Flexible Contracting in Software Project Business:

What We Can Learn from Agile Methods in the Software Industry

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A contract between project parties defines agreements and actions for coordination, safeguarding, and adaptation during a project lifecycle.[4] Traditionally, literature has viewed contracts in a very legal oriented manner, where documents are designed by lawyers to protect different parties against risks and to get commitments from others; commitments that the law will enforce at the court in the worst case scenario.[5] This view is challenged by the agile approach in the software industry. Agile methods started to evolve in the early 1980s and the main principles were introduced in the Agile Manifesto in 2001.[6] After a decade these practices are commonly used in software development to increase flexibility and minimize negative impacts of changes in software projects. In project business, which is characterized by fierce competition, increasingly complex project networks, and unstable project environments, there is an increasing demand for proactive coordination and flexible adaptation for changes.[7] In this research, we investigated agile methods in the software industry and gained understanding on how the agile approach is used to maximize co-created value in the project and to increase flexibility in project contracting. Flexible contracting may work as an innovative tool for collaboration among project parties, potentially enabling dynamic project management and

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[4] 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., Williamson, O.J. (1985) *The Economic Institutions of Capitalism*. Free Press, New York, NY. 450 p.

[5] 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., 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., 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.

[6] 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 9 February 2015].

[7] Lumineau & Oxley (2012)., 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., 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.

contingency planning in various types of projects. This research presents our empirical findings from the software industry and facilitates discussion on how flexible contracting could be applied in project business beyond software development.

1. Introduction

The traditional view on contracts in project management research is that a contract defines agreements and actions for coordination, safeguarding, and adaptation during a project lifecycle.[8] In addition, legal scholars view contracts in a very legal oriented manner, where documents are designed by lawyers to protect different parties against risks and to get commitments from others; commitments that the law will enforce in court in the worst case scenario.[9] Because of these safeguarding oriented views on contracting, there is fundamental rigidity built into both project contracting processes and project contracts. Contracting parties must expend significant effort and resources to specifically define project artifacts and deliverables before signing the contract. There are also formal change management procedures involved in project management in order to adapt to required changes during the project implementation phase.

This type of formal, legal-centric contracting process and clunky, bureaucratic approach to project change management might work well with less complex projects, where the targeted result can be clearly and precisely defined, but many projects require a more flexible approach to be able to maximize co-creational value. For example, agile software development projects, where the aspired end-result cannot be precisely defined beforehand, tend to require increased flexibility to be able to maximise the created value. Our earlier research discovered that the demand for proactive coordination and flexible adaptation to changes by project parties is increasing, particularly in the context of project business characterized by complexity and uncertainty.[10] This is the case in agile software projects, which focus on cooperation with a customer, continuous re-defining of requirements, accepting the fact of constant changes in the project. Agile projects need flexibility to manage uncertainty, especially in the early phases of the project lifecycle when there is not enough

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[8] Argyres & Mayer (2007), Williamson (1985).
[9] Lumineau & Oxley (2012), Nystén-Haarala et al. (2010), Siedel & Haapio (2010).
[10] Kujala, J., Nystén-Haarala, S. and Nuottila, J. (2015) "Flexible Contracting in Project Business." International Journal of Managing Projects in Business, Vol. 8, No. 1, pp. 92-106.

information regarding the detailed specifications of the project scope and implementation of project work. In our earlier research we suggested that in software business there are two fundamentally different approaches to implementing flexibility in the contracting process and in the project contract: (a) postponing the decisions until there is adequate information for decision making; or (b) making decisions that allow flexible adaptation to changes during the project lifecycle.[11]

In this research we collected data from several industry professionals having extensive experience in agile software projects in order to study contracting practices and change management in those projects. We wanted to deepen our understanding on (RQ1) what are the salient characteristics of a project contracting process and project contracts when applying agile development methods. Furthermore, we wanted to empirically find out (RQ2) how agile software projects implement flexible approaches into project contracting and project contracts.

2. Agile Software Projects

The software development processes have evolved radically from traditional waterfall and spiral models which were suitable for traditional project management approaches, to today's agile and flexible development methods.[12]

The waterfall model was the first systematic and sequential approach to software development (Figure 1). It defined different project tasks in separate, isolated stages. It was a systematic approach to software development but at the same time it was rigid as it prevented

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[11] Kujala et al. (2015).

[12] Royce, W. W. (1970) "Managing development of large software systems" *Proceedings of IEEE Wescon*, Vol. 26, No 8 (Aug 1970), pp. 1-9., 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., Pressman, R. S. (1997) *Software engineering: A practitioner's approach*. (Fourth ed.). New York: McGraw-Hill Companies Inc. 885 p., 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.

