



OULUN YLIOPISTO  
UNIVERSITY of OULU

FACULTY OF TECHNOLOGY

**FLEXIBLE CONTRACTING IN SOFTWARE  
PROJECT BUSINESS**

Jouko Nuottila

Master's Thesis

Degree Program in Industrial Engineering and Management

October 2013

# TIIVISTELMÄ OPINNÄYTETYÖSTÄ

Oulun yliopisto, Teknillinen tiedekunta

Koulutusohjelma (kandidaatintyö, diplomityö) Tuotantotalous		Pääaineopintojen ala ---	
Tekijä Nuottila, Jouko Johannes		Työn ohjaaja yliopistolla Professori Jaakko Kujala	
Työn nimi Joustava sopiminen projektiliiketoiminnassa, case: ohjelmistoprojektit			
Opintosuunta ---	Työn laji Diplomityö	Aika 27.10.2013	Sivumäärä 72
<p>Tiivistelmä</p> <p>Yksi projektiliiketoiminnan keskeisistä päämääristä on saavuttaa projektille asetetut tavoitteet, sekä puhtaasti liiketaloudelliset että muut tavoitteet. Tällä tavoin voidaan projektitoiminnan menestystä luotettavasti mitata ja yrityksen toimintoja voidaan parantaa tulevaisuuden projekteja varten. Projektinhallinnan kirjallisuus kuvailee monia epävarmuustekijöitä, jotka voivat vaikeuttaa projektin tavoitteiden saavuttamista. Muutokset vaatimuksissa ja toimintaympäristössä ovat yleensä vakavimpia riskejä projekti toteuttamiselle. Perinteisesti näitä riskitekijöitä on pyritty hallitsemaan erilaisilla projektinjohdon työkaluilla. Nämä työkalut ovat kuitenkin yleensä reagoivia luonteeltaan, vaikkakin pyrkivät ennakoimaan tulevaa.</p> <p>Yksi vaihtoehto parempaan ennakointiin voidaan saavuttaa ennakoivilla ja joustavilla projektisopimuksilla. Sopimukset voivat olla työkalu parempaan yhteistyöhön projektitoimijoiden kesken ja ne voivat myös edistää tehokkaampaa kommunikointia. Tämän tutkimuksen tarkoituksena oli tarkastella sopimusprosessia ja sopimuskyvykkyyttä varsinaisen sopimuksen rinnalla. Erityisesti oli tarkoitus havainnoida voisiko joustava sopiminen edistää projektin liiketaloudellisten tavoitteiden saavuttamista. Toisen tavoitteena oli tarkastella kuinka joustavaa sopimista voidaan käyttää projektiliiketoiminnassa ja mitä hyötyjä ja riskejä se tähän toimintaan tuo. Tutkimuskysymykset olivat:</p> <ul style="list-style-type: none"><li>- Mitkä ovat sopimusprosessin vaiheet ja projektisopimuksen elementit?</li><li>- Kuinka joustavuus on otettu käyttöön sopimusprosessissa ja projektisopimuksessa?</li><li>- Mitä hyötyjä ja riskejä joustavuus tuo ohjelmistoprojektin toimittajalle?</li></ul> <p>Tärkein tutkimustulos oli, että joustavuutta voidaan lisätä kahdella tavalla. Päätöksiä voidaan viivästyttää niin pitkään, että riittävästi tietoa päätöksiin on saatavilla tai päätökset voidaan tehdä niin, että ne sallivat joustavat muutokset projektin elinkaaren aikana.</p> <p>Muut tulokset voidaan tiivistää seuraavasti: Joustava sopiminen vaatii luottamusta yritysten välisessä suhteessa. Joustava sopiminen on tärkeää arvontuoton kannalta ohjelmistoprojekteissa. Pitävät sopimusehdot ovat tärkeitä liiketoiminnassa, mutta joustavuudella voidaan tietyissä sopimusehdoissa saavuttaa ennakoivaa yhteistyötä projektikumppaneiden välille ja edistää muutoksiin adaptoitumista kompleksisessa projektiympäristössä.</p>			
Muita tietoja Avainsanat: Joustava sopiminen, projektisopimus, projektiliiketoiminta, ohjelmistoliiketoiminta, ohjelmistoprojekti			

# ABSTRACT FOR THESIS

University of Oulu, Faculty of Technology

Degree Programme (Bachelor's Thesis, Master's Thesis) Industrial Engineering and Management		Major Subject ---	
Author Nuottila, Jouko Johannes		Thesis Supervisor Professor Jaakko Kujala	
Title of Thesis Flexible contracting in software project business			
Major Subject ---	Type of Thesis Master's Thesis	Submission Date 27.10.2013	Number of Pages 72
<p><b>Abstract</b></p> <p>One of the most important issues in project business is to reach the goals set for the project, both monetary and non-monetary goals. This is also how project success can be measured and company's activities can be evaluated for future adjustments in different project functions. As project management literature suggests, several types of uncertainties and changes in project requirements or project environment create the most severe source of risk preventing to reach project goals. The traditional way to control the risk during the implementation of the project is to use different project management techniques. However, these techniques are many times reactive as nature; even they usually try to foresee the future problems in project implementation and delivery.</p> <p>To overcome these challenges, project contracts can be seen as a potential source of flexibility for the project implementation and delivery phase, and as a potential tool for better cooperation and communication between the project parties. The goal of this research was to look at the contracting process and capabilities and see if they, along with the project contract, can support a company to reach its business goals within a project. Furthermore, another goal was to consider a concept of proactive contracting from flexibility point of view and increase understanding how flexibility can be applied in project business and what are the risks and benefits in doing so. To achieve these goals, the research questions of the research were:</p> <ul style="list-style-type: none"> <li>- What are the phases of contracting process and the elements of project contract?</li> <li>- How is flexibility implemented in contracting process and into project contract?</li> <li>- What type of benefits and risks does flexibility bring to software project vendor?</li> </ul> <p>The main finding of the study was that it is possible to use two different approaches to implementing flexibility in the contracting process: Postpone decisions until there is enough adequate information available for decision making or make decisions that allow flexible adaptation to changes during the project lifecycle.</p> <p>The other findings can be concluded in three notions. First, flexible contracting requires certain level of relational accumulation and trust. Secondly, flexible contracting plays a vital role in value creation of a software project. Based on this research, flexible contracting creates synergies with agile software development in project business. And lastly, safeguarding is an important function of a project contract but with flexible contracting approach, contracts can work as a business tool to enable proactive coordination and flexible adaption for changes in a complex project environment.</p>			
<p><b>Additional Information</b></p> <p>Keywords: Flexible contracting, project contracts, project business, software project business, software contracting</p>			

## ACKNOWLEDGEMENTS

*In loving memory of my grandmother Hilja (1910-2006),  
the greatest source of motivation...*

First, I am delighted to express my gratitude to my supervisor, Professor Jaakko Kujala at the University of Oulu for a great opportunity to write a master's thesis with such an interesting, challenging and important topic. I am also grateful for his support, ideas, and time for many discussions. Also, I would like to express my thanks to both Professor Pekka Kess and Professor Jaakko Kujala for practical arrangements to facilitate my work and my graduation.

I would like to express my gratitude to Professor Soili Nystén-Haarala at the University of Lapland and Luleå University of Technology for great support, supervision, discussions and comments for my thesis. I would also like to express my gratitude to Professor Tim Brady at the University of Brighton for inspiration, support and comments for my thesis.

Furthermore, I would like to express my thanks to Doctor Elisa Vuori and Doctor Tuomas Ahola at the Aalto University, Doctoral student Osmo Kauppila and Doctoral student Jukka Majava at the University of Oulu for comments and ideas for my thesis.

Finally, I would like to express my gratitude to Lecturer Aila Auvinen and Licentiate Eija Vieri at the University of Oulu for support in my studies, Helena Haapio, Thomas Barton, René Franz Henschel and Fredrik Jörgensen for discussions related to my thesis, and my family and friends for always being there for me when I needed you.

Oulu, Finland, October 27<sup>th</sup>, 2013,

Jouko Nuottila

# CONTENTS

1 INTRODUCTION .....	7
1.1 Theoretical background.....	9
1.2 Structure of the thesis.....	10
2 CONTRACTING IN PROJECT BUSINESS .....	11
2.1 Project business and contracting capabilities.....	11
2.2 Contracts and contracting.....	16
2.3 Elements of contracting process.....	17
3 PROJECT CONTRACTS .....	19
3.1 Project contract terms and their functions.....	19
3.2 Creation, adjustment and retention of business relationship.....	24
3.3 Definition of project organization, including specification of content, schedule, resources, roles and responsibilities .....	25
3.4 Definition of authority, decision and control rights .....	26
3.5 Contingency planning and governance .....	27
3.6 Communication and dispute resolution.....	29
3.7 Specification of price, payoff and payment terms .....	31
4 FLEXIBILITY IN PROJECT CONTRACTS .....	32
4.1 Flexibility options for project contracts .....	33
4.2 Flexibility in the definition of project organization, including specification of content, schedule, resources, roles and responsibilities .....	33
4.3 Flexibility in the definition of authority, decision and control rights .....	34
4.4 Flexibility in the contingency planning and governance .....	34
4.5 Flexibility in the communication and dispute resolution.....	35
4.6 Flexibility in the specification of price, payoff and payment terms .....	35
5 CHARACTERISTICS OF SOFTWARE DEVELOPMENT PROJECTS .....	36
5.1 Software development practices .....	36
6 THE CASE STUDY .....	40
6.1 Data gathering and analysis .....	40
6.2 Case companies and the case project .....	41
6.3 Case description .....	41
6.3.1 Business initiation (Search).....	42

6.3.2 First phase of the project (Preparation) .....	42
6.3.3 Project order (Bidding) .....	43
6.3.4 Contract negotiation (Negotiation) .....	44
6.3.5 Project implementation (Implementation) .....	46
6.3.6 Project termination and business continuation (Transition) .....	51
6.4 Flexibility in the case project .....	53
7 DISCUSSION .....	58
7.1 Critical evaluation of the research .....	62
7.1.1 Construct validity .....	62
7.1.2 Internal validity .....	63
7.1.3 External validity .....	63
7.1.4 Reliability .....	64
8 CONCLUSIONS .....	65
8.1 Limitations and further research .....	65
REFERENCES .....	67

# 1 INTRODUCTION

*“Although research on project business is a relatively new branch of management studies, projects have been created and implemented throughout the world for thousands of years”.* (Artto et al. 2011)

Throughout the history of mankind huge projects have been implemented. For example the pyramids, the Great Wall of China, the Stonehenge and the medieval castles and churches are examples of massive construction projects which required great amount of resources and coordination of usage of these resources. We do not know much about the engineering and project management skills related to these ancient projects as it was only during the post-industrialism (since 1950's mainly) when project management research was founded as a research science. Because of the long history of project management research, a widely accepted view regarding the factors on managing a single project has been established (Artto et al. 2011).

Economic growth, internationalization of enterprises, fiercer competitive scene and more complex business ecosystems in the following decades after the Second World War created demand for more diverse research of projects and project environments. Research focus developed to consider topics as project marketing, project stakeholders, project goals, project lifecycle and project networks (Artto et al. 2011). These topics can be considered to be part of the project business research which is an emerging multidisciplinary research science. In the research context the project business term has been defined for example in the following way:

*“Project business is the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms”.* (Artto & Wikström 2005)

One of the most important issues in project business is to reach the goals set for the project, both monetary and non-monetary goals. This is also how project success can be measured and company's activities can be evaluated for future adjustments in different project functions. As project management literature suggests, several types of

uncertainties and changes in project requirements or project environment create the most severe source of risk preventing to reach project goals (Ward & Chapman 2003; Carson et al. 2006). The traditional way to control the risk during the implementation of the project is to use different project management techniques. However, these techniques are many times reactive as nature; even they usually try to foresee the future problems in project implementation and delivery. To overcome these challenges, some scholars have started to look at the project contracts as a potential source of flexibility for the project implementation and delivery phase, and as a potential tool for better cooperation and communication between the project parties (Pohjonen & Visuri 2008; Nystén-Haarala et al. 2010; Siedel & Haapio 2010). These scholars discuss about terms like proactive approach to contracting, proactive project contracting or proactive contracting. They also emphasize the importance of contracting capabilities in project business.

This thesis considers software project contracting from the perspectives mentioned above. The research goal is to look at the contracting process and capabilities and see if they, along with the project contract, can support a company to reach its business goals within a project. Furthermore, another goal is to consider a concept of proactive contracting from flexibility point of view and increase understanding how flexibility can be applied in project business and what are the risks and benefits in doing so. To achieve these goals, the research questions of the thesis are:

- RQ1: What are the phases of contracting process and the elements of project contract?
- RQ2: How is flexibility implemented in contracting process and into project contract?
- RQ3: What type of benefits and risks does flexibility bring to software project vendor?

The theoretical part of the thesis is a narrative literature review focusing on the contracting process, contracting capabilities, contracts, contract terms, proactive contracting and flexibility discussed by academics from variety fields of science. Contracting process is seen as a parallel, communicating process with business process



of a contracting party. Thus, there is also a strong relational aspect present in interaction of contracting parties. To be able to understand possible flexibility in contracting, one need first to understand what the contracts are for and what kind of contract terms exist in project contracts. Contracts and contract terms are thus looked into in theoretical part too. Also, the literature findings on flexibility in contracting process and contracts are searched for and results are presented. Finally, theoretical backgrounds on software development methods and software project business are covered before the empirical part of the thesis.

The empirical part of the thesis is a single case study on a software company in project business. First, a case description and introductions to companies involved are presented and a case study setup is discussed. Then, a case study analysis and discussion follows to report the case study findings.

## **1.1 Theoretical background**

There are many approaches and theories involved while looking at contracting in project business. First of all, project business is a solid area of research from business and management point of view. Project management is a traditional research area to look at the implementation phases of projects. Organizational sciences such as topic of inter-organizational relationships (IOR) are used to analyze different organizations working together in one project or in a project network. Purchasing management is used to look optimised ways to handle industrial purchases, sometimes also as large as the ones conducted in projects. Project marketing is also arising science around project business. Project contract management can be seen as a managerial issue but legal studies are also looking at the contracting capabilities and project contracts as a legal device. Proactive contracting is a new multidisciplinary approach in the area of legal science to look at the contracts as a tool for cooperation. Negotiation theories are relevant to contracting too. While discussing on agreements and cooperation, there is also a question of trust between the organizations involved and between different actors related to the project in question. Also, sociological and psychometric theories are seen relevant for project business. While projects are usually quite large, there are also remarkable financial issues involved. This relates to the purchases of project equipment needed, resources

used and the schedules of purchases, deliveries and payments. Also, transaction cost economics theory (TCE) is traditionally used to analyze project network dynamics and project contracts. Different governance theories such as agency theories and incomplete contracting are also used in this area of project management. In addition, relational contracting can also be used to analyze especially informal agreements on project implementation, agreements which are not written in project contracts. As said in the beginning, there is lot of theories which could be used to analyze contracting in project business. In this thesis, the target is to focus on the most relevant theories to the case study of the thesis as it is impossible to focus on all the theories above in the limited scope of the thesis.

## 1.2 Structure of the thesis

This master's thesis includes 8 chapters. The structure of the thesis is presented in figure 1. In the first chapter, the motivation for the thesis, research approach, objectives and questions are introduced. In chapter 2, contracting and contracting processes in project business are presented. Project contracts and contract terms are discussed in chapter 3 and possible flexible approaches in projects contracts and project contracting are presented in chapter 4. Chapter 5 prepares for the empirical part of the thesis by discussing the characteristics and evolution of software development projects and different software development models. Chapter 6 presents the case study and the research findings and results. Chapter 7 includes an analytical discussion of the case study findings in the theoretical context and chapter 8 concludes the thesis by presenting the research contributions, research limitations and ideas for future research.

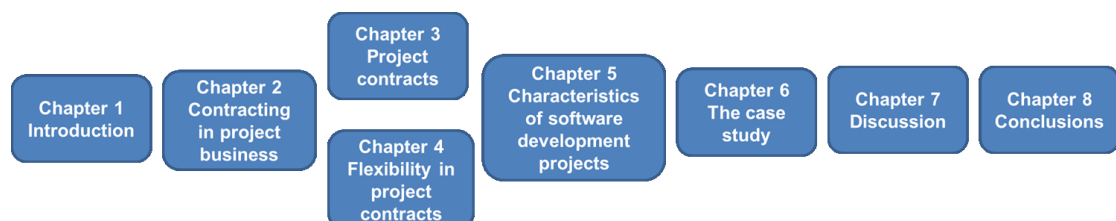


Figure 1. The structure of the thesis.

