AALTO UNIVERSITY SCHOOL OF SCIENCE AND TECHNOLOGY

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Co-design of Business and IT Systems during Requirements Elicitation

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New and old information systems are being developed everyday. Still, most of the information systems do not meet customers' needs: information system reliability, usability, and suitability for the task are not adequate. Information system developers and customers do not understand each others' work processes and world views enough to be able to communicate sufficiently. Thus, the voice of the customers is often not heard or understood during the information system development process. Requirements elicitation is the first and a critical phase in the systems design process. If the right requirements are captured during this phase, there is a higher potential for the system to satisfy the customers' needs. This study answers to the research question: how can business and IT systems be co-designed during requirements elicitation?

Two sub-questions of this study are: What are the interdependencies between information system provider and customer during requirements elicitation? How should the interdependencies between information system provider and customer during requirements elicitation be coordinated? The literature of the study consists of information system development and coordination theories. Requirements engineering, communication, and involvement of customers theories are important parts of the literature.

The thesis includes three case studies including action research. The case studies are about the requirements elicitation phase of an already existing, large financial information system development project. The Finnish information system provider wanted to elicit the requirements for the information system together with the customers: three bank groups. The cases took place between August 2006 and November 2007. Action research was carried out applying SimLab's business process development method. Data was collected by interviews (28 people), process modeling sessions and simulation day discussions, two questionnaires, feedback forms, and observation.

The results of the thesis are summarized into a conceptual framework that describes the process of co-designing business and IT systems during requirements elicitation. The process consists of three steps: 1) sharing IT and business knowledge through process modeling and simulations, 2) creating common understanding about common work processes and IS and business requirements, and 3) agreeing upon the coordination methods to be used during requirements elicitation and applying them. In addition, the findings suggest a new interdependency, named systemic interdependency, to coordination literature. Systemic interdependency is suggested to be coordinated by a new coordination mode, facilitated mutual adjustment.

Keywords
Requirements engineering, coordination, communication,
co-design of information systems and business, process modeling, simulation

AALTO-YLIOPISTON
TEKNILLINEN KORKEAKOULU
Informaatio ja luonnontieteiden tiedekunta
Tuotantotalouden laitos

LISENSIAATINTUTKIMUKSEN TIIVISTELMÄ

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Uusia ja vanhoja tietojärjestelmiä kehitetään jatkuvasti. Silti ne eivät tunnu vastaavan asiakkaiden tarpeita. Järjestelmät eivät ole riittävän luotettavia, helposti käytettäviä eivätkä sovellu työtehtävän suorittamiseen. Tietojärjestelmäkehittäjät ja asiakkaat eivät ymmärrä toistensa työprosesseja ja ajatusmalleja, jotta voisivat keskustella asioista riittävästi. Tämän takia asiakkaan ääntä ei yleensä kuunnella tai ymmärretä tietojärjestelmän kehittämisprosessin aikana. Vaatimusten määrittely on ensimmäinen ja kriittinen vaihe tietojärjestelmäkehitysprosessissa. Jos oikeat vaatimukset järjestelmälle löydetään tässä vaiheessa, järjestelmällä on paremmat mahdollisuudet täyttää asiakkaiden vaatimukset. Tämä tutkimus vastaa tutkimuskysymykseen: miten liiketoimintaa ja tietojärjestelmiä voidaan kehittää yhdessä tietojärjestelmävaatimusten määrittelyvaiheessa? Tutkimuksen alakysymykset ovat: Mitkä ovat tietojärjestelmätoimittajan ja asiakkaan väliset riippuvuudet vaatimusmäärittelyvaiheessa? Miten tietojärjestelmätoimittajan ja asiakkaan välisiä riippuvuuksia pitäisi koordinoida vaatimusmäärittelyn yhteydessä?
Tutkimuksen kirjallisuustutkimus kohdistuu tietojärjestelmäkehityksen ja koordinoinnin teorioihin sekä vaatimusmäärittelyn, viestinnän ja asiakkaiden osallistamisen tutkimukseen. Työn empiirinen osuus käsittää kolme tapaustutkimusta, jotka toteutettiin toimintatutkimuksena. Kaikissa kolmessa tapaustutkimuksessa kehitettiin olemassa olevaa, isoa finanssialan tietojärjestelmää sen kehitysprojektin vaatimusmäärittelyvaiheessa. Suomalainen tietojärjestelmätoimittaja halusi selvittää tietojärjestelmävaatimukset yhdessä asiakkaidensa, kolmen pankkiryhmän kanssa. Tapaukset tutkittiin elokuun 2006 ja marraskuun 2007 välisenä aikana. Toimintatutkimus tapahtui SimLab™ liiketoimintaprosessien kehitysmenetelmän avulla. Tutkimusaineisto kerättiin haastatteluin (28 henkilöä), prosessimallinnus- ja simulointikeskustelujen, kahden kyselyn, palautelomakkeiden ja havainnoinnin avulla. Tutkimuksen tuloksena esitetään käsitteellinen prosessimalli liiketoiminnan ja tietojärjestelmien yhteiskehittämiselle vaatimusmäärittelyvaiheessa. Malli koostuu kolmesta vaiheesta: 1) tietotekniikka- ja liiketoimintatietämyksen jakaminen liiketoimintaprosessien mallinnusten ja -simulointien avulla, 2) yhteisen ymmärryksen rakentaminen koskien työprosesseja ja liiketoiminta- ja tietojärjestelmävaatimuksia ja 3) yhteinen sopiminen vaatimusmäärittelyn aikana käytettävistä koordinointikeinoista ja näiden keinojen soveltaminen. Lisäksi tutkimuksessa löydetään uusi tehtävien välinen riippuvuus, jota kutsutaan systeemiseksi riippuvuudeksi. Tätä koordinointikirjallisuudelle uutta riippuvuutta esitellään koordinoitavaksi uudella koordinointikeinolla, jota kutsutaan fasilitoiduksi molemminpuoliseksi mukautumiseksi.

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Rita Lavikka

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1 Introduction

This study describes how business and IT systems can be co-designed during requirements elicitation which is a critical phase of information system development process. The literature of the study includes theories of information system development: requirements elicitation, communication, and involvement of users and theories of co-design of business and IT systems: coordination and alignment. The empirical part of the study consists of three case studies including action research. The focus of the case studies is on the development of an already existing, old information system during the requirements elicitation. This chapter presents the background, research questions and objectives, delimitations, and research process and structure of the study.

1.1 Background

Information systems were originally built to increase the capacity of organizations to process information, and thus to help in coordination (Galbraith 1977, p. 52). Later on, information systems (IS) were found to create strategic and structural innovations when certain conditions were fulfilled (Smeds 1996, pp. 20-27). Nowadays, information systems are needed in every business organization and they are expected to create new innovations. For example, manufacturing companies need new information systems and information technology (IT) innovations as enablers of the transition from products toward services and their combinations (Penttinen 2007).

New information systems are being designed and built everyday. Still, most of the information systems do not satisfy the necessary customer needs "…there is often a gap between an operational IT system and current business requirements in an organization" (Liu et al. 2002, p. 251). Customers and users complain about many issues, such as information system reliability, usability, and suitability for the task. There is "a significant failure rate in information systems development (ISD)" (Goulielmos 2004, p. 363). The reasons for bad design can be found from both the system provider's and the customer's side (FBI paid 170 millions for an unworkable information system, the journal of Helsingin Sanomat, 18.8.2006 in Finnish).

Clegg et al. (1997) interviewed 45 leading IT experts in the UK. One of their research questions asked about the successful integration of business needs and technology systems. Most

respondents felt that this area still needs improvement. “The most optimistic view was that 25 ± 50 % of new projects achieve the integration of technology and business goals.” (Clegg et al. 1997, p. 859)

In practice, information system developers do not understand the customer’s business well enough to be able to design systems that satisfy the business needs. Very often the reason for this is that the voice of the customer is not heard during the development of the system. However, it is recognized that intensive and continuous communication between the customer and the system developers is needed in order to understand the business needs that the system should support (Alshawi & Al-Karaghouli 2003, p. 342).

The Importance of Requirements Elicitation

Goldsmith (2004) defines a requirement as something that must be delivered to provide value. A business requirement is defined as “what is deliverable and provides value by contributing to accomplishing business objectives when delivered by the system” (Goldsmith 2004, p. 3).

> In this study, a business requirement is defined according to Goldsmith (2004) as something to be delivered by an information system provider and which provides value to the customer organization when delivered by the provider organization. The value is provided by contributing to the accomplishment of the business objectives of the customer organization.

Requirements elicitation is a critical activity in the systems design process (Davis et al. 2006, p. 78). “Deficient requirements are the single biggest cause of software project failure.” (Hofmann & Lehner 2001, p. 58) In addition, many potential innovations have been unsuccessful because the innovator has not captured the end-user’s needs and turned those needs into appropriate specifications, i.e., requirements, before developing the product or service (Rothwell 1986, von Hippel 2005).

Customers’ needs often change when the system implementation proceeds (Davis et al. 2006, p. 78; Berry & Lawrence 1998, p. 28). Already in 1994, Jarke and Pohl (p. 258) anticipated the challenge of coping with continuous change. The authors believed that in 2001, i.e., in the future at that time, because of economic pressure and new technology especially in the communications sector, organizations tend to change faster than the IT can accommodate. Nowadays, it seems that the authors had anticipated quite correctly. Hence, an important research

question is "how to design business and IT systems to fit one another and to enable the information systems evolving with the changes of business requirements" (Liu et al. 2002, p. 255).

Chang (2006) claims that there is a gap between the business process owners and IT developers. IT developers do not deliver information systems meeting the needs of the business process owners. Even though business requirements could be gathered, the requirements go through many layers before they are implemented in the system: First, there is a business analyst who gathers business requirements. Then, the business analyst passes the business requirements to the functional analyst who determines what functions each system is to perform. After these phases, the technical analysts configure the systems according to functional specifications. Finally, if programming is needed, the technical analyst will design technical specifications for the programmers to develop further. In every phase, there is a possibility for misunderstandings between the parties. Thus, in the end when business requirements are implemented, they usually do not meet the original requirements. This is how the gap develops between what the business wants and how the IT implements it. (Chang 2006) (See Figure 1)

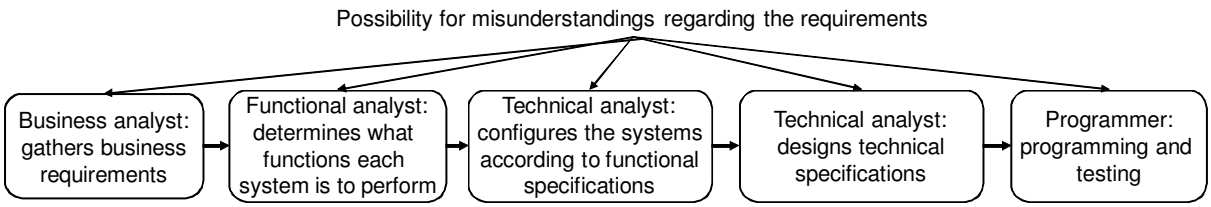

Figure 1. The development of the gap between what the business wants and how the IT implements it

Liu et al. (2002, p. 255) suggest that business and IT systems need to be co-designed but they do not present how this co-design is managed in practice. It needs to be studied how IT developers and business process owners can co-design business and IT systems. Co-design needs to start already during requirements elicitation. Thus, this study tries to understand how IT developers and business process owners can co-design business and IT systems during requirements elicitation.

Developing an Information System to Better Serve Customers' Business Processes

The author was working in a research project called Madeleine: Management, Development, Learning and Innovation in Business Networks. The project took place between 2006 and 2009. The research project was carried out by SimLab which is a research and teaching unit at

Aalto University School of Science and Technology.

In the research project, the author acted as an action researcher in three case studies that each involved gathering business requirements to develop an IT provider company's already existing information system. The parties of the case studies involved were an information system provider and three customers of the provider. The interest of the parties was both to develop the customers' business processes and information system to better serve the business processes.

The three case studies focused on the requirements elicitation phase of an information system development process because it is one of the most critical phases of system development. If the right business requirements are gathered already in the beginning, there is a possibility that the later phases of the system development process focus on right issues. It is usually very difficult to add new business requirements in the later phases of system development. Thus, the research had high practical relevance for the parties of the cases.

1.2 Research Questions and Objectives

This study has a theoretical interest and an empirical interest as well. The management of complex inter-organizational information systems development projects has little prior research (Nurmi 2008, p. 31). Many practitioners and researchers, such as Liu, Sun, and Bennett, discuss the important research question how to design business and IT systems to fit one another. Following the suggestion of Liu et al. (2002, p. 255), the possible solution is to co-design business and IT systems. Requirements elicitation is a critical phase of information system development (Coughlan & Macredie 2002). The success of the phase affects the later phases of the system development process. The co-design of business and IT systems should be started already during requirements elicitation. Thus, the main research question of this study is: *how can business and IT systems be co-designed during requirements elicitation?*

Co-design means that the information system provider and the customer jointly develop the business processes and the information system hand in hand. The question remains how this co-design is done in practise. Co-design necessitates coordination. The coordination process starts with recognizing coordination challenges and interdependencies in different processes after which suitable modes of coordination can be determined (Crowston 1997).

This study examines the requirements elicitation phase of system development process in three empirical case studies. Hence, two sub-questions, which contribute to the main research question, are:

- *What are the interdependencies between information system provider and customer during requirements elicitation?*
- *How should the interdependencies between information system provider and customer during requirements elicitation be coordinated?*

The main research question and the two subquestions are interesting for the case organizations, because on one hand the provider wants to develop its information systems to better serve their customers' business processes, and on the other hand, the customers want more support from their information systems: reliability, usability, and suitability for work tasks.

To answer to the research questions, a literature study is conducted on information system development: requirements elicitation, communication, and customer involvement, and a review on organizational theory on the coordination of interdependencies. The literature study ends with a synthesizing conceptual framework. Thereafter, empirical data is gathered through three case studies. The data is analyzed by applying the conceptual framework. The objective of the study is to contribute to coordination literature by examining what kind of interdependencies exist between the customer and the provider during requirements elicitation and how those interdependencies should be coordinated.

1.3 Delimitations

According to Jarvenpaa et al. (1985, p. 142), "The first step toward directed or 'programmatic' research is the building of a framework that defines the boundary for research to be conducted". A conceptual framework, which is either in graphical or in narrative form, explains the key factors to be studied and the presumed relationships among them (Miles & Huberman 1994, p. 18). This study presents a conceptual framework for co-designing business and IT during requirements elicitation. The framework sets the boundaries to the empirical part of this study: it introduces the particular themes to be studied in the empirical part.

There are many phases in the software development process but the focus of this study is delimited to the requirements elicitation phase. This phase is part of the requirements engineering process, including phases of requirements elicitation, requirements analysis, requirements

representation, and requirements validation. (See Figure 2) To co-design business and IT systems toward better alignment, the interdependencies between the provider and the customers during requirements elicitation are studied. The author takes more a provider's point of view to the information development process but she also recognizes the customer's point of view.

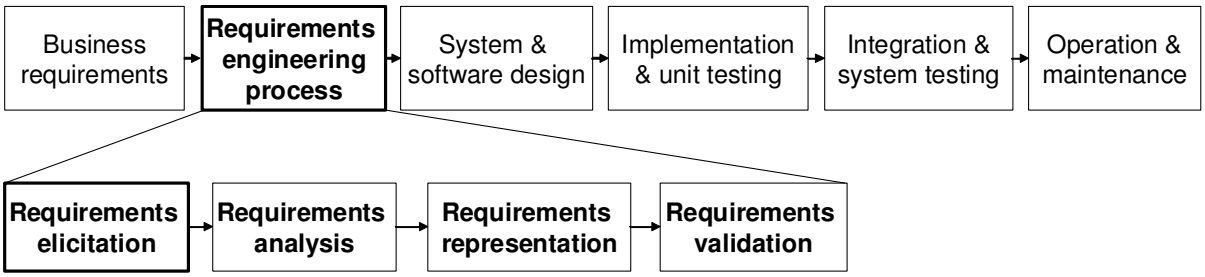

Figure 2. The phases of software development process and the focus of this study (in bold)

A delimitation of this study is that it examines only the requirements elicitation phase of a single IT provider company's information system development process. The whole information system development process of the company should be studied to understand how successful the requirements elicitation phase was and how it affected the later phases of the development process. This was not possible because already the requirements elicitation phase took over one year and the development process is still going on after four years.

Another delimitation is that the customers were simultaneously owners of the provider company. The IT provider company was selected because the author had access to it through the Madeleine research project. The company needed to develop its already existing information system provided to the customers which was the reason for selecting that specific product to be studied. The customers represent the users of the information systems.

1.4 Research Process and Structure of the Study

The researcher has to make many decisions during the research process: which theory to contribute, which methodologies to apply, what data to collect, how to analyze it, and how to present the results. All these decisions have to be compatible. Benbasat et al. (1987, p. 382) note that "No research strategy is better than all others." However, the researcher needs to be aware of how her/his decisions have affected the research process and its outcomes.

The research process and structure of this study are presented in the Figure 3. The research process is rarely linear (Dubois & Gadde 2002, p. 555). The research questions of this study

were defined based on the literature study. To add, literature study affected the selection of suitable research methods.

The literature review was done twice: the first review was done prior to collecting empirical data in order to build a conceptual framework to be applied in the analysis of the data. The second review was done after analysis of the empirical data in order to find more explanations to phenomena encountered during data collection and to extend the first review by new references. Throughout the research there was an intensive interaction between literature research and empirical analysis. First existing literature and empirical results from the three case studies could be compared and thereafter, empirical results and new findings from the literature could be compared. After the third case, theoretical saturation was reached. In practice, this meant that no new insights for the emerging theory were found anymore.

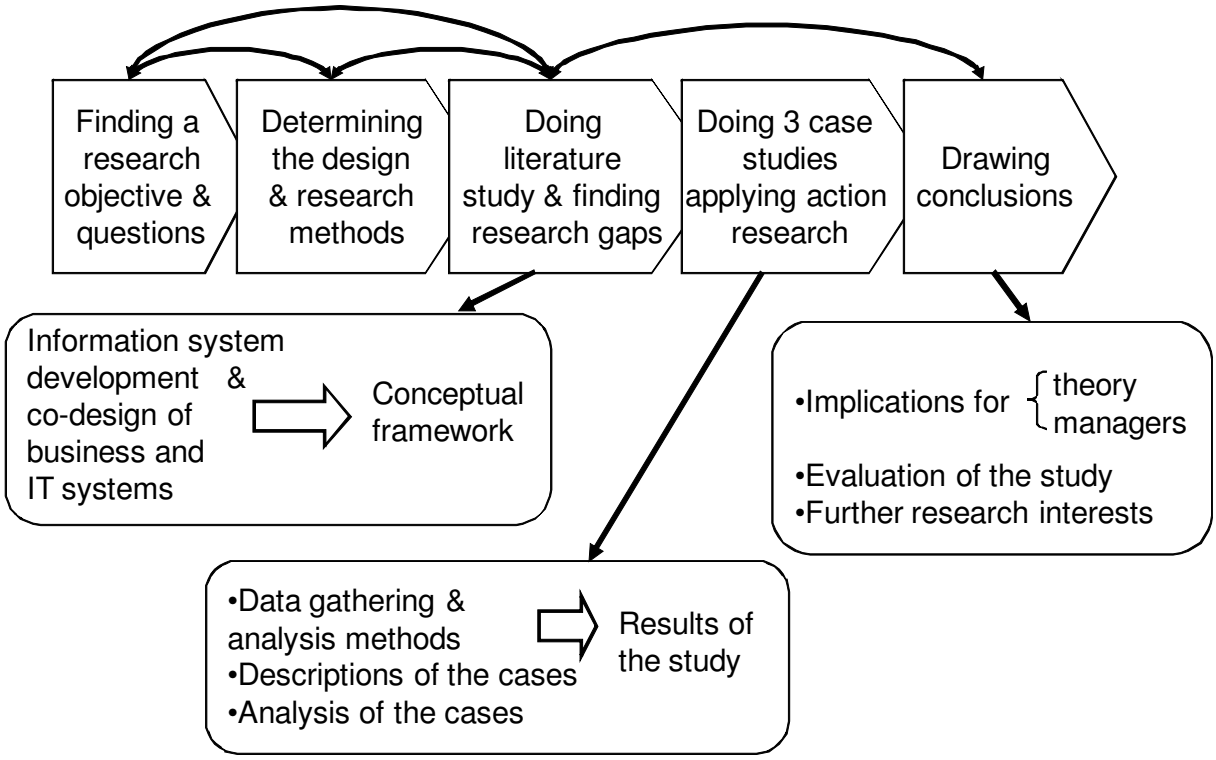

Figure 3. The research process and structure of the study

2 Research Design and Methods

Research design refers to the methodological decisions that the researcher makes (Hirsjärvi et al. 2004, Kasanen et al. 1993). The choice of methodology is determined by many things: ontological and epistemological stance of the researcher, the nature of the research problem, the theoretical frameworks informing the study, and the objective of the study (Zalan & Lewis 2004, p. 512). The researched object is being understood through scientific thinking and studies (Järvenpää & Kosonen 2000). In the following chapters, the methodological choices of this study are presented.

2.1 Qualitative Case Study Research

Qualitative research is a research approach used in social sciences to understand human behaviour and the reasons for that. Usually the questions start with why and how. The purpose of qualitative research is to get a deeper understanding of the studied object or case. A qualitative study usually requires that the researcher understands the research object thoroughly and hence, s/he is part of the research process (Järvenpää & Kosonen 2000). On the other hand, the aim of quantitative research is to test already discovered things, e.g., correlations between constructs. When a holistic and contextual explanation of the phenomenon is required, qualitative methods are appropriate methodological choice (Pettigrew 1990, pp. 270-271). The purpose of this study is to get a holistic understanding of co-designing business and IT systems during requirements elicitation; thus, a qualitative approach was chosen.

2.1.1 What Is a Case Study?

A case study researches a current phenomenon in its real life context (Yin 1989). A researcher selects a case approach when she or he wants to understand and explain complex phenomena (Remenyi et al. 1998). In a case study, the researcher is able to take into account the history and social context of the case. Donmoyer (2000, p. 63) states that case studies allow looking at the phenomenon through the researcher's eyes and to see things we might not otherwise see.

A case study can answer questions starting with how and why, whereas for example, statistics only show correlation rather than causation. (Platt 1992) Dubois and Araujo (2004) state that a case study approach is suitable for studying complexity of network links between actors because the method is flexible when dealing with temporal and boundary issues.

A case study suits well in this research because the aim is to find out how business and IT systems can be co-designed during requirements elicitation. In addition, the aim is to find out the interdependencies, which might be numerous and complex, between the provider and the customers during requirements elicitation.

Gerring (2007, pp. 20-22) defines a case study as the intensive study of a single unit, or a small number of units, i.e., the cases, for the purpose of understanding a larger class of similar units, i.e., a population of cases. Yin (1989) and Eisenhardt (1989) agree that a case study can involve one or many cases, and many units or levels of analysis. In a qualitative case study, the purpose of the researcher is to gain a deep and holistic picture of the studied object and its phenomena (Gerring 2005).

Case studies often involve field research which refers to studying organizational life in its natural setting with first-hand observations (Van de Ven & Poole 2002). Case studies can have a rich variety of data sources, such as interviews, archival data, survey data, ethnographies, and observations (Eisenhardt & Graebner 2007). In actual fact, Yin (2003) recommends using multiple sources of data which according to the principle of datasource triangulation need to confirm each other and the researched object.

Data Collection and Analysis Overlap

It is typical of a case study research that data collection and data analysis overlap frequently. In addition, it is typical that adjustments are made to the data collection process during the research. The advantage of flexible data collection is that it enables the researcher to understand each case more deeply which may provide new theoretical insights. (Eisenhardt 1989) The data collection and data analysis can be based on previous theoretical suggestions and their advancements (Yin 2003).

In this study, after every case study the data was analyzed to understand what data still needs to be collected and what kinds of data collection methods should be applied in the next case. In addition, the literature review was done prior and after the three case studies to ensure that the data is thoroughly analyzed through the theoretical lenses.

There are both advantages and disadvantages in conducting literature study before, during, or after empirical studies (Patton 1990, p. 163). The findings from the literature study may bias

the researcher and lead her/him to fishing the "right" constructs in the empirical study. On the other hand, the findings from the empirical study may also have an effect on what the researcher discovers from the literature study, i.e., may also lead to fishing. Hence, the researcher needs to stay neutral with regards to the study's phenomenon. In practice, neutrality means that the researcher does not try to manipulate the data to arrive at conclusions or does not try to prove a particular theoretical perspective. The researcher should only try to understand the phenomenon as it is and be true to the multiple perspectives the phenomenon may entail. Confirmatory and disconfirmatory results need to be reported on equal basis.

2.1.2 The Three Case Studies of this Thesis

Nature of Case Studies

Case studies can be divided into exploratory, descriptive, and explanatory ones (Yin 1989). Applying this categorization, this study is mainly descriptive because the objective of this study is to describe the process of co-designing business and information systems during requirements elicitation: especially how the provider and the customers can together elicit business requirements for an existing information system. Another reason for the descriptive nature of this study is that it also tries to apply the selected themes of the conceptual framework to this research context.

According to Eisenhardt (1989), the more cases, i.e., approximately 8 to 10 cases, the researcher studies, the better the study is for generating theory. This study presents three case studies, which is not enough cases for theory building, if Eisenhardt's statement is followed. Hence, this study adopts the view of Dyer and Wilkins (1991) who present that also fewer cases, even one case, can be a useful unit of analysis for theory building. In this study, three case studies seem to be an adequate amount for theory building. Theoretical saturation was reached after the third case study because new insights for the emerging theory were not found anymore.

Eisenhardt (1989) also argues for comparisons across organizational contexts when building new theory but this study focuses on comparisons within the same organizational context: eliciting business and information system requirements of one information system provider and its three customers that have similar and different requirements. This means that the generalizability of the results is bounded to similar organizational contexts.

The Selection of Cases

The empirical part of the thesis consists of three case studies. Every case involved an information system provider, later called the provider, which was the same company in each case, and two or three of its customers A, B, and C. The customers A, B, and C are bank groups. Each bank group consists of several independent banks, and each bank has several bank offices around Finland.

1. case 1: the provider (13 representatives), customer A (9 representatives from 7 different banks), and customer B (7 representatives from 5 different banks).

2. case 2: the provider (3 representatives), customer A (17 representatives from 7 different banks), customer B (4 representatives from 2 different banks), plus two partner companies of the customers A and B.

3. case 3: the provider (7 representatives), customer A (8 representatives from 7 different banks), customer B (5 representatives from 4 different banks), and customer C (5 representatives from 1 bank).

The customers A, B, and C are shareholders of the provider's organization. In addition, some other Finnish banks and organizations own shares of the provider's organization. An already existing, large information system of the provider is developed in each case study. The customers are users of the information system. According to Gummesson (2000), case studies are often generalized only to the researched case and its context. This restriction concerns empirical generalization. However, Eisenhardt (1989) states that case studies are appropriate for analytical generalization, i.e., for generating new theory. The objective of this study is to generate new theory on the interdependencies between the provider and the customers during requirements elicitation phase and how to coordinate them. Thus, qualitative multiple case study research can be regarded as an appropriate option for this study.

This study applies multiple case study research design. There are two methods to choose cases: theoretical sampling and convenience sampling. Theoretical sampling can be divided into two: literal replication and theoretical replication. Literal replication means that cases are selected because similar results are predicted, while theoretical replication means that cases are selected because contrasting results are predicted but for predictable reasons (Yin 2003). Yin

(2003) discusses that the goal of theoretical sampling is to choose cases which are likely to extend or replicate the emergent theory. In this study, theoretical sampling for literal replication was applied. The cases were selected for both replication and extension of the emergent theory.

In addition to theoretical sampling, convenience sampling was applied which in this study meant that the selection of the first case was affected by the fact that the researcher had an access to the case through one of the case companies of the Madeleine research project. Convenience sampling is the least preferable sampling strategy (Patton 1990, pp. 180-181) and may decrease the external validity of the study.

Gathering business requirements for an information system is not an easy task, especially if the parties do not share a common language. The parties of the three case studies, the provider and its customers, did not share a common language to communicate because of different organizational, cultural, and working backgrounds. The three case studies were selected because each case study provided new insights to the process of co-designing business and information system in the requirements elicitation phase. The first case study tried to increase common understanding between the parties about the scale of the information system development project and develop the cooperation atmosphere. The second case study tried to understand the customers' business processes and how the information system should support the processes. The third case study focused on jointly finding the ways to collaborate during the information system development project and agreeing on the coordination methods to find out the business requirements for the system.

The Unit of Analysis

The unit of analysis in case studies can be, for example a state, an organization, a group, or an event (Koskinen et al. 2005, p. 154). A case can be almost anything if it has identifiable boundaries and comprises the primary object of an inference. An individual case can be spatially delimited phenomenon that is observed at a single point in time or over some period of time. (Gerring, 2005, p. 3) The unit of analysis in this study is the interdependencies between the IT provider and the customer organizations during requirements elicitation, as part of the overall IT system development process.

2.2 Action Research

In this thesis, all case studies were conducted applying an action research approach. Action research studies the effect of induced changes in an organization in real time. Action research aims both at solving a practical problem and developing theory, i.e., expanding scientific knowledge. An action researcher is not an independent observer but a participant that has an impact on the studied case as she/he participates actively in the development of the organization as a change agent. The researcher also affects the analysis of the results and the end-results. (Gummesson 2000; Buhanist 2000, p. 155; Benbasat et al. 1987, p. 371) Thus, the researcher needs to evaluate her/his effect on the researched object.

Avison et al. (1999) present that action research is an iterative process that involves practitioners and researchers who act together. The process involves a particular cycle of activities that includes problem diagnosis, action intervention, and reflective learning. Chisholm (2001) states that ideally action research develops a system that continuously learns from experiences, learns how to learn, and creates structures that support learning. Hence, the object of development, e.g., an organization, is not left alone with development ideas generated by outsiders, such as consultants, but the object itself tries to become a system that learns to learn and thus can help itself later on.