simultaneous activities and a previous stage was always to be completed first before a following one was possible to get started.
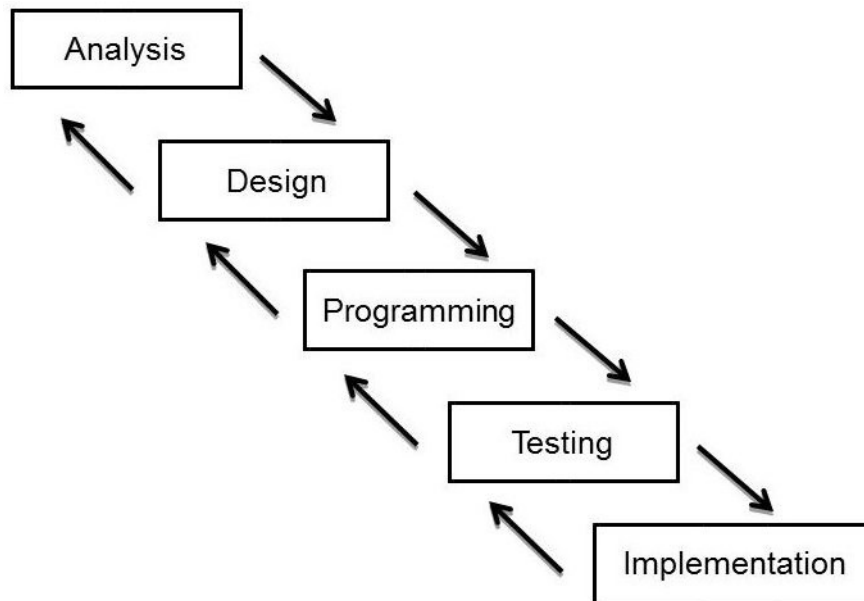

Figure 1. A waterfall model.

The waterfall model was often ineffective and inflexible. The product requirements were assumed to be known in the beginning of a project, there was a lot of documentation involved and the change management was bureaucratic and slow.[13] The model also had practical project management problems. For example, the product testing was done in the test phase as a whole. All the errors found in testing were then fixed after the test phase was over. Source code changes during the error fixing then possibly introduced new errors in software which were only found in the next round of testing and this could lead to a cycle of many loops between the code phase and the test phase thus increasing costs and delaying the project.[14] Because of these challenges with the waterfall model, a spiral model was developed.[15]

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[13] 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., Boehm (1988), Warsta (2001).

[14] Curtis et al. (1987), 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.

[15] Boehm (1986), Boehm (1988), Warsta (2001).

The spiral model started to change software development into an iterative and more responsive direction. It divided a software project into smaller cycles, each cycle basically having all the phases introduced in the waterfall model. Initial assumptions and software architectural choices could be revisited after completing each cycle. The spiral model made software development more responsive to changes and it also involved customer more often enabling better interaction with the customer.

The evolution towards agile methods started in the early 1980s. As an example, one of the most popular agile methods, Scrum, was introduced in the late 1980s.[16] By 2001 several agile methods were used in the industry, and practitioners working with these methods agreed and signed the Manifesto for Agile Software Development.[17] It listed the main principles of agile methods in four value statements:

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

These statements demonstrated the fundamental change in the mindsets within software engineering. They introduced, facilitated and promoted more open, dynamic and flexible approaches for software project management and cooperation with customers.[18] The agile development model is presented in Figure 2.

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[16] Takeuchi, H. & Nonaka, I. (1986) "The new new product development game." *Harvard Business Review*, Vol. 64, No. 1 (Jan-Feb 1986), pp. 137-146.

[17] 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., Beck et. al (2001), Highsmith, J. & Cockburn, A. (2001) "Agile software development: The business of innovation." *Computer*, Vol. 34, No. 9 (Sep 2001), pp. 120-127.

[18] Cockburn, A. (2002) *Agile software development*. Addison-Wesley, Pearson Education, Inc. 278 p., Martin, R. C. (2003) *Agile software development: Principles, patterns, and practices*. Prentice Hall, Pearson Education, Inc. 529 p., Larman, C. (2004) *Agile & iterative development: A manager's guide*. Addison-Wesley, Pearson Education, Inc. 342 p., Tate, K. (2006) *Sustainable software development: An agile perspective*. Addison-Wesley, Pearson Education, Inc. 226 p.