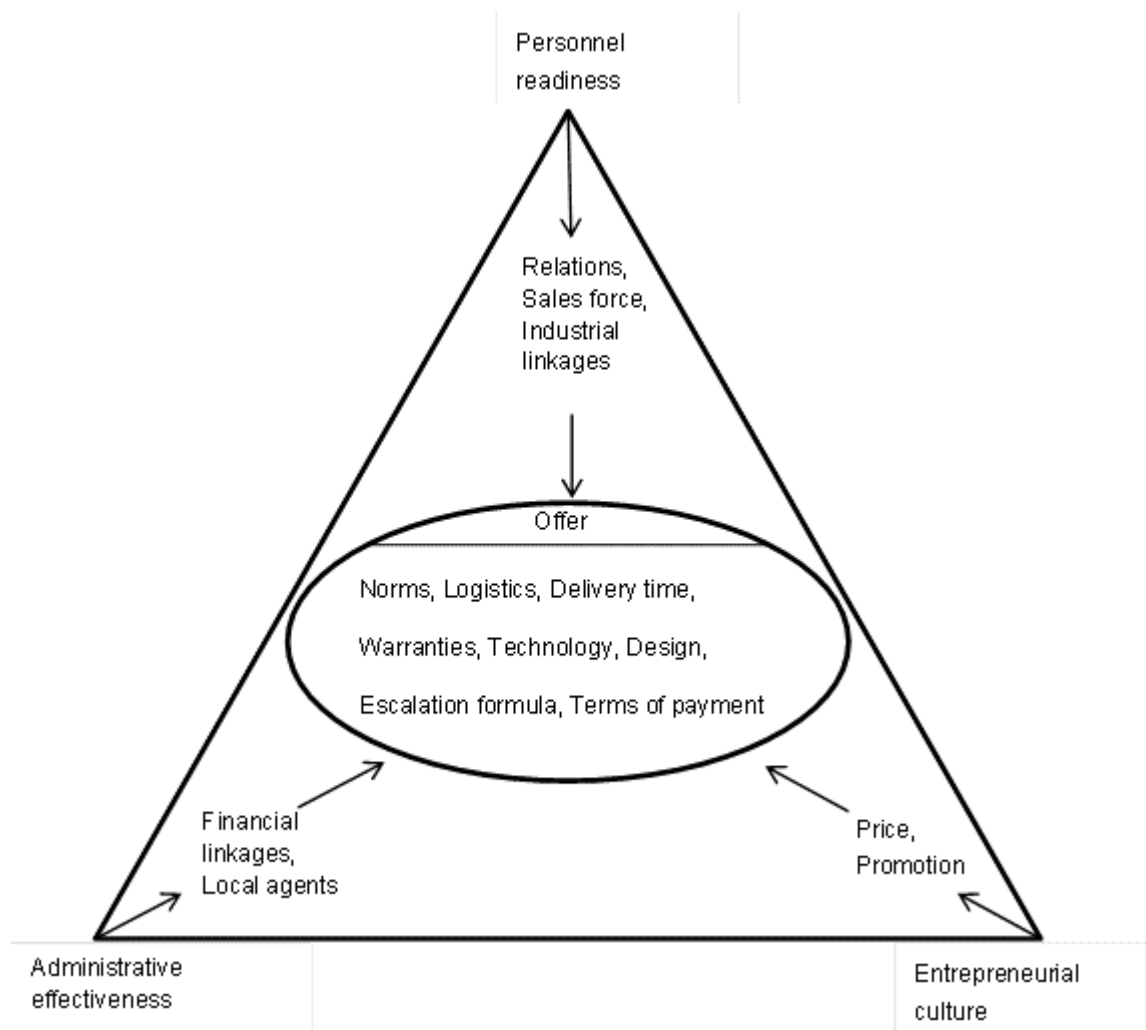
## **2 CONTRACTING IN PROJECT BUSINESS**

There are several research aspects available in looking into contracting in project business. For this research, the most important ones are business process, contracting process, and contracting capabilities of a contracting party. These form a skill and capability level of the party entering a contract.

### **2.1 Project business and contracting capabilities**

While working as the Associate Director, Projects, of the World Bank, Baum (1970) described the process which the World Bank follows in lending funds for development projects. In his article, Baum (1970) also described a project cycle the World Bank is involved in while financing the development projects. The steps of this cycle are: 1) identification, 2) preparation, 3) appraisal, 4) negotiation, 5) supervision, and 6) review. The studies on export projects also recognized that even no two projects are alike, each project passes through a common process with the stages identified in project cycle (Holstius 1987). It was also noted that the marketing of projects is induced by the project cycle and so the project cycle was modified to fit into the project marketing cycle by Holstius (1987) with the steps: 1) search, 2) preparation, 3) bidding, 4) negotiation, 5) implementation, and 6) transition. While studying project marketing, Cova & Holstius (1993) also noted that three key success factors for a firm engaging in project business are: 1) personnel readiness, 2) administrative effectiveness, and 3) entrepreneurial culture. These key success factors with marketing variables and sub-variables are illustrated in figure 2.

These success factors are related to project business and project marketing. The offer section in figure 2 however already lists some items which are usually under negotiation when project contract is discussed and finally agreed on. The details of these items are later discussed more thoroughly when project contracts and project contract terms are separately covered.



**Figure 2.** The success factors for a firm engaging in project business with marketing variables and sub-variables (Cova & Holstius 1993).

Cova & Holstius (1993) identified general success factors for a firm in project business. Scholars researching project business from mainly legal but also from business perspectives identified later that proactive approach to project contracting can prevent problems and disputes in the implementation phase and facilitate cooperation and communication between the project parties (Salbu 1997; Haapio 2006a; Haapio 2006b). More specifically Nystén-Haarala (2008) and Salmi-Tolonen (2008) went further to empirically study on corporate contracting capabilities in industrial context. They came up with four groups of capabilities related to contract contents, contract process, relational capability, and organisational & personal proficiencies. The detailed descriptions of these dimensions of contracting capabilities are presented in table 1.

Table 1. Dimensions of contracting capabilities (Nystén-Haarala 2008; Salmi-Tolonen 2008).

<b>Contract contents</b>	<ul style="list-style-type: none"> <li>- Knowledge &amp; information generating &amp; management</li> <li>- Capabilities in assignment of roles and responsibilities to the parties</li> <li>- Allocation of control &amp; decision rights to the parties</li> <li>- Understanding &amp; managing contingency</li> </ul>
<b>Contract process</b>	<ul style="list-style-type: none"> <li>- Negotiation &amp; bargaining capability</li> <li>- Contract design capabilities</li> <li>- Contract lifecycle management</li> <li>- Communication process (intra)</li> </ul>
<b>Relational capability</b>	<ul style="list-style-type: none"> <li>- Capacity to sustain cooperation</li> <li>- Capacity to end the relationship</li> <li>- Dispute resolution</li> <li>- Communication process (inter)</li> </ul>
<b>Organisational &amp; personal proficiencies</b>	<ul style="list-style-type: none"> <li>- Contracting policies</li> <li>- Capability to allocate resources with the appropriate knowledge</li> <li>- Negotiating and drafting</li> <li>- Knowledge generating</li> <li>- Contract design</li> </ul>

These capabilities are well in line with the project contract terms presented later which makes sense as with these capabilities an organisation targets to achieve a well-defined and comprehensive contract with a desired amount of flexibility in selected terms of a project contract.

Before proactive approach to project contracting, scholars mainly focused on looking at contracts from separate viewpoints of jurisprudence (lawyers), business (managers) or technology (engineers) (Pohjonen & Visuri 2008). It was assumed that contracting is the exclusive province of lawyers and legal departments (Salmi-Tolonen 2008). Argyres & Mayer (2007) presented a similar view but they emphasized that these three key roles (managers, lawyers and engineers) must all contribute to project contract design in an aligned manner so that the key competencies of these roles are utilized in defining sophisticated contract terms. This idea of balancing the different roles in developing corporate contracting capabilities is presented in figure 3.

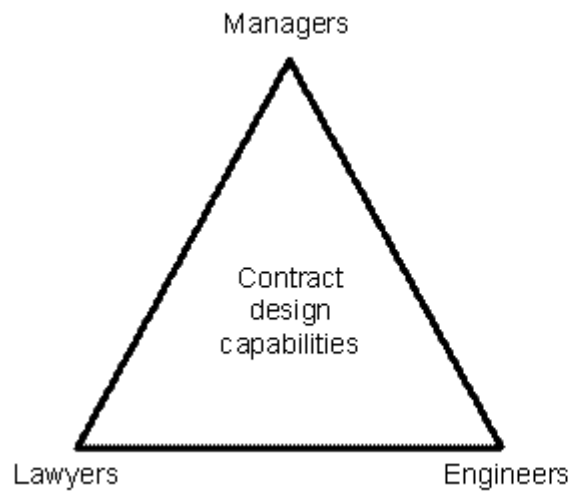


Figure 3. Three most important roles contributing in contract design as a firm capability (Argyres & Mayer 2007).

Both of these models (table 1 and figure 3) however still carried a problem within. They have aspects of developing competencies and capabilities at the personal level of different roles and not transferring them to the organisation (Nystén-Haarala et al. 2010). Especially in smaller organisations this creates a risk of losing existing capabilities because of employees leaving a company or moving to another position. This is one of the reasons why Nystén-Haarala et al. (2010) suggest that companies in project business should consider and understand concept of contracting as a process from a planning phase to a successful end of cooperation (or delivery). This process should also be documented as other processes in a company to avoid storing information only at the personal level and to enable improvements in the process. An illustration of contracting and business processes is presented in figure 4 (Corporate Contracting Capabilities Research Report 2008).

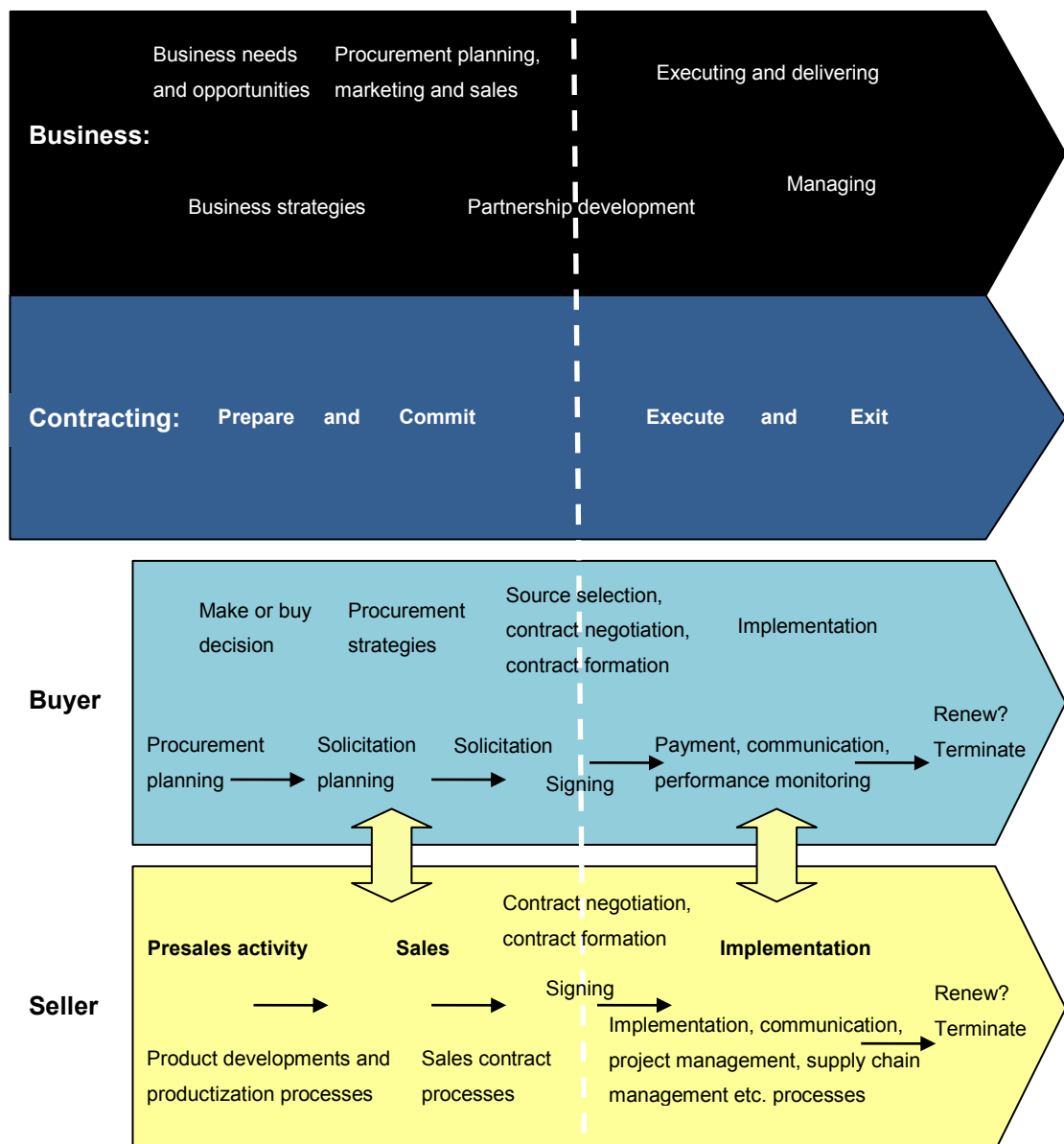


Figure 4. Contracting and business processes (Corporate Contracting Capabilities Research Report 2008). The vertical dashed line in the center of the figure depicts the moment when the contract is signed.

The researchers who came up with this process flow chart commented it: “*The illustration indicates the intertwining of business and contracting and the contracting process from the perspective of both the buyer and seller*”. While studying contracting and business processes of 8 enterprises utilizing different business models (i.e. sales of industrial goods, project business, lifecycle and service business), it was recognized that each business model requires compatible contracting capabilities. In addition it was

emphasized that the phases before the contract signing and the execution phase after the signing are significant parts of the contracting process. This is an important finding as traditionally both jurisprudence and business practices have seemed to consider only the contract signing as “contracting”. Contracting was found to be holistic by nature, not just a special area of lawyers. Contracting capabilities are connected to contract content, contract process and relational aspects of contracting. This approach also links business process with contracting process and emphasizes the need of managers and lawyers to work together towards a proactive contract. (Corporate Contracting Capabilities Research Report 2008)

This synthesis of contracting and business processes is utilized in this research as a base when looking into contracting in software project business. It can be expanded to reflect more detailed theory considerations of this research and interpret the findings of the case study.

## **2.2 Contracts and contracting**

A contract is generally widely understood as a signed document representing an agreement of contracting parties, a document which is legally binding in the courts. However, this understanding leaves out two important notions of contracts in project business:

- Contracts (legally binding) can include a variety of documents, communication, commitments, actions and incidents.
- Contracts, or deals in business people’s vocabulary (psychologically binding business commitments) are usually well respected to demonstrate relational trustworthiness in business ecosystem for various psychological, sociological and business reasons.

Legally binding contracts are not only documents signed by both parties. First of all, they can be signed by an electronic signature over an internet or be otherwise digitally approved in an electronic media. Contracts can be a chain of letters or emails between project parties. Contracts also can be formed by an offer followed by a purchase order,



or through a purchase order followed by an order confirmation. Furthermore, depending on a country and local law, contracts need to be in writing or they can be approved vocally or by another gesture or behavior. (Siedel & Haapio 2011)

Deals (as defined by Macaulay 1963) are often commitments taken seriously in almost all situations by business people. Even if deals were not legally binding they are often so much respected that contract and contract law are almost unnecessary because there are many effective non-legal sanctions. Two norms are widely accepted by business people: (a) Commitments are to be honored, one does not waltz on a deal, and (b) one ought to produce a good product and stand behind it. These norms influence the behavior of contracting parties because both parties would like to run successful business also in the future and because they are concerned about their general business reputation in the market. (Macaulay 1963)

While considering contracts from a project business perspective, which include contractual relations much more extensive than discrete transactions in the exchange of goods, it is important to notice that relations and agreements exist everywhere in business ecosystems in various forms and shapes. As Macneil (1978) mentioned when he studied economic relations under classical, neoclassical and relational contract law: *“Were we to push far in the direction of contractual relations, we would come to the firm itself, since a firm is, in significant ways, nothing more than a very complex bundle of contractual relations”*. Furthermore, it is clear that especially in project business real conflict remains between the need for reliability of planning and the need for flexibility in economic relations. Finding the right balance depends on the business model in case, risk sharing, incentives and the cooperative norms between the contracting parties.