According to Patton (1990, p. 157), in action research, design and data collection tend to be more informal and people of the researched object are involved in gathering the information and studying themselves. Kasanen et al. (1993) add that the action researcher needs to familiarize her/himself with the processes of researched object. The researcher also needs a deep understanding of the other activities of the research object. The task of the researcher is to develop the research object and scientific theory based on the research data. (Kasanen et al. 1993) The data can be both qualitative and quantitative. (Järvenpää & Kosonen 2000, Gummesson 2000)

Information systems are intended to help people in their real-world action. Social world is being constructed all the time in a dialogue among human beings. Social reality is not out there as a given fact like some physical regularity that is studied by natural sciences (Checkland & Holwell 2000, p. 22 & p. 157). Thus, action research suits well in studying social reality and action because the researcher can be part of the social reality's change process. Checkland and

Scholes (1990) also argue that action research suits for conducting work in the field of information systems because it offers an alternative to the more traditional positivist approach to inquiry. “We see no reason why action research should not be accepted in the field of information systems.” (Baskerville & Myers 2004, p. 329)

> Thus, action research was selected as a research method because this study focuses on finding out the interdependencies between the provider and the customers during requirements elicitation and the empirical data is collected in the field of information systems. In addition, action research was selected because the aim was to develop the process of co-designing business and IT systems which could not have been done by just interviewing the parties of the cases.

2.2.1 Business Process Development Method

The action research in the three case studies of the thesis followed the SimLab™ business process development method (Smeds et al. 2006; Smeds et al. 2005, Smeds & Alvesalo 2003b; Smeds, Haho & Alvesalo 2003; Forssén & Haho 2001; Smeds 1997a; Smeds 1994). More about the usage of the business process development method can be read from the following publications: Smeds 1997b, Hirvensalo 2006, Valkeapää et al. 2006, Valkeapää et al. 2007, Smeds & Alvesalo 2003a and Haho 2002. The case studies were conducted as projects, following the phases of the SimLab™ process development method. (See Figure 4) Each case study project lasted about three months. During a typical SimLab process development project, the researchers prepare and implement a process simulation together with the case companies. This includes setting goals, modeling the selected business processes, interviewing relevant parties, preparing a simulation day, organizing a simulation day, analyzing results, and giving feedback, i.e., presenting the final report of the case.

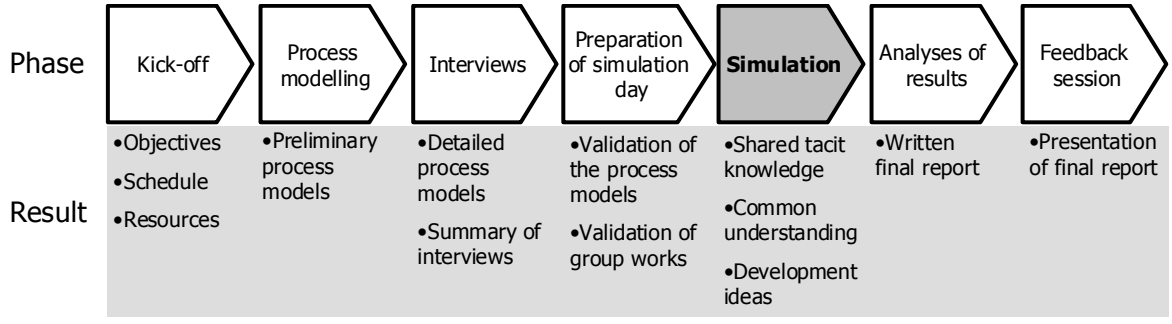

Figure 4. The phases of the SimLab™ simulation method

The culmination of an action research project is the simulation day when all the important people related to the developed process are gathered together to develop further the process. The simulation day includes a facilitated group discussion in front of a visual process model (See Figure 5) and group work sessions for developing further the solutions. Through the interactive simulation tacit, implicit knowledge is being shared and transferred to all participants (Nonaka et al. 2000). The visualized process model is simulated through joint discussion that is based on participants' experience and joint imagination. The simulation day provides an interactive learning environment that functions as a platform for building common understanding among the participants. Common understanding consists of shared meanings that are created through communication or shared experiences. (Jaatinen & Lavikka 2008, pp. 149) Thus, the simulation day helps the organization to learn which in practice means that the participants change their behaviour (Feller et al. 2005, p. 389).

During the simulation day, research data is being collected through recorded discussions about the process and the object of development, post-it notes, recorded group work discussions, and feedback and research forms. Right after the simulation, the recorded discussions are transcribed, all data analyzed, and results written on a case report that is handed to the participants of the action research project. The simulation day results, among others, lots of process improvement ideas. In addition, strategic questions concerning the business models of the participating companies awake. (Smeds & Alvesalo 2003b)

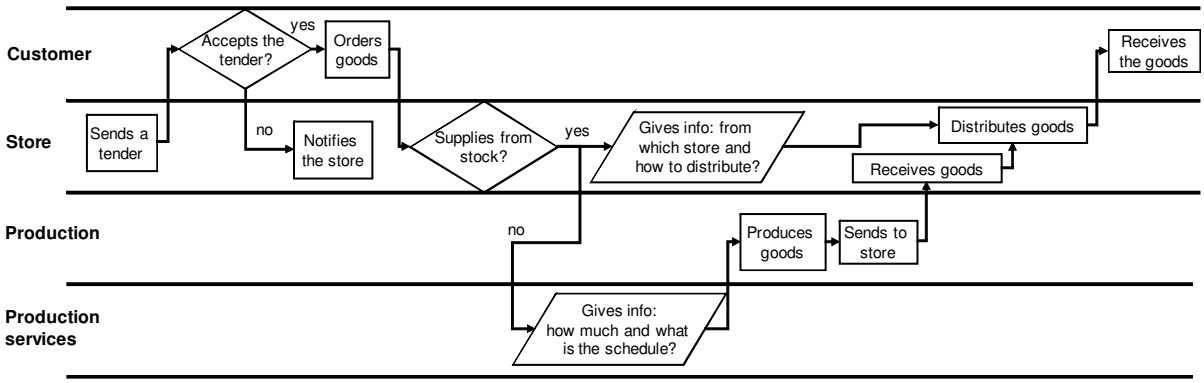

Figure 5. An example of a process model representing the processing of an order

Kettinger et al. (1997) argue that a simulation can provide a user-friendly and media-rich picture of business processes because a simulation allows many people to participate in process redesign and it also provides easy visualization. Eatock et al. (2002, p. 306) present that busi-

ness process simulations can present organizational, functional, and behavioural aspects of the system.

One limitation of the business process simulation method is that it usually lacks the ability to model the informational side of the process. This means that the integration of information technology to the business process can be challenging applying simulation method. (Eatock et al. 2002, p. 306-315) The process models need to be drawn on a right level of detail to be used in the later phases of system development process.

The SimLab™ simulation day does not include any mathematical computer simulations which, e.g., Harrison et al. (2007) or Davis et al. (2007) are discussing. Instead, conceptual, visual models are used as boundary objects for human dialogue and knowledge construction (e.g. Smeds 2003, Smeds et al. 2006). Maybe in the future SimLab will also have interactive three-dimensional planning simulations as the Urban Simulations and Information Systems Laboratory (SIMLab) at the University of Colorado has (Arias et al. 1997).

The author of this thesis acted as a facilitator in the three action research projects. In addition, there were three other researchers that were involved in the projects as facilitators. The role of the facilitators is important for learning. The facilitators are the main developers of the simulation models (Smeds 2003) and important mediators in the co-construction of knowledge and shared understanding (Smeds et al. 2006). Senge (1990, p. 174) presents that new ideas fail to get put into practice because they conflict with people's mental models which are deeply held internal images of people how the world works. They are images that usually limit people to familiar ways of thinking and acting. Hence, the role of the facilitator is to try to change the mental models of the participants (Forssén & Haho 2003, p. 24).

Literature on organizational change makes a distinction between episodic, i.e., intentional and discontinuous, and continuous, i.e., incremental and evolving, change (Weick & Quinn 1999, pp. 365-381). Process modeling and simulations tend to create episodic change in organizations. The role of the facilitator in this situation is of prime mover who tries to create change (Weick & Quinn 1999, p. 373). However, successful change that is triggered by process modeling and simulation is seldom episodic, but continuous (Smeds 1997). In this study, change is defined according to Tsoukas and Chia (2002, p. 567) as "the reweaving of actors' webs of beliefs and habits of action to accommodate new experiences obtained through interactions".

Three Reasons for Choosing Business Process Development Method to Carry out Action Research

There were three reasons for choosing the SimLab ™ business process development method as a way to carry out action research. The first reason for selecting the development method was that the simulation projects show repeatedly excellent results in creating a shared understanding between the participants, and generating a lot of improvement ideas for the future development of the pocess (e.g. Smeds and Haho 1995, Smeds 1997, Smeds and Alvesalo 2003, Forssen and Haho 2001, Haho 2002). The method enables the integration of the participants' diverse perspectives. The information system provider needs to understand the customers' business processes, whereas the customers need to gain understanding of the possibilities offered by the information technology. Process simulations as action research interventions increase the participants' process understanding (Smeds and Alvesalo 2003, Haho 2004, p. 250).

The second reason for choosing the method was that it provides the researchers with a thorough understanding of the case within a short period of time (Feller et al. 2005, p. 391). The simulation projects also produce efficiently a wealth of high quality case data for further scientific analysis purposes (Smeds et al. 2006).

The third reason for choosing the method was that in process modeling sessions, the researchers have numerous face-to-face interviews that show many opinions and insights that could be difficult to gain through interviews only. Furthermore, through observing the comments and interactions of the participants during the simulation days and in process modeling sessions, the researchers gain more knowledge that cannot be transferred only by interviewing the participants.

2.2.2 Abductive Reasoning

This study applies abductive reasoning. This inference logic applies both induction and deduction. Abduction is a sort of middle-road between inductive (See e.g., Ketokivi & Mantere 2010) and deductive reasoning. It moves back and forth between the previous studies, empirical studies, and the researcher's own reasoning (Grönfors 1985): The reasoning starts with a theoretical clue and proceeds to develop theory using the steps of deduction. After that, the theory is tested empirically and induction is applied to generalize from empirical reality. (Ketokivi & Mantere 2007, Danermark et al. 2002, Grönfors 1985, Niiniluoto 1983)

This study tries to contribute to coordination literature by conducting three qualitative case studies and using abduction as a reasoning strategy when analyzing the data. The author applies abductive reasoning, because it is best suited for case research where the aim is both to link empirical data with previous literature and contribute to theory (See Dubois & Gadde 2002, p. 555 on systematic combining). First, a conceptual framework that is based on previous theory was created. A conceptual framework is the current version of the researcher's map of the territory to be investigated. The conceptual framework can developed out of fieldwork itself. (Miles & Huberman 1994, pp. 20-21) Then, the framework is applied to interpret the findings from the three empirical case studies. Finally, the findings from the empirical case research are generalized to theory as a new refined framework. (See Figure 6)

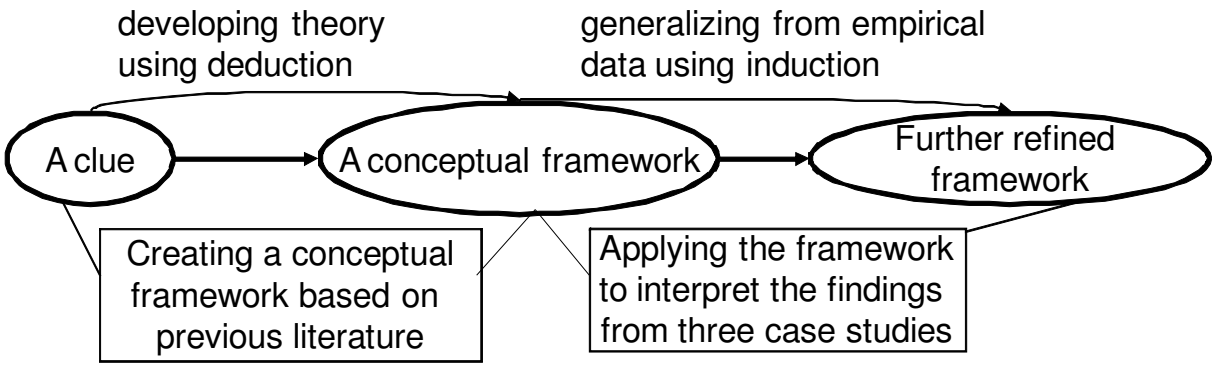

Figure 6. The process of abductive reasoning in this study

2.3 Epistemological and Ontological Assumptions

Methodological decisions are always related to the researcher's assumptions of the phenomenon itself, i.e., ontology, the basis of the knowledge, i.e., epistemology, and the relationship between the humans and their environment (Hurmerinta-Peltomäki & Nummela 2004).

Epistemology is a philosophical theory of knowledge. What is knowledge, how is knowledge gathered, and what do people know are epistemological questions. In this study, a more constructivist approach is taken instead of rationalism. According to constructivism, knowledge is constructed and contingent on human perception and social experience, whereas according to rationalism, the world can be understood through reason. (Audi 1998)

An ontological question that management researchers face is whether the researcher takes reality as an objective nature, which is external to the individual, i.e., positivist approach or

whether reality is a product of individual mind, i.e. interpretive approach. For example, Ramos et al. (2005, p. 486) take the stance of a more interpretive approach when stating that "If there were to be an objective reality, the requirements engineers would simply elicit information from the reality and proceed systematically to a requirements specification." If there was an objective reality, there possibly would not either be a need for a study examining co-design of business and IT systems during requirements elicitation.

In this study, reality is regarded as a combination of objectivity and subjectivity: reality is both a product of individual mind and an objective nature. In practice, this means that the reality is socially constructed but the researcher expects to capture certain causal mechanisms, and describe that specific reality of the people that constructed it. Thus, this study combines both positivist and interpretivist approaches for a similar standpoint, especially in qualitative research (see also Lin 1998), although the researcher takes more interpretive than positivist approach. In practice, this means that the validity of the study needs to be evaluated according to criteria suitable for more interpretive studies. For example, Mingers and Stowell (1997, p. 257) present that good interpretive research gives rich insights into the human, social, and organizational aspects of information systems development and application.

3 Literature Review and Research Gaps

Ragin (1992, p. 218) presents that, at best, theory can provide an initial image which is a vague starting point for looking at empirical evidence. Dubois and Araujo (2004, p. 212) agree with this statement by writing that "…ideas and evidence are mutually dependent; we transform evidence into results with the aid of ideas, and we make sense of theoretical ideas and elaborate them by linking them to empirical evidence." Thus, a researcher needs to build her/himself some "eyeglasses", i.e., theoretical bases, through which s/he interpretes the empirical data that is to be collected and analyzed.

Beeson et al. (2002, p. 317) state that the alignment of business strategy and information systems is an interesting research and consultancy topic. The literature of this thesis consists of information system development theories: requirements elicitation, communication, customer involvement, and organizational coordination theories. These theories are then combined into a conceptual framework that is being applied in the analysis of the case studies' data, and further developed.

3.1 Information System Development

In the following, relevant research on the information system development process is presented, followed by research on the requirements engineering process. Thereafter, communication in requirements elicitation phase is studied in more detail. Finally, the importance of involving users in the information system development process is portrayed.

3.1.1 Information System and Its Development Process

What Is an Information System?

According to Land (1985), an information system can be regarded as a social system which has embedded in it information technology. In this study, the information system is regarded as a system that emerges from the mutual interactions between the information technology and the organization, thus, the information system is not information technology alone (Lee 2004 in Laukkanen 2007).

The purpose of information systems (IS) is to support people taking action in the real world. The concept of an information system entails two linked systems: the system which serves and the system which is served. (See Figure 7) (Checkland & Holwell 2000, pp. 109-111)

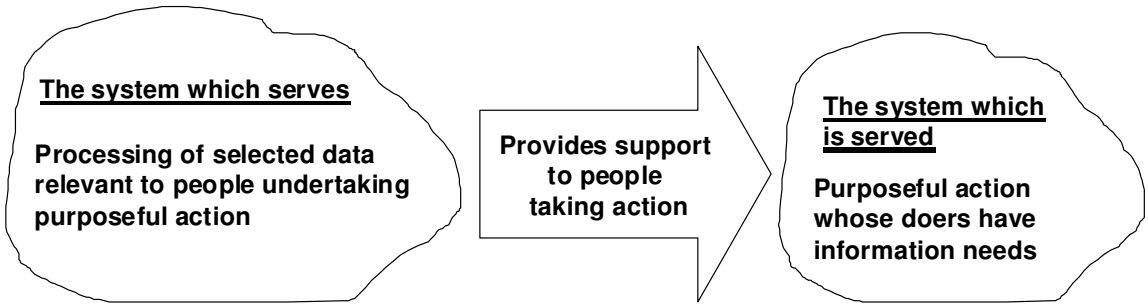

Figure 7. Two linked systems which are entailed in the concept of an information system (Checkland & Holwell 2000, p. 111)

Information System Development Process

Kling and Iacona (1984) have presented that information system development is an ever-unfolding process, "a design in use" approach, which means that the information system needs to be developed also after the adoption of the system. According to Champion and Stowell (2002, p. 274), information system design process starts with creating some ideas for some desired purposeful action. Then, the process continues with creating some ideas for a system to serve that action.

According to Robey and Farrow (1982), information system development can be regarded as a process whereby technical and social changes are introduced into an organization. As Kaplan and Duchon (1988, p. 574) note "…information systems development and use is a social as well as technical process that includes problems related to social, organizational, and conceptual aspects of the system". Lai (2000, p. 207) presents that the challenge arises "when IS developers translate their understanding of business tasks into technical functions, they map human activities, objects, and events into 'processes', 'data format' and 'data structure'. Yet, these graphical expressions are not the actual world." Organizations are complex and there are no modeling techniques that would capture the whole (ibid.).

Land (1985) presents that it is not possible to design a robust and effective information system, which incorporates significant amounts of technology, without treating it as a social system. Thus, it is important to understand the social system that the information system is trying to support. Nowadays, some information system providers have understood the social dimension of information systems and have started to incorporate customers in the information system development projects.

Information system development process has roughly five phases: requirements definition,

system and software design, implementation and unit testing, integration and system testing, and finally operation and maintenance (See Figure 8). These phases composed the first published software development process. (Royce 1970 in Sommerville 2001)

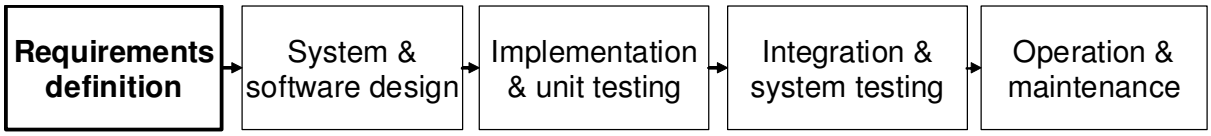

Figure 8. The phases of information system development process and the focus of this study (in bold)

According to Sutcliffe (1996, pp. 170-171), requirements engineering has several starting points. For example, it may start with a problem that needs to be solved in an already existing information system. Another starting point is to create a new system that is intended to satisfy a new customer need. In addition, the starting point can be "a super designer's vision" or "more creative brainstorming approach" where more individuals are involved. (Sutcliffe, 1996, pp. 170)

Two Schools of Thought in IS Field

There exist two schools of thought in IS field. One school, i.e., hard systems thinking, takes the objective positivistic scientific view and regards the world consisting of systems that can be engineered to achieve their objectives. The other school, i.e., soft systems thinking, takes the subjective or interpretative view and regards the world as problematical and thinks that the process of inquiry can be applied to find out the meaning people attribute to their world and what information is relevant. (Checkland & Holwell 2000, pp. 68-74)

Coughlan and Macredie (2002, p. 48) also present that there are two perspectives on design process: one is a rationalistic problem-solving view and the other is a user-centred, i.e., problem-finding, view of the socio-technical school. The rationalistic view thinks that there is a definable problem which is to be solved through a specification of the requirements and logical steps to the development. The user-centred view thinks that the problem is ambiguous and thus needs to be located and defined in context. (Coughlan & Macredie 2002)

The rationalistic and user-centred problem-solving perspectives of Coughlan and Macredie (2002) resemble closely the hard versus soft systems thinking perspectives of Checkland and

Holwell (2000).

> This study adopts the user-centred approach and suggests that systems development needs to be a collaborative process. In addition, this study regards requirements elicitation to be a process of ongoing interaction and negotiation between users of the system and system providers, as Coughlan and Macredie are suggesting (2002).

Miller and Luse (2004, p. 117) discuss that communication between information system developers and users is important during the whole IS development process and effective communication supports that process. According to Beyer and Holtzblatt (1995, p. 45), "It is the relationship between designers and customers that determines how well the design team understands the customer problem."

Problems in Information System Development Process

Information systems still suffer from the same problems that were already mentioned by Lyytinen (1987) over twenty years ago. Lyytinen categorized the problems, according to different studies, into six information system problem classes (1987, p. 9):

1. Goals: goals are ambiguous, too narrow, and conflicting
2. Technology: technology restricts choices, high risk of change
3. Economy: poor quality of calculations, lack of foundations
4. Process features: analysts dominate, poor communication, lack of quality control
5. View of organization: neglect of behavioural and organizational issues
6. Self-image: highly rationalistic image

In Clegg's et al. (1997) study, the interviewees were asked why information systems do not meet their objectives. Most respondents answered that it is because of organizational complexities: The lack of attention to the human and organizational aspects of IT is a major explanatory factor and is manifested in many issues, such as poor management generally, poor project management, poor articulation of user requirements, inadequate attention to business needs and goals, and in the failure to involve users appropriately. Sommerville (2001) lists these same problems as causes for software failures. In addition, he admits that it is not always the poor management, poor quality training, or inadequate processes but IT system supplier companies need to compete and they deliberately under-budget to win a contract. This

pricing to win system causes bad quality in the developed information system. (Sommerville 2001)

The reasons why information systems do not satisfy their objectives are presented by the author in the Figure 9. The model represents the viewpoint of the system provider (Lyytinen 1987). The question that still remains to be answered is how much each reason affects the possibility of a system failure.

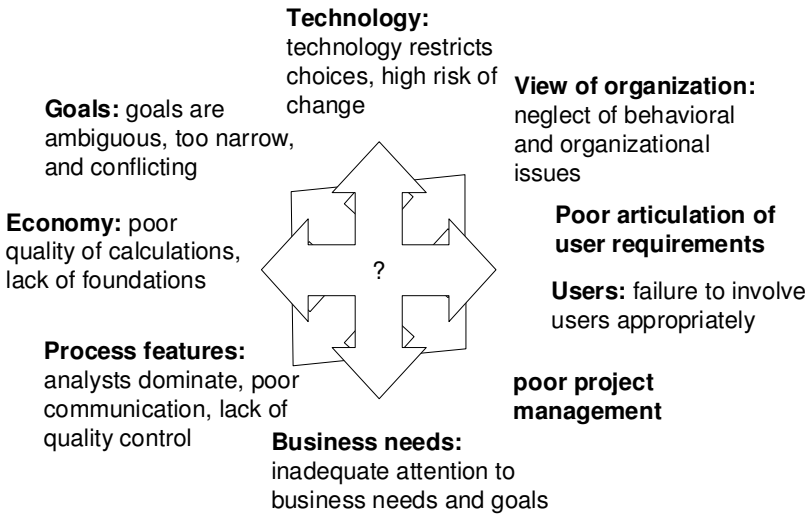

Figure 9. Reasons why information systems do not meet their objectives

3.1.2 Requirements Engineering Process

Al-Karaghouli et al. (2000, pp. 93-95) discuss that one of the biggest reasons for the failure of information technology based systems are the problems in understanding customer requirements during the requirements elicitation phase of the information system development process. In their study, the authors found that the failure of information systems can be attributed to the inadequacy of the specification and the misunderstanding between the various stakeholders involved. In addition to these problems, there are also the problems of culture and knowledge gaps between system developers and customers. Moreover, Patel (2000, p. 84) discusses that the requirements determination is the most important stage in information system development process.

Usually requirements are categorized into two groups: functional requirements and non-functional requirements. The functional requirements describe what kinds of operations are wanted from the system. The non-functional requirements are usually related to the system's

performance, e.g., accurateness and response time. (Karvonen & Tommila 2001, p. 127)

The purpose of requirements is to guarantee that the system to be built will satisfy its intended customers' needs (Davis & Zowghi 2006, p. 1). It is important to understand the customer requirements in the beginning of the system development process. However, often customers change their requirements during the development process, which cannot be prevented by understanding the initial requirements of the customers. (Al-Karaghouli et al. 2000)

Requirements engineering is a process that includes several activities to create and maintain a system requirements document (Sommerville 2001). Researchers have made different kinds of lists of activities. Davis and Zowghi (2006, p. 1) have listed the following requirements engineering activities:

1. Eliciting requirements from stakeholders
2. Analyzing the requirements for consistency
3. Determining which requirements should be addressed given the constraining schedule and budget
4. Documenting the selected requirements, i.e., requirements representation phase
5. Verifying that the selected requirements conform to quality standards, i.e., requirements validation phase
6. Managing changes to requirements, i.e., requirements management phase

This study focuses on the first activity: eliciting requirements from stakeholders. According to Al-Karaghouli et al. (2000), communication between the various parties involved in the systems development is an important part of this phase. Also Havelka's (2002, p. 234) study confirms that communication between the IS developers and users is a critical factor to the quality of the information requirements determination process. In this study, communication is defined according to Sonnenwald (1996, p. 279) and Kautz and Kjaergaard (2008, p. 64) as human behaviour that facilitates the sharing of meaning and takes place in a particular social context. Kautz and Kjaergaard (2008) add that communication is a social process.

According to Havelka (2002), the specific data gathering techniques applied in the information requirements determination process affect the type and quality of information exchanged. As an example, he gives surveys which may be used to determine which features of the current system are most troublesome. He continues (ibid., p. 234):

> However, information related to pontential solutions or improvements may not be easily deter-

> mined by using surveys. To obtain detailed knowledge about the business processes that a system is to support may require interviews or group-based data-gathering approaches.

Al-Karaghouli et al. (2000, p. 95) discuss that the customer's business knowledge and acquired knowledge through experience are very important. On the other hand, the developer's technical knowledge is also important. The challenge is that the knowledge the two parties have is significantly different, which leads to misunderstandings. Reich and Benbasat (2000, p. 84-86) present a term domain knowledge which means that IT people and business executives understand and are able to participate in others' key processes. The researchers argue that shared domain knowledge helps the parties in communication and in alignment between business and IT planning (ibid.).

Al-Karaghouli et al. (2000, p. 95) raise also another very important problem besides the problem of communication. The researchers claim that the developers often fail to understand the customer's business and needs. On the other hand, the customers often do not sufficiently appreciate the realities of software development, or what the software people are offering them. Holtzblatt and Beyer (1995, p. 31) emphasize that information system developers and customers need to develop a shared understanding of the customer's work problems and the impact of technical solutions on the work. Information system developers build different systems depending on how they perceive their customers' work (Beyer & Holtzblatt 1995, p. 48). In the following chapter, communication in the requirements elicitation phase will be examined in more detail.

3.1.3 Communication during Requirements Elicitation

The requirements elicitation phase focuses on gaining understanding of the organizational situation that the system should improve. In addition, it is important to understand the needs and constraints that concern the system to be developed. (Kavakli 2002, p. 238)

Requirements elicitation phase is a difficult process for many reasons (Sommerville 2001):

- Stakeholders may find it difficult to articulate what they want from the information system. Stakeholders may make unrealistic demands because they do not know how big the costs would be for those demands.

- Stakeholders express their requirements with their implicit knowledge of their own work. Requirements engineers need to understand these requirements even without experience in the customer's business field.

- Different stakeholders have different requirements which requirements engineer has to discover. She/he also has to find out conflicts between the requirements.

- There may also be political factors that have an effect on the requirements. For example, some stakeholders may demand certain requirements because it is the way to acquire more power in the organization.

- Business environment is dynamic which means that it will change during the requirements elicitation and analysis phase. New requirements may emerge and the importance of certain requirements may also change.

Successful requirements elicitation results in users having a better understanding of their needs and constraints, whereas developers gain a clear, high-level specification of the problem to be solved (Saiedian & Dale 2002, p. 420).

The phase is characterized by communication activities that involve many people from differing levels of background, skill, knowledge, and status (Coughlan & Macredie 2002, pp. 47-49, Holtzblatt & Beyer 1995, p. 31). According to Coughlan and Macredie, the goal of communication is to achieve an understanding of the problem that needs to be solved by the system. Studies have shown that effective communication is very important in system design. Effective communication is needed especially when the problem to be solved is ambiguous in nature, the system to be built is large, and the system design team is widely distributed. Communication problems affect and inhibit shared understanding between the system designers and users. (2002, pp. 47-49) Hornik et al. (2003, p. 22) found in their study that communication skills of the IS developers affect the successful completion of information system projects. They conclude that user satisfaction is increased for users who perceive IS developers' communication abilities higher than the expected communication competency.

Communication Interface Makes Information System Development Difficult

Garrity (2001, pp. 108-109) illustrates with a figure (See Figure 10) the difficult communication interfaces that make the information system development difficult. Carlile (2004, p. 555) discusses knowledge boundaries when referring to these communication interfaces. A lot of communication and knowledge transfer needs to take place between the user and analyst. Kautz and Kjaergaard (2008, p. 64) discuss that communication is needed for knowledge sharing but communication alone does not guarantee learning. The parties may not share a common lexicon which is needed for knowledge transfer (Carlile 2004, p. 560). Furthermore, the parties may have different domain knowledge which hinders the adoption of new information if it differs a lot from the domain knowledge they already possess. The properties of

knowledge are difference, dependence, and novelty. Carlile (2004, p. 556) remarks that "As difference in the amount and/or type of domain-specific knowledge increases between actors, the amount of effort required to adequately share and assess each other's knowledge also increases."