Regular updates

Product backlog list: Requirements, priorities, effort estimates

Goals of next Sprint

Sprint backlog list

Requirements

Sprint

New product increment
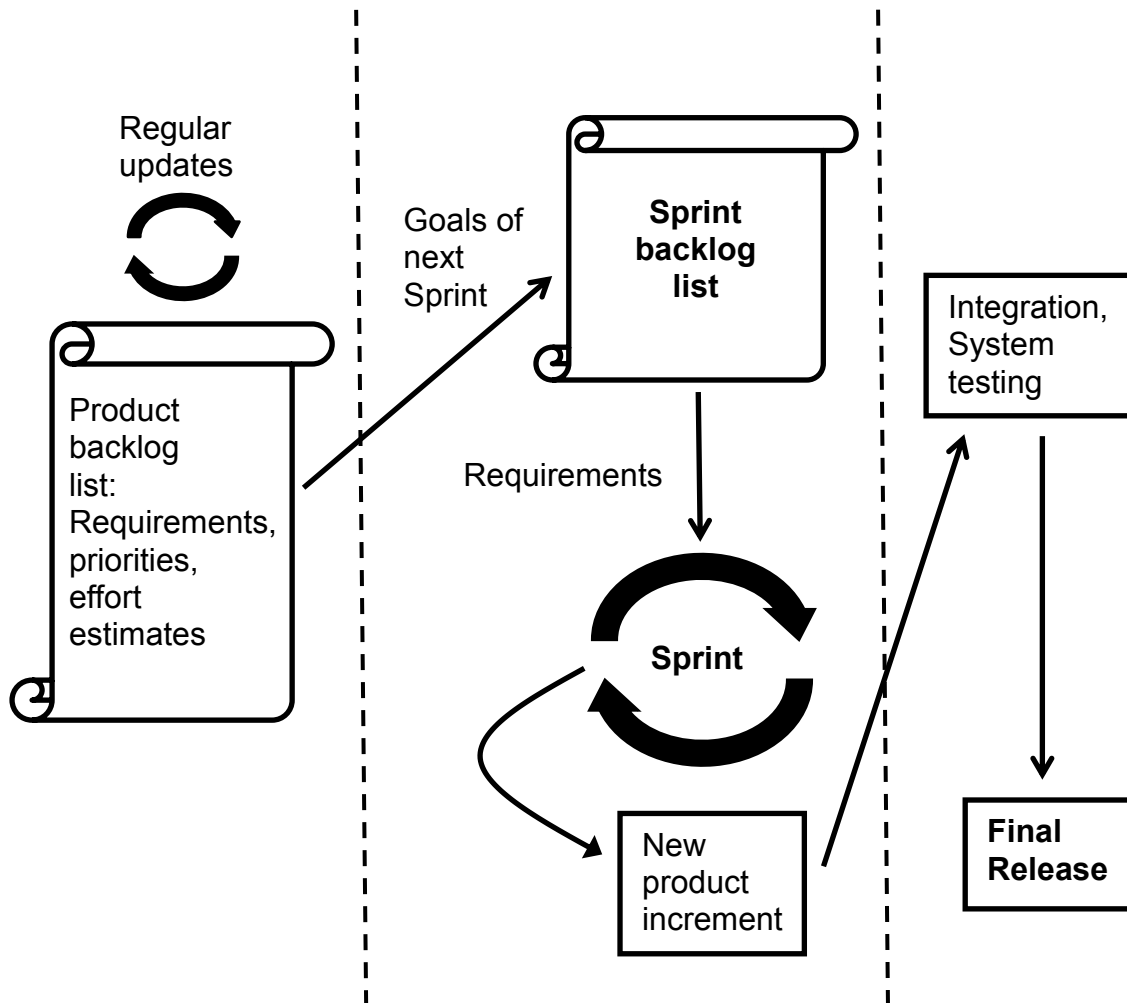
Integration, System testing

Final Release

Figure 2. An agile development model.

A product backlog is a list of feature requirements which is regularly updated with the customer. It also contains information on priorities and work effort estimates of those requirements. A sprint is a period of implementation which usually lasts a couple of weeks. After each sprint, some product features are implemented completely and they can be integrated in the product increment. Finally, after several iterations of sprints, the final product release will be completed.

The agile development model, which emphasizes customer collaboration over contract negotiation, challenges not only the traditional project management but also the traditional contracting process which must evolve to increase the flexibility of contracting to match the

agile principles.[19] The ideas of flexibility have also emerged in contract law from the 1980's onwards. Contracts have been explained as developing gradually[20] and contracting parties have started to be required to act in good faith and take the other party's interests into consideration, at least to some extent (cf. Sund et al. in this volume). However, the change of paradigm has not been easy: research has documented many challenges in executing agile software projects successfully.[21] In addition to increased cooperation with customers, agile practices have been stated to encourage change rather than discourage it, by having focus on responding to change rather than on following a plan.[22] A valid question from the project business perspective is whether the understanding of the current contracting processes and project contracts is flexible enough to support the dynamic co-operation during the project execution.[23] Change mechanisms are seen as important contract terms, and yet they are most often absent from contract documents.[24] Empirical studies show a tendency to write hard and inflexible contract documents and bend the formal rules with oral changes.[25]

3. Contracting in Project Business

The nature of procurement within project business differs from the nature of industrial purchasing management—transactions which are more compatible with the traditional

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[19] Abrahamsson, P., Salo, O., Ronkainen, J. and Warsta, J. (2002) *Agile software development methods: Review and analysis*. VTT Publications 478, Otamedia, Espoo. 107 p., Beck et al. (2001), Nystén-Haarala, S. (1998) *The Long-Term Contract: Contract Law and Contracting*, Finnish Lawyers' Publishing, Helsinki. 325 p., Warsta (2001).

[20] Grönfors, K. (1993) *Avtalsgrundande rättsfakta* (Legal Facts Constituting Contracts), Nerenius & Santérus Förlag, Göteborg. 221 p., Pöyhönen, J. (1988) *Sopimusoikeuden järjestelmä ja sopimusten sovittelu* (The System of Contract Law and Adjustment of Contracts), Finnish Lawyers' Association, Helsinki. 397 p.

[21] Charette, R. N. (2005) "Why software fails?" *Spectrum, IEEE*, Vol. 42, No. 9 (Sep 2005), pp. 42-49., Cerpa, N. & Verner, J. M. (2009) "Why did your project fail?" *Communications of the ACM*, Vol. 52, No. 12 (Dec 2009), pp. 130-134.

[22] Beck et al. (2001), Higsmith & Cockburn (2001).

[23] Atkinson, S. (2010) "Why the traditional contract for software development is flawed?" *Computer and Telecommunications Law Review*, Vol. 16, No. 7, pp. 179-182.

[24] IACCM. (2012) *2012 Top terms in negotiation*. International Association of Commercial and Contract Management. Available at: <http://www.iaccm.com/resources/?id=4611> [Accessed 10 February 2015].