### **2.3 Elements of contracting process**

Project business, especially with large projects in question, involves complexity (Kujala 2012). There are many concurrent processes running at the same time and these processes involve actors from many organizations as illustrated in figure 4. While legal and business processes are described in figure 4, there is one more aspect of contracting

(or agreeing) recognizable in the literature and it is a psychological process of making deals. It works both in an individual level and in an organizational level.

In the beginning it is a business prospect in a seller side and an idea of getting a problem solved in a buyer side. It is in the first contact of project contracting parties when they see an option to create value together. There are first commitments made already during the first contact. The seller might commit to send more information about the products, information on references and technical specifications. The buyer might commit to send more details on future plans and information on requirements of a project in question. It is important to notice that in a psychological level there are sort of commitments already made. When a more detailed discussion is started, companies enter into bidding and a negotiation phase (Kujala et al. 2007), this is illustrated in the figure 5. When the negotiations go further, psychologically binding commitments by individuals and organizations are getting stronger. At the same time also a business case and a value creation model is getting clearer, legally binding agreements are done and finally a contract is signed.

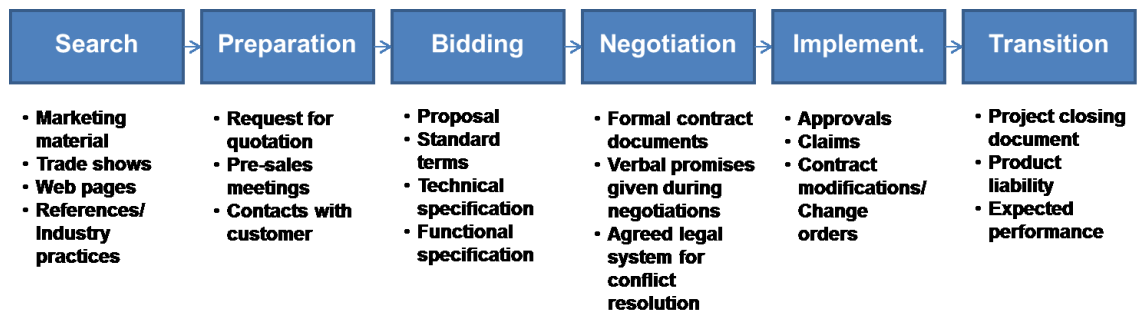


Figure 5. Examples of elements in contracting process (Holstius 1987; Nystén- Haarala et al. 2010; Skaates et al. 2002; Kujala et al. 2007; Tikkanen et al. 2007).

## 3 PROJECT CONTRACTS

In this chapter a concept of *contract* is viewed from different perspectives to demonstrate that there is not a single, widely accepted definition of contract either in an academic or in a corporate context. Based on this literature review, a selection of suggested functions and definitions of contract will be later more thoroughly discussed.

### 3.1 Project contract terms and their functions

While studying the linkage between business processes and contracting processes in project business, Nystén-Haarala et al. (2010) recognized that the understanding of purpose of contracts varied a lot in a corporate context and was often viewed differently by business people and lawyers. These controversial views however have a long history in the past and they are observed for example by Macaulay already in 1963. Macaulay and his research team studied commercial transactions between companies in manufacturing business in Wisconsin, USA. Macaulay focused on contracting issues and looked into contract forms, contract terms, court cases, conducted a wide survey among businesses and in addition interviewed tens of business people and lawyers. He clarified some issues of the term “contract” and stated that contract should not be understood as a synonym for a commercial exchange itself but contractual elements may or may not be attached to this exchange. Furthermore he stated that contract should not be understood simply as a written and signed agreement but it is something more extensive. It is interesting to notice that although these definitions are expressed almost 50 years ago, still business people often share understanding that contracts are legal documents designed by lawyers and these documents do not have practical value in conducting business but they serve only a safeguarding function in dispute situations (Nystén-Haarala et al. 2010).

Macaulay (1963) suggested a definition, for the use in his research, that contract has two elements: (a) A rational planning function of the commercial transaction with provision for all identified future contingencies, and (b) a judicial enforcement function of the agreed actions in the commercial transaction. It is important to notice that Macaulay

recognized that it is not possible to foresee all contingencies in advance while creating an exchange relationship, and although legal terms and conditions exist in this exchange relationship, they are not necessarily taken into use in case of problems arising during the relationship. Based on Macaulay's research, two functions of contract will be recognized: *The creation of exchange relationships and the adjustment of exchange relationships and the settling of disputes.*

Argyres and Mayer (2007) studied contract design among companies in technology and software businesses. They observed the role and actions of managers, engineers and lawyers in contracting process and demonstrated organizational learning as an increasing factor of firm's contracting capabilities. Along with other definitions for their research, Argyres and Mayer discussed different types of contract terms and grouped them in five categories. These categories will shed light on functions of contract seen by Argyres and Mayer.

Argyres and Mayer (2007) listed a definition of roles and responsibilities as one of the key functions of contract terms. They argued that when a commercial transaction involves complex technology, it is a major challenge to specify the roles and responsibilities of both parties in such details that there will be no genuine misunderstandings on who should work on a specific task and also that there will be no room for opportunistic behavior by either party. On the other hand, too rigid contract terms on this matter would inhibit adaptation to unexpected circumstances during the exchange relationship and also would lead to inefficiency in resource allocation if the most capable resources could not be used in a specific task because of inflexible contract terms.

The second category of contract terms by Argyres and Mayer (2007) is the allocation of decision and control rights for contracting parties. These rights can for example include the right to terminate an agreement prematurely or allow the buyer an option to extend the exchange duration or quantity, and possibly also purchase some additional services. Argyres and Mayer also included the question of ownership of the intellectual property used or created in commercial transaction as one control rights item of contract terms. They also included an acceptance policy of deliveries in this category of contract terms.

The next group of contract terms introduced by Argyres and Mayer (2007) covers the governance of contentious issues. The terms can include dispute resolution provisions for contracting parties, define an arbitration procedure or specify the contract law to be used and the location of court in a case of litigation. In addition, auditing clauses assigning rights to verify claims about cost and revenue impacts of engineering changes were listed in this category of contract terms by Argyres and Mayer.

As the fourth category, Argyres and Mayer (2007) listed contract terms covering contingency planning. Contingency planning clauses try to anticipate changes, incidents and problems that may or may not occur during commercial transaction and make provisions for such situations. These contingencies might arise because of changes in customer requirements, technological or competitive environment, regulations or strategic approach.

Finally, as the fifth category of contract terms, Argyres and Mayer (2007) identified communication aspects of contractual relationship. Effective communication has a vital role in successful execution of commercial transaction. The seller needs to communicate on progress of agreed tasks, inform about possible problems in performance or delivery schedules and report about external concerns affecting the exchange. The buyer needs to report on performance or quality concerns and deliver clearly specified change requests in a timely manner. This kind of communication principles should be agreed by both parties and this is why they should be included in contract terms as suggested by Argyres and Mayer. Based on the research by Argyres and Mayer (2007), five functions of contract will be recognized: *The definition of roles and responsibilities, the definition of decision and control rights, the provisions for dispute resolution, the contingency planning and the provisions for communication activities.*

Turner (2004) studied different forms of contracts in project business and emphasized that the project owner must be able to align the owner's objectives with the contractor's objectives in order to reach the successful execution and completion of the project. This kind of cooperative relationship between the parties can be achieved by balancing *ex ante* incentivization and *ex post* governance in contract terms. Turner deployed Transaction Cost Economics to discuss about the ability of a contract to provide

incentivization and governance. Incentivization parameters in contract terms include: The reward from the project, the risk associated to it, and the safeguard against the risk. Governance parameters in contract terms include: The incentive intensity for contractors, the ease of making mutually agreed bi-lateral adaptations in case of changes, the reliance on monitoring and administrative control system, and the reliance on court ordering in case of disputes. Turner mainly focused on price (and reward) as a motivational factor, but also mentioned for example an opportunity for the contractor to gain by cost saving or an urgency for the contractor to preserve a good reputation. Based on Turner's (2004) research, three more functions of contract will be recognized: *The creation of a cooperatively motivated, temporary organization to achieve project objectives, the definition of price (related to the concepts of risks and safeguards in project) and the governance planning to deal with unforeseen circumstances.*

Based on the discussion above, the functions of contract recognized and collected from the literature are:

- The creation of exchange relationships
- The adjustment of exchange relationships and the settling of disputes
- The definition of roles and responsibilities
- The definition of decision and control rights
- The provisions for dispute resolution
- The contingency planning
- The provisions for communication activities
- The creation of a cooperatively motivated, temporary organization to achieve project objectives
- The definition of price (related to the concepts of risks and safeguards in project)
- The governance planning to deal with unforeseen circumstances

As there is some overlapping in these functions, there is a need to organize and combine them to serve the setting of this research better. Also, there is a need to consider non-contractual relations introduced earlier and conclude findings from that discussion so that these informal agreements can be analysed being part of the contracting process and affecting behaviour of the contracting parties. Also, based on the literature review and

the approach selected for this research, from now on the term “contract” is understood in the widest possible way suggested by scholars. In addition to terms and clauses of a written document, the contract is considered to include informal agreements of the representatives of the contracting parties, and to include the aspects of business relationship between the contracting parties in a sense these aspects affect the behaviour of the contracting parties in exchange relationship of project business in this particular research.

To combine the functions of contract as a usable group for contract terms in this research, a list of contract terms is created and categorized to contain five groups of contract terms:

- *definition of project organization, including specification of content, schedule, resources, roles and responsibilities*
- *definition of authority, decision and control rights*
- *contingency planning and governance*
- *communication and dispute resolution*
- *specification of price, payoff and payment terms*

These are the actual contract terms in project contracts but to acknowledge the importance of relational capabilities in contracting process and relational aspects of project business, there is urgency to recognize these to have some effects on contract terms. This is why the *creation, adjustment and retention of business relationship* are identified as an effecting factor to all the other groups of contract terms. The summary of project contract terms for this research is presented in figure 6.

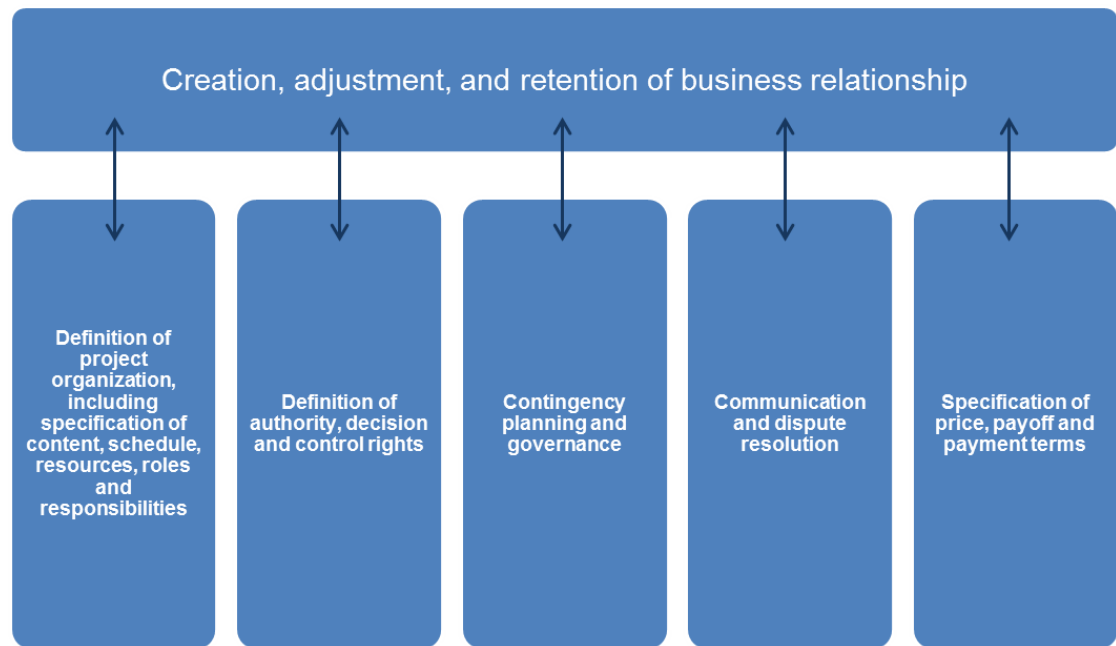


Figure 6. The functions of project contract terms and relational capabilities/aspects of project business.

In the next chapters the suggested groups of contract terms and a relational effecting factor are discussed more thoroughly and flexibility of contract terms is looked into based on literature.

### 3.2 Creation, adjustment and retention of business relationship

It is important to separate the nature of project business from the nature of industrial purchasing management to understand the differences in the depth of the business relationship of these two procurement activities. While industrial purchasing can be executed in a form of a project or purchased items can be utilized in a manufacturing project, these types of transactions can be considered as routine contracts compared to more complex project environment described in a definition of project business (Arto & Wikström 2005). In project business it is crucial to have a climate of trust in a mutually motivating, cooperative relationship between the contracting parties because this kind of relationship is required



- to get all project participants to work towards project objectives (Turner 2004; Smyth et al. 2010; Ruuska et al. 2011) and to reach those objectives successfully (Turner 2004; Ruuska 2005; Ruuska et al. 2011),
- to overcome possible misunderstandings and disagreements during the project and to be able to resolve disputes without litigation (Macaulay 1963; Smyth et al. 2010; Lumineau & Oxley 2012), and
- to develop cooperative norms over the course of an extended exchange relationship (Lumineau & Oxley 2012), to identify additional value creation opportunities and business opportunities during the project (Kujala et al. 2007; Smyth et al. 2010; Kujala et al. 2013) and to identify and maintain future business prospects (Skaates et al. 2002; Tikkanen et al. 2005; Smyth et al. 2010; Lumineau & Oxley 2012).

### **3.3 Definition of project organization, including specification of content, schedule, resources, roles and responsibilities**

Macaulay (1963) suggested that one of the negotiated items by business people in a bargain is to plan what each party is to do or refrain from doing. As this is a logical discussion in a project contract negotiation when resource allocations are to be decided, there are some conflicting considerations on it. To be able to maximize the value created in a project and minimize the cost related i.e. maximize the profit from a project, it would be reasonable to use the best possible resources from contracting parties to execute the project. However, usually the resources are scarce and there is a competition of allocating them to other activities (Hällgren & Maaninen-Olsson 2005) and the contracting parties are tempted to demonstrate self-interest seeking behaviour to maximize company-specific benefits from a project (Murtoaro & Kujala 2007). To overcome these fundamental problems, it is suggested that through project contracts

- the resources that are the most applicable for the project requirements should be specified and agreed (Argyres & Mayer 2007),
- the human resources assigned to the project should be motivated to act and they should be get to develop faith in and commitment to project objectives (Turner & Müller 2003; Turner 2004),

- the agreement on how to share gains from the project to project parties should be reached and this agreement should be fair in order to make it durable (Murtoaro & Kujala 2007), and
- the roles and responsibilities of project parties should be clearly defined to reduce the potential for opportunistic interpretation of the contract (Mayer and Argyres 2004; Argyres & Mayer 2007).

### **3.4 Definition of authority, decision and control rights**

The decision and control rights refer to authority of project parties to different actions during the project under contract. Some of the most dramatic actions would be cancellation of a goods order (Macaulay 1963) or termination of an agreement prematurely (Argyres & Mayer 2007). Macaulay (1963) said that even there seems to be a widely accepted view by business people that commitments are to be honoured in almost all situations, there also seems to be commonly shared understanding that sometimes cancellation is necessary because of the other party's business situation. So although cancellation might be disturbingly disappointing for the other party, these cases rarely go into litigation because firms want to avoid bad business reputation (Macaulay 1963). Instead, they generally seem to prefer private dispute resolution and avoid litigation as they are aware of the "shadow of the future" i.e. potential business prospects with the other party or with other companies in the similar market (Lumineau & Oxley 2012). However, even if the contract gives contracting parties a possibility to prematurely terminate the agreement, usually parties are safeguarded against these situations and are eligible for indemnity specified in the contract (Macaulay 1963; Argyres & Mayer 2007). Another demonstration of decision and control rights in the contract is a determined possibility for the buyer to extend the exchange duration, purchase additional (or reduced) quantity of goods (Milner & Rosenblatt 2002) or acquire optional packages and additional services on top of the project (Kujala et al. 2013).

