress in both system and project dimensions made the **maintaining the overall system view** challenging. For example, the system was developed module-by-module, starting from the

customer-service operations, and rolled out incrementally from few user organisations to broader use. Possible risks with the new technologies were aimed to be managed with the incremental development practices. The piloting phase provided information about technical possibilities so that, in a long run, IS can be implemented as desired. In practice, however, the IS was too incomplete at the phase of piloting. Also decisions how the technologies support the desired processes had to be delayed. New technology and limited timeline formed a dilemma. Technical competence advanced slowly in relation to the project schedule. An evaluation of the configuration options and business benefits against an operating system was not consequently possible. This forms **the third and fourth paradoxes** (Figure 1, paradoxes 3 and 4). A small development team did not enable the distribution of development activities outside the piloting system stabilisation efforts (Figure 1, paradox 3).

Decision making in the project was 'polarised'. Critical project schedule and development priority related decisions were made in two separate steering groups: one at the management level, another at the vendor's internal product development. This kind of decentralised decision making structure easily slows down the operational effectiveness (Lyytinen and Newman, 2014; Olson and Chervany, 1980), especially, if appropriate mechanisms for knowledge integration (Mitchell, 2006) have not been established. The disappearance of the key knowledge broker and corresponding ability to span boundaries (Pawłowski and Robey, 2004) formed a dilemma. The progress reports did not reach the top management and the project steering group anymore. Consequently the managers did not have an understanding of the project performance as they did not have a shared view and accesses to the external knowledge (Mitchell, 2006). From this perspective Jacob (Former IT/project manager, Customer) was a critical resource in contributing to the maintenance of the overall system view as he was the only messenger between different groups in the project organisation.

Selective code, **making evolving system parts and progress visible**, aims at making some hidden parts of the project visible. This includes evolving quality assurance, a sketching the (overall ISD) roadmap, and time needed for the machinery tuning. The members in the steering groups were not able to consider all the tensions because of the low visibility to the evolving system parts (Figure 1, paradox 4). This made the evaluation of the IS model challenging, and forms **the fifth paradox** (Figure 1, paradox 5). Some **coping with the change** mechanisms, such as mindfully with temporary challenges, became rooted mostly in the individual actions. Yet they also influenced the collective project culture. At the piloting phase collective belief prevailed with thinking "...problems belong to a piloting phase of a new system"(Charlie, Lead in the user organisation, Customer) on one hand advanced the acceptance of the defects and problems, but, on the other hand, created excessive optimism for the future versions - that then those problems are fixed. The risk of planning fallacy (Kahneman et al., 2011) was thus evident. Accepting the defects at the piloting phase may also lead to wrong decisions when selecting technologies. These influences on **the sixth paradox** (Figure 1: paradox 6). Pre-existing social ties and *individual actions* between the customer and vendor grew stronger throughout the long term collaboration. This encouraged for informal and inconsistent collaboration. Prevailing informality became fundamental.

Pre-existing and established project structures were difficult to change. The customer's top management **was aware of** the drawbacks of **the informality** and wanted to make it more transparent. This forms **the seventh paradox** (Figure 1, paradox 7). This was particularly problematic as the vendor was fully in control of the development of the IS. Informal structures developed naturally not only for communication and collaboration, but also for managing interrelated tasks in a more efficient manner. Jacob left the project in the middle of piloting rollouts, an upheaval phase (Lyytinen and Newman, 2008; Tushman et al., 1986). Philip (new IT manager, Customer) was hired to replace Jacob and to systemise the project structures and practices. However, as Jacob had been a trusted actor among his peers, replacing him was challenging. Over the years Jacob had gained institutionalised power to dictate priorities and actions in many groups (Zucker, 1987). Establishing formal control mechanisms and building trust (Koeszegi, 2004) were both important to reach better control of the processes and structures within the project, and to steer it efficiently and effectively.

Enhancing the collaborative ISD culture by managing the interrelated tasks and sharing the knowledge across the organisational boundaries was challenging. Only few ‘super’ actors (i.e. Jacob) took care of these mechanisms. This forms **the eight paradox** (*Figure 1*, paradox 8). The projects favouring super actors support the establishment of a shadow organisation (Allen and Pilnick, 1973). When endorsing this kind of asymmetry and local strategies to solve problems quickly, weakens the visibility to the evolving modules, knowledge repositories, and actions towards the shared ISD vision. As many actors were committed to the pre-existing social ties and existing ways of working, the shadow processes fragmented critical control points and caused more ambiguities and uncertainties in managing the change.

These paradoxes were not easily solvable as the managers lacked the sense making abilities (Lüscher and Lewis, 2008) to understand prevailing contradictions and tensions in the ISD project. For external actor entering a long-term cooperation it is difficult to observe and understand different sources of tensions within the short time line. This shortness may mean months, even years, as Philip (IT manager, Customer) was not able to act until 6 months after his entering. Radically formalising existing informalities by limiting the creativity of the self-organised teams can also introduce new tensions. Both exploring and exploiting (March, 1991) with appropriate individual, group and organisational level actions are needed for the successful changes toward the new model/state. This was especially critical in this ISD project studied in which the actors were learning how to utilise new technologies while developing the business critical IS product. With the suitable amount of flexibility and adaptability in mindsets of participating actors, tensions emerged can be even turned into strengths for a change initiative. In this vein, paradoxes can be considered being natural in any multi-faceted ISD change process. However, as paradoxes are formed in a context in which competing demands and differences encounter (Smith and Lewis, 2011), any ISD project needs to be aware of their own potential paradoxes, and aim to build capabilities to work through them from time to time. This cannot be restricted although the main purpose of an ISD project would be the ability to achieve business benefits and technical competences with the right set of development practices and IS technologies.

6 Conclusion

This GT study investigated the change phenomenon in the ISD project context. In this paper, we focused on the category ‘Management of Change in ISD’. The main contribution is a theoretical model (*Figure 1*), which helps us to understand the meaning of ISD context specific paradoxes when aiming to implement the management of change structures in an ISD project. Through the GT analysis the seven selective codes emerged forming the main components of the theoretical model. With the theoretical coding, these were integrated to each other within the individual, group, or organisational level actions occurring in interactions of the project actors. The eight paradoxes identified during the analysis formed the ‘polarities’ of each selective code, i.e. although some aims in the management of change are recognised as important issues, the choices or actions cause paradoxes, because they are not in line with the aims.

Further work: The aim of the future research is, for example, to generate a new model/ or theory, which discusses the both main categories, which were identified in this study. The aim is to lift up our initial concepts/theory to a higher level of abstraction for the proper theoretical extension.

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