[25] Poppo, L. and Zenger, T. (2002) "Do formal contracts and relational governance function as substitutes or complements?", *Strategic Management Journal*, Vol. 23 No. 8, pp. 707-725., Corporate Contracting Capabilities Research Report. (2008) *Contracting capabilities in industrial life-cycle and service business*. 13 p. (CCC report 2008) Available at <http://www.uef.fi/oikeustieteet/ccc> [Accessed 9 February 2015].

contract law approach. It is important to understand the differences in the depth of the business relationships of these two procurement approaches. Industrial purchasing transactions can be considered as routine transactions compared to transactions and contracts in a more complex project business environment.[26] Breaches of contract, which contract law deals with, can similarly be more easily defined in connection with transactions. In project business it is crucial to have a climate of trust in a mutually motivating, cooperative relationship between the contracting parties. A trusting, collaborative relationship is required:

- to get all project participants to work towards project objectives[27] and to reach those objectives successfully;[28]

- to overcome possible misunderstandings and disagreements during the project and to be able to resolve disputes without litigation;[29] and

- to develop cooperative norms over the course of an extended exchange relationship,[30] to identify additional value creation and business opportunities during the project[31] and to identify and maintain future business prospects.[32]

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[26] Artto, K. A. & Wikström, K. (2005) "What is project business?" *International Journal of Project Management*, Vol. 23, No. 5 (July 2005), pp. 343-353.

[27] Turner (2004), Smyth et al. (2010), 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, pp. 647-660.

[28] Turner (2004), 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 9 February 2015]., Ruuska et al. (2011).

[29] Macaulay, S. (1963) "Non-contractual relations in business: A preliminary study." *American Sociological Review*, Vol. 28, No. 1 (Feb 1963), pp. 55-67., Lumineau & Oxley (2012), Smyth et al. (2010).

[30] Lumineau & Oxley (2012).

[31] 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., Smyth et al. (2010), 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.

[32] 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., 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., Smyth et al. (2010), Lumineau & Oxley (2012).

Some of these features of successful business relationship were already recognized in the 1960s by Macaulay,[33] who emphasized relational aspects of running business. Macaulay talked about deals that run in parallel or sometimes in contrary with the traditional written contracts. Deals[34] are commitments taken seriously in almost all situations by business people. Even if deals were not legally binding, they are often so respected that contract and contract law are almost unnecessary because of the many effective non-legal sanctions. Two norms are widely accepted by business people: (a) Commitments are to be honored, one does not welsh 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 operate successfully in the future and because they are concerned about their general business reputation in the market.[35]

While considering contracts from a project business perspective, which include contractual relations much more extensively than discrete transactions for the exchange of goods, it is important to note that business relations and agreements exist everywhere in various forms and shapes. According to Macneil[36] all contracts have relational elements, which, however, vary depending on the type and function of the contract. As Macneil[37] 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*".

Contrary to the need for trustful relations and flexibility in project business, mainstream legal studies have focused on anticipating all contingencies and including them in contracts. Contracts have been treated as complete agreements which should include all the potential solutions for contingencies that a reasonable person should have foreseen. Because of this, there is an emerging need to develop good, well-functioning and profitable contracts contributing to business cooperation instead of only safeguarding. Some legal scholars have started to move beyond the legal centralist approach and view contracts as not only

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[33] Macaulay (1963).

[34] as defined by Macaulay (1963).

[35] Macaulay (1963).

[36] 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.

[37] Macneil (1978).

documents written for potential disputes in court but more as a tool for business cooperation.[38] This proactive law movement attempts to find and develop multidisciplinary approaches for research on business contracting.[39] Typically, proactive law not only empirically studies how things are but also aims to contribute to better contracting in business.[40] Proactive law approaches contracts from a wider perspective, recognizing that contracts must be aligned with the subsequent business model and that the processes of the contracting parties have to be coordinated.[41] The contract document is seen as a tool for cooperation, where every person or team implementing it can find guidelines and instructions. The tool can also be adjusted to first account for contingencies and then to signal the changes to those who implement it. The proactive contracting approach is well aligned with the recent discussion in the project management literature about the role of contracts in supporting the business of a project-based firm.

3.1 Contracting Process and Contract Elements

The project marketing literature describes the following steps in the project lifecycle: search, preparation, bidding, negotiation, implementation and transition.[42] In the beginning there is a business prospect on a seller side and a search for getting a problem solved on a buyer side. In the first contact of the project, contracting parties can see an option to create value together. First commitments are made during the first contact. The seller might commit to send more information about the products, references, and technical specifications. The buyer might commit to send more details on future plans and information on requirements of a project in question. Specification and marketing material related to the offer create expectations for the customer about the functionality of products and services provided by the supplier. From a business perspective, this can be considered as a commitment to include

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[38] Barton, T.D. (2009) *Preventive Law and Problem Solving: Lawyering for the Future*, Vandepals Publishing, Lake Mary, Fl. 382 p., Siedel and Haapio (2010).

[39] Nystén-Haarala, S. (2008) "Why does contract law not recognize life-cycle business? Mapping of challenges for future empirical research", in Nystén-Haarala, S. (Ed.), *Corporate Contracting Capabilities; Conference Proceedings and Other Writings*, Department of Law, University of Joensuu, Joensuu, pp. 18-32., Haapio, H. (2006) "Introduction to proactive law: a business lawyer's view", in Wahlgren, P. (Ed.), *A Proactive Approach*, (Vol. 49), Scandinavian Studies in Law, Stockholm Institute for Scandinavian Law, Stockholm, pp. 21-34.

[40] e.g. Haapio (2006), Siedel and Haapio (2010).

[41] Nystén-Haarala et al. (2010).