Argyres & Mayer (2007) also mentioned the question of ownership of the intellectual property created or utilized in the project as an example of decision and control rights. If there are new inventions made in the project to solve technological problems, contract

provisions should define the ownership of these innovations. Also if contracting parties use their proprietary technology as part of the project solution, there is a question of licensing model or ownership transfer of these technologies. Especially when software in question, there also might be restrictions of exporting software components to some countries based on the lists of controlled and embargo countries specified by governments or international trade associations.

The acceptance policy of project deliveries is also a demonstration of decision and control rights (Argyres & Mayer 2007). A payment schedule can be bound to the customer verification of deliveries or progress in the project (Dayanand & Padman 2001), which contractually gives the customer a control point over contractor's cash flow. Macaulay (1963) also pointed out that buyers can withhold payments until the contractor has performed to their satisfaction.

### **3.5 Contingency planning and governance**

Pich et al. (2002) recognized that contingency planning techniques suggested by scholars in the area of project management include a diverse portfolio of approaches. They also insisted that there is a lack of conceptual understanding of why so many views on contingency planning exist and how practitioners should choose among them. Ruuska et al. (2011) supported these ideas and argued that there is a need to clarify the concept of project governance, especially in the context of project business of multiple firms and stakeholders. In addition, Ward & Chapman (2003) suggested that project risk management has a limited focus and fails to improve project management practice and project performance. They argued that a broader view on uncertainty management is needed. Some of the relevant issues for this research in the area of contingency planning are next looked into.

Argyres & Mayer (2007) argued that contingency planning involves anticipating and making provisions (in the contract) for problems that may or may not occur during the execution of the project. They noted that focusing on irrelevant contingencies can slow down the contracting process and can give a bureaucratic, difficult and legalistic image of a firm as a negotiation partner. On the other hand, they stated, a negligent approach

on contingency planning may lead into conflicts between contracting parties during the execution phase of the project when unexpected incidents occur.

Pich et al. (2002) pointed out that, in project management, task scheduling and risk management (pre-specifying and triggering corrective actions based on signals) are sufficient approaches as long as information about the project system is adequate. This rarely is the case. Pich et al. (2002) also noted that: *“Inadequacy of information is caused either by events or causality being unknown (ambiguity), or by an inability to evaluate the effects of actions because too many variables interact (complexity)”*. On the other hand, Schrader et al. (1993) defines uncertainty involving a situation where the actors have a sufficiently clear understanding of the problem but may not yet have a clear understanding of possible outcomes of different actions to solve the problem. They continued describing ambiguity involving a situation where the actors do not yet have a clear understanding of the structure of the problem and thus do not yet have an action portfolio to choose from to overcome the problem (Schrader et al. 1993). Carson et al. (2006) took a slightly different view defining volatility and ambiguity being two aspects of uncertainty. They noted that: *“Volatility refers to the rate and unpredictability of change in an environment over time, which create uncertainty about future conditions”*. They continued noting that: *“Ambiguity, in contrast, refers to the degree of uncertainty inherent in perceptions of the environmental state irrespective of its change over time”*. They listed four aspects of ambiguity as *“(1) lack of clear information, (2) uncertainty about the importance of environmental variables, (3) uncertainty of cause-effect relationships between variables, and (4) uncertainty about available courses of action and their potential effects”* (Carson et al. 2006). Ward & Chapman (2003) listed possible causes of uncertainty in project scope as:

- lack of clear specification of what is required,
- novelty, lack of experience of a particular activity,
- complexity in terms of the number of influencing factors and inter-dependencies between these factors,
- limited analysis of the processes involved in the activity, and
- possible occurrence of particular events or conditions which could have some (uncertain) effect on the activity.

At the same time, Ward & Chapman (2003) recognized that in the literature uncertainties are usually divided in risks and opportunities describing the possible either negative or positive effect of these uncertainties for the project implementation. Furthermore, Pich et al. (2002) discussed about “known unknowns” and “unknown unknowns” to separate incidents which can be seen in the planning phase and which cannot. They emphasized that contingencies cannot be planned for unknown unknowns as existing operational tools do not address them. Project governance should be able to handle these situations in a more creative way.

Finally, some scholars have identified the causes of uncertainties in more practical terms. Argyres and Mayer (2007) mentioned that a possibility for changes in customer requirements, technological or competitive environment, regulations or strategic approach should be handled in contingency planning provisions of the project contract. Ward & Chapman (2003) suggested that in the project there may be uncertainties about basis of estimates, design and logistics, objectives and priorities, and uncertainty about fundamental relationships between project parties. They also noted that in case of involvement of multiple parties in the project, there may be uncertainty arising from ambiguity in (Ward 1999; Ward & Chapman 2003):

- specification of responsibilities,
- perceptions of roles and responsibilities,
- communication across interfaces,
- the capability of parties,
- contractual conditions and their effects, and
- mechanisms for coordination and control.

This list supports earlier findings on the most important issues to be covered in a project contract to manage uncertainty and ambiguity in project environment.

### **3.6 Communication and dispute resolution**

In addition to the communication needs identified by Argyres and Mayer (2007) also other scholars have emphasized the importance of communication especially if a project

involves parties with high geographical distance or cultural diversity (Ainamo et al. 2010; Stahl et al. 2010). Ruuska et al. (2011) emphasized the importance of relationships and self-regulation in governance of project networks. Cooperative relationships and self-regulation cannot be established without open information sharing and shared perception of project environment macroculture (Jones et al. 1997; Ruuska et al. 2011). Similarly, Lumineau & Oxley (2012) recognized that one reason for a serious conflict and litigation between contracting parties is that the parties have failed to develop cooperative norms during the relationship. Macaulay (1963) and Jones et al. (1997) also emphasized the importance of informal and frequent communications in building a relationship between contracting parties. It is also significant to note that these informal communications include informal communications about the issues in project context but also informal communications between project participants in personal social context (Macaulay 1963; Smyth et al. 2010).

Communication and relationships also are in a key role when scholars have observed how companies behave in a case of disagreements and disputes. In addition to the formal dispute resolution provisions identified by Argyres and Mayer (2007), in practice companies seem to rely on relational capabilities and informal agreements influenced by a social context of the relationship to overcome dispute situations (Macaulay 1963; Macneil 1978; Nystén-Haarala et al. 2010; Lumineau & Oxley 2012). Informal agreements can be legally binding in court, as binding as the formal, written contracts are but it is also important to note that companies seem to take extreme measures to stay out of the court. While Lumineau & Oxley (2012) studied 102 dispute cases in vertical exchange relationships, they found out remarkable issues. Even these disputes were serious enough to get a contracting party to make a decision to get an external lawyer involved, only 61 of them got into litigation. As business people are considered to try to avoid lawyers and relying in court in business relationship (Macaulay 1963; Macneil 1978), in these conflicts business people found no other alternative than contacting an external lawyer. However, contacting an external lawyer seemed to be the last resort as based on the study, contracting parties first negotiated for a long time privately before seeking for outsourced assistance. Still, only 61 of the cases ended up into litigation, while 13 was taken into arbitration, 5 into mediation and 23 were settled in negotiations involving an attorney consultant. Lumineau & Oxley (2012) also noted that the “shadow

of the past”, the parties’ history of prior exchange, increased the duration of private negotiations before contacting lawyers and decreased likelihood of litigation especially if companies developed cooperative norms during the exchange. Also, shadow of the future had a significant effect on decreasing likelihood of litigation. Based on the various views in the literature, it seems to be important to have dispute resolution provisions in project contract but at the same time it seems that most conflicts are resolved by relational capabilities rather than lawyers and court.

### **3.7 Specification of price, payoff and payment terms**

As in any other business pursuing economical sustainability, also in project business a key driver is profitability. This of course relates to pricing but compared to the exchange of goods, in project business the pricing issue is more complicated because of a unique nature of product, many variables in execution and uncertainties in project environment (Crocker & Reynolds 1993; Dayanand & Padman 2001). Especially in large projects, it is challenging to define optimal tendering variables, pricing model, price, and payment schedule (Dayanand & Padman 2001; Turner 2004; Murtoaro & Kujala 2007; Ruuska et al. 2011). Furthermore, as project-based firms seem to evolve to create solution offerings and service business, the project pricing issues become even more complex as there might be for example a temptation to compromise payoff from a single project in order to gain from a longer-term service contract or obtain good reputation to win similar future deals (Jalkala et al. 2010; Wikström et al. 2010).

In addition to the specific question of price, there are also other considerations of project pricing scheme in a project contract. As Turner (2004) demonstrated, a monetary incentive is used and optimized to motivate the contractors to work toward project’s owner objectives. Smyth et al. (2010) discussed on a trend utilizing several contractors and getting benefit of risk spreading but some scholars also presented project risk as a trade item and thus affecting the price based on who carries the risk by a contract (Hartman & Snelgrove 1996; Turner & Simister 2001; Müller & Turner 2005). Another price related issue is payment scheduling. The payments are usually bound to progress of the project but on the other hand the scheduling is also a question of level of financing contractor’s operations for the project (Dayanand & Padman 2001).

## 4 FLEXIBILITY IN PROJECT CONTRACTS

Based on the earlier discussion, it seems obvious that soft terms and informal agreements exist in project contracting. These terms and agreements guide project parties' behaviour regardless whether or not they are legally binding by law. This view is related to the relational contracting and self-regulating aspects of business networks. According to this view, business decision making is based on three different disciplines: economics, law and ethics (Fort 1997; Siedel & Haapio 2010). These three elements of business decision making are presented in figure 7. Flexible clauses in project contract together with soft terms and informal agreements increase project flexibility to cope with uncertainties in different phases of project. This approach is called *flexible project contracting* by the representatives of proactive law movement and it is looked into in this chapter based on the findings and examples from existing project business and project management literature.

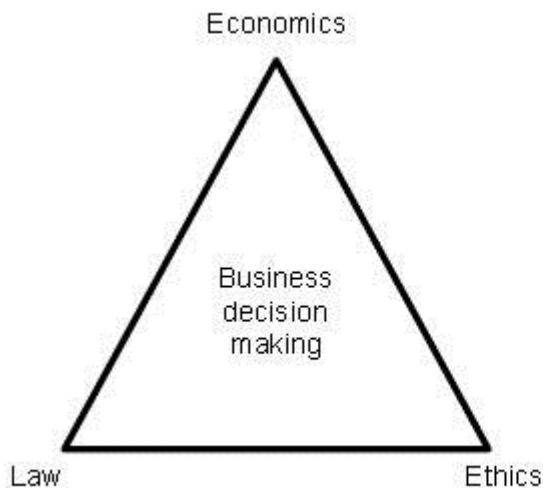


Figure 7. The three elements of business decision making (Fort 1997; Siedel & Haapio 2010).

As mentioned earlier, there are different actors and roles involved in marketing, sales, negotiations, legal advisory, and management in project environment. For example, while Argyres and Mayer (2007) studied contract design, they focused on the roles of managers, engineers and lawyers as main contributors for contract terms. As knowledge



and professionalism of these roles is focused on different areas, they all have dedicated expertise for contracting capabilities and thus for evaluating risks and benefits of flexibility items of contracts.

#### **4.1 Flexibility options for project contracts**

There are generally two options to increase flexibility in project business. One option is to agree to agree later. When negotiations and project planning is taken further, some issues are left open until they are needed to get defined or until there is enough information for defining them. Another option is to leave some undefined issues in the contract or write a contract in such a way that there is flexibility in the contract clauses.

Literature has examples of different types and levels of flexibility in contracting. These examples are categorized in the next chapters in a similar way as the project contract terms were categorized in the previous chapter. As this type of flexibility is not researched in an organized way and as the examples of flexibilities are gathered from academic sources of different sciences this hardly is a complete list and requires a lot more research to be presented in a comprehensive way. However, it is a good starting point for a debate and for the case analysis of this thesis.

#### **4.2 Flexibility in the definition of project organization, including specification of content, schedule, resources, roles and responsibilities**

There are several different types of examples in the literature for this category. Quantity of purchase can be left open for later decision. Suppliers may offer quantity flexibility to the buyer i.e. purchase quantities could be within a pre-specified quantity window (Li & Kouvelis 1999; Milner & Rosenblatt 2002). This can be deployed as a risk-sharing model in an uncertain economic situation. Supplementing a contract is another option to increase flexibility. Parties can agree to agree later (vs. late locking as a project management technique), or agree to institute an organizational process for specifying and defining the principles or references for supplementation (Nystén-Haarala et al. 2010). Contract duration is an obvious way to adjust the level of commitments in the

exchange relationship (Harris et al. 1998) but as shorter contracts are more flexible they also can decrease the level of cooperation in the relationship. One more example is flexible duration of project and included services (Nombela & de Rus 2004). For example public road construction and related road franchising uses this model. A private firm builds a road and then charge tolls to road users during a period of time in order to recover the investments. However, this model is currently mainly used in a public sector.

### **4.3 Flexibility in the definition of authority, decision and control rights**

There are not too many examples for this category in the literature. Early termination flexibility (Harris et al. 1998) means that there is a contract clause permitting early termination of the contract. Sometimes this is also referred as a mutual termination clause. A time-flexible contract (Li & Kouvelis 1999) allows the firm to specify the purchase amount over a given period of time without specifying the exact time of purchase.

### **4.4 Flexibility in the contingency planning and governance**

Renegotiation clauses (or renegotiation flexibility) enable some or all aspects of the contract to be changed during the lifecycle of the contract (Harris et al. 1998). Renegotiation terms (Nystén-Haarala et al. 2010) provide parties with mechanisms to handle contingencies and renegotiate contract terms or to change contracts under certain circumstances. Contract governance structure can also be planned to allow (1) adaptations to the contract through mutual agreement, (2) early identification of problem situations and dealing with the problem in a cooperative fashion, and (3) monitoring the project progress and conduct needed adjustments in a cooperative fashion (Turner 2004). While studying contract selection strategy, it was also noticed that *“greater incentive intensity will elicit greater performance and sustained effort from the contractor to achieve the owner’s objectives”* (Turner 2004).

#### **4.5 Flexibility in the communication and dispute resolution**

Dispute resolution clauses are used in contracts to avoid often expensive and long civil procedures. Contract governance structure may let contracting parties to rely on the relationship and the agreement and not to resort to the law (Turner 2004). Contract can also include an explicit dispute resolution provision to direct resolution by negotiation, mediation, arbitration or litigation including lawyer involvement in the dispute process (Lumineau & Oxley 2012).

#### **4.6 Flexibility in the specification of price, payoff and payment terms**

Price flexibility can be reached through indexing, renegotiation or open pricing (Harris et al. 1998). This means that the original contract may be changed through escalation/de-escalation. Alternatively, contracting parties may meet to renegotiate the price, or the precise price may be left for later determination (Harris et al. 1998). Price flexibility can also be targeted by risk sharing (Li & Kouvelis 1999). In such a case, risk-sharing features can be incorporated in the contract in terms of the purchase price that is eventually paid. Within a pre-specified price window the realized price is paid, but outside of the price window added costs or benefits are shared in an agreed way (Li & Kouvelis 1999). Another option is to use an incentive contract with performance incentives (Harris et al. 1998). This type of provision links vendor payments to performance of the user organization for example in large industrial projects (machinery, factory, production line etc.).

## 5 CHARACTERISTICS OF SOFTWARE DEVELOPMENT PROJECTS

Software development is mainly done in projects. And because software is nowadays widely spread, the companies developing software form a big portion of project business industry (Artto & Wikström 2005; Charette 2005; Cerpa & Verner 2009). Thus the case study of this thesis looks into a software company in project business.