Garrity (2001, pp. 108-109) suggests that information system development can be seen as a mutual learning process between the parties. It is a joint problem solving task in which the users and developers try to understand each other's particular capabilities, i.e., business knowledge versus computer software domain knowledge, and views, and try to cooperatively produce a joint solution to a common problem. (ibid.) Kyng (1995, p. 50) writes that during the mutual learning activity "the professional designers learn about the organization and the work of the users, and the users learn about the possibilities and limitations for computer support in their kind of work". Carlile (2004, p. 558) states that when common meanings are developed, creation of shared meanings is possible which in turn provides the means for sharing knowledge. He calls this the translation of knowledge approach.

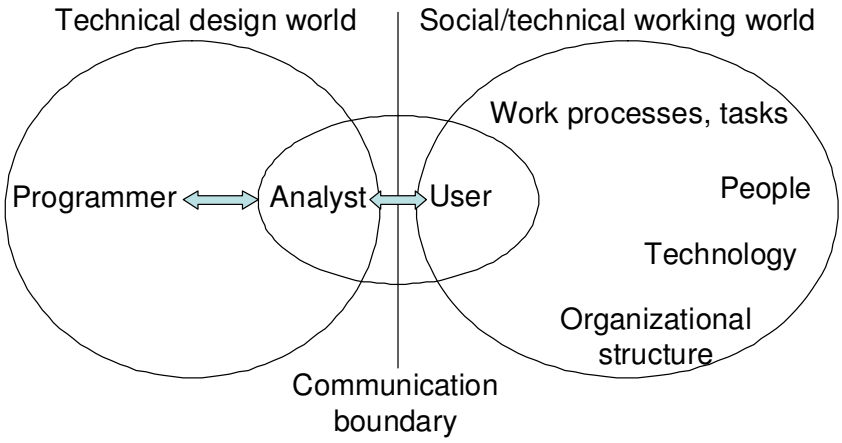

Figure 10. The information system development environment and communication boundary between the analyst and the user (modified from Garrity 2001, p. 109)

The Facilitator as a Boundary Spanner and Boundary Objects

Saiedian and Dale (2000, p. 420) present that the diverse interests of many participants involved in requirements elicitation need to be recognized. A facilitator can act as a boundary spanner between different parties. A boundary spanning role is important in knowledge exploration and collaboration in design (Sonnenwald 1996, p. 280). The boundary spanning role includes behaviour related to communication and information processing between two or

more parties.

During requirements elicitation, it is important to model and analyze the stakeholder needs and how they could be met or compromised by the new system (Kavakli 2002, p. 237). Models being graphical representations are usually more understandable than detailed language descriptions of the system requirements (Sommerville 2001). Dataflow diagrams and entity-relation diagrams provide a communication medium between the developer and customer. The models help to increase understanding of the problem domain and essential requirements. (Halbleib 2004, pp. 10-11) These models can be called as boundary objects. They are artifacts that adapt to local needs and constraints of the several parties that employ them. Examples of boundary objects in the context of software development include design drawings/models, standardized reporting forms, and prototypes. (Xu 2009, p. 35, Levina & Vaast 2005, p. 339)

The success of requirements engineering workshops often depends on the mediation skills of the workshop facilitator (Macaulay 1999). As Huxham and Cropper (1994, p. 3) point out, "…the role of the facilitator is paramount in creating and managing a process through which problems can be addressed creatively, and through which the team may be led to mutual understanding, consensus and to a commitment to act". Thus, the facilitator's role in process modeling and simulation sessions is to facilitate the discussion toward common goal and understanding about the object of development.

Requirements Elicitation Methods

Coughlan and Macredie (2002, pp. 53-54) define an elicitation technique as a method for mediating communication. The researchers put elicitation techniques into six broad classes:

1. Traditional, e.g., questionnaires, unstructured and structured interviews, and analysis of existing documentation
2. Group, e.g., brainstorming, focus groups, and consensus-building workshops
3. Prototyping, e.g., mock-ups
4. Model-driven, e.g., scenarios and rich pictures
5. Cognitive, e.g., protocol analysis
6. Contextual, e.g., ethnographic methods: a requirements engineer spends time as a user in the user's organization

In addition to these methods, observing the actual behaviour of potential users can also be used to gather requirements. Observation requires that requirements are observable, which can

be difficult to determine beforehand. By observing potential or actual users of the system, large amounts of data can be gathered but some of it may also be irrelevant.

Many model driven techniques have been developed and applied to finding out requirements for information systems, such as data-flow diagrams, use cases (Regnell 1999), entity life histories, entity-relationship-attribute models, BaRE (Nikula 2002), Venn diagrams, i.e., graphical requirements representation techniques (Al-Karaghouli et al. 2000), role activity diagrams (Patel 2000), and soft systems methodology (Checkland 1999). A use-case is one of the methods used to capture functional requirements of a system. Although the use-case method is a user-centered approach, current use-case approaches are limited in managing large use-case models (Lee & Xue 1999, p. 92). Depending on the context of the study, some of the techniques are more effective in eliciting requirements (see e.g., Tuunanen 2005, p. 49). Furthermore, different techniques are more useful for eliciting particular kinds of requirements. (Coughlan & Macredie 2002, pp. 53-54)

Introna and Whitley (1997, p. 42) discuss that it should not be believed that only one suitable methodology is required. Instead, elements from different methodologies should be picked up and used when necessary. The methods are developed for certain purposes in mind and thus are rarely the most approapriate ones for the design. Similarly, Nandhakumar and Avison (1999, p. 177) and Cheng and Weiss (2000, pp. 19-20) note that combining informal and formal approaches to requirements engineering can lead to a more effective technique than neither technique alone could be. The problem seems to be how to inform the development community of the different techniques and approaches. Introna and Whitley (1997, p. 43) point that methodologies should enable system developers to focus on their tasks, and not end up focusing on the methodologies they are using.

> This study combines several methods for requirements elicitation: interviews and analysis of existing documents, group elicitation techniques for brainstorming, so called process modeling sessions, and model-driven workshops for consensus-building, so called process simulation workshops.

Coughlan and Macredie (2002) studied four different methodological approaches to requirements elicitation. They developed a framework which was named as a four-dimensional view on a methodology. (See Figure 11) The framework entails the following concepts: user partic-

ipation and selection, user-designer interaction, communication activities, and techniques. Later on, Coughlan et al. (2003) named the framework as four-dimensional view on requirements engineering. The four dimensions in the framework represent the activities that are performed during the requirements elicitation process as part of engaging different stakeholders in the design process (ibid., p. 526).

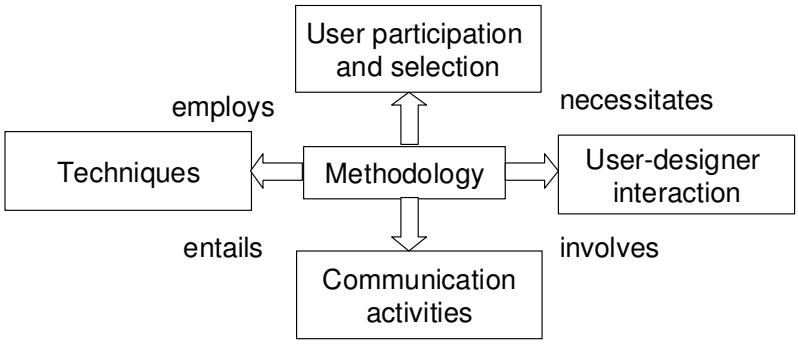

Figure 11. Four-dimensional view on a methodology (modified from Coughlan and Macredie 2002, p. 50)

3.1.4 The Importance of Involving Users in the Information System Development Process

Coughlan and Macredie (2002, p. 48) state that it has been beneficial to spend time with users to communicate and develop productive relationships. The relationships have been beneficial because they have led to greater success in systems analysis and the determination of requirements (Vitalari & Dickson 1983, Marakas & Elam 1998).

The degree of usefulness and usability of a system can increase if developers understand the problem area in which the system should help. The problem area includes the users, the context where the work is done, and the wider organization affected by the work. Furthermore, the likelihood of successful system development projects can increase, if users and their needs are understood. (Coughlan & Macredie 2002, p. 47) Curtis' et al. (1988, p. 1271) study has an illustrative quote of a system engineer describing the problem of understanding the information system's application domain "Writing code isn't the problem, understanding the problem is the problem."

Emam and Madhavji (1995) found out that user participation is one of the most important factors contributing to requirements engineering success (Hofmann & Lehner 2001). It is easier

to agree on the requirements when the new information system is designed with the customer (Beyer & Holtzblatt, p. 52).

Hartwick and Barki (2001, p. 21) define user participation as "the extent to which users or their representatives carry out assignments and perform various activities and behaviours during information system development". This definition includes user participation in all development-related activities, such as analysis, design, and implementation of the system. In this study, user participation is defined according to Hartwick and Barki, but the study focuses only on the analysis phase of the system development, thus, also the definition is bounded to users participating only to the analysis phase.

> Karat (1997, p. 38) also points out that the development of usable systems is achieved through the involvement of potential users of a system in the system's design process. The main focus of this study is on requirements elicitation but it is recognized that user involvement also leads to better usability of the system. The interested readers are referred to Nielsen's (1993) publication on usability engineering. (See Figure 12)

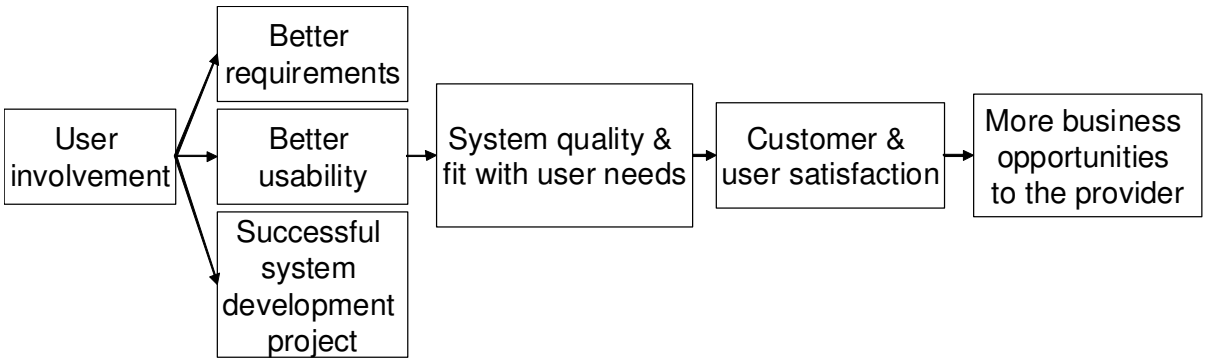

Figure 12. The effect of user involvement in system development project

Reasons Why IT Providers Do Not Involve Users in the Development Projects

Macaulay (1999) presents that it is accepted that different stakeholders participate in the requirements engineering and design processes. It is also accepted that a shared meaning of the system needs to be developed between the stakeholders that include system developers, users, resellers, and maintainers as well.

Users and customers are not still always taken into the development process: one inhibiting factor is that it is quite expensive and time-consuming to involve end-users in the develop-

ment projects (Thomke & von Hippel 2002, p. 76). This is probably because IT providers cannot involve the users in a cost effective way. Even though, customers and system developers would meet and discuss with each other, they would probably miss a common language that is needed for building common understanding about how the information system should work in practice (Lai 2000, p. 207).

In some cases the involvement of customers can be harmful. For example, when developing new software, capturing the current process of users can result in software that is outdated already when developed. (Leonard-Barton & Sinha 1993) In addition, customers need to be informed and convinced about the benefits of the new solution that competes with other firms' innovating new solutions. This can be a difficult task because the organizational customer usually consists of many parties that look at the innovation from different points of view. For example, the technical people look at the technical features, whereas the financial people only see the costs involved in developing the new solution. (Tidd, Bessant & Pavitt 2001)

Furthermore, customers often do not identify and cannot articulate their needs explicitly. Though, Qurban and Austria (2009, p. 302) remind that also IS developers have problems in practical communication skills needed during requirements engineering, such as better stakeholder interaction and participative design process. Nonaka et al. (2000) discuss that to transfer tacit knowledge from one person to another requires the creation of a shared context. This context can be created by bringing the participants into creation space which is called Ba (Nonaka & Konno 1998). Coughlan et al. (2003, p. 532) discuss that customers' "lack of understanding and inability to project in forward-thinking terms leads to a poor definition of requirements."

The challenge of not understanding each other's language is not only specific to relationships between information system providers and customers. For example, Ackoff (2006) has struggled with teaching systems thinking to managers. According to him, the problem is usually the different languages used by system thinkers and managers. He writes (p. 707):

> Until we communicate to our potential users in a language they can understand, they and we will not understand what we are talking about.

Carlile (2004, p. 560) discusses about syntactic boundary between parties when a common lexicon is missing, which hinders the sharing and assessing of knowledge.

The author thinks that many of the challenges presented above are no reasons not to involve the end-user. On the contrary, they reveal the poor capabilities of user-involvement at the IT provider, and point to crucial development needs in the IT provider organizations.

Reasons for Involving Customers in the Development Projects

Nevertheless, already early studies of technological innovation process stress the importance of understanding user needs and demands to innovatory success (Rothwell 1986). At least four reasons encourage the involvement of customers in development process. Firstly, the quality of the process being developed can be improved by understanding the "mental schemas" and needs of the customers. Secondly, the users are more willing to start using a new system if they have being involved in its design. (Hirschheim 1985, p. 298, Leonard-Barton & Sinha, 1993) Thirdly, costly re-makes may be prevented. Fourthly, enhanced user understanding of the system can be gained (Von Hippel 2005, Leonard-Barton & Sinha 1993, Robey & Farrow 1982). Moreover, close customer linkages can help in decreasing lead times (Rothwell 1994). More variety in knowledge, i.e., more ideas as basis for process development, and better implementation of the new processes are gained when users are involved (Smeds 1996).

Leonard-Barton and Sinha (1993) found in their study of 34 internal software projects developed in four electronics firms that the more the customers had been involved in the development projects, the more they were satisfied. However, the researchers also found that extensive user involvement may not predict user satisfaction but low level of customer involvement leads to dissatisfaction. The timing of user involvement may be important when predicting the user satisfaction. (Leonard-Barton & Sinha 1993) Process modeling sessions involving customers, observation, empathic design, consumer idealized design, conjoint analysis, and focus group interviews are ways to involve customers and discover knowledge about customers (Valkeapää et al. 2006). According to Jacobson et al. (1997, p. 267), customers' and end-users' needs are best acquired through modeling the processes they partipate in. This may also indicate where the information systems can add value.

Selecting the Right Kind of Users for Involvement

Boland (1978) studied the involvement of users in the system design process. Boland's literature study showed that it is very important to involve users in the design process. He presents that the designer and the manager, i.e., the customers, need to share leadership, learn from

each other, and develop the solution together (ibid., p. 888). Beirne's et al. (1998, p. 301) case studies showed that users were selectively taken into formal design processes depending on their position and status, even though they should be selected based on their skills in domain knowledge and in IT. Coughlan and Macredie (2002) discuss that when involving customers in the requirements elicitation process, it is important to select the appropriate employees that are active in defining requirements and direct in their communication.

3.2 Co-design of Business and IT Systems

In the following chapters, literature on the alignment of business and IT systems are shortly discussed. The academics have not yet written much about the alignment of business and IT systems. The practitioners have so far been more active in this field. The chapter also discusses business processes. After that, coordination literature is studied in detail. This part includes definition of coordination, different interdependencies, and their coordination modes, components of coordination, and processes underlying coordination.

3.2.1 Aligning Business and IT Systems

Aligning business and IT systems has been an important research topic for the past nine years. Still, the challenge of aligning business and IT has remained. (Pisello 2006) When business changes, it needs new kind of system support but especially large information systems are difficult to change quickly.

There is not much literature on how to design business and IT systems to fit one another. Reich and Benbasat (2000, p. 82) suggest two approaches to the subject of alignment. The first examines the strategies, structures, and planning methodologies in organizations; whereas the other approach examines the actors and their values in organizations, communication between actors, and their understanding of each others's domains.

Liu et al. (2002, p. 255) discuss that the possible solution in aligning business and IT is to co-design them. Beeson et al. (2002) have approached this challenge by examining one case study. The researchers took a communication and decision perspective by exploring the communication and decision-making links that connect business with IT. They present a general framework of communication and decision-making within which plans are reviewed and modified and changes taken into account. The researchers admit that the framework is only a start in understanding the communication links and they suggest further analysis. (ibid.)

> This study will concentrate on actors' interdependencies, mainly communication. In addition, the actors do not reside inside one organization but in two different organizations: the provider organization and its customer organizations.

Davenport and Short (1990, p. 16) point out that the awareness of IT capabilities, i.e., what IT can deliver, should affect business process design. Thus, the usual way to first determine the business requirements of a process, and then to develop a system, is not the most efficient. The role of IT in a process needs to be considered in the early phases of the process' redesign.

Hammer and Champy (2001, pp. 89-92) present that technology should not be viewed through the lenses of the existing business processes. This is because automating existing processes does not generate innovations; it just automates already existing practices. Instead, technology should be used to do new things that the company is not yet doing. The new capabilities offered by technology should be exploited to achieve new business goals.

> In this study, it is regarded important that business process development and information system development go hand in hand because information systems are supposed to support business processes.

What is a Business Process?

According to Davenport and Short (1990, p. 12), a business process can be defined as a set of logically related tasks that are performed to achieve a defined business outcome. Furthermore, Hammer and Champy (2001, p. 38) add that processes are customer-oriented and crossfunctional. A process is an "an organized group of related activities that together create a result of value to customers" (Hammer 2001). Hannus (2004, p. 104) has a similar definition for a process: action chains that begin by understanding a customer need and end by fulfilling the need. Evokari and Smeds (2003, p. 13) add that processes involve human actors, technology supported activities, and material and information flows.

Melão and Pidd (2000, p. 122-123) studied business processes from four different perspectives: deterministic machines, dynamic complex systems, interacting feedback loops, and social constructs. Based on the results, they state that business processes are mixed and conflicting in nature. The researchers propose that business processes have technical and social, tangible and intangible, objective and subjective, quantitative and qualitative dimensions.

Information technology has an important role in coordinating and supporting the process. Patel (2000, p. 85) presents that "the essence of process is that it requires interaction and coordination among members of an organization to achieve a predefined goal". What is more, Lavikka et al. (2007) present that the operations of an organization can be coordinated by a common service process that defines the sequence of activities. Hence, a process can also be regarded as a coordination mechanism (Mintzberg 1983, Södergård 2005, Lavikka et al. 2009).

3.2.2 Coordination

Kim (2000, p. 289) presents that successful organizational process change requires management of numerous dependencies among coordination elements. When IT systems are developed, the organizational process or business process it supports also changes. Thus, the design of business and IT systems necessitates coordination. Through coordination, the different interdependencies between business and IT systems can be managed toward common objective. In this study, the focus is on the coordination of the interdependencies between the IT system provider and its customers during requirements elicitation. Requirements elicitation is a complex process which can be analyzed by coordination theory (Crowston & Kammerer 1998, p. 230). Lack of effective interactions and coordination between users and information system developers may lead to wrong assumptions by information system developers and thus to failed information system development projects (Hornik et al. 2003, p. 19, Crowston & Kammerer 1998, p. 232-233).

What is Coordination?

Coordination has been defined in many ways depending on whether the author has a background in organizational research (e.g., Thompson, Mintzberg, and Lawrence & Lorsch) or in information science (e.g., Malone and Crowston). In literature, there seems to be no clear difference between the terms coordination and integration but the terms are used interchangebly. For example, Axelsson and Easton (1992, p. 105) define coordination as the integration of a whole. A recent dissertation on managing cross-functional interdependencies also applies the terms coordination and integration interchangeably (Turkulainen 2008, p. 16).

Integration can be done to processes, activities, or parts that when coordinated form a whole (Axelsson & Easton 1992). According to Robbins (1990, p. 216), companies often integrate using rules, formal plans, and hierarchies. On the other hand, these integration methods are

classified by Thompson (1967) and Mintzberg (1983) as coordination methods. In contrast, Van de Ven et al. (1976) define coordination as the linking or integration of organization's different operations. According to them, integration is one structural form of coordination. In this study, coordination and integration are regarded as the same phenomenon.

> In this study, coordination is defined as the act of managing interdependencies between activities to achieve a common objective between the parties. This definition by Malone and Crowston (1994) is adopted because it is widely applied in IS research and the researchers emphasize the process approach to coordination.

The following table (Table 1) presents different definitions for coordination.

Table 1. The definitions of coordination

Source	**The definitions of coordination**
Thompson 1967	Managing interdependencies between work tasks.
Van de Ven et al. 1976	Integrating or linking together different parts of the organization to accomplish a set of tasks.
Mintzberg 1979, 1983	Coordinating interdependencies between work tasks to accomplish operations.
Malone & Crowston 1990, 1994	Managing interdependencies between the tasks that are needed to achieve the objective.
Axelsson & Easton 1992, p. 105	Integration means forming a whole.
Kraut & Streeter 1995, Lawrence & Lorsch 1986;1967	Integrating different parts of the organization to achieve a common objective.
Raghu et al. 1998, p. 88 according to American Heritage Dictionary 1985	Arranging or organizing to achieve a desired or effective combination.
Åberg 2000	Communication between business units. Coordination is a process that assures a suitable size for the delegated tasks. In addition, it assures that tasks are not overlapping or that some tasks are not left undone.
Fayol in Huczynski & Buchanan 2001	Assurance that operations and resources work together to achieve common objective.
Quinn & Dutton 2005	A process for managing operations. Usually an interactive experience where interplay can be verbal or written and it happens between two or more persons.
Faraj & Xiao 2006, p. 1157	A temporally unfolding contextualized process of input regulation and interaction articulation to realize a collective performance.

Components of Coordination and Processes Underlying Coordination

The components of coordination are goals, activities, actors, and interdependencies (Malone & Crowston 1990, p. 360). First, the goals need to be identified. The goals need to be mapped to predefined activities. Furthermore, activities need to be assigned to actors. Activities have goal-relevant relationships, i.e., interdependencies which must be managed. (ibid.)

According to Malone and Crowston (1990, pp. 364-365), there are three processes underlying coordination in IT development and implementation projects: group decision-making, communication, and perception of common objects. Coordination in development projects usually requires that some decisions are made and accepted by the group executing the coordination. Group decisions require communication about the goals between the parties. Finally, communication necessitates that messages are transported between senders and receivers in a language that is understandable to both parties. According to Malone and Crowston (1990, pp. 364-365), common language means that the parties perceive common objects, such as physical objects or information in a shared database. (See Table 2)

Table 2. Processes underlying coordination, components of coordination, and examples of coordination in IT projects (Malone & Crowston 1990, p. 365)

Process level	**Components of coordination**	**Examples of coordination processes**
Coordination	Goals, activities, actors, resources, interdependencies	Identifying goals, ordering activities, assigning activities to actors, allocating and synchronizing resources
Group decision-making	Goals, actors, activities, evaluations, choices	Proposing and evaluating alternatives, making choices
Communication	Senders, receivers, messages, languages	Establishing common languages, selecting receivers, transporting messages
Perception of common objects	Actors, objects	Seeing same physical objects, accessing shared databases

Grandori and Soda (1995, p. 194) remind that some inter-firm relationships are sustained merely by communication, decision, and negotiation mechanisms. To maintain long-term cooperation, communication, decision-making, and negotiation take place sequentially and repeatedly.

3.2.3 Different Interdependencies and Their Coordination Modes

Already March and Simon (1959, pp. 159-162) discussed coordination. The authors presented that the type of coordination used is depended on the extent to which the situation is standardized. They defined two coordination modes: coordination by plan and coordination by feedback. Coordination by plan referred to predefined plans to coordinate interdependent activities a priori, whereas coordination by feedback referred to the exchange of new information to coordinate interdependent activities during their execution. The authors argued that stable, predictable situations applied coordination by plan, while unpredictable and variable situations had to rely on coordination by feedback.

In the late 1960s, contingency theory started to be the prevailing theory among management researchers. Contingency theory assumes that there is no one best way to organize the activities of an organization, i.e., one organization structure is not equally effective under all conditions (Galbraith 1977). This claim has not been discarded, e.g., Hall in 2002 still argued that there is no one best way to coordinate, but the suitable coordination mechanisms depend on the environment.

Galbraith (1977, pp. 35-50) developed contingency theory further. According to him, the best way to structure an organization is contingent upon the amount of information processing it has to do. Information processing, on the other hand, is dependent on the uncertainty and diversity surrounding the organization.

Thompson (1967) continued March and Simon's work on coordination. He was interested how the contingency factors affect organizational structure and coordination. Thompson (1967) presents three types of task interdependencies: pooled coupling, sequential coupling, and reciprocal coupling, and three modes of coordination: standardization, planning, and mutual adjustment to manage the task interdependencies. (See Figure 13) Tasks that are coupled in a pooled way are independent but share the same resources. When a pooled interdependency exists, coordination is achieved through rules and routines. In case some tasks are sequentially coupled, they should be performed in a certain order. In this situation, the coordination is achieved by plans. Reciprocally coupled tasks provide input for each other in a mutually interdependent way. This requires that people executing these tasks communicate frequently and adjust mutually during task execution. Mutual adjustment applies in small organizations as well as in complex operational environments, e.g., in project environments. Mutual adjust-

ment refers to, e.g., unscheduled meetings, ad hoc communication, cross-functional teams, or physical proximity. (Mintzberg 1979)

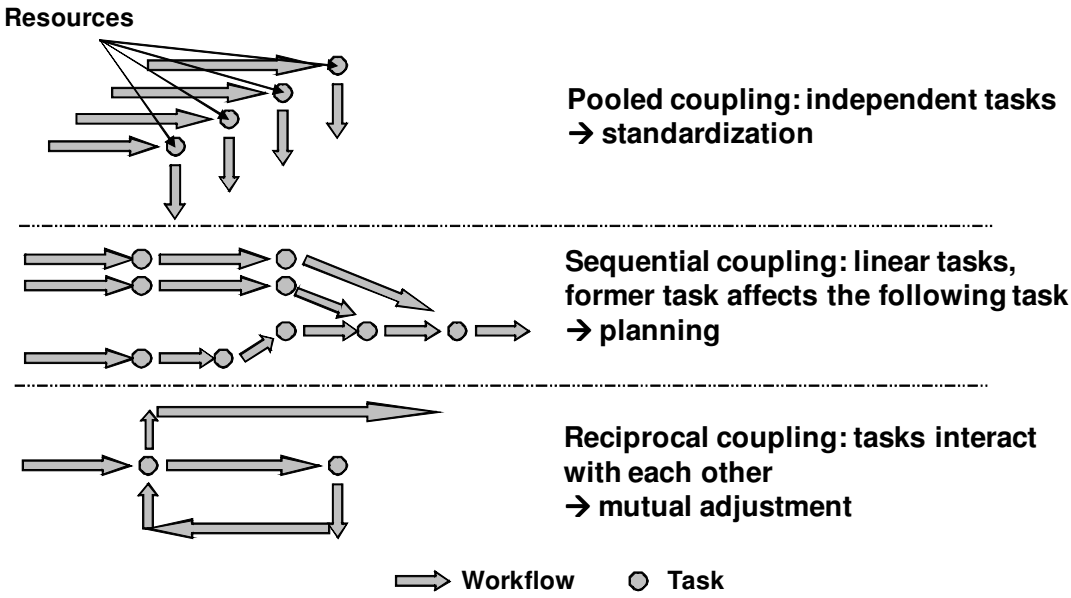

Figure 13. Three task interdependencies and their coordination modes (Thompson 1967)

Malone et al. (1999, pp. 429-430), building on Thompson (1967), present also three interdependencies that arise from resources that are related to multiple activities. The first one is flow dependency which arises "whenever one activity produces a resource that is used by another activity". This dependency resembles Thompson's sequential coupling. The second is called sharing interdependencies which occurs "whenever multiple activities all use the same resource". This dependency resembles Thompson's pooled coupling. Finally, the third one is called fit dependency that arises "when multiple activities collectively produce a single resource". This dependency resembles nearest Thompson's reciprocal coupling. (See Figure 14)

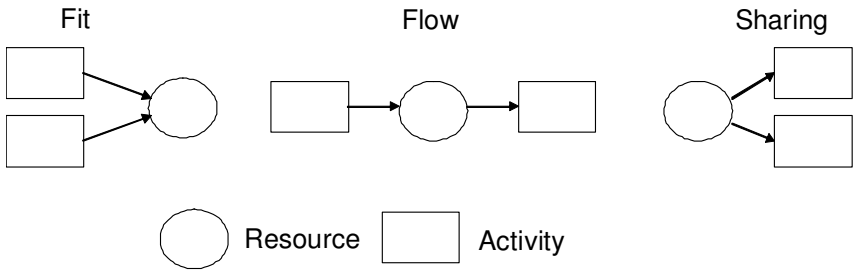

Figure 14. Interdependencies according to Malone et al. (1999, p. 430)

Mintzberg (1979) continued Thompson's work in the field of coordination by stating that a fourth mode of coordination, i.e., direct supervision, exists. Direct supervision is suitable in small and simple organizations when informal communication is not enough for coordination. Direct supervision can be practiced by a coach. The coach is an inspiring person that controls the performance of others and provides others with leadership and encouragement. (Mintzberg 1979) Mintzberg's modes of coordination are intended for coordinating work in different organizational structures.

> This study is interested in the coordination of the interdependencies between the provider and the customers during requirements elicitation in an IT-development project. The IT project manager, a representative of the IT supplier, would typically be the supervisor. However, s/he does not have the authority to supervise the customer's representatives in the project. Therefore, direct supervision is left out from the coordination mechanisms in this research. This study applies Thompson's theories of coordination.

Frayret et al. (2004) studied coordination and control in distributed, agent-based manufacturing systems. They found out that recent advances in manufacturing systems have led to new forms of coordination that cannot be included in the previously made classifications of coordination. Frayret et al. (2004, p. 52) present a new class of coordination, i.e., coordination by mediation "in which the coordination of the activities of many centers is supported by a third party". In addition, Jaatinen and Lavikka (2008, p. 151) state that it is possible to coordinate by creating shared meanings between parties through communication.