[42] Holstius, K. (1987) *Project export*. Research report 1, Lappeenranta University of Technology, Department of Industrial Engineering and Management. 67 p.

such functionality and features in the project. Psychologically, initial commitments are already made at this point. From a business perspective, it may be difficult to withdraw from the contracting process after psychological commitments have been created; this is especially true for the supplier.[43] When a more detailed discussion is started, companies enter into the bidding and a negotiation phase.[44]

As negotiations go further, psychologically binding commitments by individuals and organizations are getting stronger. In the bidding phase, the customer usually conducts tendering among several suppliers and receives formal offers from suppliers. The customer continues with a shortlist of suppliers and continues negotiating with them until the customer makes a decision and selects one supplier. However, customers often ask for binding proposals in the tender phase, which means that the customer can accept them without modifications, and these can be considered as binding contracts.[45] During the negotiations the business case and value creation models are getting clearer, legally binding agreements are completed, and finally a contract is signed. During the implementation phase, modifications to the project contract are made and agreed between the parties. In the transition phase, the project is accepted, the guarantee period starts and responsibility for the delivered system is transferred to the customer. Even in contract law, the legally binding effect of a contract can nowadays be seen as developing gradually during the negotiation process.[46] This idea contradicts with the earlier need to find a clear starting point for contractual liability, such as the signing of the final document. These new approaches in legal studies, however, tend to blur the decision-making of judges in courts.[47]

As discussed earlier, agile methods have changed the linear view of the contracting process in the software industry. For example, a requirement specification is not usually completed before the project starts and it is changed many times during the project. Also, agile methods promote "continual refinement of the product and project practices" and this means that project parties continuously seek for better project practices which might mean changes to the originally agreed conventions. Thus the agile approach means that the contracting process

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[43] Kujala et al. (2007).
[44] Kujala et al. (2007).
[45] Siedel and Haapio (2010).
[46] Pöyhönen (1988).
[47] Nysten-Haarala (1998), Scott, R.E. (2003) "A theory of self-enforcing indefinite agreements." *Columbia Law Review*, Vol. 103 No. 7, pp. 1641-1699.

includes refinement and re-evaluation, and contracts can also be renegotiated during the implementation phase. This continuous and dynamic renegotiation in the contracting process is illustrated in Figure 3.[48] The default rules of contract law do not grasp the idea of continuous renegotiation. Although decision-making in courts can involve requirements for loyalty between contracting parties, changes are better made within the private autonomy of the contracting parties. Constant changes require trust between cooperative parties. Disputes are better solved and settled without courts or any law-driven tri-partial dispute settlement method.
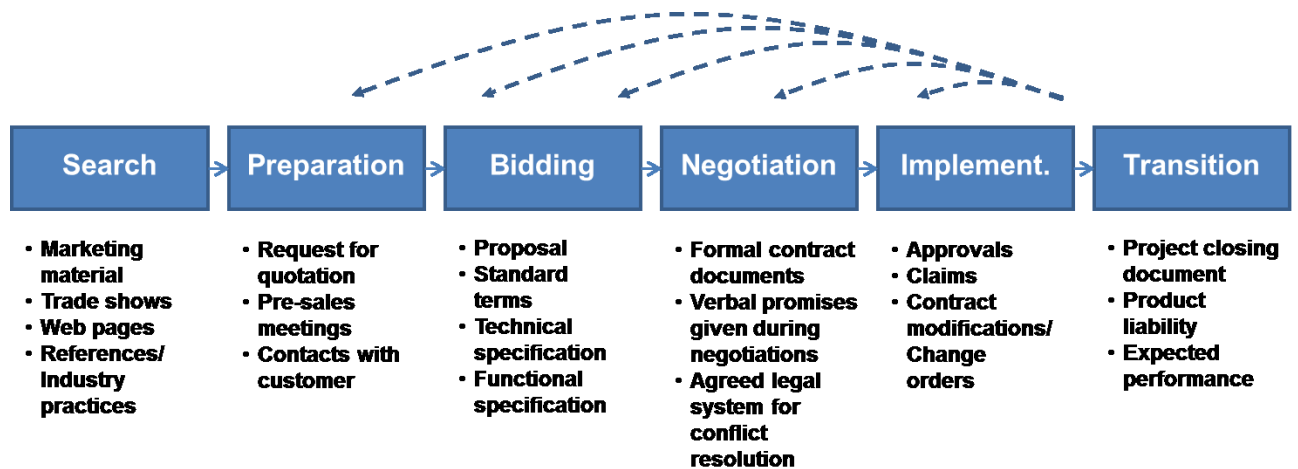
Search	Preparation	Bidding	Negotiation	Implement.	Transition
• Marketing material • Trade shows • Web pages • References/Industry practices	• Request for quotation • Pre-sales meetings • Contacts with customer	• Proposal • Standard terms • Technical specification • Functional specification	• Formal contract documents • Verbal promises given during negotiations • Agreed legal system for conflict resolution	• Approvals • Claims • Contract modifications/Change orders	• Project closing document • Product liability • Expected performance

Figure 3. Contracting process in project business and the idea of renegotiation practices required by agile development methods.

4. Methodology

Our empirical study is based on 5 semi-structured interviews with experienced professionals who have been involved in utilizing agile methods in software development for several years and who have been working with software development projects up to two decades. The informants are all from Finland, but their experience is from several companies in international software business and they are experienced in working with international software development projects. The information about the informants is presented in Table 1.