### 5.1 Software development practices

The software development processes have evolved radically over the last decades. There are numerous process models for developing software but usually three of them are recognised as major steps in the history of process development. The first systematic model of software development was the waterfall model presented in figure 8 (Royce 1970; Boehm 1976; Boehm 1988; Warsta 2001). It introduced a systematic and sequential approach to software development by defining different actions in separate, isolated stages. It was a systematic approach to software development but at the same time it was rigid as it prevented simultaneous activities and a previous stage was always to be completed first before a following one was possible to get started.

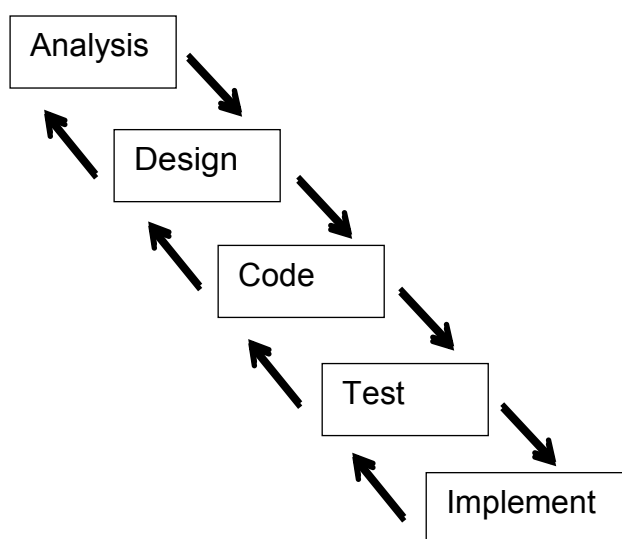


Figure 8. A generic waterfall model of the software lifecycle (Warsta 2001). Requirements are defined in the beginning for the analysis phase.

Soon it was realized that the waterfall model had problems of being ineffective and inflexible. It assumed that the requirements were known in the beginning of a project, lots of documentation was required and change management was bureaucratic and slow (Curtis et. al 1987; Boehm 1988; Warsta 2001). There were also some practical project management problems involved. For example, testing was done only after the coding stage was completed and this meant that bug fixing was done after testing was completed. Some of the bug fixes then possibly introduced new bugs in software which were only found in the next round of testing and this could lead to a cycle of many loops between coding and testing increasing costs and delaying the project (Curtis et al. 1987; Liu & Horowitz 1989). To overcome these challenges, a spiral model was developed (Boehm, 1986; 1988; Warsta 2001). The spiral model divided a software development project into smaller pieces and provided evaluation check-points of technical progress and risk level more often than in the waterfall model. Initial assumptions and software architectural choices could be revisited in every round around the spiral. The spiral model is presented in figure 9.

The spiral model also involved customer more often in the project and enabled better interaction with the customer. The typical length of one cycle in the spiral model was from couple of weeks to 2-4 months. During the first iteration cycles, the releases were not necessary software builds, but they could also be paper models or prototypes (Pressman 1997). Compared to the linear sequential models, the spiral model changed radically the approach of building software. However, as demand for even more productive and flexible software development arose in late 90's, the agile methods were introduced.

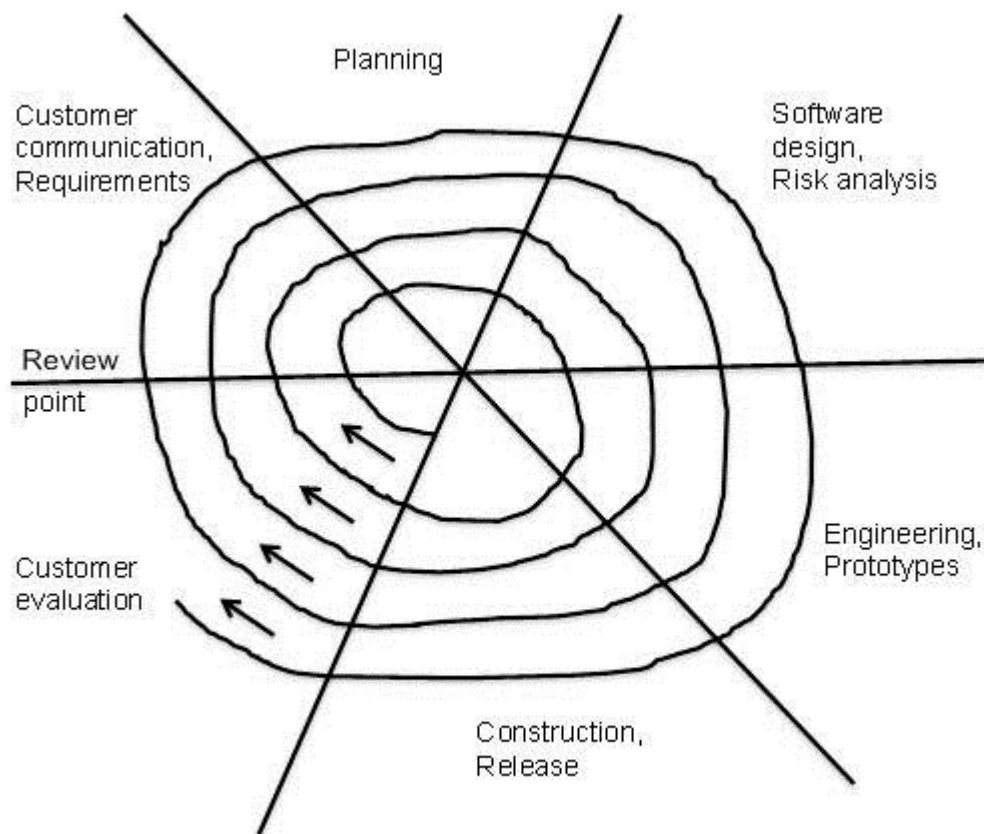


Figure 9. A spiral model of the software lifecycle (Boehm, 1986; 1988; Pressman 1997; Warsta 2001).

The evolution towards agile methods started already earlier but for example Scrum, one of the most popular agile methods, was introduced in late 80's (Takeuchi & Nonaka 1986). Davis and Sitaram (1994) discussed about a concurrent process model which is an agile type of model built on a legacy of the spiral model. In 2001 there were already several agile methods used in the industry and researchers working on these methods agreed and signed the Manifesto for Agile Software Development (Rising & Janoff 2000; Beck et. al 2001; Highsmith & Cockburn 2001). It listed the main principles of agile methods in 4 value statements:

- individuals and interactions over processes and tools,
- working software over comprehensive documentation,
- customer collaboration over contract negotiation,
- responding to change over following a plan.

These statements demonstrated the change in the mindset of software engineering. They promoted more open, dynamic and flexible approach for software project management and cooperation with customers (Cockburn 2002; Martin 2003; Larman 2004; Tate 2005). Tate (2005) additionally emphasized “continual refinement of the product and project practices” and “valuing defect prevention over defect detection”. The agile development model is presented in figure 10.

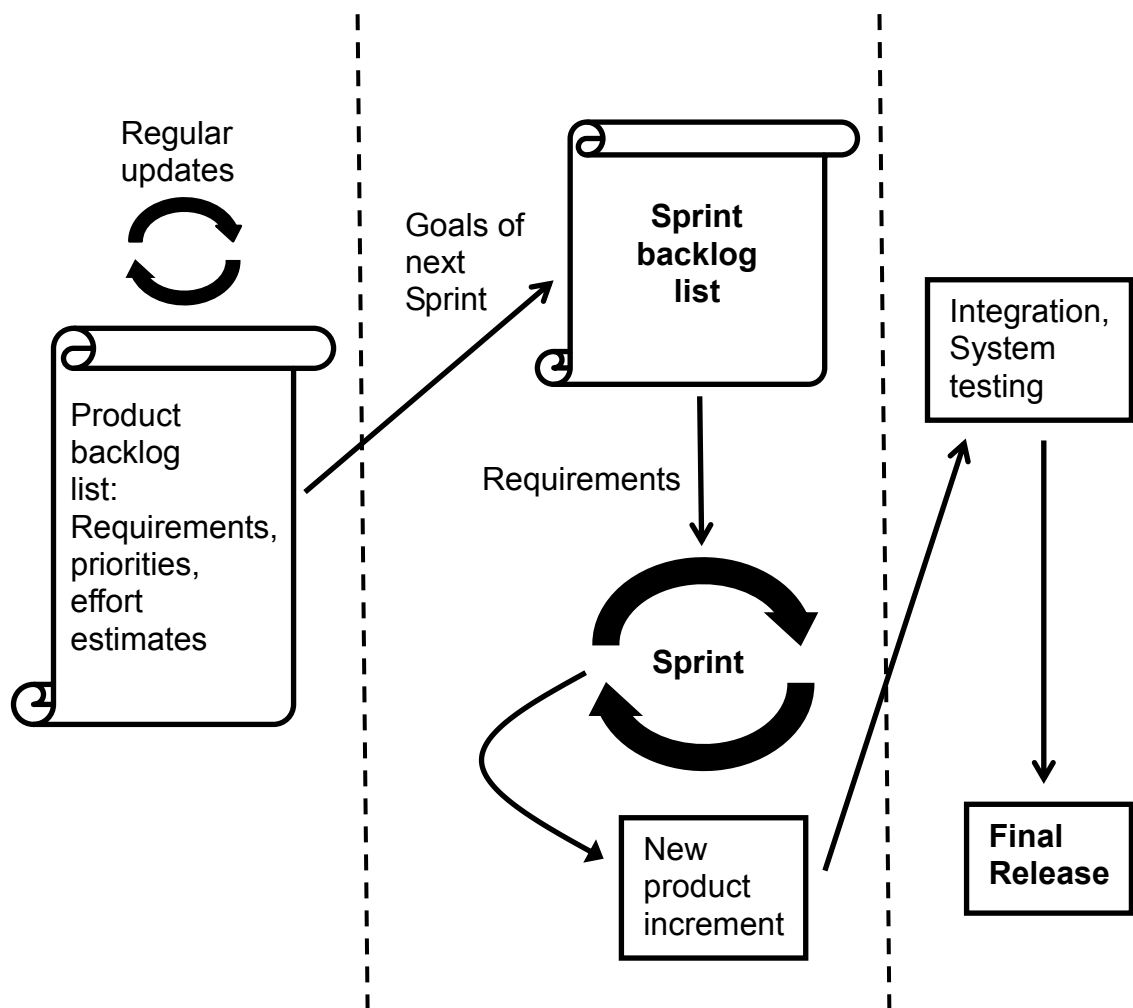


Figure 10. An agile development model (Scrum process) of the software lifecycle (Abrahamsson et al. 2002; Larman 2004).

## 6 THE CASE STUDY

The empirical part of the thesis was completed as an exploratory case study in a software project business. In this chapter, the principles and practices of data gathering and analysis are described, the case study companies (vendor and customer) are introduced and a selected case study project is described as seen by the project vendor.

### 6.1 Data gathering and analysis

The case study design in this research was selected to be a holistic, single case approach. Yin (2003) presents five possible reasons to select a single case research design: 1) A single case represents the *critical* case in testing a theory, 2) A single case represents an *extreme* case or a *unique* case, 3) A single case is the *representative* or *typical* case, 4) A single case is the *revelatory* case, or 5) A single case is the *longitudinal* case. Three of these five reasons work as the rationale for the selected research approach. First, the case study represents a critical case to test if the presented theory on contracting process and contract terms also applies in software project business. Secondly, the case study works as a representative case to demonstrate a common agile software development project. And thirdly, the case study potentially includes signs of a revelatory case if there is evidence of unrevealed type of flexibility in software contracting found.

The empirical data of the thesis was gathered by conducting semi-structured interviews at the project vendor company. In addition, background information on the case companies was acquired from newspaper and magazine articles, press releases and internet. During the interview sessions, there was also review access to some project contracts and contract templates provided. After the interview sessions, additional information was acquired by email discussions and phone conversations.

There were two interviews conducted, the chief executing officer of the vendor company and the technical lead of the case project were both separately interviewed. The CEO took care of sales and contract negotiations in the company and the technical lead had a combined role of project manager and software architect in the project. He



also led the technical implementation of the case project. The interviews were recorded and later transcribed for an effective case analysis.

## **6.2 Case companies and the case project**

The case company (hereafter Company) is a small software development company located in northern Finland. Company focuses on software development projects and software subcontracting (as a seller). Majority of Company's customers are local enterprises but it also has international customers. Company has approximately 10 customers in a year and 4 biggest customers generate 90 % of the annual revenue. Company is privately owned, the CEO being a major owner of Company. Company uses agile development methods in software development, a Scrum approach specifically.

The customer company (hereafter Customer) in this project case is a big electric power industry company with hundreds of employees in several sites globally. Customer has a research and development office in the same location as Company has its operations. Customer is a hardware system vendor and it does not have experience in software development. Customer is owned by a multi-industry conglomerate operating globally and by a government-owned investment company which is a minor shareholder.

The case project is a specification, development and delivery project of an industrial, embedded software application (hereafter Application) to remotely monitor and manage a large hardware system in a real-time manner.

## **6.3 Case description**

The case project is first studied from a process point of view by looking at the project and project phases chronologically and identifying the elements of contracting process presented in figure 5, especially in reflection of the business and contracting processes presented in figure 4. The recorded incidents of the case project are placed into the elements of the contracting process in figure 11. Then the case is described step by step in the following chapters.

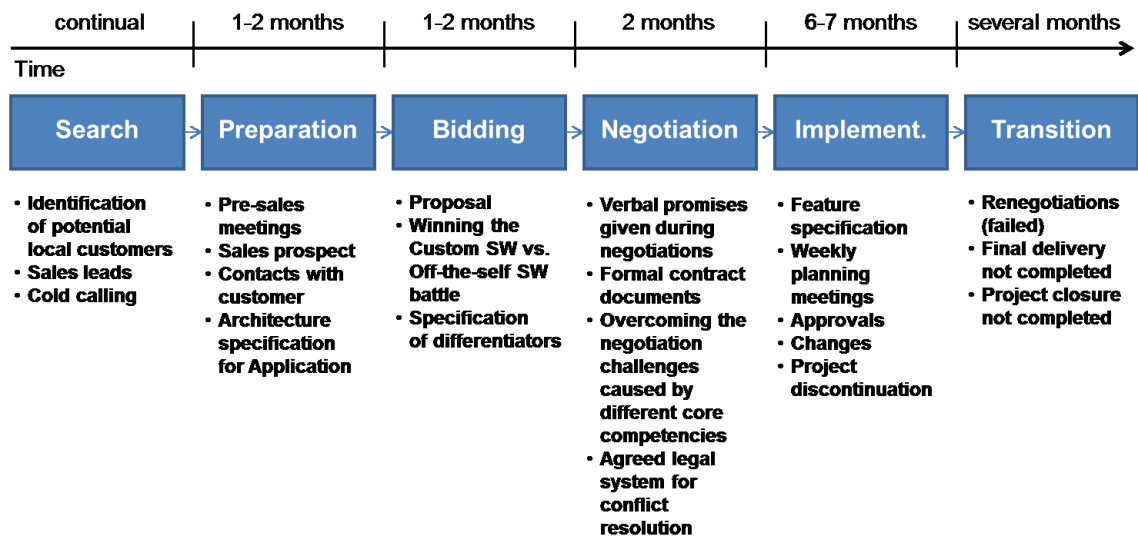


Figure 11. Observed elements of the contracting process in the case project.

### 6.3.1 Business initiation (Search)

The business relationship was initiated by a cold marketing call by Company. The Company CEO called to Customer and offered software development services. After couple of phone discussions Customer agreed to have a meeting with Company to see if there are opportunities to do business together.

*“...The cooperation with Customer started by a cold marketing call, we offered our services to them. They actually had just started to work on Application. They were thinking on making Application at the time. Then they finally agreed to meet us, and we visited them and managed to convince them that we have the competence and we manage the development of Application...”* – CEO

The company CEO was well aware of local businesses and continuously identified potential customers in the area. He considered Customer as one of the sales leads and managed to organize series of meetings with them by a cold marketing call.

### 6.3.2 First phase of the project (Preparation)

Customer was about to start a development project of a monitoring and management software Application to manage and configure real-time its hardware system products in

the premises of its customers. This software Application is an essential part of the hardware system delivery to get the most out of the hardware products. Company contacted Customer at the time when Customer was initiating the development of this software Application. After meetings held together, Company managed to convince Customer about Company's capabilities to participate in the development project. Customer ordered a specification for software architecture and design from Company. Company delivered the specification for Customer's consideration.