The cheapest or least-cost coordination mode for an organization in a pooled interdependency situation is standardization because some tasks can be executed automatically, while mutual adjustment is the most "expensive" coordination mode (Thompson 1967). Thus, organizations try to plan and standardize as much as possible to minimize coordination costs. (Grandori 1997, Smeds 1996)

3.3 A Summary of Literature

Next, the literature presented in this thesis is synthesized. The objective is to construct a conceptual framework that summarizes the theoretical themes introduced in the theoretical literature. The other purpose of the framework is to act as the basis for analyzing the three empirical case studies.

3.3.1 The Context of Information System Development

According to Checkland and Holwell (2000, p. 111), an information system is composed of two linked systems: the system which is served and the system that serves: usually business processes are the ones to be served and the information system is the one that serves. The purpose of an information system is to support the business activities of an organization's employees. Thus, information system development has to be started by carefully defining the activities to be served. In addition, it is crucial to understand the context where the information system is to be used. The information system developers need to understand why certain data is relevant for that organization and what the intentional actions to pursue that data are.

One of the biggest reasons for the failure of information technology based systems is the problems in understanding customer requirements. There are misunderstandings between the various stakeholders that affect negatively the information system development. (Al-Karaghouli et al. 2000, pp. 93-95) According to Hutchings and Knox (1995, p. 75), the questions that need to be addressed are: What do the customers/users do? What are the goals of their work? How do they realize those goals? How could technology support their work goals? After understanding the necessary business activities and their context, the decisions can be made on what information is needed and how technology can help in providing it.

3.3.2 Communication in Requirements Elicitation Phase

The requirements elicitation is the most important phase in information system development process (Patel 2000). During this phase, communication between the IS developers and users is a critical factor to the quality of the process (Havelka 2002, p. 234). It is beneficial to spend time with users to communicate and develop productive relationships. The relationships have been beneficial, because they may lead to greater success in systems analysis and the determination of requirements. (Coughlan and Macredie 2002, p. 48)

> This study applies the user-centred approach and regards systems development as a collaborative process. Requirements elicitation is regarded as a process of ongoing interaction and negotiation between the users of the system and the system providers (Coughlan and Macredie 2002).

There are also the problems of culture and knowledge gaps between the system developers

and the customers. The customer has the business knowledge and the provider has the IT knowledge. (Al-Karaghouli et al. 2000) The two parties need to develop a shared understanding of the customer's work problems and the impact of technical solutions on the work (Holtzblatt & Beyer 1995, p. 31). Thus, the parties in the development process need to interact to understand the problem area.

Al-Karaghouli et al. (2000, p. 95) also discuss another problem: the developers often fail to understand the customer's business and needs. On the other hand, the customers often do not sufficiently appreciate the realities of software development or what the software people are offering them. Information system developers build different systems depending on how they perceive their customers' work (Beyer & Holtzblatt 1995, p. 48).

A lot of communication and knowledge transfer needs to take place between the user and analyst. According to Carlile (2004, p. 560), the parties need to develop a common lexicon to share and assess knowledge at a syntactic boundary. Garrity suggests that information system development can be seen as a mutual learning process between the parties (ibid.). It is a joint problem solving task in which the users and developers try to understand each other's particular capabilities, i.e., business knowledge versus computer software domain knowledge, and views, and try to cooperatively produce a joint solution to a common problem. (ibid.) Mutual learning process refers to sharing knowledge at the semantic boundary which means that the parties have been able to develop common meanings and created shared meanings (Carlile 2004, p. 560).

A facilitator can act as a boundary spanner between different parties. A boundary spanning role is important in knowledge exploration and collaboration in design (Sonnenwald 1996, p. 280). In addition, boundary objects may help in understanding the joint problem and in sharing knowledge between parties (Levina & Vaast 2005, p. 339).

3.3.3 Interdependencies and Their Coordination

Goals, activities, actors, and interdependencies can be coordinated (Malone & Crowston 1990, p. 360). In this study, the aim is to find out what kind of interdependencies between the provider and the customers exist during requirements elicitation, and how these interdependencies are coordinated. Thus, the presumption is that the interdependencies will be found between the representatives of the provider and its customers. The assumption is made based on

the fact that during requirements elicitation an important task is to understand the business processes the information system is to be supported. In addition, it must be determined what the newest technology can offer to the business process. Thus, to understand the business processes the provider and its customers need to share a lot of information.

The research applies in the analysis of the interdependencies Thompson's (1967) concepts of pooled coupling, sequential coupling, and reciprocal coupling. The respective coordination modes that are sought for in the research are standardization, planning, and mutual adjustment.

3.3.4 A Conceptual Framework: IT Provider and Customer Interdependencies and Their Coordination during Requirements Elicitation

The conceptual framework (See Figure 15) is partly based on the framework developed by Coughlan and Macredie (2000, p. 50) and Coughlan et al. (2003) presented earlier (See Figure 11). Their framework was developed to examine different kinds of methodological approaches. Their framework presents the activities that are performed during requirements elicitation as part of engaging different stakeholders in the design process. The framework entails the following themes: user participation and selection, user-designer interaction, communication activities, and techniques. In this study, the main emphasis is on user-designer interaction, communication activities, and techniques. It is taken for granted that users are selected carefully and involved in the development activities.

Interdependencies between the Customer and the Provider during Requirements Elicitation

The customer is connected to both the business processes and the information system: she/he acts in the business processes and uses the information system, whereas the provider is only connected to the information system: she/he develops and maintains it. The two parties are also connected to each other when eliciting requirements for the information system. The aim is to find what kind of interdependencies exists between the customers and the provider during requirements elicitation and how those interdependencies should be coordinated.

Business Process Modeling and Simulation in Gathering Requirements

This study combines several methods for requirements elicitation: interviews and analysis of existing documents, group elicitation techniques for brainstorming, so called business process modeling sessions, and model-driven workshops for consensus-building, so called business

process simulation workshops.

On one hand, a business process modeling session, where both customers and developers are present, can lead to rich discussion and creation of new development ideas. On the other hand, the simulation can provide a user-friendly and media-rich picture of business processes because simulation allows many people to participate in process redesign and it also provides easy visualization (Kettinger et al. 1997). When the functioning of the business processes is understood, it is easier to understand how the information system should support the processes, which means that it is easier to gather the requirements.

This study examines the first phase of requirements engineering process, i.e., the requirements elicitation for two reasons: Firstly, requirements elicitation is a critical phase of information system development (Coughlan & Macredie 2002), and it creates problems continuously. Research is thus badly needed in this challenging phase. Secondly, the case organizations, i.e., the provider of the information system and its customers, struggled with this phase of system development for over two years during the Madeleine reseach project. Thus, the researcher has data from this phase.

The Role of the Facilitator

The discussions during business process modeling and simulation sessions are usually guided by an outsider, i.e., a facilitator whose task is to bring out the diverse perspectives of different stakeholders. The aim of the facilitator is to ensure that the different parties of the development project discuss and understand each other. In addition, the facilitator tries to ensure that the parties develop common understanding about the interdependencies between business and IT systems and how to coordinate them toward better alignment.

Customer's Business Knowledge and Provider's IT knowledge

The customers should share their business knowledge with the provider. Business knowledge includes the activities that are performed during the business process, the people who are involved in the process, and knowledge on how the information system could support the activities. The provider should share its IT knowledge: how the newest technology could support the business process, how much certain functionalities would cost to implement, and how long it would take to implement them.

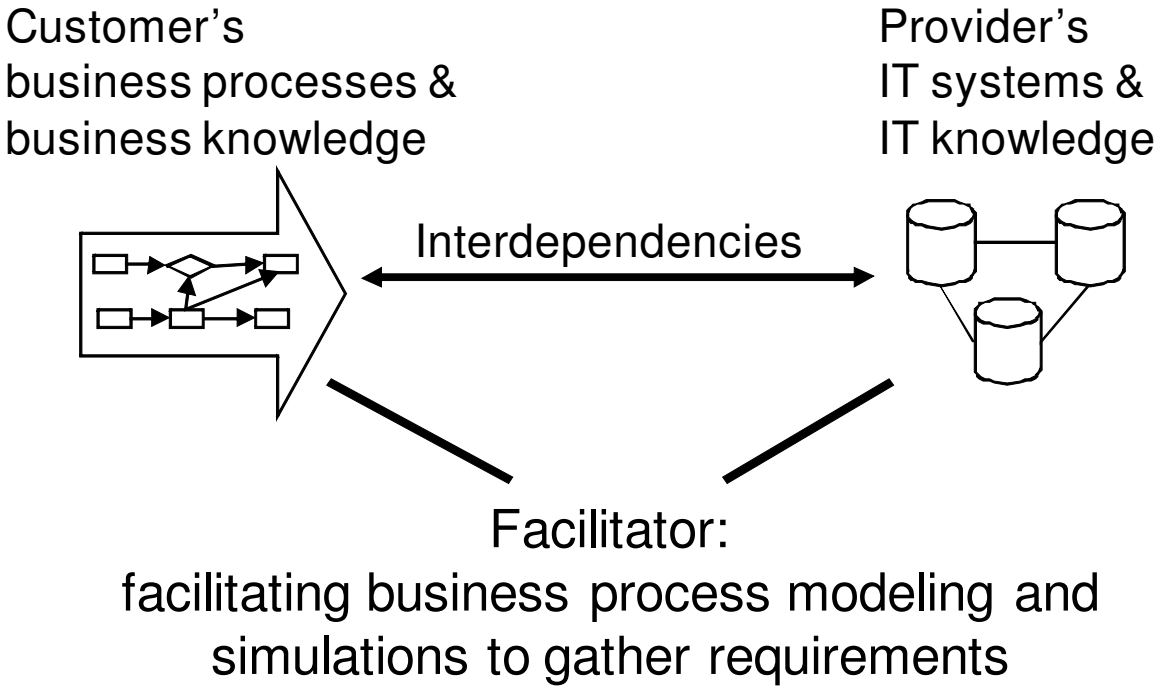

Figure 15. The conceptual framework: the co-design of business and IT systems with the customers during requirements elicitation

4 Data Collection and Analysis Methods

According to Yin (2003), the use of multiple data sources improves the reliability and validity of a case study. The data sources of a case study can be for example documents, interviews, observation, and other products of human beings (Yin 2003). Berg (1979 in Zalan & Lewis 2004, p. 522) states that it is very important to present the methods used in the study in detail:

> The task of the researcher is not…to show whether his findings, models or hypotheses are right or wrong, but to convince the reader that they are reasonable conclusions, drawn from material, which has been processed by methods which can be explicitly described.

Data analysis is the most difficult and least codified phase of the case study research process (Eisenhardt 1989). In the following chapters, the data collection and analysis methods of the thesis are discussed in more detail. In addition, the iterative process of data collection and analysis during the empirical research process is described.

4.1 Data Collection

The data of this study is gathered through interviews, observation, questionnaires, archival data, post-it notes, group works, and discussions during process modeling sessions and during simulation days. In the following chapters, the different data gathering methods are described in more detail.

4.1.1 Interviews

Semi-structured interviews were chosen as one of the data gathering methods because the author wanted to acquire a deeper understanding about the studied object. In addition, she wanted to be able to clarify the answers that she got from the interviewees, without disturbing the worldview of the interviewees with guiding questions. To add, the author wanted to be able to specify the questions as the interview proceeded. (Hirsjärvi & Hurme 2004)

The interviewees were selected in cooperation with key representatives from the case organizations, i.e., snowball sampling (See e.g., Biernacki & Waldorf 1981, p. 141) was applied to find out relevant interviewees. These representatives knew the employees of their organization and their skills and knowledge areas. The key representatives identified persons that had recently been involved in requirements engineering activities. The interviewees represented the following organizational levels in the provider and customers' organizations: middle-managers, product managers, project managers, domain experts, and clerical employees. The

number of people interviewed in each action research project is presented in the following Table 3.

Table 3. The number of people interviewed in each action research project

	Action research project 1	Action research project 2	Action research project 3
Number of people interviewed from the provider's organization	9	1	7
Number of people interviewed from the customers' organizations	0	2	9
Number of people interviewed from the customers' partner organizations	0	1	0
Number of researchers participating in the project	4	3	3
Interview themes and questions	See Appendix 1	See Appendix 3	See Appendix 4

The semi-structured theme interviews of this study concentrated on predetermined topics selected by the researchers, but the flow of discussion was free, hence; relevant topics emerging during the interviews could be talked through and the interviewee was able to answer to the questions in her/his own words (Eskola & Vastamäki 2001, Hirsjärvi & Hurme 2004). The interviewing method can also be called qualitative interviewing where interview participants are viewed more as meaning makers than passive information retrievers (Warren 2001, p. 83). The themes of the interviews in all the case studies were related to the co-design of an information system and business processes. The questions posed to each interviewee differed a bit from each other depending on the experiences of the interviewees. At least two researchers participated in every interview to get as rich data as possible: one researcher focused on interviewing the interviewee, whereas the other researcher focused on taking notes and observing the situation. After the interviews, the researchers discussed the striking and possibly unclear points.

Every interview lasted between one hour and one hour and a half. The interviews were first digitally recorded by permission of the interviewees, after which they were transcribed into text files word for word to maintain the connections created by them and to get implicit points

under examination. After that, they were analyzed by marking the relevant pieces of the text and classified into themes, and finally classified by type i.e., content analyzed.

All the collected data was stored in a case study database as recommended by Yin (1989). The electronic database was shared by the SimLab's researchers that had written a non-disclosure agreement. The main contents of the case study database are the tapes of the interviewees, process modeling sessions, and simulations, notes made by the researchers during the data collection, word-by-word transcripts, other material, such as interview questions, case planning notes, and power point presentation slides used during the case studies, and case study reports.

4.1.2 Process Modeling Sessions and Simulations

Knowledge about the business processes that the system to be developed needs to support was gathered through interviews, process modeling sessions, and process simulations, i.e., group-based data-gathering approaches, as Havelka (2002, p. 234) and Tuunanen (2003, p. 58) propose. In each case study, process modeling sessions and simulation days were organized by the researchers who acted as facilitators of the discussions. The number of process modeling sessions and number of people participating in the process modeling sessions and in simulation days is presented in the Table 4. In addition to these people, there were five to eight researchers making sure that the simulation day's practical arrangements functioned properly.

Table 4. The number of process modeling sessions and number of people participating in process modeling sessions and simulation days in each action research project

	Action research project 1	Action research project 2	Action research project 3
The number of process modeling sessions	5	4	2
The number of people participating in process modeling sessions from the provider's organization	2	0	7
The number of people participating in process modeling sessions from the customers' organizations	18	11	9
The number of people participating in simulation days from the provider's	13	2	7

organization			
The number of people participating in simulation days from the customers' organizations	16	10	18
The number of people participating in simulation days from the customers' partner organizations	0	5	0

The purpose of the process modeling sessions was to model and develop the business processes together with the provider and customer organizations' representatives. In addition, the purpose was to develop the information systems to better support the business processes. Hence, the models also represented how the customers use the information systems in their work activities.

Discussions during the process modeling sessions and the simulation days were recorded. Detailed notes were taken during the simulation days but some parts of the recorded tapes were also transcribed if there were some important parts related to the study's research questions. The notes or transcribed material from the process modeling sessions and simulation days were analyzed and thematically categorized.

> In all three case studies, ideas that emerged during the simulation day discussions were written down to post-it notes by the participants and put to a wall during the breaks. Other participants could review the post-it notes. Archival data included documents from the case companies that dealt with requirements specification and other company specific information, such as business model related information.

4.1.3 Questionnaires and Feedback Forms

During case studies one and three a questionnaire was designed to concentrate on finding out how customers could be involved in the information system development process. In addition, the purpose of the two questionnaires was to understand how information system development could be done cooperatively, i.e., the provider and the customers together. For example, the information system providers were asked how they saw that customers could be involved in the development process. On the other hand, the customers were asked how they would like to be involved in the development process. (See questions in Appendix 2 and Appendix 5)

The questionnaires were designed by the author and two other researchers and given to another researcher in order to test and improve the validity of them (Marshall & Rossman 1995). The questionnaires were handed to the participants of the simulation day immediately after the simulation. The questionnaires included open-ended questions and they were anonymous in order to elicit honest opinions. The answers to the open-ended questions were classified into themes.

The purpose of the questionnaires was not to gather quantitative data but to get more indicative answers. The advantage of a questionnaire is that the researcher does not need to interview all people, which is time-consuming, and people can answer to sensitive questions anonymously. The weakness of a questionnaire is that the respondent may understand the question wrongly and the researcher cannot specify the question in more detail. (Järvenpää & Kosonen 2000, Valli 2001)

The participants also filled in an anonymous feedback form at the end of the simulation days. The purpose of the feedback forms was to find out what kind of development ideas regarding the participants' own work processes the simulation day had created and how the participants are going to implement them in their work. The data from the feedback forms was first categorized and then put into themes. All the data was analyzed by two researchers.

4.1.4 Observation and Archival Data

The researchers observed the discussions of the kick-off meeting, process modeling sessions, the preparation meeting, the process simulation days, and the feedback sessions (See chapter 2.2.1 Business Process Development Method). Observation was more holistic than structured in nature (Marshall and Rossman 1995), and the researchers made free-form notes during the discussions. After each meeting, the researchers together talked through the notes and observations taken during the discussions. The purpose of observation was to give background information to the researchers and also to understand the collaboration atmosphere between the provider and its customers.

Archival data of this study consists mainly of information system design documents which are confidential, visual process models prepared by the action researchers of the case, and case organizations' annual reports and other development project related documents.

Other material include documents such as service chain descriptions developed by the provider, annual report 2005 of the provider, annual report 2005 of the customers, requirements specification for a customer relationship management system developed by the provider, project documents/reports of former system development projects by the provider, a report documenting customer interviews conducted by the provider, power-point presentations about the information system structure, documents provided by the customers during the process modeling sessions, and process models modeled by the provider.

Number of pages analyzed in the study is summarized in the Table 5. The data was divided into two: transcribed material and notes from the meetings. The three case studies generated altogether 886 pages of transcribed material or notes to be analyzed.

Table 5. The number of informants, transcribed material, and notes from meetings in the three case studies

	The number of informants	**Transcribed material**	**Notes from meetings**
Case study 1			
Process modeling sessions	20		36 pages
Interviews (individual, group, and follow-up)	9	26 pages	7 pages
Simulation day	29	60 pages	
Group works	29	79 pages	
Kick-off notes, simulation preparation notes, feedback session notes	35		17 pages
Other material			207 pages
Altogether 432 pages			
Case study 2			
Process modeling sessions/group interviews	11	55 pages	30 pages
Interviews (individual, group, and follow-up)	4	74 pages	12 pages
Simulation day	17	51 pages	
Group works	17	14 pages	8 pages
Kick-off notes, simulation preparation notes, feedback session notes	20		7 pages

Other material			22 pages
Altogether 273 pages			
Case study 3			
Process modeling sessions	16		21 pages
Interviews (individual, group, and follow-up)	16	26 pages	8 pages
Simulation day	25	28 pages	16 pages
Group works	25	15 pages	
Kick-off notes, simulation preparation notes, feedback session notes	28	29 pages	38 pages
Altogether 181 pages			

4.2 Data Analysis

According to Miles and Huberman (1994, pp. 10-12), the analysis of qualitative data consists of three concurrent flows of activity that are data reduction, data display, and conclusions drawing and verification. Data reduction means selecting, focusing, and transforming the data that is in written-up field notes and/or transcriptions. Data display means that the data is organized and compressed so that conclusions can be drawn from it. Drawing conclusions means that the researcher finds out explanations, causal flows, and propositions. Conclusions also need to be verified. Analysis of qualitative data is very much dependent on displays that compress and order data to permit drawing coherent conclusions (Miles & Huberman 1994, pp. 1).

During the case studies, the author applied visual mapping strategy to analyze all the data that she got from interviews and process modeling sessions. Visual mapping in a form of a process model suited well in the analysis of process data because it allowed a representation of a large number of dimensions, such as precedence, parallel processes, and the passage of time (Langley 1999). Visual mapping also allowed showing the participants of the simulation days the data gathered so far. To add, process models acted as a tool for the further development of ideas that had emerged during the process modeling sessions.

After each case study, the researchers made a content analysis of all the data. First, the researchers carefully read through all documented data which included observation notes, process modeling sessions' notes, simulation day notes, group works, the answers to the feedback

questionnaire, and a research questionnaire in case studies one and three. Then, the researchers grouped the data into themes. After presenting the case results, the author compared the emerged themes against her theoretical background, i.e., the conceptual framework. Finally, the author reached a closure when she could not find any new themes emerging from the data. (See Figure 16)

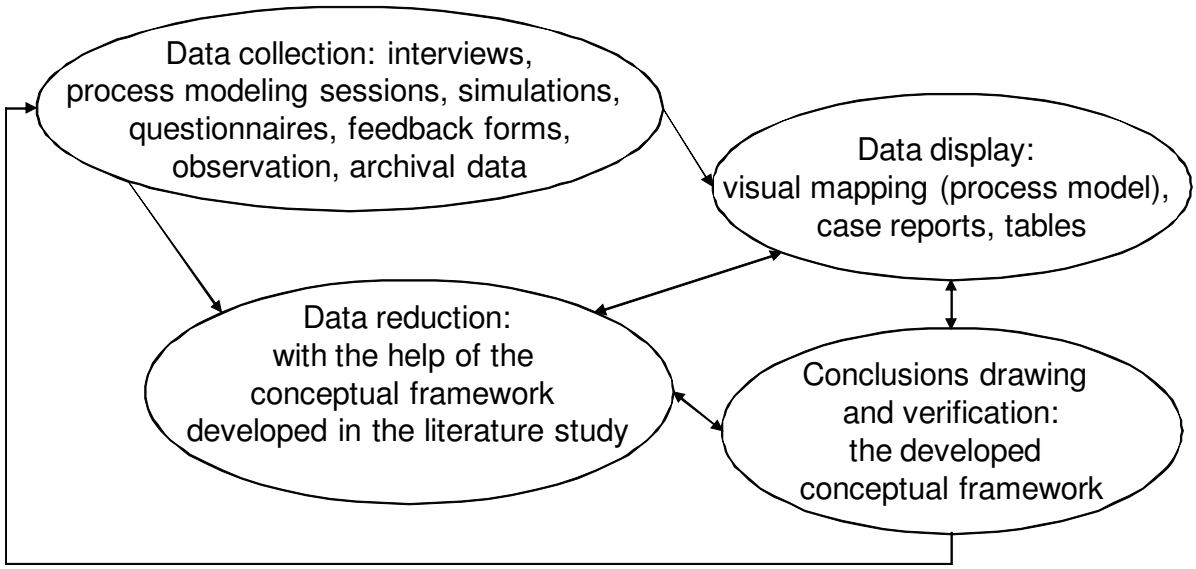

Figure 16. The components of data analysis in this thesis (modified from Miles & Huberman 1994, p. 12)

As part of the developmental action research project, a report of the case's development and results was made and handed to the key informants of the case organizations. The key informants checked the report and suggested improvements which were together discussed. Finally the researchers, together with informants, agreed what to change in the report. In addition to possible incorrect information, the informants were asked to point out any issues considered important. The researchers also presented the content of the report to the participants of each case study in a feedback session of which purpose was to get insights on the findings of the persons who actually participated in the case.

Nowadays computer software for qualitative data analysis (QDA) is often recommended because it makes the data more easily accessible, speeds up the analysis, and makes the data more systematically and better reported. However, data analysis can also be done manually: this study does not apply any QDA software simply because of

the cost-benefit considerations in the case of a relatively small volume of data.

4.3 The Empirical Research Process: an Iterative Process of Data Collection and Analysis

The data collection and analysis was an iterative process, i.e., insights that emerged from early data collection had an impact on the next round of data collection, i.e., the next case study. The data collection in the beginning of the research process also led to refined research questions and the collection of more data. Hence, data collection and data analysis overlapped, while the resulting findings were compared to existing literature, with the aim of raising the work's theoretical level. (Eisenhardt 1989) According to Patton (1990, p. 378), overlapping of data collection and analysis improves the quality of data that is collected and the quality of the analysis. However, he reminds researchers not to allow initial interpretations to distort additional data collection.

The Figure 17 reflects the data reduction and analysis methods used in this study. First, a conceptual framework was developed to synthesize the literature study and to create boundaries to the empirical study. The framework entails the following themes: business process, information system, business knowledge, information technology knowledge, facilitator, business process modeling, simulation, and interdependencies between the customers and the provider.

Then, data was gathered by conducting interviews, observing, two questionnaires, process modeling sessions, and simulation days. In addition, data was gathered from archival data, post-it notes, and group works. The huge amount of data was first categorized into open themes that were compared to the themes in the conceptual framework. Visual mapping, in a form of process models, was applied to organize the open themes into maller number of themes.

A new finding, possibly a new interdependency between the provider and the customers during requirements elicitation, led the author to go back to literature and check whether some researcher had already found it. The author applied Thompson's (1967) task interdependencies in the analysis. When the author could not found the new interdependency in the literature, she made modifications to the list of themes and tried to explain the emerging theory. Finally, the author compared the themes against the conceptual framework and made some modifications to it. The rather "static" conceptual framework was changed into a process

model of co-designing business and IT systems during requirements elicitation. In addition, the author suggested a new interdependency to coordination literature.

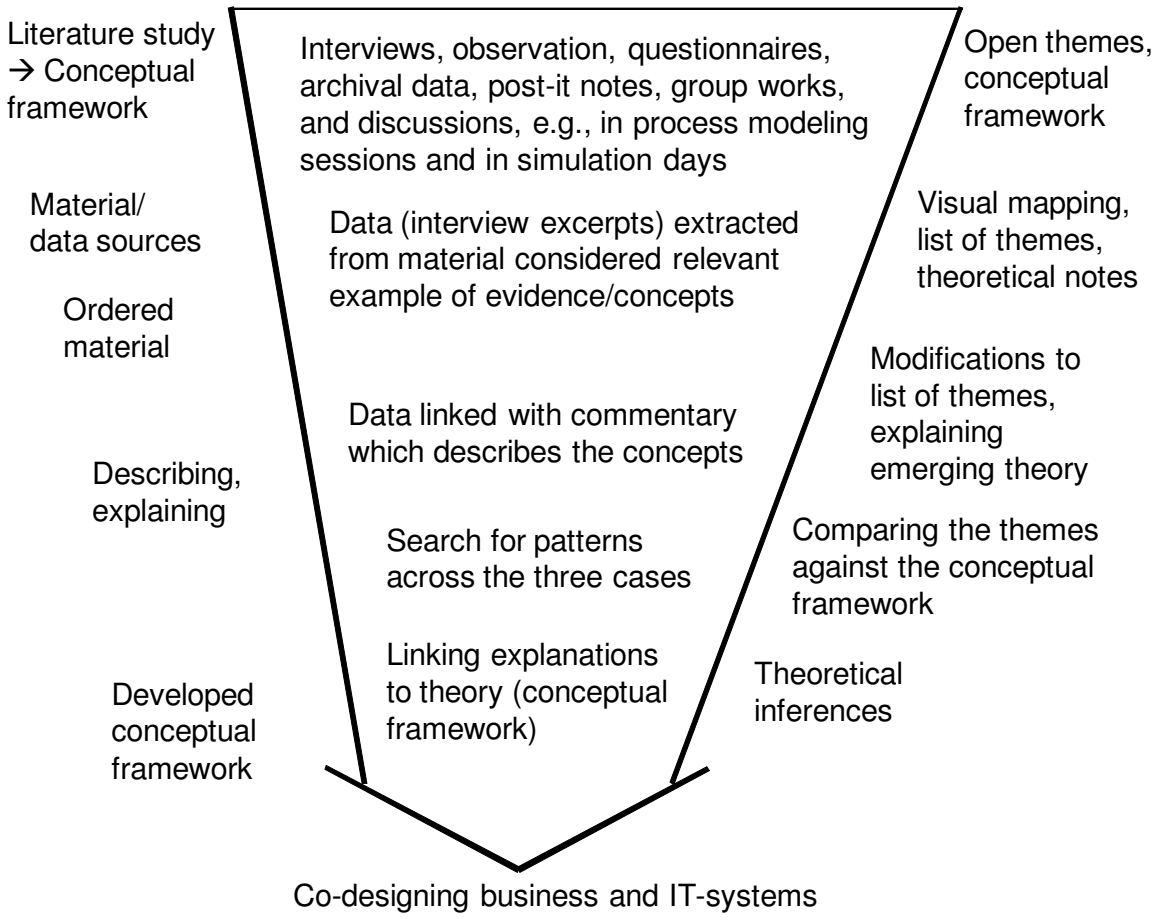

Figure 17. Collecting, managing, and analyzing data in the thesis (modified from Zalan & Lewis 2004, p. 517)

5 Empirical Study

The purpose of the empirical study is to answer to the research questions based on three case studies that have been conducted as action research projects. Next, the three case studies and their action research projects will be shortly introduced. Then, data gathering and analysis methods are presented in more detail, and their data are described. Finally, the cases are analyzed using the conceptual framework developed in the literature study.

5.1 Introduction to the Three Case Studies

The research was undertaken in Finland's financial sector. The Finnish banks have globally been among the earliest and most advanced adopters of IT. Over the years, the systems have started to suffer from the burden of various new developments of software and hardware being added to the existing systems. In addition, new information systems have been built for almost every new business need, with poor interoperability with other systems. This has led in the banking sector to many information systems that do not communicate sufficiently with each other. Al-Karaghouli et al. (2000) report this same situation in the retail sector in the UK.

The three case studies of this thesis describe the development of an already existing specific integrated information system for banks. The development is conducted by the IT provider in collaboration with its customer banks. The existing system is composed of many different subsystems for different purposes, e.g, customer acquisition, customer relationship management, product management, and Internet application management. The focus of each case study is on the interdependencies between the IT provider and its customer banks during requirements elicitation.