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[48] Kujala et al. (2015).

Table 1. List of informants.

Informant occupation	Experience (years)	Interview duration	No. of interviewers
CEO of SW company	+ 20	105 minutes	2 researchers
Chief SW Architect	+ 15	95 minutes	1 researcher
Technical Lead of SW	+ 10	29 minutes	1 researcher
SW Sales Manager	+ 15	57 minutes	2 researchers
Managing Director of SW company	+ 10	104 minutes	2 researchers

The semi-structured interviews were used to gain insights into informants' experience on agile methods and their thoughts regarding impact of agile methods on flexibility in software projects. Four interviews were recorded and transcribed for analysis, one was transcribed during the interview and the transcription was reviewed with the informant immediately after the interview. The transcriptions were then taken into computer assisted qualitative data analysis software which was used to code the research data to identify emerging patterns of key concepts and issues and facilitate the data analysis.

5. Empirical Findings on Agile Software Projects

5.1. RQ1: Salient characteristics of a project contracting process and project contracts when applying agile development methods

Based on the research data, a signed contract in agile software projects is usually a framework agreement or a framework contract between the project parties on project practicalities and governance, main responsibilities and price (per hour). It defines a mutually agreeable goal for the project and might include a high-level definition of the product to be created in the project. However, in many cases, the negotiations concerning the detailed scope of the product, project deliveries and services continue afterwards. Project parties work together on defining the requirements and features of the SW product and services and the contract can also be completed with supplements. This kind of contractual behaviour utilizing a frame agreement and supplements was demonstrated well in the interview with the CEO SW Company:

> "In this case with our customer, it was a frame agreement which was signed. In the frame agreement we don't yet agree on what is going to be done, who is going to do it or when. In

the frame agreement we agree on confidentiality issues, possible recruiting issues, IPR issues, how payments are done and this kind of [issue]. Then we separately have an order for work specifically."

"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."

"There were also some sanctions for us specified in the frame contract in case of our failure to meet the contract obligations."

"In some frame contracts we have a clause which says that as a vendor we must guarantee the availability of agreed resources, this is quite normal in software project contracts."

"In the contract there is always a list of responsibilities the customer must commit to. Participation in weekly meetings is listed there too."

The agile methods promote continuous collaboration between the project parties and this requires frequent interaction to make decisions at the most optimal moment. Based on the research data, project parties continue to work together towards product specification after signing a framework contract. So they basically define the detailed scope of the project and product requirements after the project implementation phase is started. The agile methods enable project parties to continuously redefine project deliveries and services and to agree on required changes to maximize the value created in the project. This flexible approach to changes was clearly highlighted in the interviews:

"In agile (model), the changes and new requirements are mentally accepted; the organization has the culture of accepting changes and new requirements. This mindset makes the organization flexible and fast to react to changes." – Chief SW Architect

"The agile methods have had a big impact in SW sales processes and SW development. Nowadays the intention is to get the development started as soon as possible. Earlier there was a target to create very detailed specifications before the project start[s] but now with agile methods it is important to get the real product development (programming) ongoing faster." – SW Sales Manager

"The project was going very well and it was agile. There was a rough specification of application and we defined the details every week as it is done in agile development process. The customer understood that for this kind of a project the traditional waterfall model does not work. So, it was going very well..." – Technical Lead of SW

"In my opinion, the customer is the owner of the product. During the weekly meetings we learn more about the customer's ideas and wishes for the product. Many times [the] customer is saying that we would like to have this kind of a feature done like this. But then when you ask more about an original problem this feature would solve, you realize that it can be implemented in an easier way with less development time. Usually when you discuss with the customer about it they are fine with a suggested development idea so it is very interactive discussion with the customer in those planning meetings..." – CEO of SW Company

Traditional project management literature suggests that there are several types of uncertainties and changes in project requirements or project environment which create the most severe source of risk in reaching the project goals.[49] Uncertainty may arise from multiple sources, such as the basis of estimates, design and logistics, objectives and priorities, and uncertainty about fundamental relationships between the project parties.[50] While approaches based on the traditional project planning can address a part of the uncertainty, traditional project management techniques cannot address every aspect of it.[51] In practice there are always issues that cannot be foreseen, or issues that remain unknown until there is enough information cumulatively collected during the project. This is especially the case with new software development, in which the related project is unique in a much wider sense than is typical in more traditional industries. The agile methods have recognized this fact and the agile approach agrees that there certainly are major important issues in software projects that are beneficial to solve later during the project. Hence, flexibility in the contracting process is also required to overcome the challenges caused by uncertainty in the project. Based on the

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[49] 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., 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.

[50] Ward and Chapman (2003).

[51] Barros, M.O., Werner, C.M.L. and Travassos, G.H. (2004) "Supporting risks in software project management." *Journal of Systems and Software*, Vol. 70 Nos 1-2, pp. 21-35.

research data, it is obvious that agile development methods set evolving requirements for the project contracting process and project contracts:

- In agile software development projects, the project contract continues to evolve after signing the project contract (which usually seems to be a frame agreement or a frame contract). Traditionally signing the contract has been seen as an end of the negotiation phase and as a start of the implementation phase. In agile projects, however, the contract is complemented by contract supplements, and product scope and requirement related issues are continuously renegotiated in the meetings between the project participants after each pre-set period of implementation (called sprint).