*"...They ordered a specification project from us; we designed a view of software architecture for Application and drafted initial features for it. We made the specification project very carefully for them, then they went to visit some trade shows and after comparing some similar commercial off-the-shelf software applications they decided that they wouldn't like to finance the development of Application because there were similar products in the market. However, in the negotiations with them, I emphasized that creating a tailor-made Application is one important way for them to differentiate their total solution to their own customers. It could be one thing that they can do better than the competition when other components of the solution will become commodity..."* – CEO

Company and Customer held meetings which can be considered as pre-sales meetings when they went further to discuss about Customer's need for Application. It might be that Customer didn't yet have a plan to finance the development of Application but they maybe wanted to have an architecture specification, increased understanding and product references to grow their purchasing competence to be able to buy a similar off-the-shelf application. In any case, the meetings they had created contacts and communication between the two companies and when the Company CEO understood the importance of Application for Customer, he considered Customer as a proper sales prospect.

### **6.3.3 Project order (Bidding)**

Customer analyzed the specification and decided to search for a commercial off-the-shelf software application to match the need it had. It found several solutions from trade shows and exhibitions and decided to select one of them. However, after meetings with

Company, Customer changed its mind. Company convinced Customer with an opinion that Application is an important differentiator in a total solution Customer offers to its customers. They decided to start a project together and agreed that Company will develop and deliver Application to Customer.

*“...I convinced them to have a tailor-made solution for Application. Then we started to negotiate for a development project contract and after having a contract in place, we started the project...” – CEO*

In this case there were no actual bidding but Customer privately asked Company to come up with a proposal to develop Application and to deliver a project tender for further negotiations.

#### **6.3.4 Contract negotiation (Negotiation)**

After agreeing to work together for the Application development, Company and Customer started to negotiate on the project details and draft the project contract. Customer didn't have much experience in buying software and this caused some problems in the negotiation phase.

*“...I think it took something like nearly two months to negotiate the project contract. We had to take many negotiation and drafting rounds. It is because they didn't have any experience in developing software and they didn't understand software development. It led to a situation where I needed to give reasoning for basic issues in software contracting. And they didn't get it. It was difficult for them to understand that in a software project (if we agree on time based pricing) they buy development time. They buy development time and on that time our developers program software for the project. After programming for a week for example, there is a lot of new software built, but as in making software it is, there will be bugs in the software. If the work phase was to program, developers didn't yet test the software. Customer insisted that there must be a guarantee given for all developed software and bug fixing should be included in the guarantee. It was difficult to explain to them that there can't be any guarantee given for a new piece of software as it is not tested yet and as it is natural that software includes bugs before testing it and that bug fixing is one of the normal work phases in developing*

*software. Their opinion was that bug fixing should be free-of-charge because of the guarantee. I told them that this is not a proper way to approach developing software, there is no guarantee given during the development phases in the project as they pay per hour for all development phases (testing being one of them) in the software process. This was a really difficult issue to negotiate with them and it took a lot of time to clarify this issue to them...” – CEO*

There were problems in both technical questions and in contractual details. This lengthened the negotiation phase and made it more difficult.

*“...Customer didn’t have any software competence or experience in buying software and this clearly stood out in negotiations...” – CEO*

*“... In this case we now discuss about, there was a legal advisor by a customer present in project negotiations, but he was absolutely non-competent (technically) to buy software. It was difficult to negotiate on a contract because the legal advisory did not understand what it means to develop software. This is why they insisted to have certain clauses in the contract which were irrelevant but I needed to think really carefully what they mean in case of a possible conflict. Then again we have some other customers who are used to buy software so they have a great frame agreement template in place, a template which is written to take care of the interests of both parties. It is pretty straightforward to sign that kind of a contract and start to work...” – CEO*

After two months of negotiations and many rounds of reviews, the project contract was signed and Company started the development activities.

*“...There were strange discussions with them during the negotiations. They wanted to have unconventional clauses in the contract and I needed to add my own expressions there to neutralize these clauses so that they didn’t mean too much at the end. They were satisfied to have their own clauses in the contract but also I felt ok as I got my responding sentences in the contract too. But this is also why it took so long to go through the contract negotiations...” – CEO*

*“...The payment schedule was defined and agreed in the frame agreement with Customer. There were also fees and other consequences defined in a case of late or unpaid payments...” – CEO*

*“...In the frame agreement it is also agreed how to proceed in a case of dispute. In this case it was agreed that arbitration will be held in Helsinki...” – CEO*

*“...There weren't any tough price negotiations on this project. The initial specification and architecture work was a fixed price contract. And then the actual development project was agreed to use time based pricing. They knew local pricing level and they thought that our price was somewhere there so there wasn't too much discussion on price issues. And in addition I had a feeling that they wanted us to be the one working to develop Application...” – CEO*

In the negotiation phase the verbal promises given earlier by Company (the project vendor) started to concretize into the frame agreement i.e. the project contract. Because of the different core businesses of the project parties and because of the different backgrounds of the negotiators there were some challenges to communicate and agree on details. At the end, the consensus was found, the contract was signed and the actual implementation could get started.

### **6.3.5 Project implementation (Implementation)**

The project was started in a spirit of good cooperation while both project parties worked together on a feature specification. The development planning with Customer was coordinated by following an agile development model (Scrum process). Weekly planning meetings with Customer were organised to go through the progress, review the completed features, discuss about the next steps and manage the prioritisation of feature requirements for the backlog.

*“...We agreed the delivery of the software as follows: We defined and described the software release 1.0 together. We made a list of desired features for the release 1.0. Of course at that point of time you don't know how to develop those features and how much time they are going to take. So we usually agree for example that we will work*

*2000 hours for the release 1.0 as we use time based pricing. We won't promise that all the drafted features will be in the release 1.0 as in developing software it is really difficult to estimate in the beginning how much time is needed. But we agree that 2000 hours of work will be used for the release 1.0. When the project is approaching the release 1.0 milestone, we will go through the desired features with the customer again and agree what will be in and what will be left out of the release 1.0. This is the way we also used in this project. We worked together with Customer and they said that they need certain features for the release 1.0 because they wanted to demonstrate them internally and we agreed after discussions the content of the release 1.0. It worked very well as it usually does in this kind of projects...” – CEO*

*“...Our developers had weekly meetings with Customer to specify the features of Application in practice, based on the architecture specification made earlier. Together with Customer we agreed on the features and their appearance on the user interface. We also used an external advertising agency to make proper design decisions and layout for the user interface and our developers then programmed the functionality to fit into the agreed user interface...” – CEO*

*“...I came into the project when the development actually started. Before the development started, there had been sales, marketing, negotiations and specification work done with Customer during the previous months. I started to work at Company and this was the first assignment here, to be a technical lead or an architect for this project. There was an architecture specification done already and a brief proof of concept and then we started the actual development work...” – Tech Lead*

*“...We met face-to-face every week. We went to Customer's office or they came to visit us. It was a project manager and a technical person from Customer's side participating in the meeting usually. And often also their supervisor was there too. From our side it was usually me and one of our programmers who participated. And in the beginning it was also our architect who had participated in the negotiations...” – Tech Lead*

*“...We had a weekly planning meeting with Customer. In those meetings we specified together how Application should work and then our guys divided higher level*

*functionality into technical tasks and put them in the backlog. Then on next week's meeting we showed Customer the progress and we did the next step planning together..." – CEO*

*"...In the beginning it was mainly our documentation available for the project. There was an architecture specification available when we started the project with Customer. There was also the main technology choices made and introduced to Customer and we started to look at the actual requirements. First we agreed on practical issues of the project like meetings and reviews etc. We agreed on weekly meetings to go through what has been done, what is going to get done next and if there any changes or problems we should discuss about. It was a scrum approach we agreed to use for the project. It worked well and for the weekly meetings Customer brought some ideas and we discussed about them together. It was working fine..." – Tech Lead*

Cooperation on technical issues remained to be on a good level focusing on practical implementation issues but the business relationship faced some serious challenges. After couple of months of implementation, Customer fell behind in the payment schedule and later didn't basically pay any of the agreed payments anymore. Because of this, Company first delivered several notices of unpaid bills to Customer's head office and later started legal actions to get the payments from Customer. At this point, after couple of months of unpaid monthly payments, Company also stopped working for the project, so they halted any actions to develop Application any further.

*"...After couple of months of development work, they started to be behind the payment schedule and then they didn't pay anything at all anymore. First we tried to contact them and tell them that they should pay the bills. They promised to pay but they actually didn't. We contacted them again and they always answered that they will pay in two weeks but they didn't. Then we contacted a debt collection agency and assigned them to take care of the issue. We had already earlier made a payment plan for Customer but they didn't follow it. Then by a mistake, the debt collection agency made them another payment plan and as these processes took a long time, the debt increased quite a lot. Then at some point we withdrew delivering any work to the project and told to*



*Customer that there will be no additional actions made for the project until they will pay their debt...” – CEO*

*“...It was usually only technical implementation issues we discussed in the project meetings with Customer. But of course sometimes we also unofficially discussed about the problems with payments getting late. And if we officially had other than only implementation issues on the agenda, then we invited also our CEO to participate in the meetings...” – Tech Lead*

*“...There were changes all the time in the project. As almost always is the case in the real projects like this. The original specification is always an initial one and you work to get it more detailed during the project and together with the customer you specify the application week by week until the customer is happy with it...” – Tech Lead*

*“...At some point of time the amount of unpaid payments was so big that I informed Customer that we will stop working for this project. They answered that they will pay soon. But they didn't. So we made a payment plan for them. But then they didn't follow that plan either. Then after the debt collection agency had tried several times and Customer didn't pay, we decided to go further to a legal process of getting our money. They were summoned to pay their bills in a legal debt collection process. A judge at the court made a clear decision that they need to pay but at the time they clearly didn't have funds to do that. It was then our call to either apply them for bankruptcy or file an execution against them. We realized that in a case of bankruptcy we might not get anything from them as they owned money for many others too and that's why we decided to choose the execution...” – CEO*

*“...There was a short interruption in the project because of the unpaid payments but after that we continued for couple of months before the project was then totally halted at the end...” – Tech Lead*

The first release of Application was almost completed when the work for the project was stopped totally. After that Company managed to get almost all of the payments from Customer, excluding a minor payment which was left unpaid. Although of these

challenges Company and Customer continued negotiating on possibilities to work together to complete the first release of Application, to start new projects for further releases of Application and to manage a hand-over of Application to Customer as a delivery and maintenance transfer.

*“...The unpaid payments weren’t a cause for arbitration as there wasn’t a disagreement; they violated the agreement in the contract. That’s why we went through a legal debt collection and they didn’t oppose this process as they admitted that they violated the agreement by not paying us by the agreed schedule...”* – CEO

*“...I think that we were somewhere in the midpoint of the project (release 1.0) when it was halted. There was a plan to have a mockup or a prototype for demonstration purposes in the near future as Customer wanted to show it in a trade show but we didn’t get it done as the project was discontinued...”* – Tech Lead

*“...So we made a decision to stop working for the project. Because of that we had some idle time for our developers as there was no immediate project to start working with. So I could say it caused some loss of the cash flow we expected to have but fortunately no major losses of revenue because of that...”* – CEO

*“...I think that Application was important to them and that’s why Customer’s local staff tries to get this done. Otherwise they would have abandoned the project totally. I don’t know what kind of the relationship there is between Customer’s different offices or functions. But the project budget was approved by them so the cost was known beforehand. And then they just left the payments unpaid...”* – Tech Lead

As discussed above, the project started well, the project parties continued with the feature specification and started weekly meetings as part of the agile development model (Scrum process). Changes and approvals were handled also as part of the agile project practices in the weekly meetings until the project was discontinued incomplete.

### 6.3.6 Project termination and business continuation (Transition)

Company was willing to continue cooperation with Customer even after the serious failures to meet the payment schedules. However, they demanded that Customer must pay any project related work beforehand. Customer was willing to negotiate on these terms but it turned out that Customer's financial situation was difficult and the negotiations didn't succeed.

*"...After we got almost all of our money by execution, we would have continued working for the project if they had agreed to pay us in advance. We informed them that we will continue working for the project if they pay us four months payments in advance..."* – CEO

*"...We tried to ignore the problems with payments in the project meetings as we knew that no one present in the project meeting could do anything about it so we tried to focus on the implementation issues. But of course you could feel the tension on Customer's side because of the situation. And they also had some layoffs ongoing, and actually the technical person we were working with decided to leave the company. So we had a new technical contact in the project but we didn't work too long together before the project was halted..."* – Tech Lead

*"...The problems with payments were because Customer was running out of money. There were extra costs because of unpaid payments, interest for late payment, fees etc. so this was a really expensive way for them to operate. I do not see any other reason for that but the actual funding problems, there were running out of money..."* – CEO

*"...Originally there were plans to continue working with Customer. We thought that after the first phase of the project (release 1.0 which was discontinued) there would have been two more projects ahead (releases 2.0 and 3.0) if the cooperation had continued. I was willing to continue the work if we had agreed on the situation and they would have agreed to pay us in advance..."* – CEO

*"...It also can be that Customer's international management (who were responsible for the financing and payments) were upset because of our actions to start a legal debt*

*collection process and maybe they even found our actions silly as there was an opportunity that they would have ordered other projects (release 2.0 and 3.0) from us too and maybe they thought that before starting those projects they would have paid all the payments related to the release 1.0...” – CEO*

On a project contract it was agreed that until all the payments are done by Customer, the source code and copyright of Application remains to be Company’s property. As Customer didn’t ever pay all the bills but left a minor payment unpaid, Company has not delivered the source code and ownership of Application to Customer. Because of these facts, the situation stayed open and the final resolution still remains to be clarified.

*“... but we have, also in the contract with them we have a clause.., we made a frame agreement during the negotiation with them, and I insisted to have a clause in the contract which says that the software developed (during the project) is totally ours (IPR) until it is completely paid by the customer. So as they haven’t yet paid the rest of the project payments, everything we have developed during the project is still ours (IPR)...” – CEO*

*“...All the people involved in the project knew that we own the IPR until they have paid everything and it was clear in the project meetings too. And it was accepted by everyone. I feel like we were on the same side, I mean that we all (everyone involved in the project) hoped that we could continue with the project and could get it done and delivered. But we didn’t trust Customer’s international management so for example when we were demonstrating Application we restricted access to source and binary code so that the code couldn’t get downloaded...” – Tech Lead*

*“...It was interesting to see how different reactions there were on Customer’s side for the problems we had. The local crew, whom we were actually doing the development project with, was always very positive, cooperative, trustworthy and everything went really well with them. They were obviously embarrassed because of the unpaid payments and all the trouble. But they didn’t have authority to do anything for the situation. And then the international management who were responsible for the*

*financing and payments, they were far-off and unapproachable, we couldn't trust them at all..." – CEO*

*"...I am still in touch with Customer's local project manager. We have a good relationship and we are still convinced that we would make an excellent Application and we both would like to get the development work completed. But it all depends on their international management at the end and how they decide to proceed..." – CEO*

*"...The plan is that whenever they have paid everything they own us, we will make a handover of Application to them. It is not a big sum of money and in practice they have paid a lot more as interest for late payment but they need to pay everything to get the IPR. So when they do, we will make a handover of binaries and source code and technical documentation with some education of Application..." – Tech Lead*

As mentioned earlier, Company is still willing to work together with Customer if Customer agrees to pay any work beforehand. There still is a good communication between the technical teams involved but there is not too much trust left in the relationship between higher (financial) levels of these two organisations.

#### **6.4 Flexibility in the case project**

It was mentioned in chapter 4.1 that there are generally two options to increase flexibility in project business. One option is to agree to agree later. Another option is to leave some undefined issues in the contract or write a contract in such a way that there is flexibility in the contract clauses. Several examples of different types and levels of flexibility in contracting were earlier listed from the literature. These are summarized in table 2 and then the case project is examined based on these assumptions.

Table 2. Examples of flexibility in contracting.