The starting point of the IT systems development effort was that the present IT system was quite complex and included a large amount of interconnections between different subsystems. However, the subsystems were not sufficiently integrated to exchange data which meant that bank clerks need to enter the same data into many subsystems when, e.g., opening a new customer account and a bank account for the customer. This was very time-consuming. The system contains a huge amount of lines of code. The development of such a system requires the capabilities of many programmers, i.e., a large development team.

The reason for the existence of an information system that does not meet all the business

needs is that the system is so called “ready system” that was bought from a third party and fitted into the customers’ already existing subsystems. The reason for buying a ready system was that the customers had wanted certain functions quickly into use. The ready system turned out not to satisfy the business needs: it required changes in the customers’ way of working. The ready system’s implementation project proceeded on time but the customers had problems in changing their way of working.

In the digital economy of today, customers switch banks easily, and the banks face a fierce competition. Less clerical time should now be spent in operating the information systems and more time in active selling and acquiring new customers. There is a clear need in the banks to develop their information systems to meet the new needs of the rapidly changing digital customer service business.

The research was started in August 2006 and it was finished in November 2007. During this time, three case studies were carried out as three separate action research projects. The case studies concerned the early phases, i.e., requirements elicitation, of the IT provider’s system development project with three different customers A, B, and C operating in the banking sector. The three customers are three different bank groups. Each bank group consists of many banks that each have many bank offices around Finland. In the case studies, only few banks represented the customers A, B, and C. In the second case, there were also two partner organizations of the customers. The names of the organizations are not revealed for reasons of confidentiality. The parties of each case are presented in the Figure 18. The parties wanted to elicit the business requirements for the information system and customers’ business processes, and thus develop the information system and the customers’ business processes.

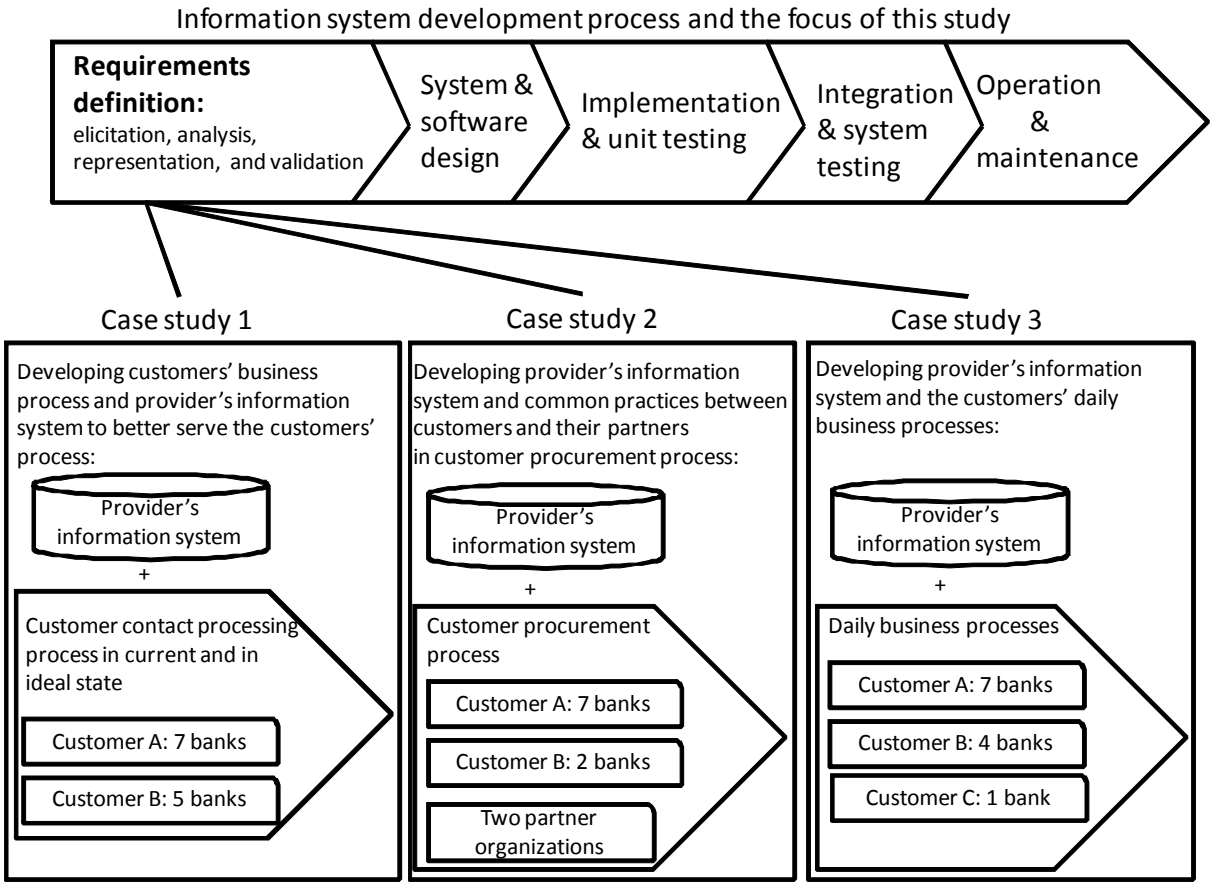

Figure 18. The focus of the study in the provider's information system development process and the purpose and the parties in the case studies

Four researchers were altogether involved in the three action research projects, and the author acted as the project manager of the first and the third projects. She took part in every data gathering event: 1) the interviews during each action research project and thereafter during the follow-up periods, 2) the process modeling sessions, and 3) the simulation days. The author also developed, with the help of another researcher, two questionnaires used in the first and in the third case studies. The origins of data in the three action research projects are presented in the table (See Table 6). All interviews and process modeling sessions were recorded, because no-one of the interviewees objected that practice. The interviewees were promised anonymity: nothing they said was attributed to them personally, to anyone else within, or outside their organization. Detailed notes were taken during the process modeling sessions. The interviews and the simulation day were transcribed.

Table 6. The origins of data in the three action research projects

	Action research project 1	Action research project 2	Action research project 3
Interviews	x	x	x
Process modeling sessions	x	x	x
Simulation day discussions	x	x	x
Observation	x	x	x
Group works	x	x	x
Post-it notes	x	x	x
A feedback questionnaire	x	x	x
A research questionnaire	x		x

Before this study, i.e, before the action research projects, the IT provider had already conducted a preliminary study that showed that the customers, i.e., the end-users, of the information system were not satisfied with its subsystems. For example, certain subsystems were neither reliable nor effective enough.

The common objective for the three action research projects was to develop certain subsystems in the already existing information system. The focus was on the early phases of the information system development process, i.e., the requirements elicitation phase. The parties of the cases, i.e., the customers and the information system provider, did not share a common language for communication because they had different backgrounds in education and in working life.

Thus, the first case study focused on developing common understanding between the parties about the information system development project and also developing cooperation atmosphere. The second case study focused on understanding the customers' business processes and how the information systems are applied in supporting the process. In addition, the focus was on understanding customers' new business requirements that the system should support in the future. The third case study also focused on understanding certain business processes of the customers and developing improvement ideas. The case studies are later described in more detail. Next, the information system provider and the customers are introduced in more detail.

5.1.1 Information System Provider

The information system provider is a Finnish software company that supplies IT systems for banking and related support services. It gathers information system requirements for its IT development efforts from different sources: 1) customers for example via email, support lines, and reference groups that are organized by the provider twice a year, 2) from customers' customers, i.e., retail and corporate customers, 3) from its own employees, and 4) by benchmarking competitors.

In the development of information systems, the provider uses third-party organizations, such as IT consultancy companies. Thus, the provider is not always the party that actually implements the changes in the information system of the customer but acts sometimes as an intermediary between the end-users and programmers. In the three case studies of this thesis, the provider acted as an intermediary. The provider's objective was to understand the customers' business requirements and write a requirements specification document that could be handed to the third party that then would take care of the actual programming. The requirements specification documents were finished one year after the last case study. One representative from the provider's organization that was interviewed described her role in the requirements elicitation phase and in the later phases of the requirements engineering process:

> For me it is essential that in the requirements specification document I can describe in great detail what we and our customer organizations want from certain functionalities. I need to describe in detail how certain functionalities should work in practice. After that, we and the third party will examine together the requirements and determine what information is still needed to have detailed enough specifications for them to implement the functionality. Then, the third party tells their opinion on how the functionality should be technically implemented. Finally, we together determine the best possible way to implement it.

Some of the provider organization's employees that participated in the three case studies had a background working in the banking sector. The employees regarded this as a strength in understanding their customers' business and its needs. One representative from the provider's organization described this advantage in the following way:

> I started working here six months ago, after over fifteen years of working in a customer organization. Hence, I happen to be fortunate in having the knowledge of customers' business processes. I already know what their needs are but of course the wants and needs change all the time. We need to stay in contact with the customers and their union representatives.

5.1.2 The Customers of the Information System Provider

In this study, the focus is on three customers A, B, and C. The customers are important share-

holders of the provider organization. The three customers are three different bank groups. Each bank group was represented by few independent banks of each bank group. The provider grouped these three customers into one customer group, which turned out to be quite challenging during requirements elicitation because the customers' requirements differed from each other a lot from time to time.

The customers A, B, and C had common problems regarding their information systems. There were too many information systems that were not well integrated. This had led for example to the situation that opening a new customer account took a lot of time. This did not actually bother the customers of the customers A, B, and C because the opening of the account could be done in the back office after the customer had left the meeting. But the customers A, B, and C suffered from inefficient operations in their critical customer acquisition process. To add, it also took a lot of time to educate new bank clerks to use the diverse information systems efficiently. Hence, the customers A, B, and C wished that their information systems would be developed so that they would better support their business processes.

5.2 Descriptions of the Three Case Studies' Research Process

Next, the research processes of the three case studies are described in detail. The descriptions follow the temporal ordering of each case study, i.e., the phases in each respective action research project: kick-off meeting, process modeling sessions, interviews, the meeting for preparing the simulation, simulation day, and feedback session. The phases of the three action research projects are presented in the Figure 19. The aim has been to describe the research process in such a detailed level that it helps the reader to evaluate the research process. Another aim is to make the research more accessible to the reader.

Case Analysis during the Action Research Projects

All the process modeling sessions were tape recorded to ensure that all data could be gathered. In addition, one researcher was all the time taking notes during the sessions. After each process modeling session, the researchers modeled the processes electronically with Visio. In addition, the researchers analyzed all notes and listened to the recorded tapes to prepare a short report summarizing all data gathered so far. Each simulation day was followed by few weeks analysis period during which the researchers analyzed all data and wrote a case report to the organizations involved in the project. The reports were presented to the representatives

of the organizations.

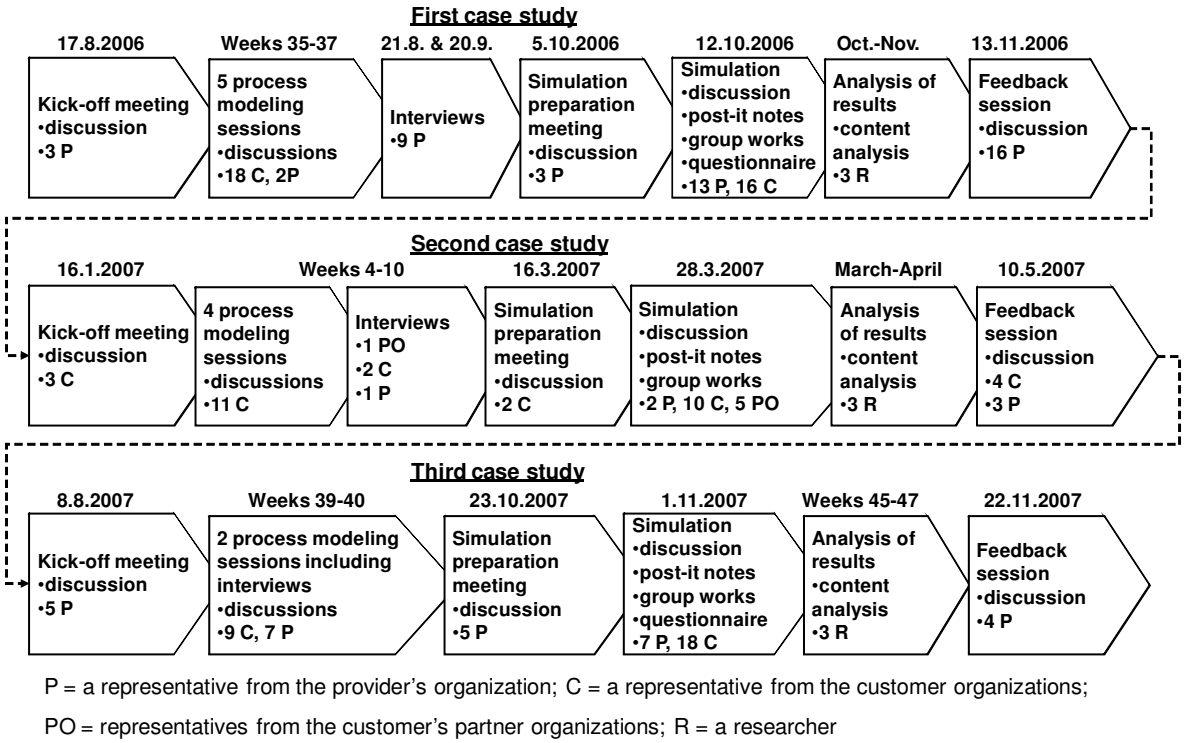

Figure 19. The phases of the three action research projects

5.2.1 The First Case Study: Developing the Information System to Better Meet the Customers' Business Needs

Background

The first case study took place between August 2006 and November 2006. It involved the information system provider, later called the provider and customer A and customer B. The objective of the project was to develop the already existing information system to better meet the business needs of the customers. The aim was to model the customers' customer contact processing process in its current state and in the ideal state, and to find out how the information system could better serve these business processes. (See Figure 20)

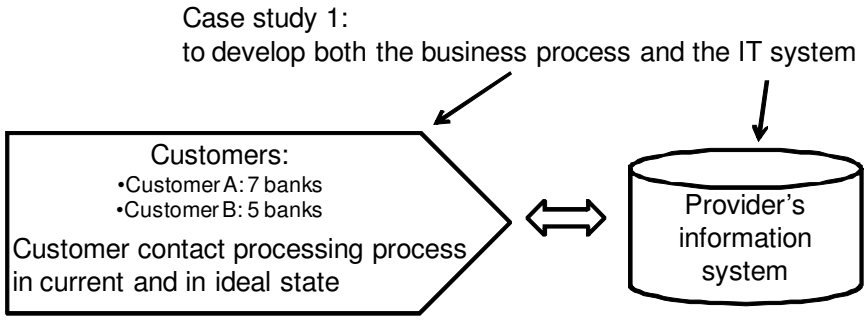

Figure 20. The business process and the parties of the first case study

There were three reasons for involving the customers in the early phases of the requirements elicitation process. The first reason was that the provider thought that it could better improve the information system if it would get direct input from the customers. The second reason for involving the customers closely in the development of the information system was that the provider wanted to minimize the number of costly re-makes. There was a common understanding between the provider and the customers that the information system should support the customers' business and not the other way around. A third reason that was not communicated to the customers was that minor and/or major innovations were expected to emerge when involving the customers in the development process.

Four action researchers participated in the case study. The author acted as a project manager of the project. The objective of the researchers was to find out customers' business requirements, and to find out how these business requirements could be met by the information system. Business process modeling was selected as a tool to achieve this objective, because it has been succesful in developing common understanding between the participants (See Jaatinen & Lavikka 2008; Jaatinen, Södergård & Peuhkurinen 2005) and in generating improvement ideas for the future development process (See Smeds and Haho 1995, Smeds 1997, Smeds and Alvesalo 2003, Forssen and Haho, 2001, Haho, 2002). In addition, process simulations as action research interventions increase the participants' process understanding (Smeds and Alvesalo 2003, Haho 2004, p. 250). In the following, the phases of the action research project are described in more detail.

Kick-off Meeting and Process Modeling Sessions

The researchers organized a kick-off meeting on the 17th of August 2006 to set the objectives for the case study. In addition to the four action researchers, three representatives from the

provider's organization were involved in the meeting: a product manager, a domain expert, and a project manager.

After the first meeting, three researchers organized five process modeling sessions in different banks' bank offices of the customer A and customer B all around Finland. The sessions were held during weeks 35-37. The participants from different organizations are presented in the table (See Table 7). The purpose of process modeling sessions was both to develop the customers' business process and to understand how the information systems should be developed to support the business process better. The participants of the sessions were also group-interviewed to find out development ideas for a desired state process model.

In the process modeling sessions, the researchers modeled the customers' customer contact processing process in current state with the help of customers' representatives. They described the activities of the business process and how they use the different information systems in the process. Two provider representatives that were present in every process modeling session asked clarifying questions during the sessions. They were not allowed to interfere in the process modeling activities in any other way to make sure that they do not disturb the sessions.

Customers' customers are retail or corporate customers. The modeled business process describes how the customer A and customer B use the Internet-based information system when processing a customer contact. First, the process was modeled onto a wall with the help of post-it notes, after which the researchers modeled the process electronically with Visio.

Interviews

Researchers also interviewed nine representatives from the provider's organization. The purpose of the interviews was to get a holistic picture of the different information systems that the provider provides to its customer organizations. In addition, the purpose was to find out how the information systems are going to be developed in the future: the key development objects and schedule. To add, the researchers wanted to know how customers are involved in the development projects and how the provider sees they should be involved in the future.

Simulation Day

The simulation preparation meeting was organized on the 5th of October 2007. Three representatives from the provider's organization participated. The purpose of the meeting was to

plan the activities of the simulation day. The researchers had prepared a preliminary agenda for the day that was then modified together.

The simulation day was organized on the 12th of October 2006. The participants from different organizations are presented in the table (See Table 4). The researchers, together with the provider, tried to select the lead users to the simulation day, because they provide better opportunities to lively discussion around the business and information system development. In this study, lead users are employees of the customers that use an information system that currently experiences business needs that are still to be met by the information system. Lead users are usually willing to help in the development of the information system, because they greatly benefit when they obtain the solutions to their needs. Von Hippel (2005) also recommends taking lead users into the development projects.

5.2.2 The Second Case Study: Developing Common Practices in Customer Procurement and Finding out Information System Requirements

Background

The second case study took place between January 2007 and May 2007. It involved the provider, customer A, customer B, and two partner companies of the customers. The objective of the development project was to develop common practices between the different parties when acquiring new customers to the customers of the provider. In addition, the aim was to recognize information system requirements in customer procurement. (See Figure 21)

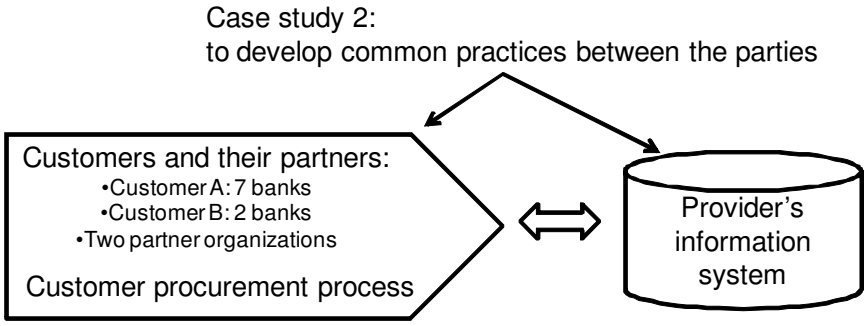

Figure 21. The parties of the second case study

Three action researchers, including the author, participated in the case study. The objective of the researchers was to find out the suitable common practices for the different parties to pro-

cure new customers. In addition, the aim was to find out the information system requirements in customer procurement. Business process modeling was again selected as a tool to achieve this objective.

Kick-off Meeting and Process Modeling Sessions

The researchers organized a kick-off meeting on the 16th of January 2007 to set the objectives for the case study. In addition to the three action researchers, three customer representatives were involved in the meeting. After the first meeting, researchers organized four process modeling sessions in different bank offices of the customer A and customer B all around Finland. The sessions, which resembled thematic group interviews, were held during weeks 4-10. The participants from different organizations are presented in the table (See Table 7). In the sessions, the researchers modeled the process how customer A and customer B can together require new customers. This included the process of marketing, contacting customers, and handling of customers.

Interviews

The researchers also conducted four individual interviews: one representative from the provider's organization, one representative from customer A, and two representatives from two different partner organizations of the customers were interviewed. The purpose of the interviews was to understand the partner organizations' viewpoints to the collaboration in system development. In addition, the purpose was to understand the information system requirements to be met by the information system. The representatives from the different organizations were selected based on their role in their organization and their knowledge of the developed subject.

Simulation Day

The simulation preparation meeting was organized on the 16th of March 2007. Two representatives from one of the banks of customer B participated in the meeting. The purpose of the meeting was to plan the activities of the simulation day. The researchers had again prepared a preliminary agenda for the day that was then modified together.

The simulation day was organized on the 28th of March 2007. The participants from different organizations are presented in the table (See Table 4). The researchers, together with the customers A and B of the provider, tried to find the employees from the banks that were experts

in the banking business to the simulation day because they were considered to be the best ones to suggest development ideas to the business processes and to the information systems.

5.2.3 The Third Case Study: Developing Daily Business Processes and Information Systems

Background

The third case study took place between August 2007 and November 2007. It involved the provider, customer A, customer B, and customer C. Three action researchers, including the author, participated in the project. The author acted as the project manager of the project. The objective of the development project was to model and develop the daily business activities of the customers, such as opening a new account, withdrawing of money, lending operations, and answering to customer requests, with the help of the customers' representatives. In addition, the aim was to develop improvement ideas related to the information systems. Business process modeling was again selected as a tool to achieve this objective because it worked well in the first two development projects. (See Figure 22)

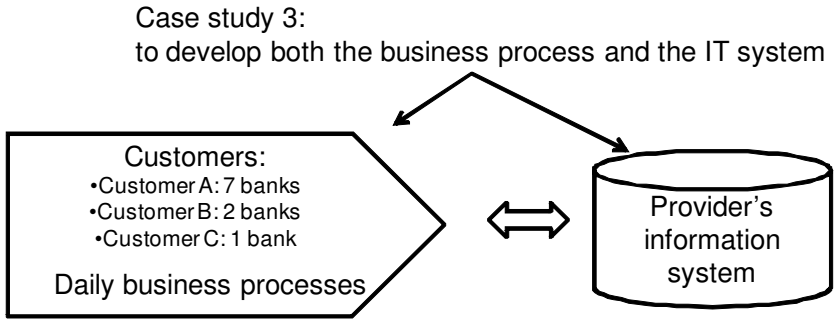

Figure 22. The business process and the parties of the third case study

Kick-off Meeting and Process Modeling Sessions

The researchers organized a kick-off meeting on the 8th of August 2007 to set the objectives for the development project. In addition to the three action researchers, four representatives from the provider's organization were involved in the meeting. First, there was not a general agreement whether the project should focus on modeling the current or the desired business processes of the customers. Finally, an agreement was reached that the process modeling sessions should examine the daily business activities of the customers and how they used the information systems to support those activities.

After the first meeting, researchers organized two process modeling sessions. The sessions were held during weeks 39-40. The participants from different organizations are presented in the table (See Table 7).

Interviews

The researchers interviewed a middle-manager from the provider's organization. The purpose of the interview was to know how the information systems are going to be developed in the future: the schedule, how the customers are going to be involved in the development project, and to which direction the information system development should go.

Simulation Day

The simulation preparation meeting was organized on the 23rd of October 2007. Five representatives from the provider's organization participated in the meeting. The purpose of the meeting was to plan the activities of the simulation day. The researchers had prepared a preliminary agenda for the day that was then modified together.

Simulation day was organized on the 1st of January 2007. The purpose of the simulation day was to build common understanding about the modeled business processes of the customers. In addition, the purpose was to create development ideas to the information systems so that they would better support the business processes. The participants from different organizations are presented in the table (See Table 4). They were selected together with the representatives from the provider's organization. This model had worked in the two previous simulations: the discussions were lively and good ideas were gained, partly because the right people were involved in the simulation day.

Table 7. The number of participants in process modeling sessions of each action research project. The number of process modeling sessions in each project varies.

	Action research project 1	Action research project 2	Action research project 3
The first process modeling session: The number of people from the provider's organization / The number of people from the customers' organizations	2 / 4	0 / 3	3 / 6
The second process modeling session: The number of people from the provider's organization / The number of people from the customers' organizations	2 / 4	0 / 4	4 / 3

The third process modeling session: The number of people from the provider's organization / The number of people from the customers' organizations	2 / 2	0 / 2	
The fourth process modeling session: The number of people from the provider's organization / The number of people from the customers' organizations	2 / 2		
The fifth process modeling session: The number of people from the provider's organization / The number of people from the customers' organizations	2 / 3		

5.3 Review of the Findings

Next, the findings from the three case studies, i.e., action research projects, are described. The data from the three case studies is organized according to the theoretical themes: Customer's business knowledge and provider's IT knowledge, the role of the facilitator, business process modeling and simulation in gathering requirements, and the interdependencies between the customer and the provider during requirements elicitation. These themes were presented in the conceptual framework (See Figure 15) and they are elaborated in the analysis chapter (See chapter 5.4 Analysis of the Cases).

The basis for the case interpretations is illustrated by direct citations from the interviews, process modeling sessions, questionnaires, and/or simulations. The aim has been to describe the data in such a detailed level that it helps the reader to evaluate the conclusions made by the researcher. The interviews were held in Finnish. All citations in the thesis are translated by the author into English.

5.3.1 Findings from the First Case Study: Understanding the Complexity of the Information System Development Project

Customer's Business Knowledge and Provider's IT Knowledge

During the simulation day, the representatives from the customers' organizations and the representatives from the provider's organization discussed together around the current state and desired state process models with the help of the researchers, i.e., the facilitators of the discussion, and tried to improve both the business process and the information system in parallel. The customers had taken into use the information system years ago, though; some new subsystems and features had been taken into use just about two years ago. Thus, the customers

could present what needs the information system is not yet meeting. On the other hand, the provider representatives told what kind of possibilities the technology offers to develop the information system.

The Role of the Facilitator

The facilitators needed from time to time activate some of the customers' representatives because they did not comment anything, although they had commented in process modeling sessions where a smaller number of people were present. The activation was provoked by making the participants discuss certain parts of the business process in pairs. This showed that there were some strong personalities in the audience that disturbed some customers' representatives telling their opinions.

Business Process Modeling and Simulation in Gathering Requirements

The participants of the simulation day developed together many good ideas how to develop the processes and the information system to better meet the business needs. Some of the development ideas were decided to be implemented soon in the future by the provider, whereas some of the ideas required a bigger project to be implemented. A bigger project was needed by the requirements that at first sight seemed to be requiring many hours of work and resources, i.e., they required financial investments. The customers also got ideas how to develop their business process.

During the simulation day discussions, it became clear that the adoption phase of the newest subsystem had not gone so well. When the new subsystem was introduced, the purpose of the new system was not quite clearly communicated to the customers. This led to the situation that the customers used the system in a wrong way for a wrong purpose. To add, the customers did not feel a need to start using the system they thought they did not need. One of the customer A's representatives that participated in one of the process modeling sessions described her thoughts toward the system in the beginning of the adoption:

> When we started to use this system [the name of the customer relationship management system is not revealed for the reasons of confidentiality], I was very skeptical toward it. We had bookkeeping by hand and we compared our bookkeeping to the system's bookkeeping and sometimes some data was missing from the system. The system is very clumsy from the user's point of view. When I open the system in the morning, I would like it to stay open all day but it does not. I have to log in again once in awhile. The password is very complex. The system irritates me a lot. I have not learned to use it but I know how to search certain things in there.

Another participant agrees with the former opinion:

> The system is functionally very difficult to use. The system seems unnecessary. No information is automatically stored in it. I have to enter all the data into two different systems.

The answers to the feedback form of the simulation day showed that the discussions about the challenges faced with the subsystem were regarded beneficial: it cleared the collaboration atmosphere so that the customers' representatives and the provider representatives could work efficiently together in group works to develop the ideas further.

After the project, researchers did one follow-up interview. It was held on the 30th of May 2007 and two representatives from the information system provider's organization participated in the interview: a project manager of the information system development project and a middle-manager responsible for the development of a certain subsystem. The name of the system is not revealed for reasons of confidentiality. The middle manager told us that the project was bigger and more complex than they had thought:

> The development project is still going on [after six months]. The project was bigger than we had imagined and the investments are much bigger than first calculated. This development project will continue for many years. The project we did with you showed us how complex this issue is. The development will take many man-years to be completed. In addition, we need to think about risks. How do we cope with them?

The provider did not know how to continue developing the subsystem with the business process models. The provider thought that it was good to know the current state business process, but the provider did not know how to use the desired state model, because it was on a too abstract level. The desired state process model needed to be modified, i.e., to cut into smaller pieces which could then be analyzed. The requirements document could not be otherwise written. The middle manager described the situation:

> We identified the business requirements and business processes with your help through the process modelings and simulation. However, that is just the top of an iceberg. We still need to do a lot of development with the subsystem. We do not yet know how to proceed. In the next project with you, we need to take these modeled processes and go deeper into them. We need to know in more detail what information goes in and out of the system.

The provider had identified many possible routes for the information system development but it was difficult to choose between them. Furthermore, the provider was concerned which technology would be the most beneficial when developing the information systems. The project manager of the information system development project described the situation:

> We should find a common understanding about what to do next with the information system development project. We have many technological opportunities. We have one particular technology in mind that should be studied in more detail. This should be done during this autumn.

The provider was also asked about the possibility of using service oriented architecture because they had earlier discussed that it could be one possible solution to reconfigure the system platform into a more manageable one.

> According to Pisello (2006), the idea of service oriented architercture is that services-centered application and IT infrastructure are assembled flexibly which supports the changing business demands. In addition to the better alignment of business and IT, companies can gain improved productivity, faster deployment, and improved agility. Jakobsen et al. (1997) have also argued that the effective use of service oriented architecture can provide business value.