- To be able to respond to demands for increased flexibility in agile software development projects, the project contracting process needs to reach actively over the negotiation phase and project signing to cover the project implementation phase with actions needed. Traditionally, a simplified project contracting process included two sets of actions: (a) prepare and commit before signing the contract; and (b) execute and exit after signing the contract.[52] In agile projects, negotiations continue during the implementation phase of the project and this requires continued attention and actions in the project contracting process.

Evolving requirements for the project contracting process and project contracts can be demonstrated by combining the agile development model (Figure 2) and the model of the project contracting process (Figure 3). Based on the research data, the illustration of the dynamics between the development model and the project contracting process is presented in Figure 4.

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[52] Corporate Contracting Capabilities Research Report (2008).

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        Negotiation            Implementation            Transition
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Negotiation

Regular
updates

Product
backlog
list:
Requirements,
priorities,
effort
estimates

Goals of
next
Sprint

**Sprint
backlog
list**

Requirements

Sprint

New
product
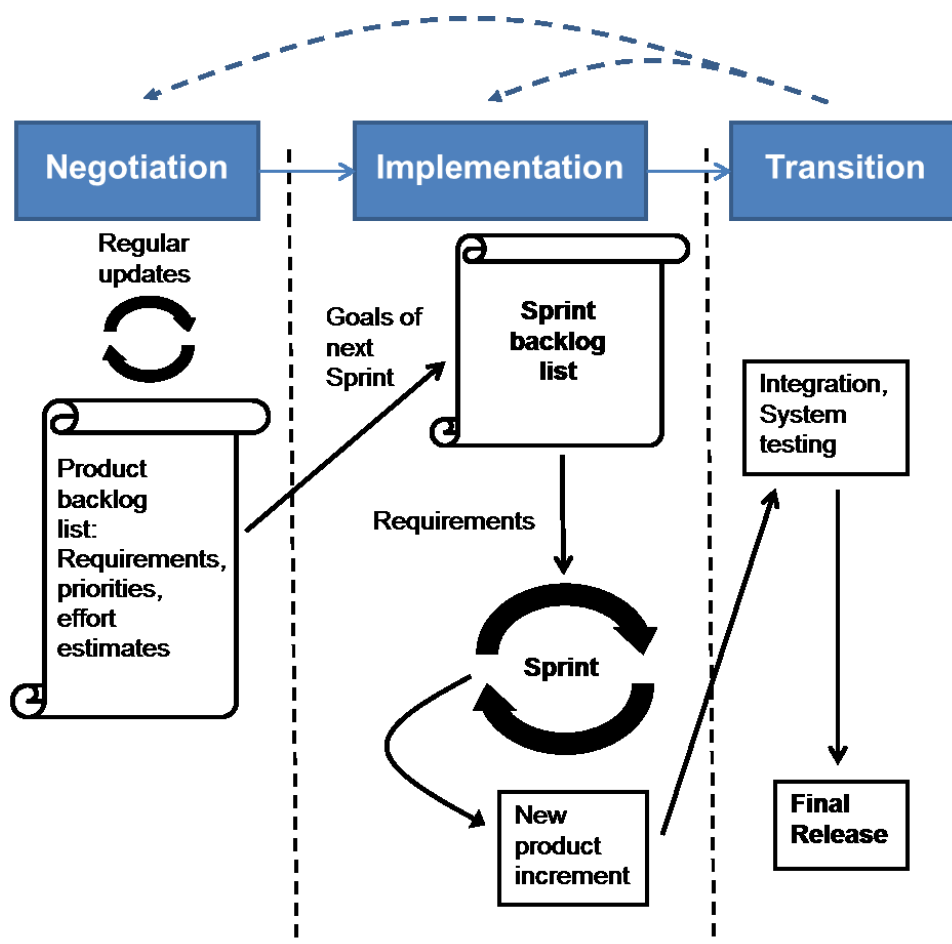increment

Integration,
System
testing

Final
Release

Figure 4. The dynamics between the agile development model and the
project contracting process. The illustration recognizes the renegotiation
practices and flexibility required by agile development methods.

The implementation phase starts based on the knowledge and mutual understanding
developed during the negotiation phase. Implementation is done in sprints, which usually last
a couple of weeks each. After each sprint, project parties review the result of previous sprint
and agree on new requirements and changes to the existing ones. They also agree on the goals
of the next sprint and on the detailed requirements to be implemented. After each sprint, the
completed features and software components are released. In project management terms, they
are delivered and the parties move into the transition phase. Figure 4 presents the iterative
characteristics of agile methods and highlights flexibility and change adaptiveness included.

In addition to the previously presented impact on project contracts and contracting processes,
agile methods also challenge contracting parties to truly collaborate. Only by continuously
working together can they run a complicated project, maximize the co-creational value in the

project, and develop a high-quality software product. This challenge for a mental change was also demonstrated in the interviews:

> "As a buyer, if you know your requirements exactly, then the agile model is not needed. This rarely is the case, so then the agile model is a good solution for purchasing SW. In the agile model it is important for the customer and the vendor to discuss continuously because then the customer can influence the priority order of requirements and understand the development cost of each requirement." – Chief SW Architect

> "Some organizations see agile methods only as a tool in the software development process and they can't utilize [the] agile approach successfully. Agile methods are more like a mindset, the whole philosophy of value creation must change when you start to use agile methods. To be able to utilize the full potential of agile methods for increasing flexibility and enhance value creation, you need to understand the agile mindset. The customer is in the core of value creation; in the process of value creation, project parties create value together iteratively in minor pieces inside a major project. For some larger organizations this type of an ideology is strange, they just don't understand it." – Managing Director of SW Company

It is evident, based on our research, that utilizing agile methods to increase flexibility in project business requires changes also in project contracting and the project management approach. And this requires efforts and contribution from all project parties; both the buyer and the vendor must be able to commit to new project governance mechanism to support the agile approach. It is also important for business lawyers to understand that the agile approach virtually lengthens the negotiation phase of the project. Project parties voluntarily leave negotiable items open for later phases in order to avoid bad decisions and to maximize co-created value in the project.