<b>Content, schedule, resources, roles and responsibilities</b>	<ul style="list-style-type: none"> <li>- Quantity of purchase left open</li> <li>- Quantity within a pre-specified quantity window</li> <li>- Supplementing a contract</li> <li>- Agree to agree later</li> <li>- Agree on processes for supplementation</li> <li>- Contract duration left open</li> </ul>
<b>Authority, decision and control rights</b>	<ul style="list-style-type: none"> <li>- Early termination right</li> <li>- Mutual termination clause</li> <li>- Flexibility in time of purchase</li> </ul>
<b>Contingency planning and governance</b>	<ul style="list-style-type: none"> <li>- Renegotiation clauses</li> <li>- Adaptations through mutual agreement</li> <li>- Early identification of problems and agreed process to solve them</li> <li>- Monitor the project progress and conduct adjustments needed</li> </ul>
<b>Communication and dispute resolution</b>	<ul style="list-style-type: none"> <li>- Dispute resolution clauses</li> <li>- Clauses and agreements on using negotiation, mediation, arbitration or litigation</li> </ul>
<b>Price, payoff and payment terms</b>	<ul style="list-style-type: none"> <li>- Price flexibility through indexing, renegotiation or open pricing</li> <li>- Price left open for later determination</li> <li>- Price flexibility by risk sharing</li> <li>- Price flexibility through cost/benefit sharing</li> <li>- Performance incentives</li> </ul>

When the project parties started the discussions together, Customer had a need or a problem and Company was convinced they have capabilities to build a solution for it. Because the product in question was software, it would have been time-consuming and challenging to prepare a detailed specification of it. Instead, based on the architecture specification Company made, Customer acquired a sufficient level of confidence on Company's capabilities that they decided to proceed with the project and agreed to use agile development model to define the product details later.

*"...There was an architecture specification available when we started the project with Customer. There was also the main technology choices made and introduced to*

*Customer and we started to look at the actual requirements. First we agreed on practical issues of the project like meetings and reviews etc. We agreed on weekly meetings to go through what has been done, what is going to get done next and if there any changes or problems we should discuss about. It was a scrum approach we agreed to use for the project...” – Tech Lead*

Company and Customer agreed on the amount of working hours to be used for the release 1.0, they also agreed the roles and responsibilities of the project parties in the project and they agreed on the personnel resources for the project. But they intentionally left the detailed content of the product unspecified. It is because of the special nature of software as a product but also because it increases flexibility in design choices, allows utilization of cumulative information and decreases the number of change requests.

It was agreed between the project parties that the project deliveries or project progress are to be approved in the weekly meetings. So basically also the content of the product was approved by decisions made in the weekly meeting. The procedure was agreed in the beginning of the project and was working fine. On the other hand, there was a big open question of delivering the product when the payment problems started. On the contract there was a major control point (however quite normal approach with software) given to Company stating that all intellectual property rights will remain in the possession of Company until all project payments are done. This is an important control aspect related to software projects.

As the case project is a software development project and it utilized an agile approach, it didn't have a governance structure or contingency planning similar to construction projects, for example. It is mainly because of the different nature of software projects. On the other hand the project parties had practical project monitoring built into the weekly meetings as part of the agile project management practices. Similarly, all the changes inside the project were handled continuously in the weekly meetings.

The project parties had a dispute resolution clause in the contract. It was agreed that in a case of dispute the companies enter an arbitration process in Helsinki. In terms of communication, there was a clause in the contract obligating both parties to participate

in the weekly meetings. This obligation included an agreement to communicate any concerns in those meetings, make decisions on corrective actions there, and approve the project stages and deliverables also there.

*“...In the contract there is always a list of responsibilities customer must commit to. Participation in weekly meetings is listed there ...” – CEO*

The customer involvement is an important issue for an agile software development process as in an agile model it is assumed that the requirements taken from the product backlog for implementation, once implemented, will get accepted and approved during the project implementation as part of the weekly meetings agenda. This guarantees that gradually larger and larger portion of the project outcome (software product) will get approved so this approach works as an acceptance policy of project deliveries.

The project parties agreed to use time based pricing for the development work. They drafted together possible features for Application and future versions of it. They also agreed on a rough number of working hours to be allocated for the release 1.0. Again, based on the agile development model, the drafted features were prioritized and the plan was to include features in a prioritized order into the release 1.0 until the allocated working hours were used. The rest of the features were planned to be included in the following product releases 2.0 and 3.0. The pricing scheme was typical for this type of software project but it also can be assumed that in addition to the monetary cash flow Company also got some non-monetary payoff in terms of future business prospects because they knew about possible product releases 2.0 and 3.0 and they had initial customer lock-in built with their software competencies. However, these future prospects never realized because of Customer’s financial problems. Payment terms were conventional for projects like this but later there were major problems with payments as discussed earlier. The summary of the case project contracting is presented in table 3 to demonstrate both flexible and rigid clauses and approaches observed in the case project.



Table 3. Summary of flexible and rigid approaches in the case project.

<b>Content, schedule, resources, roles and responsibilities</b>	<ul style="list-style-type: none"> <li>- Content was continuously redefined as part of the agile approach (weekly meetings)</li> <li>- Schedule was fixed or actually the number of hours was fixed</li> <li>- Resources, roles and responsibilities were defined and agreed</li> </ul>
<b>Authority, decision and control rights</b>	<ul style="list-style-type: none"> <li>- Product content was approved as part of the agile approach (weekly meetings)</li> <li>- Project deliveries were approved as part of the agile approach (weekly meetings)</li> <li>- Product IPR was defined to be transferred to customer when all the project payments were paid</li> </ul>
<b>Contingency planning and governance</b>	<ul style="list-style-type: none"> <li>- Project monitoring and change management were included in the agile approach (weekly meetings)</li> </ul>
<b>Communication and dispute resolution</b>	<ul style="list-style-type: none"> <li>- Dispute resolution clause was defined in the contract</li> <li>- An obligatory clause for both parties to participate in the weekly meetings, communicate there and take care of the project governance there</li> </ul>
<b>Price, payoff and payment terms</b>	<ul style="list-style-type: none"> <li>- Time based pricing used and payment terms agreed</li> </ul>

## 7 DISCUSSION

The objective of this research was to examine project contracting, project contracts and flexibility in contracting process among companies in project business. This objective was completed with a wide, narrative literature review on selected theories and with a single case study on a software company in project business.

In the literature review of this thesis, the contracting in project business and the elements of contracting process were introduced based on the variety of academic sources. The findings from a case study supported theory presented in chapter 2 very well. The dimensions of contracting capabilities (Nystén-Haarala 2008; Salmi-Tolonen 2008) illustrated in table 1 were recognized in the operations of the case company and these capabilities were considered and developed further continuously. However, because of the nature of the case project, the case data lacked detailed information on case company's approach to understanding and managing contingency and general contracting policies.

The theory suggested managers, lawyers and engineers as three most important roles contributing in contract design as a firm capability (Argyres & Mayer 2007). The case company had also identified these three roles in a practical manner. However, because of the small size of the case company, they didn't have a hired lawyer but the CEO took care of this role. They recognized the need for a lawyer but after they several times had used a contract lawyer, they were disappointed on the software competences of these lawyers and stopped consulting them. This confirms the earlier findings that it is important for technology companies to have access to business-oriented legal services, at best with lawyers having good understanding on technology context of the companies operating in (Argyre & Mayer 2007; Haapio & Siedel 2013). Also, with the current setup in the case company, there is a risk of losing capabilities as a big portion of contracting capabilities were stored at the personal level (Nystén-Haarala et al. 2010) because the CEO took care of many tasks in company's contracting process.

The elements of contracting process in the case company (figure 11) corresponded well with the model created by project marketing scholars (Holstius 1987; Nystén- Haarala et

al. 2010; Skaates et al. 2002; Kujala et al. 2007; Tikkanen et al. 2007) illustrated in details in figure 5. The biggest exception was that the case project didn't actually reach the transition phases because of the payment problems in the project described earlier. Also, there were some differences observed, especially with the timing of creating technical and functional specification (bidding), with the approval procedures (implementation), and with the change management policies (implementation). These differences are mainly because of the agile software development model (Warsta 2001; Abrahamsson et al. 2002; Larman 2004) which increases the flexibility in these traditional project conventions to better support the business requirements in software project business.

Based on the alignment illustration (figure 4) of contracting and business processes (Corporate Contracting Capabilities Research Report 2008), it would have been beneficial to be able to meet the customer of the case project and get interviews also with the buyer. This would have helped to create better understanding on customer business and contracting processes and shed light on some customer decisions points during the project. Also, more comprehensive information on both case company's and customer's business strategies would have helped to create a more complete picture on the overall situation.

Based on the literature review, project contracts and contract terms were introduced in chapter 3, followed by the presentation of flexibility in project contracts in chapter 4. To be able to contemplate flexibility in project contracts, there was a need to acquire an understanding (from the literature) of a concept of contract, to create a theory-based presentation on contract terms and to group these terms to serve the case study analysis. This was a demanding challenge because of the wide variety of views, approaches and abstractions of contracts by scholars. After a comprehensive review on the matter, an aggregating illustration of project contracts and contract terms was completed (figure 6). It listed five categories of project contract terms and identified one relational aspect of contracting which affects all the categories in the project lifecycle. This presentation of contract terms was then used to analyze the case project data.

The most contract terms found from theory were also identified and taken in use in the case company. They used contract templates provided by the software industry organizations, templates suggested by customers and templates they had modified based on the earlier experience. These templates covered the most issues they felt important in their contracts. Flexibility in contracting or in contracts was not a familiar term in the case company, it is generally not a well-defined term in the literature either. Instead of trying to get direct answers from the case company if they have flexibility in their contracting process or not, the collected data was analyzed to find evidence based on the gathered information. The findings on flexibility were dualistic. There were many fixed contract terms and safeguarding clauses in the project contract. The schedule, or in this case the number of hours was fixed together with the fixed price and payment terms. In addition, the resources, roles and responsibilities to be used in the project were defined and agreed. There was a dispute resolution clause defined and there also was a declaration of IPR ownership and ownership transfer in the contract. And finally there was an obligatory clause for both project parties to participate in the weekly meeting procedure promoted by the agile development model to increase flexibility in the project lifecycle. Flexibility found was mainly related to the agile approach (Abrahamsson et al. 2002; Larman 2004) of the software development project. The product content was not specifically defined before the contract was signed. The project parties continuously redefined the product features during the weekly meetings. This type of flexibility makes adjustments easier and decreases bureaucracy compared to traditional change request and change management procedures. Similar, low bureaucracy approach was used to monitor the project progress and approve the project deliveries.

Based on the case findings, there is a need for formal, safeguarding function of a contract. There are business critical issues in projects which require exact definitions and management of risks with contractual agreements. On the other hand, there also are many issues in project contracting which can effectively be taken care of with more flexible approach. At least this is the case in the context of software project business as demonstrated next to conclude the case discussion.

Relational aspects of project contracting are obvious but difficult to measure or prove to exist by scientific evidence. But these aspects still seem to be there. For example, the

CEO of the case company mentioned couple of small customers they don't use contracts with. They earlier did, but now when they know the customer and they trust the customer, they don't use formal contracts anymore. A phone call or an email works as a project order from a known customer. This piece of information supports the facts already demonstrated by Macaulay (1963): "*Businessmen often prefer to rely on "a man's word" in a brief letter, a handshake, or "common honesty and decency" – even when the transaction involves exposure to serious risks*". It seems that already in 50 years ago, and still today, business people are willing to take the risk involved to be able to flexibly do business with the trusted customers. On the other hand, doing business is also possible without strong trust between the project parties but then the business prospect needs to be evident. The case company was willing to work together with the customer also after the serious problems with payments if the future payments were guaranteed. There is an analogy here to the shadow of the future discussed by Lumineau & Oxley (2012) as they found out that companies prefer private dispute resolution and avoid litigation, especially if there is a future business prospect foreseen.

The product specification approach and the approval approach of project deliveries observed in the case study increased flexibility in many phases of the project lifecycle. The product specification approach enables faster preparation and bidding as there is no need for a detailed specification. On the other hand, this also increases a risk level in later phases of the project if there are severe differences of opinions with the customer for example about technology choices, feature specifications or implementation details. The flexible approach to approving project deliveries decrease bureaucracy and make the agile development approach efficient with continuous discussion and interaction with the customer. It also increases cooperation between the project parties, enables creation of cooperative norms in the business relationship (Lumineau & Oxley 2012), and helps to identify additional value creation opportunities and business opportunities during the project (Kujala et al. 2007; Smyth et al. 2010; Kujala et al. 2013).

The weekly meeting procedure promoted by the agile development model obviously increased communication between the project parties. The literature emphasized the importance of communication especially if a project involves parties with high geographical distance or cultural diversity (Ainamo et al. 2010; Stahl et al. 2010). In

this case it also could be argued that the importance of communication increases if a project involves parties with dissimilar technology competences. There was a good cooperation between the project parties in an implementation level, even after the payment problems started. It was also mentioned in the literature that cooperative relationships and self-regulation cannot be established without open information sharing and shared perception of project environment macroculture (Jones et al. 1997; Ruuska et al. 2011). It could be argued that this kind of environment is needed for the agile development approach as it is self-regulatory in a sense. However, this argument would require more research data for confirmation. Furthermore, Argyres and Mayer (2007) stated that effective communication has a vital role in successful execution of commercial transaction. Based on the case study, effective communication also has a vital role in increasing flexibility in project contracting.

## **7.1 Critical evaluation of the research**

Retrospectively speaking, the topic of this research was an ample and ambitious one to be conducted as a master's thesis. As mentioned already in the introduction, there are many approaches and theories involved while looking at contracting in project business. To select the most suitable ones to study flexible contracting was a challenging task and it could have been done also differently. On the other hand, the selected theories and approaches gave a solid and organized basis to build understanding on the presented view of contracting in process business and they gave a clear setting for the case study and the case study analysis. But as said, the scope of the thesis could have been also a bit narrower.

### **7.1.1 Construct validity**

There are some identified weaknesses in the construct validity of this case study research. First, the case study company was a relatively small one. Because of this, the number of interviewees was small which isn't aligned with a recommendation to use multiple sources of evidence (Yin 2003). On the other hand, also other sources of information were used and data from the interviews was well in line. Secondly, it would have been beneficial to be able to get information from all the most important roles

contributing in contract design; lawyers, managers and engineers (Argyres & Mayer 2007). However, there was no hired lawyer in the case company which often is the case also with other small software companies. Lastly, it would have been good to be able to meet the customer in this case and get interviews also with the buyer but in the current situation it wasn't possible.

### **7.1.2 Internal validity**

The question of internal validity does not apply to descriptive or exploratory studies like the one this thesis represents. It only applies to explanatory or causal studies which try to establish a causal relationship and try to demonstrate that certain conditions lead to other conditions (Yin 2003). Because of this, the concept of internal validity is not applicable to the research setting of this thesis.

### **7.1.3 External validity**

The scope of this research and the case study was narrowed to consider software project business instead of project business generally to improve the external validity of the research. Still, one could hardly argue that the findings of this research are generalizable to all companies in software project business. For example Warberg (1997 cited in Warsta 2001, p. 28) lists nine identified contract types generally in contracting: 1) Spot purchases, 2) Traditional contracts, 3) Simple framework contract, 4) Binding framework contract, 5) Complex framework contract, 6) Cooperation contract, 7) Integrated cooperation contract, 8) Joint venture, and 9) Full integration, and furthermore Warsta (2001) adds three types of contracted software products: 1) Commercial-off-the-shelf software, 2) Modified-off-the-shelf software, and 3) Tailored software. The case project could be described as a traditional contract or a complex framework contract producing a tailored software product and it is a good, representative case in this category. The case study might represent well also other contract types and products in software project business but it would be a brave claim to actually state so. At least it would require additional research in other business environments to verify the applicability.

#### **7.1.4 Reliability**

There was couple of actions taken to ensure the reliability of this research. First, the case study research procedures were carefully planned, including the preparations for the interviews. Secondly, there were two researchers present in the interview sessions to cover the planned discussion topics thoroughly. Lastly, the interviews were recorded, transcribed and then reviewed by two more researchers to accept the validity of the collected data. However, to further improve the reliability of this research, a more extensive documentation archive of all the steps of the case study research procedures would have been required. Also, as the case study is mainly based on interviews, there is also a possibility of biased opinions by the interviewees and misinterpretations by the researchers. However, as mentioned earlier, there were actions taken to manage and decrease this type of bias.



## **8 CONCLUSIONS**

This master's thesis presented the literature review on contracting process, contracting capabilities, project contracts and concepts of flexibility in project contracting. It also presented a case study research on equivalent topics in software project business.