The middle manager was not yet sure and it seemed too big a project for him:

> Maybe but it would be a large project that would require many years of man-hours. I personally do not want to do it but someone else in our company can do it. We need to know how to manage that kind of a project. The number of man-hours required is large. Who would like to be the project manager of that kind of a project? First, we need to find the business processes of our customers and simplify them.

The Interdependencies between the Customer and the Provider during Requirements Elicitation

In the beginning of the new subsystem's introduction the customer A and customer B had great expectations toward the new system, but in reality those expectations were not met: the system was neither reliable nor effective enough. This caused the customer A's and customer B's representatives feeling stressed: they felt being dependent on the system that could lose important customer information. The customers also reported that the new subsystem included a huge amount of features that are not used even now after two years of the system's introduction. The provider wondered whether this was caused by too few training sessions. Right after the introduction of the new system, training was organized but after that there were only few training sessions that could cover only the basic features of the system. Because lack of training sessions, the customers' representatives felt they could only use the basic functions effectively. However, the customers would have wanted to have more training in using some of the features of the subsystem. The challenge seemed to be that the customers had not budgeted for extra training sessions.

The customers also reported that some tasks were difficult to perform using the subsystem. The system was not designed for performing certain tasks which also meant that the system was difficult to use. Hence, the functionality of the system was still to be improved. This also caused the customers stress situations. For example, customer B reported that they could not trust the system, so they entered data both to the system and to an excel document to have a backup for data. Some of the banks of the customer A did not even use the system but wrote down notes using paper and pen during the discussions with their customers. The provider admitted that the usability of the subsystem was not yet as good as it should be but the usability problems were noticed and they would be handled later on. One of the customer A's representative reported the situation as follows:

> This subsystem is so different from the other information [sub]systems. It does not work as the other ones. It is also quite heavy to use and difficult. It is somehow separated from the other systems and it slows down the customer service even though its purpose was to make it quicker. The system logs you out after two hours if you have not used it and then you need to log in again. We were told that a new system is coming [to solve some problems] but the employees got tired when the expectations were not met.

When we asked the provider whether they knew about the development ideas, they replied that they knew many of them. The challenge for them was to know which development ideas were worth of implementing. The provider could not evaluate which development ideas were the most critical ones to implement next. Every development idea needs to be evaluated to know how many working hours it takes to implement and how much it costs to the provider and to the customers. In addition, it needs to be evaluated how much the customers are ready to pay for certain functions.

The questionnaire of the study was filled in by the participants of the simulation day before leaving. Twenty-six participants out of twenty-nine participants answered to the questionnaire: sixteen representatives from the provider's organization, i.e., all responded, and ten out of thirteen representatives from the customers' organizations answered. The questionnaire asked the customers' representatives what kind of benefits and disadvantages involving the customers in the information system development bring. All the sixteen representatives from the customer organizations found benefits in participating in the information system development. Three kinds of benefits were listed: One of them was that the developer gets straight feedback from the users, such as what are the problems in the current systems and how the customers use the system in practice. Another benefit was that the business needs of the cus-

tomers are discovered. The third benefit was that the customers are able to participate in the direction of the information system development.

The three respondents from the customers hoped that they would be taken into the development process of the information system early enough, because they thought they knew the system best: seven respondents wrote they were able to tell the problems in the information system. To add, two respondents thought they were able to describe how the system is used in practice in the business process. One respondent wrote that the users are able to suggest many development ideas to the system.

The customers' representatives also listed three kinds of disadvantages in participating in the information system development: One of them was that it takes a lot of time to participate in the development and other tasks in the bank tend to pile up meanwhile. Another disadvantage was that the participation in the development was not awarded in anyway. The third disadvantage was that the needs of the different customers differed somewhat.

The questionnaire asked the provider representatives how they involve their customers in the information system development. One respondent wrote that customers are nowadays involved in different phases of the information system development. According to the respondent, the challenge was to get customers express their ideas and thoughts genuinely.

The questionnaire also asked what kind of benefits and disadvantages there were to involve customers in the information system development process. Three kinds of benefits were listed: the customers get a chance to express its development ideas, the customers can bring in their business knowledge, and a lot can be learnt from the customers. The disadvantage of involving customers was that it is difficult for the customers to stop thinking about the current business and focus on the future business.

5.3.2 Findings from the Second Case Study: Understanding Customers' Business and Information System Requirements

Customer's Business Knowledge and Provider's IT Knowledge

An interviewee from one of the banks of customer B was asked why a customer relationship management subsystem was not widely used in the banks. The interviewee's personal opinion was that there were so many challenges and problems with the usage of the system that it was

no wonder that the system was not much used:

> First of all, there was not enough change management when the banks' new way of working was launched. Neither was there change management when starting to use the system that was supposed to support the new way of working. On the other hand, the system is completely separated from the other subsystems being used in the banks. It looks so different from other systems, its operating logic is very different, it has not been integrated into other systems, and it does not support the way of working but the system requires that the way of working is changed. We should have thought before what should have been done differently. Maybe we would have done something differently if there had been more time. I think the training session organized for the banks were not enough. There should have been more training to each bank separately.

Furthermore, the interviewee told that they had also done an audit, an outsider was hired to do the auditing, about why the subsystem is not widely used and what the reasons were for that. According to the audit report, the reason was that the change in the customer B's business, i.e., the sales-oriented way of working, was not managed correctly. A new subsystem cannot alone change the way of working. First the change needs to be managed, after which a new system can be brought to support the new way of working:

> The change that is being occurring in the banks has not been managed correctly. A new information system cannot change the way of working, the change itself needs to be managed first. At the moment, we are arranging training for the bank clerks. We only provided a two-day long training session about six months before the system was implemented. It was not maybe enough. However, in the training sessions we emphasized that this change is about changing the way we work in the banks and the new system is only part of the change. Then, we went through what kind of advantages the new system can bring to the new way of working.

However, the interviewee told that in some of the banks of customer B the change was properly managed:

> Some of the banks are very advanced and they have invested in the development of bank clerks. They have even used an outside consulting company to train their employees to start working in this sales-oriented way. They have defined their distribution of work and roles again, i.e., they have thought about the big change. Those banks have been actively involved in the development of this information system.

The interviewee told that the challenge with the provider was the role they had taken. The provider did not want to tell the customers how to use the systems they had developed. The provider had only presented the possibilities of the system but not how to use it most effectively in the business. The reason was that the provider did not want to act as a business consultant but only as a system developer.

There were some misunderstandings between the customers and the provider because their

opinions on this matter were not congruent. When we interviewed the representative from the provider's organization, she told us that they wanted both to be a customers' business consultant and a system developer.

> In the training sessions, we examine the customers' business and processes and then we together determine how the system could support the activities of the customers' processes. Of course, in the end, our role is to develop systems that support customers' business. Our job is not to direct the business but we need to listen to our customers and develop the best possible tools for them.

The Role of the Facilitator

During the simulation day morning, the representatives from different organizations discussed together around the current state business process model with the help of the researchers, i.e., the facilitators of the discussion, and tried to improve both the business process and the information system in parallel as in the first case study. The facilitators had a pre-understanding about the topics to be discussed during the day because they had done interviews and modeled the business process in advance. This helped in focusing on the right issues regarding the information system development.

During the simulation day discussions, the participants agreed that the business process has certain requirements that the information system does not yet satisfy. The provider promised to take into consideration these requirements and promised to find out how much they would cost if implemented and how they should be implemented, and what the time-scale would be. The provider presented initial estimates on how much resources the implementation of certain features would require. In any case, any changes to the information system would require quite a lot of resources because the information system is quite large and complex and cannot be changed without exactly knowing how it affects the subsystems.

Some of the banks of customer A reported that some features in the system were difficult and time-consuming to use so that they had stopped using them. Some of the banks of customer A reported that they did not know how some particular features were supposed to be used. The customers hoped that they would get more training in using them. The customers agreed that the subsystem should be easy to use and it should support the current business needs, i.e., the sales-oriented way of working:

> …the number one thing is that the information system is easy to use so that bank clerks have time to sell. The time should not be spent on playing with the systems but it should be used to selling…

Business Process Modeling and Simulation in Gathering Requirements

The participants of the process modeling sessions were selected carefully to elicit active discussion around the processes and to find out the information system requirements. The selected participants needed to know the subsystems, i.e., they needed to have used the subsystems for some time, and be able to discuss openly and work with the representatives of the provider organization.

Some of the same information system problems, which were mentioned in the first case, were also discussed in the process modeling sessions: for example, the difficulty of starting to use the systems, the bad usability of the systems, and the complexity of the systems. Here are three excerpts from the process modeling sessions:

> I guess the biggest thing is that the system is very difficult to internalize and learn to use. It is so different from other systems that we have. The challenge is to understand how the system works. For example, when I enter a certain sales proposal according to how I think it should be done, then I later on find out that someone else has done it totally differently which leads to different sales statistics between me and her.

> The system is difficult to use. When you enter something, you need to browse the page up and down and you do not know where the thing you are looking for is situated. The content of the windows of the system are difficult to read.

> We know how to use it nowadays but still it is difficult and complex. It should be made easy to use. The system takes a lot of working time and we do not have time anymore.

The problems of the system had been discussed already during the simulation day's morning, though, some of the participants wanted to express their feelings toward the system also in the afternoon. This was a clear sign to the provider that the customers were not satisfied with the system. One participant of the simulation day expressed his anxiety toward the system:

> Why do we need to enter the same information twice into two different systems? It is unbelievable. We are living the computer time which should mean that once I enter some data to a system, it should be available to other systems; still, I need to enter the data twice. Unbelievable!

The provider listened patiently and tried to convince that development will occur in the near future:

> We agree with you. The system should be easy to use. The bank clerks should not spend their time playing with the systems. It is essential that the subsystems support banks' business and the systems should not take time from planning and creating new business ideas. We really need to develop the systems. Your feedback will be discussed internally in our organization and then it will be presented to the decision-makers who finally decide which development projects are financed.

The good thing in the communication between the provider and the customers during the simulation was that the provider could give immediate feedback to some of the suggested ideas. In addition, the provider could present a preliminary schedule for the information system development project. This set the customers' mind at rest for awhile. The implementation of new features can take two years.

> …our [the provider's] starting point is that we can analyze these requirements by the end of May this year. Then, during June we can make decisions about how to continue with the development project. However, there would be some changes regarding the system, it will take one and a half to two years before it will be used in the banks. No system is such that you decide to take it and then it will be used immediately.

After the simulation day, we asked the provider whether they had received any good, new ideas to the development of the system. The representatives answered that there were some new ideas but the best thing in the day had been the understanding of the customers' business processes and the interaction between the provider and the customer.

The researchers collected data also through a feedback questionnaire. The feedback form's open-ended questions were made to find out what kind of ideas related to their own work the participants got from the simulation day. In addition, the questions were intended to find out how the participants are going to apply the ideas in their own work. Twenty-two participants out of twenty-nine answered the open-ended questions of the feedback form. Fourteen respondents answered that they got new ideas related to their own work. Next, a few excerpts from the answers to the question: what kind of ideas related to your own work did you receive during the simulation day?

- I got a confirmation about which are the key areas that need to be developed in the information system.
- I got ideas how to develop the collaboration between these organizations.
- The process model gave me a confirmation that communication to the personnel is easily forgotten. Before executing things we should remember to communicate them to the personnel.
- I got information how these issues are executed in the branch offices.

Next, a fex excerpts from the answers to the question: how are you going to apply the ideas in your own work?

- I will immediately apply the process models in the information system development.
- I will try to deepen our collaboration relationship.

- I will take the things discussed today to my own branch office.
- I will take the necessary issues further.

The Interdependencies between the Customer and the Provider during Requirements Elicitation

Some of the customer A's and customer B's representatives had been involved in reference groups organized by the provider. Reference groups are organized by the provider usually twice a year. The meetings usually last a few hours and their purpose is to develop some particular ideas further. The provider presents development ideas into the different subsystems of the information system. The ideas originate from either provider representatives' or from customers' feedback. In addition, the provider presents what new things the information technology enables and what things the competitors have done recently. The reference groups are win-win situations because the customers are able to participate in the system's development and the provider gets feedback how the system should work. These meetings should contribute to better subsystems, i.e., to systems that meet the customers' business needs. Furthermore, the customers should be more ready to adapt a subsystem they have been developing.

The development ideas regarding the subsystem and the business process were further developed in the afternoon in group works that concentrated on predefined topics set by the facilitators. In one of the group works, the participants suggested that there should be one responsible in every bank of each customer A, B, and C that takes care of the communication toward the provider. This could ease the communication between the customer and the provider. At the moment, every employee in that bank of customer B has the access to contact the provider in case of problems with the system or when they want to suggest new improvement ideas. Another bank of customer A reported that they already have one person in charge of the contacts toward the provider and it had worked well.

5.3.3 Findings from the Third Case Study: Creating Common Understanding about Coordination Modes in Requirements Elicitation

Customer's Business Knowledge and Provider's IT Knowledge

The middle-manager from the provider's organization told that their organization knows their information systems better than their customers and they know the possibilities of their systems:

> We are quite close to our customers: we do many things that normal IT-providers do not do, e.g., we do the banks' reporting to authorities. We know our systems better than our customers and we know the systems' possibilities.

The researchers also asked whether the service oriented architecture project had proceeded to some direction. The interviewee's answer was that the question was very difficult. He described the typical challenges in the IT industry. It seemed that the question of service oriented architecture was stressful and that the discussions about it should be left alone for awhile.

> All actors in the financial sector have these basic information systems that carry a lot history's burden. There should be a change in the technological generation or change in the systems. It is typical for the IT industry that the support for some application development tool is finished and it has to be changed to a new one that has support. There is lot of discussion going on what should be done to the systems. This is why we are discussing about service oriented architecture. However, these are big issues and they involve a lot of risk, so please forget the service oriented architecture for awhile. These are so difficult decisions.

The interviewee told that nowadays their organization cannot produce all services themselves but services need to be bought from other service providers' too. Thus, the provider's business was changing to a new direction where focusing on the core business was important to manage in the business.

> We are changing our way of working. Nowadays we are taking a more integrative role: we do not anymore think that we should do everything ourselves but we need to buy services produced by other actors [information system providers]. We combine our own customer service from those services and our own services. We need to focus on issues where we are good at.

The Role of the Facilitator

During the simulation day the representatives from the customers' and provider's organizations discussed together around the current state business process models. The aim of the discussion was to improve both the business processes and the information system in parallel. The researchers, i.e., the facilitators of the discussion, facilitated the discussion and asked clarifying questions when needed. The facilitators also needed to encourage the participants to make comments because there were some participants that did not participate actively in the discussions. The provider also asked their customers clarifying questions during the discussions.

The facilitators made the required changes in the process models after the simulation day. One challenge was that there were three customers whose information system requirements varied a bit. It was difficult to model all different requirements into the same process model. The re-

searchers solved this problem by modeling only the work activities into the process models.

In addition to common discussions around the process models, the participants also discussed and developed new ideas to the processes and information systems in small groups. In the afternoon, the participants did group works developed by the facilitators. The simulation day provided many development ideas to the processes and to the information systems. Each process had some particular requirements that were not yet satisfied by the system. The provider promised to take the responsibility of considering the requirements further in their internal information system development project meetings.

Business Process Modeling and Simulation in Gathering Requirements

The pattern of the two process modeling sessions was as follows. First, the project manager of the information system development project from the system provider's side explained the nature of the day and described shortly the project that was launched to develop the information system. Next, the two preselected business processes were modeled together with the customers' representatives using post-it notes. One process described how the customers handle their retail and corporate customers in daily bank activities. The other process described how the customers handle their customers in more advanced bank services, such as funds, stocks, and loans. These process models were discussed, argued over or commented, and modified iteratively many times before they were accepted by the customers A, B, and C.

This brought us to lunch time when the customers' and the provider's representatives and researchers could refresh their minds. The discussions continued more informally at lunch. These informal discussions added some new aspects to the processes under development. In addition, the more informal part of the process modeling session let the researchers observe the interaction between the provider and the customers A, B, and C. The researchers observed that the representatives from the provider's organization and customers sat apart from each other. Both parties sat in their own group and no words were changed between the groups during lunch break. It seemed weird because the provider could have discussed with their customers and show some interest toward them. One explanation is that the whole day process modeling session is quite exhaustive and requires a lot of energy to focus on the development ideas. Hence, the provider representatives may have lacked the energy to focus on customer relationship management issues.

The lunch sessions were important for the creation of a more open and trusting atmosphere between the researchers and the customers. The provider and the researchers already had a more open relationship because they had been working together in the first two cases but the customers were different people. After lunch, we continued developing ideas how the information system could support the business processes. In addition, we discussed how the improvements in the information system could change and develop the business processes.

Finally, the process modeling session was finished. The customers were asked comments about the day. They answered that they were happy since they could express their ideas regarding the development of the system. Furthermore, they thought that it was good that it seemed that someone was really developing the system.

After the customers' representatives had left, we asked comments for the day also from the provider's side. They told us that they were happy that so many requirements were discovered. In addition, it was good that the current business processes were modeled. However, they told us that they were worrying that now the customers could think that every development idea and every requirement would be implemented in the future. They emphasized that they could not promise anything to the customers without knowing whether those requirements could be implemented, how much they would cost, and what the time scale for the development project would be. In practice, the provider can implement every requirement but it needs to be confirmed that the customer is ready to pay for them. The provider does not want to implement features that would cost the customers too much: the interest of the provider is to ensure the financial well-being of its customers.

After the simulation, the participants were asked with a feedback form whether they regarded the simulation day and its discussions beneficial and what should have been improved. Almost every representative from the customers' organizations was satisfied with the day's discussions. Some of the participants told that it was good to be able to ask the provider directly why they had not implemented all ideas that were communicated them long time ago. However, some of the respondents still doubted whether the provider will really consider all the development ideas produced during the simulation day. Furthermore, they wondered whether the provider will ever communicate what was decided to do with every requirement.

The representatives from the provider's organization were also quite satisfied with the day's

discussions. Still, they were a bit worried again whether the customers would now expect that every requirement found during the day to be implemented within a year or two. The provider reminded that the requirements elicitation is not a linear process but the requirements need to be considered in detail, e.g., how much they would cost and the time-scale. Each new change in the system would require a lot of testing because banking systems need to work correctly, otherwise the customers' business would suffer a lot. Furthermore, the provider reminded that the EU legislation will bring new requirements to the customers' business processes, which requires changes in the information systems. The provider told that changes are an inevitable part of today's information system development.

Two questions in the questionnaire focused on finding out how the process models had helped the participants in developing their own work and understand their work processes. The customers' representatives listed the following comments: participants developed good ideas, continuous communication between the parties is needed, and process simulations are the best way to develop collaboratively the information systems and processes. The provider representatives listed the following comments: it is easier for the customers to participate in the development process, we could organize "an innovation afternoon" where the provider and customers can innovate new features of the system, and the process modeling needs to be done on a more detailed level in the future.

The Interdependencies between the Customer and the Provider during Requirements Elicitation

We asked the middle-manager from the provider's organization how the customers should be involved in the development projects. He admitted that the twice a year organized reference groups were not the most effective way of taking the customers into the development. He also admitted that their way of thinking differs from the customers' way of thinking because they see things from another perspective.

> We are taking our customers twice a year into these reference groups with the purpose to present the development ideas and get input. It is important that the customers are committed to them because they are paying them. The customers' way of thinking differs a lot from ours: they see new things from a different perspective than we do. It is sometimes difficult to understand each other's perspectives. They come here twice a year to handle these development ideas; it is not always the world's most efficient way of working together. However, it has worked well enough, we have enough revenue and the customers are doing also well, so this cannot be the worst way of working together.

The researchers also interviewed one employee from the provider's organization whose task is to develop certain information systems. The interviewee told us that the organization is supposed to guide the customers in their business, i.e., to consult the customers not just in the information systems but also in their business. The problem was that the interviewee felt that they did not have time to visit their customers because the daily activities took so much time.

> We should guide the customers' operations, not just develop systems. The challenge is that we have so much work to do that we do not have time to visit our customers. I guess these development ideas will be implemented in 2015. We should establish a department that could support customers' business.

The questionnaire of the study was filled in by the participants of the simulation day before leaving. Sixteen participants of twenty-five answered the questionnaire: eleven customers' representatives and five provider representatives. The questionnaire focused on finding out what kind of benefits the simulation day brought to the participants. In addition, it was asked how information system development should be collaboratively organized between the customers and the provider.

The customers' representatives reported that they got many small development ideas regarding their work and that they will implement them in their organizations. One representative from the provider's organization reported that the customers think and view technological solutions very differently compared to provider representatives. Two provider representatives reported that they will consider more the customer's perspective when developing the information system.

One representative of customer C wrote that the starting point for the co-design is a mutual understanding about the both parties' work processes. Another customer representative wrote that the cooperative information system development should be organized through collaboration groups: the provider should tell about the technical solutions and listen to the customers how their business processes work. Three customer representatives emphasized the collaboration in information system development and the importance of involving customers in the development process. One customer representative wrote that the collaborative development should be organized through the reference groups. Another customer representative wrote that there should be one "support person" from the provider's side who could be called and send development ideas.

One provider representative wrote that the gap between IT and business should be narrowed: IT should not direct the business decisions too much. Another provider representative wrote that communication and knowledge transfer between the parties should be increased: there should be a "core group" responsible for the development of the customers' information systems. One provider representative wrote that the customers' business experts and union representatives are in an important role when developing the systems.

After the case study, on the 8th of February, the author interviewed one provider representative: the middle-manager that was already interviewed during the case study to get feedback of the case study and discuss the topic of requirements elicitation with the customer. The author asked specifically how the provider and the customers can develop an information system together. The provider representative replied that the common process depends on both organizations' capabilities, such as customers' knowledge about information system development process and the maturity of business strategy, and provider's maturity to understand the customer needs:

> It is a difficult question how to co-design information systems. It depends on both organizations' capabilities: how much the customer understands about information system development process and how mature their business strategy is. In theory, customers can describe their needs in an unambiguous way so that we can start doing something. In practice, this is rarely the case. The business strategy of the customer should be mature and from there we lead the requirements to different business areas, and finally the needs turn into information system requirements.

The author also asked the provider in which phase they should be involved in requirements elicitation. The provider told that requirements elicitation should be done together from the beginning: business requirements and system support need to be aligned. The customer cannot develop a perfect information system because of limited financial resources. The most important functions need to be chosen. It is a joint problem-solving situation: the customer presents her/his business processes and the provider presents the possibilities of information systems. Then it is together decided how the information systems can support the processes. The information system requirements need to be found together and then it needs to be decided together which requirements to implement.

> There needs to be a continuous dialogue between us and the customers. The more there is contact with the customers, the more it shares understanding between us. Common understanding is a prerequisite for collaboration. We cannot start a project without common agreement what the project will do. However, the more there are participants involved, the more there are misunderstandings between the parties as could be observed in the process modeling sessions where dif-

> ferent customers were represented. Communication does not always lead to understanding. That is why there is consulting business. Consultants are their [customers] caretakers.

One research question asked whether the provider will continue considering service oriented architecture model in system development. The provider answered that it seems to be today's way of developing systems:

> SOA, i.e., service oriented architecture starts from the idea that we can serve our different types of customers: they have different kinds of needs. Our information systems need to be more flexible and we can make them more flexible by using service oriented architecture. In theory, there are lego bricks which can be built into different configurations. SOA is a big concept. It is difficult to know what it means as a change: it is hard to say when it will be ready, if ever. It is somehow continuous for ever. SOA is a universal trend that every big information system provider is using. SOA is one of the phases of IT-industry's development; it is also an efficient way to do things. SOA enables the implementation of different business requirements in a more efficient way. Today many business logics reside deep inside the systems and now we are trying to loosen them. The business logic should reside on some level and same systems should serve different business logics.

Another research question asked how to deal with changing customer needs. The provider responded that in the beginning of an information system development project it is important to agree with the customer on what the project is about. After the agreement, the changes are handled through normal change management procedures:

> Change management means normal agreement procedures. If a new thing emerges that needs to be implemented, we estimate a price for it and the customer decides whether it will be done or not. If the customer decides that it will be done, a cost is calculated and timetable defined. Customers do not always understand how much a new requirement will affect the project. If the customer does not understand system development projects, she/he may demand new things anytime during the project. However, there is this triangle: timetable, content, and price. If you change one of them, it will affect the other ones.

5.4 Analysis of the Cases

Ragin (1992) presents that theory and empirical evidence are mutually dependent, "We transform evidence into results with the aid of ideas, and we make sense of theoretical ideas and elaborate them by linking them to empiricial evidence." The analysis of the cases happens through the researcher's theoretical lenses which in this study mean the developed conceptual framework (Järvenpää & Kosonen 2000). (See Figure 15)

Especially in qualitative studies, the analysis of data is continuous, i.e., it interweaves with other aspects of the research process: research design, data collection, and analysis are continuous and simultaneous processes. Data analysis is not a separate phase of a qualitative study.

(Bryman & Burgess 1994, pp. 217-218)

5.4.1 Data-based Unit of Observations in the Cases

The conceptual framework was first applied to analyze the findings from the first case study in depth, and then the two successive case studies were examined to find out whether similar patterns could be found out. This is called the replication strategy (Yin 1989). In addition, the author tried to find out patterns in the successive case studies that did not corroborate the findings from the first case study. The author tried to be as honest and open to the data as possible: both predetermined factors fulfilling the conceptual framework and factors emerging from the data were used.

One of the challenges of qualitative research is dealing with complexity, as Pettigrew (1990, p. 281) notes "death by data asphyxiation". One of the solutions to this challenge is to identify analytical themes that cut across the data (Pettigrew 1990, p. 282). In this research, the original analytical themes were identified in the literature research and summarized into the conceptual framework (Figure 15). The conceptual framework presents the following themes: business process, information system, business knowledge, IT knowledge, facilitator, business process modeling, simulation, and interdependencies between the provider and the customer. These themes were used as a starting point for the analysis of the case studies' findings. If new themes emerged, they were added to the conceptual framework. Next, the analytical themes that appeared in all case studies are given their empirically grounded definitions. (See Table 8)

Table 8. The themes in the conceptual framework and their empirically grounded definitions

Theme	**Empirically grounded definition in the first case study**	**Empirically grounded definition in the second case study**	**Empirically grounded definition in the third case study**
Business process	Customers' customer contact processing process	How different customers can together require new customers: the process of marketing, contacting customers, and handling of customers	Daily business activities of the customers' employees and how they use the information systems to support those activities
Information system	Existing information system should better support the customers' customer contact processing process	Existing information systems can support the process but the subsystem needs to be further developed	Existing information system could not support all activities but needed development
Business	The customers' repre-	The customers' representa-	The customers' representa-

knowledge	sentatives discussed and shared business knowledge with the provider: • Business needs that the information system is not yet meeting • The activities in the customer contact processing process • Difficulties in the system usage	tives discussed the problems in the information system usage during customer procurement.	tives discussed how they use the information systems in their daily business activities. The provider representatives discussed new EU regulations that change customers' business processes and require changes in the information systems.
IT knowledge	The provider told customers' representatives about the possibilities the technology offers to develop the information system.	The provider told customers' representatives initial estimates about how much financial and man-hour resources the implementation of certain features would require.	The provider presented possibilities offered by new technology.
Facilitator	The facilitators needed to activate some customers' representatives because they did not comment anything, although they had commented in process modeling sessions where a smaller number of people were present.	The facilitators had a preunderstanding about the topics to be discussed, and hence tried to focus the discussion on important issues in the information system development.	The facilitators asked clarifying questions when needed. The facilitators also needed to encourage the participants to make comments because there were some participants that did not participate actively in the discussions.
Business process modeling	Two provider representatives asked customers' representatives clarifying questions. Customers' representatives liked to present how they use the information systems in daily business activities.	The customers' representatives described their business processes to the researchers. No provider representatives were present.	The customers' representatives represented different customers A, B, and C which had different needs toward the information system.
Simulation	Discussions about the challenges faced with the information system cleared the collaboration atmosphere.	The participants agreed that the business process has certain requirements that the information system does not yet satisfy. New development ideas emerged.	The process models were argued over and modified because there were different customer needs that needed to be aligned to find the shared information system requirements.
Interdependencies: provider – customer	Common discussion about information system requirements took place in process modeling sessions and in process simulations.	Common discussion took place in process simulations.	Common discussion took place in process modeling sessions and in process simulations. Parties discussed reference groups.

According to the findings, business knowledge mainly resides in customers' side and it should be shared with the provider. However, the provider had some high level understanding of the customers' business processes and knew some specific details about the customers' business, such as the new EU regulations that affect the customers' business processes and require changes in the information systems. IT knowledge resides mainly in the provider's side; the provider needs to understand the customers' business sufficiently in order to offer information technology that suits the business. The provider needs to share its IT knowledge with the customer on an adequate level of detail.

Business process modeling allowed customers' representatives to share their business knowledge to the provider. On the other hand, the provider could share their IT knowledge, i.e., newest technology, possibilities and limitations of technology, and trade-offs between requirements, costs, and schedule. The simulation encouraged participants to create new development ideas and collaboration atmosphere was cleared and improved. The facilitators needed to encourage discussion between customers' representatives and the provider. The facilitators needed to have a good pre-understanding about the discussion topics in order to facilitate the sharing of knowledge.

During the three case studies, the interdependencies between customers' representatives and the provider were limited to process modeling sessions and simulations. Thus, the provider did not apply any other requirements elicitation methods during the case studies, although some methods had been applied earlier with reasonable success. The interdependencies between the customers and the provider are realised when the customer informs the provider about some feature that do not work in a specific subsystem or suggests some new development idea. The ways to share this kind of information are email, telephone, feedback forms on the Internet, feedback forms in the subsystems, and twice a year organized reference groups.

5.4.2 The Effects of Shortening the Knowledge Gap

A culture gap exists (Al-Karaghouli et al. 2000, pp. 93-95) when norms and values held by two parties differ substantially in issues of relevance to each group. Different education background and socialization has created specialists in their own area of expertise with differing languages and views of the world. The IS specialists have their own values, working habits, and language and so do the customers. Thus, the parties do not understand each others' perspectives easily. (Taylor-Cummings 1998, p. 31) The culture gap between the provider and

the customers could be observed in the behaviour of the provider and the customers during the process modeling sessions when the parties did not communicate during lunch breaks.