The main finding of the study is that it is possible to use two different approaches to implementing flexibility in the contracting process: Postpone decisions until there is enough adequate information available for decision making or make decisions that allow flexible adaptation to changes during the project lifecycle.

The other findings can be concluded in three notions. First, flexible contracting requires certain level of relational accumulation and trust. Or at least good communication between the project parties to increase cooperation and to enable creation of cooperative norms in the relationship. Secondly, flexible contracting plays a vital role in value creation of a software project. Based on this research, flexible contracting creates synergies with agile software development in project business. And lastly, safeguarding is an important function of a project contract but with flexible contracting approach, contracts can work as a business tool to enable proactive coordination and flexible adaptation for changes in a complex project environment.

### **8.1 Limitations and further research**

Empirical findings of this research are based on a single case study on a software company in project business and the findings can not be generalized as such to all companies in project business, not even to all companies in software project business. Accordingly, an important area of further research would be studying several software companies with a similar research approach and then expand research to cover other industries in project business.

This research also brought up several other research ideas. Relational contracting is studied in business context but not too much in project business. Relational contracting is related to a concept of trust and it would be important to understand more about the

concept of trust in project business, both in individual and organizational level, and how trust affects a possibility to take advantage of flexibility in project contracting. There is very little research on how contracts are actually drafted, the roles of different people in the contracting process, and how implicit or explicit contracts guide the behavior of organizations and individual people participating in project work. Finally, more theoretical and empirical research is needed on which type of flexibility is beneficial for project parties with different characteristics of the project transactions and the contractual capabilities.

## REFERENCES

- Abrahamsson, P., Salo, O., Ronkainen, J. and Warsta, J. 2002. *Agile software development methods: Review and analysis*. VTT Publications 478, Otamedia, Espoo. 107 p.
- Ainamo, A., Artto, K., Levitt, R. E., Orr, R. J., Scott, W. R. and Tainio, R. 2010. Global projects: Strategic perspective. *Scandinavian Journal of Management*, Vol. 26, No. 4 (Dec 2010), pp. 343-351.
- Argyres, N. & Mayer, K. J. 2007. Contract design as a firm capability: An integration of learning and transaction cost perspectives. *Academy of Management Review*, Vol. 32, No. 4 (Oct 2007), pp. 1060-1077.
- Artto, K. A., Martinsuo, M. & Kujala, J. 2011. *Project Business*. Helsinki, Finland. 324 p. Available at <<http://pbgroup.tkk.fi/en/>> [Accessed 3 October 2012]
- Artto, K. A. & Wikström, K. 2005. What is project business? *International Journal of Project Management*, Vol. 23, No. 5 (July 2005), pp. 343-353.
- Baum, W. S. 1970. The project cycle. *Finance & Development*, Vol. 7, No. 2 (Jun 1970), pp 2-13.
- Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R. C., Mellor, S., Schwaber, K., Sutherland, J. and Thomas, D. 2001. *Manifesto for agile software development*. Available at <<http://www.agilemanifesto.org>> [Accessed 27 February 2013].
- Boehm, B. W. 1976. Software engineering, *IEEE Transactions on Computers*, Vol. C-25, No. 12 (Dec 1976), pp. 1226-1241.
- Boehm, B. W. 1986. A spiral model of software development and enhancement. *ACM SIGSOFT Software Engineering Notes*, Vol. 11, No. 4 (Aug 1986), pp. 14-24.
- Boehm, B. W. 1988. A spiral model of software development and enhancement. *Computer*, Vol. 21, No. 5 (May 1988), pp. 61-72.
- Carson, S. J., Madhok, A. and Wu, T. 2006. Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Academy of Management Journal*, Vol. 49, No. 5 (Oct 2006), pp. 1058-1077.
- Cerpa, N. & Verner, J. M. 2009. Why did your project fail? *Communications of the ACM*, Vol. 52, No. 12 (Dec 2009), pp. 130-134.
- Charette, R. N. 2005. Why software fails? *Spectrum, IEEE*, Vol. 42, No. 9 (Sep 2005), pp. 42-49.

- Cockburn, A. 2002. *Agile software development*. Addison-Wesley, Pearson Education, Inc. 278 p.
- Corporate Contracting Capabilities Research Report. 2008. *Contracting capabilities in industrial life-cycle and service business*. 13 p. Available at <<http://www.uef.fi/oikeustieteet/ccr>> [Accessed 19 September 2012].
- Cova, B. & Holstius, K. 1993. How to create competitive advantage in project business. *Journal of Marketing Management*, Vol. 9, No. 2, pp. 105-121.
- Crocker, K. J. & Reynolds, K. J. 1993. The efficiency of incomplete contracts: an empirical analysis of air force engine procurement. *The RAND Journal of Economics*, Vol. 24, No. 1 (Spring 1993), pp. 126-146.
- Curtis, B., Krasner, H., Shen, V. and Iscoe, N. 1987. On building software process models under the lamppost. *Proceedings of the 9th international conference on software engineering*. IEEE Computer Society Press. pp. 96-103.
- Davis, A. M. & Sitaram, P. 1994. A concurrent process model of software development. *ACM SIGSOFT Software Engineering Notes*, Vol. 19, No. 2 (Apr 1994), pp. 38-51.
- Dayanand, N. & Padman, R. 2001. Project contracts and payment schedules: The client's problem. *Management Science*, Vol. 47, No. 12 (Dec 2001), pp. 1654-1667.
- Fort, T. L. 1997. How relationality shapes business and its ethics. *Journal of Business Ethics*, Vol. 16, No. 12-13 (Sep 1997), pp. 1381-1391.
- Haapio, H. 2006a. Business success and problem prevention through proactive contracting. In: P. Wahlgren & C. Magnusson Sjöberg, eds, 2006. *A proactive approach*. Scandinavian Studies in Law, Vol. 49. Stockholm, Stockholm Institute for Scandinavian Law, pp. 149-194.
- Haapio, H. 2006b. Introduction to proactive law: A business lawyer's view. In: P. Wahlgren & C. Magnusson Sjöberg, eds, 2006. *A proactive approach*. Scandinavian Studies in Law, Vol. 49. Stockholm, Stockholm Institute for Scandinavian Law, pp. 21-34.
- Haapio, H. & Siedel, G.J. 2013. *A short guide to contract risk*. Gower. 226 p.
- Harris, A., Giunipero, L. C. and Hult, G. T. M. 1998. Impact of organizational and contract flexibility on outsourcing contracts. *Industrial Marketing Management*, Vol. 27, No. 5 (Sep 1998), pp. 373-384.
- Hartman, F. & Snelgrove, P. 1996. Risk allocation in lump-sum contracts – concept of latent dispute. *Journal of Construction Engineering and Management*, Vol. 122, No. 3 (Sep 1996), pp. 291-296.
- Highsmith, J. & Cockburn, A. 2001. Agile software development: The business of innovation. *Computer*, Vol. 34, No. 9 (Sep 2001), pp. 120-127.

- Holstius, K. 1987. *Project export*. Research report 1, Lappeenranta University of Technology, Department of Industrial Engineering and Management. 67 p.
- Hällgren, M. & Maaninen-Olsson, E. 2005. Deviations, ambiguity and uncertainty in a project-intensive organization. *Project Management Journal*, Vol. 36, No. 3 (Sep 2005), pp. 17-26.
- Jalkala, A., Cova, B., Salle, R. and Salminen, R. T. 2010. Changing project business orientations: Towards a new logic of project marketing. *European Management Journal*, Vol. 28, No. 2 (April 2010), pp. 124-138.
- Jones, C., Hesterly, W. S. and Borgatti, S. P. 1997. A general theory of network governance: Exchange conditions and social mechanisms. *Academy of Management Review*, Vol. 22, No. 4 (Oct 1997), pp. 911-945.
- Kujala, J. 2012. *Understanding complexity in project business*. A research paper presented in 28<sup>th</sup> EGOS Colloquium 2012 in Helsinki. 12 p.
- Kujala, J., Murtoaro, J. and Artto, K. 2007. A negotiation approach to project sales and implementation. *Project Management Journal*, Vol. 38, No. 4 (Dec 2007), pp. 33-44.
- Kujala, J., Ahola, T. and Huikuri, S. 2013. Use of services to support the business of a project-based firm. *International Journal of Project Management*, Vol. 31, No. 2 (Feb 2013), pp. 165-322.
- Larman, C. 2004. *Agile & iterative development: A manager's guide*. Addison-Wesley, Pearson Education, Inc. 342 p.
- Li, C.-L. & Kouvelis, P. 1999. Flexible and risk-sharing supply contracts under price uncertainty. *Management Science*, Vol. 45, No. 10 (Oct 1999), pp. 1378-1398.
- Liu, L.-C. & Horowitz, E. 1989. A formal model for software project management. *IEEE Transactions on Software Engineering*, Vol. 15, No. 10 (Oct 1989), pp. 1280-1293.
- Lumineau F. & Oxley J. E. 2012. Let's work it out (or we'll see you in court): Litigation and private dispute resolution in vertical exchange relationships. *Organization Science*, Vol. 23, No. 3 (May/Jun 2012), pp. 820-834.
- Macaulay, S. 1963. Non-contractual relations in business: A preliminary study. *American Sociological Review*, Vol. 28, No. 1 (Feb 1963), pp. 55-67.
- Macneil, I. R. 1978. Contracts: Adjustment of long-term economic relations under classical, neoclassical, and relational contract law. *Northwestern University Law Review*, Vol. 72, No. 6 (Jan-Feb 1978), pp. 854-905.
- Martin, R. C. 2003. *Agile software development: Principles, patterns, and practices*. Prentice Hall, Pearson Education, Inc. 529 p.

- Mayer, K. J. & Argyres, N. S. 2004. Learning to contract: Evidence from the personal computer industry. *Organization Science*, Vol. 15, No. 4 (Jul/Aug 2004), pp. 394-410.
- Milner, J. M. & Rosenblatt, M. J. 2002. Flexible supply contracts for short life-cycle good: The buyer's perspective. *Naval Research Logistics*, Vol. 49, No. 1 (Feb 2002), pp. 25-45.
- Murtoaro, J. & Kujala, J. 2007. Project negotiation analysis. *International Journal of Project Management*, Vol. 25, No. 7 (Oct 2007), pp. 722-733.
- Müller, R. & Turner, J.R. 2005. The impact of principal-agent relationship and contract type on communication between project owner and manager. *International Journal of Project Management*, Vol. 23, No. 5 (Jul 2005), pp. 398-403.
- Nombela, G. & de Rus, G. 2004. Flexible-term contracts for road franchising. *Transportation Research Part A: Policy and Practice*, Vol. 38, No. 3 (Mar 2004), pp. 163-179
- Nystén-Haarala, S. 2008. Why does contract law not recognize life-cycle business? Mapping of challenges for future empirical research. In: S. Nystén-Haarala, ed. 2008. *Corporate Contracting Capabilities; Conference proceedings and other writings*. Joensuu, University of Joensuu. Publications in Law No. 21, pp. 18-32.
- Nystén-Haarala, S., Lee, N. and Lehto, J. 2010. Flexibility in contract terms and contracting processes. *International Journal of Managing Projects in Business*, Vol. 3, No. 3, pp. 462-478.
- Pich, M. T., Loch, C. H. and De Meyer, A. 2002. On uncertainty, ambiguity, and complexity in project management. *Management Science*, Vol. 48, No. 8 (Aug 2002), pp. 1008-1023.
- Pohjonen, S. & Visuri, K. 2008. Proactive approach in project management and contracting. In: H. Haapio, ed. 2008. *A proactive approach to contracting and law*. Turku, Turku University of Applied Sciences (Course material 38), pp. 75-95.
- Rising, L. & Janoff, N. S. 2000. The scrum software development process for small teams. *Software, IEEE*, Vol. 17, No. 4 (Jul-Aug 2000), pp. 26-32.
- Royce, W. W. 1970. Managing development of large software systems. 1970. *Proceedings of IEEE Wescon*, Vol. 26, No 8 (Aug 1970), pp. 1-9.
- Ruuska, I. 2005. *Social structures as communities for knowledge sharing in project-based environments*. [e-book] Doctoral Dissertation Series 2005/3. Laboratory of Work Psychology and Leadership, Helsinki University of Technology, Espoo. 234 p. Available at: <<http://lib.tkk.fi/Diss/2005/isbn9512276712/isbn9512276712.pdf>> [Accessed 21 November 2012].
- Ruuska, I., Ahola, T., Artto, K., Locatelli, G. and Mancini, M. 2011. A new governance approach for multi-firm projects: Lessons from Olkiluoto 3 and Flamanville 3

- nuclear power plant projects. *International Journal of Project Management*, Vol. 29, No. 6 (Aug 2011), pp. 647-660.
- Salbu, S. R. 1997. Evolving contract as a device for flexible coordination and control. *American Business Law Journal*, Vol. 34, No. 3 (Mar 1997), pp. 329-384.
- Salmi-Tolonen, T. 2008. A multidimensional topic requires a multidisciplinary approach. In: S. Nystén-Haarala, ed. 2008. *Corporate Contracting Capabilities; Conference proceedings and other writings*. Joensuu, University of Joensuu. Publications in Law No. 21, pp. 1-17.
- Schrader, S., Riggs, W. M. and Smith, R. P. 1993. Choice over uncertainty and ambiguity in technical problem solving. *Journal of Engineering and Technology Management*, Vol. 10, No. 1-2 (Jun 1993), pp. 73-99.
- Skaates, M. A., Tikkanen, H. and Lindblom, J. 2002. Relationships and project marketing success. *Journal of Business & Industrial Marketing*, Vol. 17, No. 5, pp. 389-404.
- Siedel, G. J. & Haapio, H. 2010. Using proactive law for competitive advantage. *American Business Law Journal*, Vol. 47, No. 4 (Winter 2010), pp. 641-686.
- Siedel, G. J. & Haapio, H. 2011. *Proactive law for managers: A hidden source of competitive advantage*. Gower Publishing Company. 172 p.
- Smyth, H., Gustafsson, M. and Ganskau, E. 2010. The value of trust in project business. *International Journal of Project Management*, Vol. 28, No. 2 (Feb 2010), pp. 117-129.
- Stahl, G. K., Mäkelä, K., Zander, L. and Maznevski, M. L. 2010. A look at the bright side of multicultural team diversity. *Scandinavian Journal of Management*, Vol. 26, No. 4 (Dec 2010), pp. 439-447.
- Takeuchi, H. & Nonaka, I. 1986. The new new product development game. *Harvard Business Review*, Vol. 64, No. 1 (Jan-Feb 1986), pp. 137-146.
- Tate, K. *Sustainable software development: An agile perspective*. Addison-Wesley, Pearson Education, Inc. 226 p.
- Tikkanen, H., Kujala, J. and Artto, K. 2007. The marketing strategy of a project-based firm: The four portfolios framework. *Industrial Marketing Management*, Vol. 36, No. 2 (Feb 2007), pp. 194-205.
- Turner, J. R. & Müller, R. 2003. On the nature of the project as a temporary organization. *International Journal of Project Management*, Vol. 21, No. 1 (Jan 2003), pp. 1-8.
- Turner, J. R. & Simister, S. J. 2001. Project contract management and a theory of organization. *International Journal of Project Management*, Vol. 19, No. 8 (Nov 2001), pp. 457-464.

- Turner, J. R. 2004. Farsighted project contract management: incomplete in its entirety. *Construction Management and Economics*, Vol. 22, No. 1 (Jan 2004), pp. 75-83.
- Ward, S. 1999. Requirements for an effective project risk management process. *Project Management Journal*, Vol. 30, No. 3 (Sep 1999), pp. 37-43.
- Ward, S. & Chapman, C. 2003. Transforming project risk management into project uncertainty management. *International Journal of Project Management*, Vol. 21, No. 2 (Feb 2003), pp. 97-105.
- Warsta, J. 2001. *Contracting in software business: Analysis of evolving contract processes and relationships*. Doctoral Dissertation. Department of Information Processing Science and Infotech Oulu, University of Oulu. 262 p.
- Wikström, K., Arto, K., Kujala, J. and Söderlund, J. 2010. Business models in project business. *International Journal of Project Management*, Vol. 28, No. 8 (Dec 2010), pp. 832-841.
- Yin, R. K. 2003. *Case study research: Design and methods*. 3<sup>rd</sup> ed. Sage Publications, Inc., Thousand Oaks, CA. 181 p.