When the two parties discussed in the process modeling sessions and in the simulations, the knowledge gap between them was shortened which in practice meant that the parties started to understand each others' worries toward the business process and the information system development. In addition, new ideas could be created together because the parties started to speak common language.

During the discussions both in process modeling sessions and in process simulations, the different parties, i.e., the customers' representatives and the representatives from the provider's organization shared their expertise knowledge. The customers told how their business processes worked in practice and how they use the information systems. The provider told what kind of opportunities and challenges the new technology can offer to the information system and to the processes.

On one hand, the modeled business processes influenced the development of the information system because the process models showed where the information system is not yet supporting the business; thus, requirements could be spotted. On the other hand, the representatives from the provider's side could identify technology restrictions and opportunities that required changes in the process models.

5.4.3 Co-gathering Requirements through the Process Modelings and Simulations

Co-design of information systems requires a continuous dialogue between the provider and the customers. The challenge is that the parties do not usually share a common language. In this study, the process models functioned as boundary objects that the participants could use when interacting and discussing a particular step in the process. Thus, both parties could share a common language and communicate with each other.

Co-design of information systems also necessitates a common understanding about both parties' work processes and a common work practice. Process modeling sessions and simulations offered a forum where development process and important issues could be talked through with the help of the facilitators.

The customers of the provider liked to participate in the process modeling sessions. They thought that process modeling was a good way to gather the requirements for the subsystems and to show the provider their daily business activities. The process modeling sessions together with process simulations resulted in a thorough understanding of the customers' business domain and its requirements. Furthermore, the customers gained a better understanding of the possibilities and obstacles posed by the technology. The discussions were facilitated by a facilitator who had planned the topics of the discussions before, asked clarifying questions, and made sure that the discussions were focused on right issues. Without the facilitator it may be possible that the two different parties would not have shared their knowledge in a way that would be understandable to the other party. Thus, the facilitator acted as a boundary spanner (Levina & Vaast 2005) between the parties.

The representatives of the provider's organization were satisfied with the level of detail in the process models during the first and second case studies. In the third case study, the representatives thought that the process models were on too high a level to be used in the later phases of information system development. In the first two case studies, the focus of the processes was on a detailed level, thus also the process models were drawn on a detailed level. In the third case study, the process to be modeled was not so specified which led to modeling a process that was not detailed enough from the system developer's point of view. The customers' representatives, again, thought the level of the modeled process was well-suited to develop the business process and the information system in parallel.

The representatives of the provider's organization had drawn on their own process models describing their customers' business processes earlier. These models were mainly based on their own experiences from the days when they had worked in the customer organizations. In practice, this meant that the models did not exactly correspond with the daily reality of the customers' business processes. The models were not either verified by the customers. The representatives of the provider's organization admitted that when they were modeling the processes, they were not sure what the models' level of detail should be and which activities should be modeled and which not.

5.4.4 Interdependencies between the Provider and the Customer when Gathering Requirements

According to the provider representatives, there should be a lot of interaction and information sharing between the provider and the customer to develop common understanding about the information system requirements and to agree what the information system development projects try to accomplish. The easiness of the interaction depends on both organizations' capabilities. On one hand, how well the provider knows its customers' business processes. On the other hand, how well the customer understands information system development process and how well the customer is able to forecast its business changes, i.e., how mature the customers' future business strategy is. The simulation discussion helped to create joint knowledge, and a new "community of practice" (Wenger 1998) between the provider and the customer respresentatives. This helps the coordination of interdependencies during the elicitation phase.

The interdependencies between the provider and the customer during requirements elicitation are realised when the customer contacts the developer or the other way around. During the contact, information related to information system development is shared between the parties. The process modeling sessions and interviews showed that one of the interdependencies was realized when the customer needs to send feedback to the developer about the performance of the existing system. In addition, the customer expects that her/his problem is solved quickly and that s/he is informed when the problem is solved. The most common feedback received by the provider is usually that some feature of the information system does not work properly. In some cases, there is no problem in the information system but the customer uses the information system in a wrong way. This interdependency is handled through support lines, such as telephone and/or email and by training sessions organized by the provider once in awhile. Training sessions require some preparation from the provider's side but the customers are usually satisfied with this coordination method if the joint training session is carefully planned and they are genuily listened to.

The second interdependency is realized when the customer suggests some new improvement ideas to the information system but does not need an immediate response. The provider does not send any immediate feedback regarding the suggestions but may inform having received the suggestions. Later, the provider may inform the customer about new improvements in the information system. This interdependency is handled through feedback forms on the Internet

or in the information system. The customers were not happy with this coordination method because they do not always know whether their suggestions have had any effect on the information system.

The third interdependency is realized when the provider needs to understand how its customers' business processes work and how the information system should support the processes. The customer should describe her/his business, and the provider should be able to ask specifying questions and provide solutions that the customer is expected to comment on. This interdependency is handled through twice a year organized reference groups. This kind of coordination method requires preparation from the provider's side and also the customer should be ready to spend time face-to-face with the provider. The parties need to share a common language for communication. Usually functions to be developed in the information system are determined in reference groups.

The fourth interdependency is realized when the provider feels that she/he needs outside help to understand the wholeness of the situation, i.e., the interaction between business and IT systems. This kind of situation can appear, e.g., when business changes and thus affects the functionality of the IT system. In addition, the provider and its customers neither share domain-specific knowledge nor common language to understand each other thoroughly. An outsider is required to help in gathering and analyzing a large amount of information. Domain-specific knowledge refers to communication boundary (Garrity 2001), i.e., the provider does not understand/know its customers' business and processes well enough and the customers do not know the process of information system development and the latest technology.

When this interdependency exists, the coordination methods applied are facilitated interviews, business process modeling sessions, and process simulations. These coordination methods offer the chance to increase the amount and types of domain-specific knowledge between the parties, and to create joint knowledge. The customers seemed to be most satisfied with these coordination methods. During the process modeling sessions, they said that they felt the provider was really listening to them. Furthermore, the customers said that it was good to learn the possibilities and limitations that the technology may pose to the business processes. On the other hand, the representatives of the provider's organization told that they learned a lot about the processes but they were afraid that the customers would expect that all requirements would be satisfied in the near future because they were now spoken out. All these different

interdependencies are presented in the Table 9.

Table 9. Interdependencies, coordination modes, and coordination methods found in the empirical study

Interdependency between the provider and the customer	**Interdependency and its coordination mode (Thompson 1967)**	**Coordination methods**
The first interdependency: • The customer needs to send feedback to the developer about the performance of the existing system. The customer expects that her/his problem is solved quickly and that s/he is informed when the problem is solved. • A common feedback received by the provider is that some feature of the information system does not work properly. The provider tries to help the customer immediately.	Sequential coupling is coordinated by planning.	• Support lines, e.g., telephone or email • Training sessions organized by the provider
The second interdependency: • The customer suggests to the provider new improvement ideas concerning the information system but does not need an immediate response. • The provider does not send immediate feedback regarding the suggestions but may inform having received the suggestions. Later, the provider informs the customer about new improvements in the information system.	Pooled coupling is coordinated by standardization.	Feedback forms, e.g., on the Internet or in the information system
The third interdependency: • The provider needs to understand how its customers' business processes work and how the information system should support the processes. • The customer should describe her/his business • The provider should be able to ask specifying questions and provide solutions that the customer is expected to comment on.	Reciprocal coupling is coordinated by mutual adjustment.	Twice a year organized reference groups where e.g., functions to be developed are determined and customers are asked feedback concerning the information systems. The coordination method requires preparation from the provider's side. The parties need to share a common language for communication. The parties need to spend time face-to-face.
The fourth interdependency: • The provider needs to understand its customer changing and complex busi-	Systemic coupling is coordinated by facilitated mutual	Facilitated: • Interviews

ness. • The provider and the customer neither share domain-specific knowledge nor common language to communicate and thus need help in gathering and analyzing a huge amount of data.	adjustment which creates shared domain knowledge between the parties and helps in creating common understanding.	• Business process modeling sessions • Process simulations An outsider organizes a planned session together with the provider and its customers in where needed information is gathered and later analyzed thoroughly.

The Interdependencies Found in the Case Studies According to Thompson's Categorization

The **first** interdependency in the Table 9 resembles sequential coupling (Thompson 1967): the parties are reliant on the sequential functions of each other. The customer sends a request for help and needs to wait for a reply. When the provider provides a solution to the problem, the customer is able to continue her/his work with the information system. The provider may wait for a reply to have solved the customer's problem. Thompson suggests that sequential coupling is coordinated by planning.

In the three case studies, the sequential coupling is coordinated by support lines and training sessions. Support lines, such as telephone and email, need planning ahead to ensure that there is someone capable from the provider's side to answer the requests for help. In a way, support lines are also a standardized way to handle help requests, though; support lines also require mutual adjustment when the helper tries to solve the customer's problem. The provider does not have a customer service center or help desk but the persons responsible for certain subsystems, i.e., product managers, are given the responsibility to help the customers to solve their problems related to that particular system. Training sessions need preparation from the provider's side to ensure that all important new functions are handled.

The **second** interdependency resembles Thompson's pooled coupling that requires standardization. The customer suggests new improvement ideas to the information system but does not wait for an immediate response. The provider may inform the customer later on having improved the information system. Both parties may continue their work without first having received input from the other party. This interdependency was coordinated by standardized feedback forms on the Internet or in the information system. The feedback forms require first planning but after that they can be considered to be a standardized way of handling customer requests. The coordination method does not require many resources from the provider's side.

There are some employees given the responsibility to check the feedback database from time to time. The challenge is that the requests are many times too abstract and more information would be needed to form them as requirements for the system.

The **third** interdependency resembles Thompson's reciprocal coupling that requires mutual adjustment. The provider wants to understand how its customers' business processes work and how the information system should support the processes. The customer is expected to describe her/his business and comment on new features and solutions introduced by the provider. This interdependency was coordinated by twice a year organized reference groups. This coordination method requires a considerable time and effort from both the provider's and customer's side. However, it is also regarded an efficient way to capture requirements as the provider can ask the customer clarifying questions and the other way around. This coordination method requires that the provider and its customers spend time face-to-face and share a common language to communicate.

The **fourth** interdependency resembles also Thompson's reciprocal coupling but it differs in two issues. Firstly, this interdependency is realized, e.g., when customers' business changes and brings new requirements to the IT system, i.e., the wholeness is complex to understand and a lot of information needs to be collected and analyzed. The provider needs to understand its customer's changing business and the customer needs to understand what the latest technology can offer to their business processes. Secondly, the provider and the customers neither share domain-specific knowledge nor a common language to communicate. The author names this interdependency as **systemic coupling** because it entails a large amount of interdependencies and the difference between amount and/or type of domain-specific knowledge between the parties is large. In addition, the parties do not share a common language to communicate.

This interdependency was coordinated by facilitated interviews, business process modeling sessions, and process simulations. In this study, the interviews were done by the researchers, but the provider had done interviews regarding some new system features with the customer before. These interviews were not very successful because the parties did not share a common language for communication.

Business process modeling sessions and process simulations were organized by the researchers. An outsider is usually better in addressing difficult questions and analyzing the results

objectively. The researchers built a process model of the interaction between business and IT systems and it functioned as a platform to share information between the provider and its customers. Common understanding about the most important information system requirements could be built with the help of the outsiders and process models. In addition, domain-specific knowledge could be shared when common language and common understanding started to build between the parties.

6 Conclusions

This study aims to contribute to coordination and requirements elicitation theories by describing what kinds of interdependencies exist between the provider and the customer during requirements elicitation and how those interdependencies should be coordinated. In addition, a new interdependency and its coordination mode are presented. Furthermore, this study tries to answer to the practical problem the case organizations are facing.

In the following chapters, the results of the study are presented. Then, the theoretical and managerial implications are provided. After that, reliability, validity, and generalizability of this study are discussed. Finally, further research subjects are suggested.

6.1 Results of the Study: Answers to the Research Questions

Next, the research questions of this study are answered based on the literature study and the empirical study. In addition, the further developed framework is presented.

6.1.1 Co-design of Business and Information Systems during Requirements Elicitation

The main research question of this study is *how can business and IT systems be co-designed during requirements elicitation*. In all three empirical case studies, it was regarded important that the business processes and the information systems were developed hand in hand. This was important because the customers' business is changing all the time, which brings new requirements to the information system. Furthermore, the technology advances all the time, which brings new possibilities for the business and therefore may require changes to the business processes of the company. In addition, technical platforms need to be changed from time to time because their support is finished. Thus, this study supports the finding of Kling and Iacona (1984) that developing information systems is an ever-unfolding process, "a design in use" approach which means that the information system is being designed and developed also after the adoption, i.e., the introduction of the system.

In the empirical study, service oriented architecture (e.g., Gulledge & Deller 2008, Pisello 2006) was mentioned as a new promising approach to information systems development that could take the changing requirements into account, though, this approach is still more a

buzzword than existing practice. Service oriented architecture is a new way of thinking, based on the idea that information systems are built into smaller service components that different business logics can apply. The IT provider was not clear about how a service oriented architecture should be implemented and what the schedule for such a project would be. Starting to design information systems with service oriented architecture would according to them require a lot of work to design and implement, especially when it comes to existing, large information systems. There is not much literature on service oriented architecture yet, thus, it should be further studied.

It seems that in the context of large information systems suffering among others from the burden of many technology platforms, the requirements elicitation phase takes a lot of time. In this study, the requirements elicitation phase took over a year. A lot of work was needed after the case studies to finish the requirements specification document: the cost, required resources, and schedule needed to be examined carefully before determining which business requirements are to be changed to technical specifications. Furthermore, the provider needed assurance that the customers are ready to pay for the new features to be developed in the information systems. The long requirements elicitation phase is also partly due to the fact that there are different stakeholders, three different customer organizations, with multiple perspectives that must be understood and considered.

One of the results of this study is that to-be users should be involved early enough and continuously in the development of the information system. The users know the problems of the system and in many cases they are able to articulate them to the provider when knowing the possibilities and constraints posed by the current technology. This is not a new result and has been known for years. The users may experience many stress situations because of the use of a badly-designed system. If the users can articulate their experiences of the system, the stress feelings may even diminish.

Business Process Modeling and Simulation in Sharing Knowledge

The three case studies showed that eliciting requirements for a large information system is not an easy task. The first case study increased different parties' understanding of the complexity of the information system development project. The information system consists of many different subsystems that do not communicate adequately and their integration would require too many man-hours of work which is very expensive. In addition, the different parties did not

share a common language to communicate: the parties had different backgrounds in education and in working life. The first case study developed common understanding between the parties about the information system development project and also developed cooperation atmosphere.

The second case study focused on understanding the customers' business processes and how the information systems are applied in supporting the process. To add, the study focused on understanding customers' new business requirements that the system should support in the future. New requirements for both the business process and the information system were found. It was an important finding to understand that the information system cannot be developed alone but also operations of the business process need to be developed hand in hand.

The third case study also focused on understanding certain business processes of the customers. The collaboration atmosphere was improved in earlier cases, which helped in developing improvement ideas to the requirements found in both the business process and in information system. Furthermore, the customers were explained how important it was to find the requirements but that there is a trade-off between requirements, existing technology, development schedule, and costs of implementing. The provider worried that customers would not understand this trade-off which was a justified fear because the customers had been earlier disappointed because their requirements, i.e., development ideas had not been implemented though time had passed. The process modeling sessions and simulation sessions helped in sharing knowledge because parties could discuss development issues with the help of an outside facilitator who had developed the discussion topics in advance.

The study suggests that business process modeling and simulation of process models can provide the means for information system providers and customers to share their professional knowledge, and hence, create shared understanding about the suitable business and information system requirements. Barkhi et al. (2006, p. 46) discuss that personal relationships are many times the most appropriate coordination method for coordinating collaborative software development. They write that "Rich communication channels provide high social presence and are more appropriate for building a shared cooperative context and trust." (Barkhi et al. 2006, p. 58) Andres and Zmud (2001-2002, p. 41) also found in their study that informal, cooperative, and decentralized strategies, i.e., organic coordination, was more productive than formal and centralized coordination strategies, i.e., mechanistic coordination, during software

development projects. The results of this study indicate that the personal relationships that form during shared discussions in process modeling and simulation sessions help participants to share information, create new ideas, and decide on critical matters related to information system development.

6.1.2 Coordination during Requirements Elicitation

The subquestions, which contribute to the main research question, of this study emerged from the three case studies:

- *What are the interdependencies between information system provider and customer during requirements elicitation?*
- *How should the interdependencies between information system provider and customer during requirements elicitation be coordinated?*

The study examined the interdependencies between the information system provider and the customer by modeling business processes and finding the links between the parties when they are exchanging information about the requirements of the information system.

Thompson (1967) presented three types of task interdependencies and how they should be coordinated. The first interdependency, pooled coupling, is the relationship between tasks that are independent but share the same resources. This interdependency should be coordinated by standardization, such as rules and routines. The second interdependency, sequential coupling, is the relationship between tasks are performed in a certain order. In this situation, coordination is achieved by planning. The third interdependency, reciprocal coupling, relates to tasks that provide input for each other in a mutually interdependent way. This requires that people communicate frequently and adjust their actions mutually during task execution. All these interdependencies were found in the case studies and they were coordinated as Thompson suggests. In addition, a new interdependency was found and named *systemic coupling*.

A New Interdependency and its Coordination Mode: Systemic Coupling and Facilitated Mutual Adjustment

This study presents a fourth interdependency, named *systemic coupling*, which was found in the empirical study. Systemic coupling is more complex interdependency than reciprocal coupling because it entails a large amount of interdependencies. In addition, it is not enough just to transfer information between different parties as the parties' domain knowledge is so dif-

ferent that they would not understand each other. This is due to communication interface (Garrity 2001, p. 109) or knowledge boundary (Carlile 2004, p. 555). Carlile (2004, p. 557) has described this kind of situation as follows: "…as the number of dependencies increase between actors, the complexity and the amount of effort required to share and assess knowledge at a boundary also increases."

The study suggests that systemic coupling is coordinated by *facilitated mutual adjustment*. In the three case studies, facilitated mutual adjustment took the form of facilitated interviews, facilitated process modeling sessions, and facilitated process simulations. Facilitated mutual adjustment creates common domain knowledge between the parties, which helps in creating common understanding. The outside facilitator is a key ingredient when applying this coordination mode. Carlile (2004, p. 560) would probably state that the facilitator helps in sharing the knowledge at a semantic boundary by helping the parties to develop common meanings and thus to create shared meanings.

Next, the nature of the four interdependencies and their coordination modes and methods found in the case studies are presented. Furthermore, it is discussed what kind of effort the coordination methods require from both parties. (See Table 10)

Table 10. Interdependencies and their coordination modes and methods during requirements elicitation

Interdependency (Thompson 1967) between the provider and the customer	**Coordination mode (Thompson 1967) and methods in the three case studies**
Pooled coupling: • The customer suggests to the provider new improvement ideas concerning the information system but does not need an immediate response. • The provider does not send immediate feedback regarding the suggestions but may inform the customer having received the suggestions. Later, the provider informs the customer about new improvements in the information system.	**Standardization:** Feedback forms, e.g., on the Internet or in the information system. The customer needs to have good writing skills to express her/his wishes in writing because the provider does not usually have the opportunity to contact the customer and ask clarifying questions. There should be a common agreement as to how the provider answers and reacts to the customer feedback. Little time is required from the customer and the provider.
Sequential coupling: • The customer needs to send feedback to the developer about the performance of the existing system. The customer ex-	**Planning:** • Support lines, e.g., telephone or email • Training sessions organized by the provider

pects that her/his problem is solved quickly and that s/he is informed when the problem is solved. • A common feedback received by the provider is that some feature of the information system does not work properly. The provider tries to help the customer right away.	The customer needs to be active in giving feedback. The provider needs to have human resources to answer the customer's questions. Provider receives immediate feedback and is able to ask clarifying questions. Some time is required from both provider's and customer's side.
Reciprocal coupling: • The provider needs to understand how its customers' business processes work and how the information system should support the processes. • The customer should describe her/his business. • The provider should be able to ask specifying questions and provide solutions that the customer is expected to comment on.	**Mutual adjustment:** Twice a year organized reference groups where, e.g., functions to be developed are determined and the customers are asked feedback concerning the information systems. The provider is able to ask clarifying questions and develop the ideas further with the help of the customer. Preparation time is required from the provider's side. Parties need to spend time face-to-face. The parties need to share a common language for communication. The customers are usually happy to be able to express their wishes face-to-face and receive immediate feedback.
Systemic coupling: • The provider needs to understand its customer's changing and complex business. • The customer needs to understand what the latest technology can offer to their business processes. • The provider and the customer neither share domain-specific knowledge nor common language to communicate and thus need help in gathering and analyzing a huge amount of data.	**Facilitated mutual adjustment** which creates shared domain knowledge between the parties and helps in creating common understanding: • Facilitated interviews • Facilitated business process modeling sessions • Facilitated process simulations An outsider organizes a planned session together with the provider and its customers in where needed information is gathered and later analyzed thoroughly. Important themes are discussed and the provider may ask clarifying questions and develop the ideas further with the help of the customer. A lot of time is required from both parties. The customers usually feel that they are listened to and the development is in good hands.

These different coordination methods for requirements elicitation should be studied further in new case studies. The provider had applied support lines, training sessions, feedback forms, and reference groups to find the information system requirements. These coordination methods were not enough in the change situation of the case studies because the parties were missing a common language and common domain knowledge for communication which led to misunderstandings between the parties. This study suggests that business process modeling and process simulations were good methods to gather requirements: when working closely

with each other, the parties quickly understood how the other party is thinking and what her/his assumptions were. In addition, the customers gained a sense of having had an impact on the information system design process. Facilitated process modeling sessions and simulations led to mutual ownership between the parties. However, these coordination methods require a lot of time resources and effort from both provider's and customer's side. These coordination methods could be performed by either party, but this study suggests that an outside facilitator may be the best choice for leading the discussion between the parties and summarizing the discussions. Next, business process modeling as a requirements elicitation tool is discussed.

Business Process Modeling as a Requirements Elicitation Tool

The business process models, developed together with information system providers and the customers, acted as boundary objects (Levina & Vaast 2005) that helped in the creation of common understanding about the business requirements. The customers and the provider could understand the information system requirements when they could reflect their actions through the boundary object, i.e., the process model: the customers could see how the information system works and the provider could see how the business works in practice. The process models showed the provider the context: customers' work-related goals, IT environment, and details of their work that the information system should support.

The process models were drawn on a level that depicted the business activities and information system usage on a higher level. Thus, the provider cannot use the process models as such in the later phases of system development process but they need to transform the process models to an adequate level of detail that satisfies the needs of the information system developers.

Saiedian and Dale (2000, p. 422) state that most development engineers have only little or no experience about the usage of the application domain for which they are developing a system. This leads to development being technology-driven and no contextual sense exists of the problem to be solved. Business process modeling was beneficial from this perspective because process models provided the representatives of the provider organization a visual presentation of the customers' processes, in addition to the stories about the work processes that the customers told during the simulation days. In the same way, during the simulation days, the customers could gain knowledge about existing technological limitations in their

processes and the functioning of the information system, through the visual process models.

Still, the modeled business processes should not be thought of as representing real-world structures. The process models can be used to make sense of real-world business activities and support employees undertaking those business actions with appropriate information. As Sterman (2002, p. 522) points out, all models are wrong and cannot present all the knowledge that humans have. He writes that models cannot be built by the modeller alone but the people who are touched by the model should be involved:

> Implementation success requires changing the customers' mental models. To do so the customers must become partners with us in the modeling process. Ultimately, our chances of success are greatest when we work with our customers to find the flaws in our models, mental and formal, then work together to improve them. In this fashion we all—modellers and customers—gradually develop a deeper understanding of the system and the confidence to use that understanding to take action.

Modeling the business processes of the customer can help in understanding how the system should work in practice. The modeling is done together with the customers and the provider, which enables both parties to reflect their work. The provider can see whether the system works properly from customers' work processes point of view. On the other hand, the customers can reflect whether they are using the system in a correct way from the provider's point of view. The knowledge of how the current business processes work is needed before business processes and their support functions, i.e., information systems, can be developed. Next, the role of a facilitator in bridging two different knowledge domains is discussed.

The Role of a Facilitator in Bridging Two Knowledge Domains

The study suggests that the facilitator acts as a boundary spanner between the provider and the customer. A facilitator is an outsider, i.e., an independent person who guides the initial phases of requirements elicitation process and helps in overcoming any possible knowledge barriers between the two parties. The facilitator is responsible for the practical issues of the process, such as getting the right people involved from both sides, arranging sessions where requirements can be discussed, and setting agendas for those sessions. The facilitator ensures that the requirements elicitation sessions run successfully and to schedule.

She/he also needs to foster discussion and understanding between the parties present in the sessions. The different parties have different knowledge and backgrounds which means that communication between the parties does not automatically lead to common understanding.

The facilitator's task is to try to foster the building of common understanding. The discussion between the parties needs to be focused on right issues. On one hand, the facilitator may need to guide the customer in discussing her/his work activities. On the other hand, the provider may need to be guided in expressing ideas how to support the work activities. The discussion should be focused on information system design issues and be refrained from irrelevant comments. Furthermore, she/he should try to create a relaxed atmosphere to ensure that all parties can feel free expressing their ideas and thoughts about the information systems. Hence, as Lavikka and Luoma (2008, p. 169) conclude, the facilitator needs to be both holistically oriented and sensitive to unique context-specific features of the facilitation process.

The facilitator facilitates, i.e., diagnoses, makes interventions, and summarizes the sessions, manages the agenda, and closes the sessions. Finally, the facilitator analyzes the discussions, documents the findings in a written report, and presents the results to the parties involved in the process. The process of facilitating requirements elicitation is depicted by the author in the Figure 23.

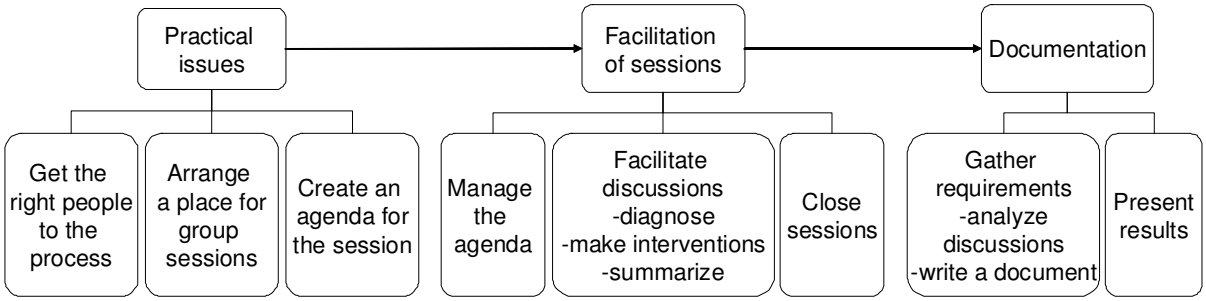

Figure 23. The process of facilitating the requirements elicitation

Macaulay (1999) presents that the success of requirements engineering workshops often depends on the mediation skills of the workshop's facilitator. In this study, this issue was not studied but it is a good subject for a new study. According to the research results, Macaulay's statement is true because without proper guidance the discussion about business requirements would have gone to wrong tracks. The author has been in many simulation days and observed that the facilitator affects the atmosphere of the day and also the topics of the discussion a lot.

Saiedian and Dale (2000, p. 420) suggest that the diverse interests of many participants involved in requirements elicitation need to be recognized. According to the results of this research, this is the job of the facilitator. In addition, right people need to be involved in the

elicitation process at the right time and the right expectations need to be addressed. This is another task for the facilitator to ensure. In this study, the facilitators with the help of the representatives from the provider organization ensured that the right people were invited and also attended to the process modeling sessions and the simulation days.

The results of the study suggest that the role of the facilitator was a coordinator of the requirements elicitation. Each stakeholder and participant has a limited view of the process of information system development and also has an agenda to satisfy her/his own goals. The facilitators ensured that the discussions during the action research projects focused on relevant issues, such as the business process and its information system requirements.

6.1.3 The Further Developed Framework: the Process of Co-designing Business and IT systems during Requirements Elicitation

The conceptual framework was further developed through the analysis of the three case studies. The framework answers to the main research question: How can business and IT systems be co-designed during requirements elicitation? It presents the co-design process between the provider and its customers during requirements elicitation which is the most important phase in co-designing business and IT systems because it determines whether the developed IT system meets the real customer needs.

In addition, the developed conceptual framework presents the coordination methods used in the cases to manage the interdependencies between the provider and the customer during requiremens elicitation. This study showed that the provider and its customers did not share a common language to communicate which hindered the elicitation of business process and IT system requirements. Thus, a process of co-designing business and IT systems during requirements elicitation was developed based on literature study and three case studies. The process consists of three steps that the facilitator needs to manage.

The **first step** is to get the different parties to discuss and start to understand each other. The framework (See Figure 24) presents that through business process modeling and simulation, the parties involved in requirements elicitation can discuss and share their expertise knowledge. On one hand, the customer describes how her/his current business processes function, what the current problems and needs are, what the organization's goals are, and possible future needs, i.e., customer's business knowledge. On the other hand, the provider describes

the possibilities and limitations the information technology can provide to the processes, possible costs of implementing certain functions, and the possible schedule of the development project, i.e., provider's IT knowledge.

The process models including the activities of the business processes and the information systems act as boundary objects that enable the parties to discuss the common object of development. The shared notation tries to make sure that the parties are sharing a common language to discuss efficiently. Common discussion can lead to creating new ideas how the information technology can enable new business opportunities.

The **second step** in co-designing business and IT systems during requirements elicitation is to help the different parties to create a common understanding about the customers' business and IT's possibilities and restrictions. This requires facilitated communication between the parties. The discussions are facilitated by a facilitator that takes care that the discussions are focused on right issues. She/he makes sure that the parties' different points of views are discussed and solutions found to possible challenges. The facilitator needs to be well-prepared for the discussions, i.e., she/he interviews different parties, analyzes interview data, and determines the discussion topics that need to be covered.

The aim of the common discussion is that the two parties are able to agree on how the information systems can support the business processes and how the business processes may have to be changed due to technology changes. The idea is to have common understanding about common work processes, business process and information system requirements, opportunities and limitations posed by technology, costs, and schedule of implementation.

The **third step** in co-designing business and IT systems during requirements elicitation is to agree on the coordination methods to ensure communication between the parties during requirements elicitation, and start applying them. The coordination methods used in the three case studies are presented in the framework and they were presented earlier in more detail in the Table 10. The coordination methods used may be jointly changed during the information system development process.

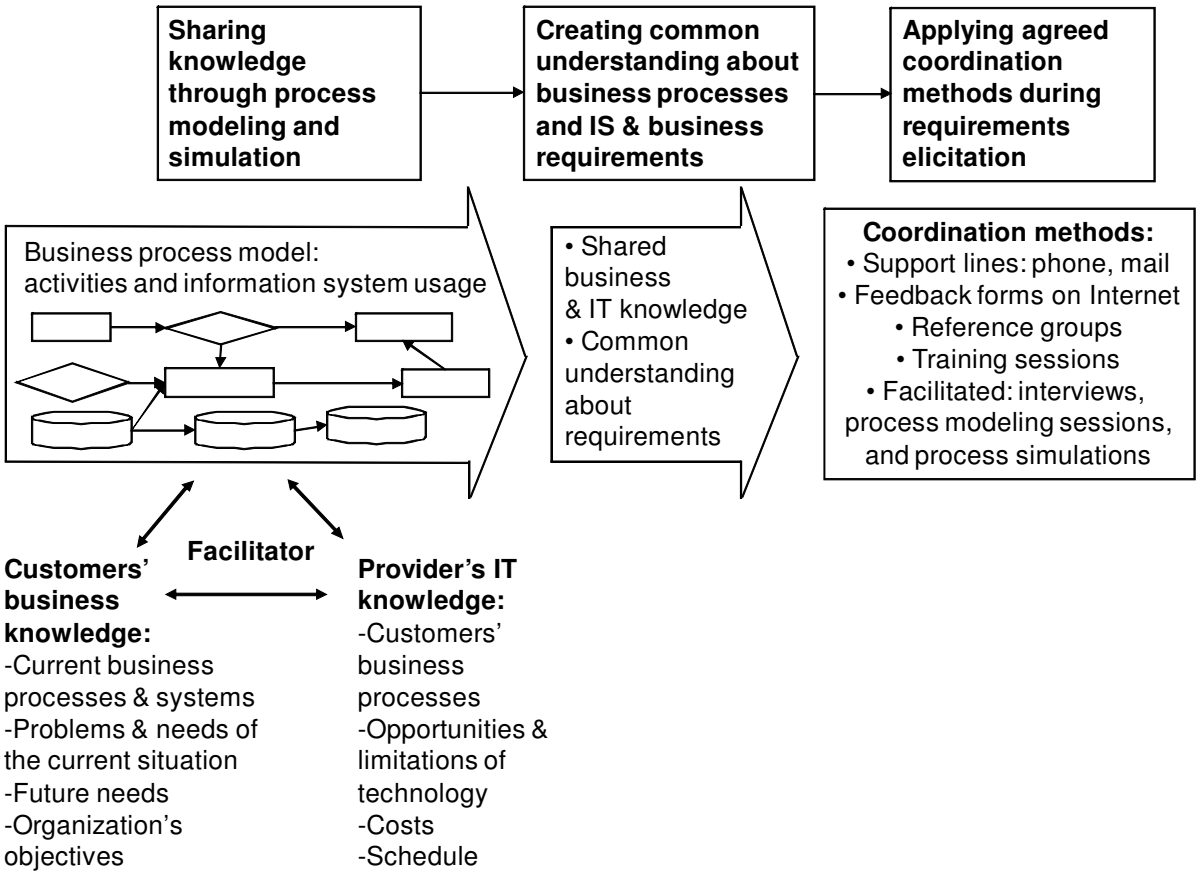

Figure 24. The further developed framework: the process of co-designing business and IT systems during requirements elicitation

6.2 Theoretical Implications

Partnership and Mutual Understanding Required

This study confirms Al-Karaghouli's et al. (2000) belief that partnership and mutual understanding are required for eliciting the right requirements. The customers need to be convinced that the development ideas they send are taken into consideration and not just stored into some database that is never browsed. On one hand, the customers need to know that the provider understands what they are explaining. On the other hand, the provider wants that the customer understands the trade-off between requirements, costs, and schedule.

Provider-Customer Links and Their Coordination

This study tries to contribute to coordination and requirements engineering theories by describing what kinds of interdependencies between the information system provider and the customers during requirements elicitation exist, and how those different interdependencies

should be coordinated. The study described four kinds of interdependencies and how these were coordinated in the three case studies (See Table 10). One of the interdependencies, i.e., *systemic coupling*, is introduced as a new interdependency to coordination literature. It is suggested that this new interdependency is coordinated by *facilitated mutual adjustment*.

Systemic coupling entails many interdependencies needing frequent coordination. The parties neither share domain-specific knowledge nor common language, which hinders the sharing of knowledge and building of common understanding. Facilitated mutual adjustment helps the parties to develop common domain knowledge and common understanding. Common domain knowledge refers to a shared, work related body of knowledge that allows for communication between the different parties. Systemic coupling and facilitated mutual adjustment should be studied further in new similar cases to understand thoroughly the meaning of common domain knowledge and common understanding in sharing knowledge.

This study confirms Malone and Crowston's (1994) statement that coordination is dependent on underlying processes of decision-making, communication, and the perception of shared objects. Xu (2009, p. 41) classified decision-making structure in large agile projects into centralized and decentralized coordination strategies. Furthermore, she classified communication into vertical, horizontal, personal, and impersonal coordination strategy. Her study suggests that these coordination strategies are contingent on project size: when size increases, more formal coordination methods are applied. In this thesis' case studies, the information system development project was large and it applied both informal and more formal coordination methods. Thus, it should be further studied in what kinds of cases Xu's statement that coordination strategies are contingent on project size applies.

Process Modeling and Process Simulations in Requirements Elicitation

The process modeling sessions and process simulations as requirements elicitation tools were beneficial in the three case studies. The reason for success was that the common boundary object, i.e., the process model provided a common frame of reference that the parties could apply in their dialogue and thus share a common notation. This confirms the findings of Smeds et al. (2006). Another beneficial thing of the process model is that it visually represents the work processes of the customers which may help in the construction of common meaning about the processes. As Jacobson et al. (1997, p. 219) propose, modeling languages provide a common language that simplifies communication between the parties when discussing the

business. Furthermore, the models supply a shared understanding of the subject, which reduces the risk of misunderstandings between the parties. The process models that were used in this research acted as a validation technique for the requirements. The more traditional models, usually data flow diagrams, were critiqued during the simulation days by both the users and the information system designers.

Coughlan et al. (2003, p. 532) discuss that to gather real requirements, effective communication techniques are required. This study suggests that the common process modeling sessions and simulations act as effective communication techniques that can be used to gather business and information system requirements. Three process simulations to gather requirements were beneficial because they allowed analysis and modeling to interleave. The understanding of the problem domain and proper requirements increased as they were represented to the customers. Proper requirements mean that the customers understand the implications of chosen requirements.

Customer's Knowledge versus Provider's Knowledge

This study confirms Al-Karaghouli's et al. (2000) statement that the customer's knowledge is mainly business knowledge with limited IT knowledge, whereas the developer's knowledge is mainly technical IT knowledge which is limited with business knowledge. Although, it would be beneficial to share business and IT knowledge, which could lead to better understanding between the parties.

The study also supports Fincham's et al. (1995 in Williams & Edge 1996) finding that supplier-user interaction is very important in the financial sector to understand the user requirements related to information systems. Common business process modeling sessions enable the integration of the participants' diverse perspectives.

Facilitator as a Boundary Spanner

The study implies that the facilitator acts as a boundary spanner (Levina & Vaast 2005) between the developer and the customer. Boundary spanners are individuals who facilitate the sharing of expertise by linking different groups of people that are separated by location, hierarchy, or function. For example, managers of research or IT specialists are expected to act as boundary spanners between organizations.

The skills and qualities of the boundary spanner affect the success of boundary acting. (Levina & Vaast 2005, p. 338) However, there are no widely accepted checklists that could be applied in evaluating the qualities of the boundary spanner. Koskinen and Pirinen (2007, p. 961) provide a list of tasks and skills the spanner should pose. These include, among others, understanding different perspectives and interpretations, understanding conflicting interests and needs, facilitating cooperation and emergence of trust, guiding the flow of communication, creating common models and language, and sensitivity to social cues and context. Hence, the spanner should have quite many qualities. One of the research topics to be studied could be how to assure that the boundary spanner the company has hired really qualifies as a boundary spanner: What are the right capabilities of a good facilitator?

The business process models help the facilitator in starting the discussion around the business and the information systems that support the business. The models need to be understandable so that all parties involved in the process simulation can understand them and provide input to the development of the business and information systems.

6.3 Managerial Implications

Understanding Customers' Business Processes

The study implies that when eliciting requirements for large, complex information systems, it is beneficial for the information system providers to understand the customers' business processes on such a detailed level that the wholeness can be understood and best possible information system solutions can be developed. Detailed level understanding is required from the provider's point of view because the functioning and logic of large, complex information systems are more difficult to change than smaller systems. The necessary level of understanding is much lower from the customer's point of view because it can easily happen that too much detail confuses the customer, and maybe even the provider. A lot of time and resources are wasted if customers' business processes are misunderstood and thus, wrong requirements elicited. Furthermore, the customers should understand the possibilities and challenges the current technology poses to their business processes. Thus, customers should be involved early enough and continuously in the information system development project to prevent developing information systems into the wrong direction with wrong requirements.

Communication Facilitated through Business Process Modeling and Simulation Methods

Communication between the parties may result in common understanding about the future directions regarding the systems and business processes. This requires that communication is successful, i.e., each party really tries to listen to the other, even though; professional jargon may first seem to be hindering the interaction. Business process modeling and simulation of the process may act as methods to facilitate communication and make the parties focus on important issues (Lavikka et al. 2008, p. 355). The outside facilitator is an important ingredient in organizing process modeling sessions and simulation days and in facilitating discussion between the parties involved in the development.

Co-designing Business and IT Systems during Requirements Elicitation is a Process

The study suggests that it is beneficial to co-design business and information systems because neither is static. On one hand, new business needs emerge which affect the information system requirements. On the other hand, technology advances and poses new opportunities and challenges for current business processes.

The study showed that co-designing business and IT systems during requirements elicitation needs to be a process that includes three steps. The reason was that the requirements elicitation methods applied by the provider were not functioning enough to elicit the requirements: The provider did not understand the customers' business processes enough. The customers did not understand what the newest technology could offer their business processes.

The **first step** is to share knowledge between the parties. The literature study showed that there are many methods to capture the requirements from the customers. In this study, facilitated business process modeling and process simulations were applied and considered beneficial in building common understanding about the suitable requirements between the customers and the provider.

The **second step** is to create common understanding about business processes, information system requirements, and about the process how to collaborate. The idea is that the parties could share business and IT knowledge and have a common understanding about the requirements. However, it must be remembered that the requirements will change during the requirements engineering process because after understanding the initial requirements they must be reviewed with time, risk, and scope in mind. These affect the cost of the requirements and customers may not be willing to pay for all the requirements but want to discard some of

them. As Lyytinen (2007, p. 20) presents, "Requirements are negotiated within the scope of project time, risk and scope, and requirements are not fixed but remain volatile."

The **third step** of the process is to decide which coordination methods to apply in requirements elicitation and start applying them.

6.4 Evaluation of the Study

Gephart (2004) has provided some advice how to evaluate qualitative studies. According to him, the researcher must describe the research process in detail and describe how observations were transformed into data, results, findings, and recommendations. Data needs to be systematically reviewed. To add, methods need to be described explicitly and studied themes need to be defined. In addition, sources and types of data, and analysis methods need to be reported. When reflecting on these demands, this study has described the research process in detail. Moreover, research methods have been described and themes are defined. Next, the reliability, validity, and generalizability of the study are examined in detail.

6.4.1 Reliability

Reliability is close to validity because it refers to logic, inner coherence, and repeatability of the research. Reliability can be internal and/or external. The study has external reliability, if the study is repeatable and another researcher can get the same results by using the same research approach and its methods. If another researcher makes the same observations from the data, the study has internal reliability. The measurement methods are reliable when incidental measurement errors happen rarely or at all. The measurement results should stay the same after each measurement if the measurement method is reliable (Järvenpää & Kosonen 2000). According to Grönfors (1985), the researcher has a chance to collect reliable data if s/he is involved in the research team that is doing the action research. In this study, the author of this thesis was part of the research team doing action research. In addition, internal reliability was increased by developing a case study database (Yin 1989) that allows other researchers to access the same data and do the analysis again.

Leonard-Barton (1990) discusses that there are limitations in qualitative case studies. For example, the researcher is vulnerable to subjective interpretation of data. Thus, the researcher needs to acknowledge these facts. The participative, almost consulting role of the thesis' author affects the research results. As Kaplan (1998, p. 110) has presented, the researcher never

analyzes the case as a complete outsider. Also Yin (1989) states that the subjective judgement, which may result from one researcher conducting all the phases of the study, is a risk to the credibility of a qualitative study. In this study, researcher triangulation was used to minimize this risk: there were always two or three researchers collecting data in every phase of the research. Another researcher made notes during interviews, process modeling sessions, and simulations, and presented clarifying questions as well as observed the interaction during data collection. In addition, the cases' data was analyzed together and reported in case reports that were verified by the key informants of the case organizations. Eisenhardt (1989) considers researcher triangulation as very important for finding out striking findings and building confidence into the study.

A limitation of this research is the timing of the research with regard to the completion date of the information system development. Data for the study was collected before the new functionalities of the information system were implemented, i.e., data was collected only during the requirements elicitation. The ideal situation would have been to follow the whole process in real time during the development. Then the author could have drawn conclusions on how the user involvement affected the information system development process in the later phases. However, during the studied one year period of the requirements elicitation the author could follow the involvement of customers in the development process in three different case studies. Thus, lots of data was available to draw conclusions on involving customers in the requirements elicitation phase. The author took more a provider's point of view in the analysis of the three case studies but recognized also the customer's point of view to the information systems development. This has influenced the developed conceptual framework: it describes more the provider's point of view to the process of co-designing business and IT systems during requirements elicitation.

The fact that the customers were also shareholders of the provider company might have affected the results in important ways. Would knowledge sharing between the provider and the customers be equally open during requirements elicitation if there did not exist this ownership relation? The effects of the ownership relation on the coordination mechanisms should be examined in future research.

The business process models were used only to understand on a high level the business needs of the customers and the information system requirements. It should have been studied

whether business process models can be drawn on such a detailed level that they could also be used in the later phases of information system development process. What is the right level of detail in a process model for co-design during requirements elicitation? Would more detailed models have been a better means for coordinating the later phases of systems development?

The development of the study's particular information system should be studied further, i.e., the later phases of the requirements elicitation process and the wider information system development process. This could show how effective the business process modeling sessions and process simulations were in finding the right requirements from the beginning. It is inevitable that the initial requirements will change or at least be refined. The common understanding about the initial requirements between the different parties in the beginning of the information system development project should help the project to develop further.

6.4.2 Validity

Broadly, validity means that the measurement methods used in a research really measure the things they are intended to measure (Järvenpää & Kosonen 2000). Validity can be improved by using several data collection methods, i.e., method triangulation, and rich empirical data. As Scandura and Williams (2000, p. 1261) have expressed it "The greater the number of sources of evidence supporting theory, the stronger the conclusions that can be drawn." The study is also more valid if many researchers have been discussing the results. The phases of the research process should be described in detail. However, as Jarvenpaa et al. (1985, p. 151) note "Even if all possible precautions are taken, a researcher may never design a perfect study because validity is a relative measure and therefore can only be estimated".

Creswell and Miller (2000) define validity as "how accurately the account represents participants' reality of the social phenomena and is credible to them". The researchers present nine different types of validity procedures. The first one is *triangulation* which can be across data sources, e.g., participants, theories, and methods, e.g., interview, archival data, observation. In this study, the researcher has tried to provide corroborating evidence by applying method triangulation, i.e., collecting data through multiple methods, such as interviews, observation, questionnaires, process modeling discussions, and simulation day discussions. This increases the validity of the study because the researcher has gone through multiple forms of evidence. (Creswell & Miller 2000) The questionnaires were piloted with two researchers working in the same research project. The respondents were also able to ask clarifying questions while

fulfilling the questionnaire. Still, there is the possibility that the respondents have understood the questions wrong, i.e., the answers are not what the researcher has expected them to be. Zalan and Lewis (2004, p. 522) note that transparency in writing about methods will lead to greater credibility. This study has tried to be transparent about the methods applied.

The second validity procedure is called *disconfirming evidence* which means that the researcher is able to find data that disconfirms some research themes. This has not been applied in this study because the aim of the study was not to test theory but to create new theory. The third validity procedure is *researcher reflexivity* which means that the researcher reports her/his beliefs and values that may shape the inquiry. In this study, the researcher has presented her ontological and epistemological stances (See chapter 2.3 Epistemological and Ontological Assumptions). The epistemological and ontological stances, the constructivist and interpretive approaches that the author took, has influenced the analysis of the case studies' data. The author did not regard information system requirements to exist as an objective reality but regarded requirements elicitation to be a product of human perception and contingent on social experience, i.e., the requirements needed to be constructed by the case parties.

The fourth procedure is *member checking* which means that the data and interpretations are brought back to the participants of the study to confirm the credibility of the information. In this study, the credibility was increased by active collaboration between the parties of the cases: the customers and the provider. The author was also able to share and discuss her observations with other researchers in every phase of the research. To add, the empirical part has been presented to one of the representatives of the provider organization and to all the researchers working in the Madeleine research project. (Creswell & Miller 2000) After the third case, on the 8th of February 2008, the author interviewed the same middle-manager that was also interviewed during the cases. The purpose of the interview was to verify the further developed conceptual framework. As this person had already been interviewed, the interview could be based on the earlier discussions and the author concentrated on definite issues that she considered to become of interest during the research process. Furthermore, the author concentrated on verifying the themes in the conceptual framework. The interviewee accepted the framework's themes and verified that it describes their cases.

The fifth validity procedure is called *prolonged engagement* in the field. In practice this means that the researcher would stay at the research site for a long time. In this study, this

procedure was not possible. The sixth procedure is *collaboration* which means that the data is gathered in close collaboration with participants throughout the research process. In this study, the researcher has been in close collaboration with the case organizations all the time. (Creswell & Miller 2000)

The seventh validity procedure is *audit trail* which means that an individual that is external to the research project examines the research process and the results. In this study, the professor of the author was the head of the Madeleine research project but she was not part of the research team, thus she was able to examine the process, the product of inquiry, and then determine the trusworthiness of the findings.

The eighth procedure is *rich description* which means that the researcher describes the context of the research, the participants, and the themes of the study in detail. In this study, all these issues have been described in great detail. The final validity procedure is *peer debriefing* which means that someone familiar with the research reviews the data and research process. In this study, the researcher's colleague Otto Mäkelä and her instructor Miia Jaatinen have been able to review the data and the research process. They have provided support and challenged the researcher's assumptions. (Creswell & Miller 2000)

6.4.3 Generalizability

Generalizability means that the research findings apply also in other contexts, e.g., across times, settings, and individuals. (Scandura & Williams 2000, pp. 1250-1261) No theory can be fully generalized empirically because temporal and spatial boundaries restrict it. Spatial boundaries state which units of analysis the theory applies to and temporal boundaries specify the "historical applicability" of the theory. If a theory is well generalized it usually means that it loses some details needed to use the theory in its intended situation. In sum, a theorist can generalize empirically when theory is detailed enough but bounded in time and space, or theoretically when theory is more abstract but not so bounded. (Bacharach 1989)

The conclusions drawn from case studies are always subjective and the generalizability of case studies has been questioned many times (Yin 1989). Case studies rarely allow statistical generalization which is often irrelevant because of the unique nature of case studies. Developing a so called local theory that consists of knowledge created in a certain context and that is applicable to deal with in that specific context is the appropriate level of generalization (Grön-

fors 1985). The author has described the research process and data in detail to increase the credibility of the study and to allow the reader to do her/his own judgements, as Yin suggests. Furthermore, the author discusses analytical generalizability which means generalizing to theory but not to new cases. The researcher expects that this will improve the understanding of the study's phenomenon and initiate new ways of approaching it.

According to Scandura and Williams (2000, p. 1252), external validity is close to the definition of generalizability which is generalization across times, settings, and individuals. In this study, method triangulation was applied to increase the external validity. A researcher can improve the generalizability of her/his study by using both survey data, i.e., quantitative data and interviews, i.e., qualitative data. In this study, there was not any possibility to apply quantitative data gathered through surveys. However, qualitative interviews usually make up for in depth what they lack in breadth. The author followed the recommendations made by Dubé and Paré (2003, pp. 621-625) to improve the case study design. These recommendations include, for example, suggestions to specify clearly the research questions, unit of analysis, context of the study, and data collection process and analysis. The strength of case study is that it aims at holistic understanding (Saarela-Kinnunen & Eskola 2001). The author thinks she has achieved to get a holistic picture of the studied phenomenon and its context.

The transferability between different contexts depends on how different the "new" context is compared to the context of this study. If the context of this study and another context B are sufficiently congruent, the working hypotheses from the sending context may be applicable in the context B (Lincoln & Guba 2000, p. 40). The transferability was increased by describing the case studies in detail. The contexts of the case studies had similar and different features: The provider and customers A and B were the same companies in each case study, but the third case study included also a customer C. The modeled business processes varied in each case but the subsystems of the information system that were developed were the same in each case study. In addition, the participants from the case companies varied in each case. The new conceptual framework needs to be applied in new similar case contexts before it can be generalized to new similar cases. However, the purpose of this study was not to build a framework that is generalizable.

6.5 Suggestions for Further Research

This study is only a start in understanding how business and IT systems should be co-designed during requirements elicitation. In consequence, the new conceptual framework should be developed further through case studies of eliciting business requirements with the customer in different contexts, such as in situations of bigger information system change versus smaller incremental developments, in different types of customer businesses, or by applying a service oriented architecture versus traditional IT system development approach.

The new interdependency: systemic coupling and its coordination mode: facilitated mutual adjustment should be studied in further cases of coordination during requirements elicitation. Systemic coupling entails more than the transfer of knowledge: it is about sharing domain-specific knowledge. How to break the communication boundary between parties and increase the amount and type of shared domain-specific knowledge?

There is little research on the evolution of coordination modes in IS projects (Nurmi et al. 2007, pp. 22-32, Sabherwal 2003, p. 159). Although, Nidumolu already in 1996 (p. 105) discusses that it would be interesting to study "…the extent to which successful software-development projects emphasize one type of coordination mechanism over another at various stages of the project…" Thus, the evolution of the coordination modes in the studied information system development project would be interesting to study. This would require studying the cases' information system development process after few months and years to find out whether the coordination modes have changed, how, and what the effect has been.

Kauppinen et al. (2004) studied critical factors affecting organization-wide implementation of requirements engineering processes. They found out that the implementation of the process is a demanding task and depends on human factors, such as management commitment, motivation, and enthusiasm. This study did not focus on the whole process of requirements engineering, but only the elicitation phase of the process. It would be interesting to examine how the whole requirements engineering process of the provider's organization function: how effectively the business requirements are turned into technical specifications.

Bleistein et al. (2006, pp. 849-850) discuss that to really understand the IT requirements of an organization, goal modeling, context diagrams, and process models should be used in parallel. In this study, only process modeling of these methods was used, thus, it could be studied

whether the parallel use of these methods will lead to better elicitation of initial business requirements.

According to Wenger (1998), practice is not a result of design but a response to it. Design is predescribed, while practice is emergent and can be restructured if new events emerge. The design is a boundary object which different communities of practice can apply when discussing around the same theme, i.e., the object to be developed. Hence, it would be interesting to study whether the business processes and IT systems were developed to the direction that the desired process models were depicting.

Customers are more and more involved in the early phases of information systems development process. This study is a start in understanding the interdependencies between the provider and the customers during requirements elicitation and how those interdependencies should be coordinated. Later studies could examine which kind of interdependencies between the customer and the provider are the most beneficial when gathering requirements. In addition, it should be studied how the involvement of users affected the later phases of the development process and the end-result. It would be interesting to know did the involvement of the customers affect their willingness to adopt the new features of the information system.

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Appendices

Appendix 1. Interview questions in the first case study

Note! The questions are translated from Finnish to English. The questions below varied from interview to interview depending on who we were interviewing, e.g., a manager or a lower-level employee. Thus, the questions below try to present an "average" question battery.

Background

- Tell us about yourself?
- When have you started in this company?
- What are your responsibilities in this company?
- How are you involved in the information system development?

Information system

- What information system are you responsible for?
- What is the purpose of your information system?
- Describe how your information system is used in the banks?
    - Which are the problem/challenge areas?
    - How those challenges can be solved?
- What interdependencies do your information system has to the other information systems in this company?
- How should your information system be developed? When will this development occur?

Information system development

- How are information systems being developed?
- What issues need to be understood/defined in the beginning of information system development?
- How are customers taken into the early phases of information system development?
    - Can you see any benefits from taking customers into the development process? Who benefits?
- Where the requirements for development are received?
- Who are involved in the development of information systems?
- Which are the roles in information system development?
    - What is the role of banks in information system development?
    - What is the role of banks' umbrella organization in information system development?
    - What is the role your company in information system development?
    - Who is in charge of the information system development?

Appendix 2. Questionnaire in the first case study

Note! The questions are translated from Finnish to English. The questions below varied from interview to interview depending on who we were interviewing, e.g., a manager or a lower-level employee. Thus, the questions below try to present an "average" question battery.

Research form 12.10.2006 about information system development with the customer

1. Which organization are you representing?
    a. Banks
    b. Information system provider
2. What is your role in the information system development of the information system provider?

If you are representing the banks, please answer the following questions from 3 to 6. If you are representing the information system provider, pleas answer the questions from 7 to 11.

3. In what kind of development meetings/sessions organized by the information system developer have you been involved?
4. What are the benefits and disadvantages of taking the banks into the information system development?
5. What is the role of banks in the information system development of the information system developer nowadays?
6. What the role of banks should be in the information system development?

If you are representing the information system developer, please answer to the following questions.

7. How is the information system developer taking the customers into the information system development?
8. How should customers be taken into the information system development?
9. What are the benefits and disadvantages of taking the customers into the information system development?
10. What kind of development ideas are received from customers
11. Describe how the information system development is being managed in your organization?

Appendix 3. Interview questions in the second case study

Note! The questions are translated from Finnish to English. The questions below varied from interview to interview depending on who we were interviewing, e.g., a manager or a lower-level employee. Thus, the questions below try to present an "average" question battery.

Background

- Tell us about your working background?
- What are your responsibilities nowadays?

Customership management

- How has the ways to manage customerships changed during the past years?
    - How has the idea for new ways of managing customerships emerged?
    - How have your customers responded to these new changes?
- How does the customer relationship management system support your customers' canvassing for customers?
- Can you describe how your customers' use the customer relationship management system when canvassing for customers?
- How does the customer relationship management system support the planning of marketing communications?
- How does the customer relationship management system support the contacting of customers?
- How should the customer relationship management system be developed?
    - Are there any development projects going on in this area? Or any plans related to the system?

The implementation of customer relationship management system

- How did the implementation of the customer relationship management system go?
- What kind of differences there were between the customer organizations when implementing the customer relationship management system?
- What kind of competence is expected from the customers when implementing the new information system?
- How were the customers supported in the implementation process?
    - What was the role of banks?
    - What was your role?
    - Who was in charge in the implementation of the system?
    - Do you have any models how to manage these kinds of changes?
    - Do you act in the same way with all your customers when a new system is taken into use?

Appendix 4. Interview questions in the third case study

Note! The questions are translated from Finnish to English. The questions below varied from interview to interview depending on who we were interviewing, e.g., a manager or a lower-level employee. Thus, the questions below try to present an "average" question battery.

Background

- Tell us about your working background?
- What are your responsibilities nowadays?
- Have you been involved in the earlier development projects related to these information systems?
- How are you involved in this [project name confidential] development project?

Process to be developed

- Who are the actors in this process? Are the actors the same in the corporate customer's process?
- Where do you think this [process name confidential] process starts?
- This process is modeled from the individual customer's point of view. How does this process differe from corporate customer's point of view?
    - Describe the different phases of the process.
    - Which information systems are used in this process?
    - What information is passed through these information systems?
    - How should the information systems be developed?
- Which process phases can be dealt through web? How do the phases proceed?
- What are the problem spots in this process?
- Does your company have development ideas related to these problems?

The process' interdependencies to other processes

- How does this other process relate to other processes that your customers have?
    - What services should the customer have before this process can be started? What services should the customer have after this process?
- How do you see the customer's life cycle?
    - How do the different phases of the customer affect the services of this process?
    - How do the different phases of the customer show in this process?

Appendix 5. Questionnaire in the third case study

Note! The questions are translated from Finnish to English.

The purpose of this questionnaire is to find out how the participants of the simulation day will utilize the development ideas born during the simulation day. The questionnaire's data is confidential and is intended only to the use of SimLab's researchers in their research.

1. Circle, whether you represent **banks** or **the information system provider**?

2. What kind of development ideas did you receive related to your work during the simulation day?

3. How are you going to apply the ideas in your work?

4. What kind of ideas did the process model give to the development of the banks and information system provider's collaboration?

5. How did the process model help you to perceive/understand your work tasks?

6. How should the collaborative (between banks and information system provider) information system development be arranged?