5.2. RQ2: How agile software projects implement flexible approaches into project contracting and project contracts

The hypothesis for the second research question based on our earlier research was that in software business there are two fundamentally different approaches to implementing flexibility in the contracting process and in the project contract: (a) postponing the decisions until there is adequate information for decision making or (b) making decisions that allow

flexible adaptation to changes during the project lifecycle.[53] We analysed the research data to see if there is evidence to support the hypothesis.

One of the stated values of the original agile manifesto is "responding to change over following a plan". It identifies a challenge of complex projects involving unique technology solutions. It is impossible to know all the influencing details in the beginning of the project and it is also very difficult to specify all the requirements and specifications for the project start. Because of this, agile methods take changes as natural and inevitable incidents and project parties prepare for this mentally and by promoting fluent change mechanisms. This approach was demonstrated in the interviews too:

> "[The] waterfall model is based on an idea that you can define all the requirements at once and based on those requirements you can design the whole SW architecture and the required work beforehand. In reality, it is extremely difficult to have such an understanding of a large and complex system at once. Also, customers do not know all the requirements beforehand; they do not have time and patience to do such a demanding planning work. Also they do not know all the requirements beforehand but they identify new and changed requirements during the SW planning when they see some plans and maybe prototypes." – Chief SW Architect

> "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." – Technical Lead of SW

We analysed the research data in more detail to identify concrete examples of how flexibility is implemented in agile projects. The findings are presented in table 2.

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[53] Kujala et al. (2015).

Table 2. Flexibility in agile development projects.

Postpone decisions to reach adequate information	Allow flexible adaptation to changes
a1. Detailed list of features for each software release decided during the project implementation phase	b1. The list of features for each software release can be changed based on a priority change, technical reasons etc.
a2. Customer can influence on project personnel during the project	b2. Customer is allowed to set new requirements and change the old ones in the meetings after each sprint
a3. Product specification in details is done incrementally during the project implementation phase	

In agile SW projects, project parties agree on a goal for the project and on a high-level definition of the product to be created in the project. They basically agree on a mutually acceptable direction of the project. But they leave the detailed list of features and technical choices open to be decided during the implementation phase of the project (a1). In this way, the features and order of their implementation can be decided when there is enough information on the priorities and related technology (a3). This approach reduces the detailed planning work allocated to the features which are dropped out of the product plans later. It also enables collaborative learning by project parties and enables better decision making at the later stages.[54] Based on our research on agile projects, the customer retains the possibility of influencing project resourcing (a2). The customer can make decisions or at least strongly influence the decision on the project personnel during the project. We consider also this to be one form of flexibility during the project.

One of the value statements of the agile manifesto was "responding to change over following a plan".[55] Concrete implementation of this value was obvious in our research. Software is usually made available on several iterative releases. In an agile approach, the content of those releases can be flexibly changed, based on changes in priorities or in the technology environment (b1). The customer is also allowed to set new requirements during the whole project, and the change requests are considered to be a part of the normal routine of the implementation phase (b2). Based on the research data, the value principles of agile methods

[54] 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, pp. 1008-1023., Nightingale, P. and Brady, T. (2011) "Projects, paradigms and predictability", in Cattani, G., Ferriani, S., Frederiksen, L. and Täube, F. (Eds), *Project-Based Organizing and Strategic Management* (Advances in Strategic Management, Volume 28), Emerald Group Publishing Limited, Bingley, pp. 83-112.
[55] Beck et. al (2001).

are used in practice in SW projects. They are used to get projects started earlier, to make contract negotiations easier, to increase collaboration, to increase flexibility and to manage uncertainty. These findings support the idea that a project contract needs to provide a flexible governance structure that allows adaptations to the contract through mutual agreement and enables early identification of problem situations and dealing with such situations in a cooperative fashion.[56] In agile projects, continuous communication between project parties facilitates cooperation and efficient change management to maximize co-creational value.

6. Conclusion

The emergence of the agile development model has radically changed internal dynamics of software development projects. It has also challenged the traditional view of project management and project contracting. In this research we wanted to discover the salient characteristics of the project contracting process and project contracts when applying agile development methods. Furthermore, we wanted to understand how agile software projects implement flexible approaches into project contracting and project contracts. We found some interesting results to our research questions, and invite additional research and discussions on these topics. Although the empirical data used in the research was limited, we think that the research provides important findings to be used as a basis for further research.

Based on this research, project parties utilizing agile methods define the detailed scope of the project and product requirements after the project implementation phase is started. They continuously redefine project deliveries and services and agree on required changes to maximize the value created in the project. Similarly, the project contract continues to evolve during the implementation phase. The original signed contract is complemented by contract supplements, and continuously renegotiated in the meetings between the project participants. Traditionally, a simplified project contracting process is divided into two phases: prepare and commit before signing the contract; and execute and exit after signing the contract. In agile projects, negotiations continue during the implementation phase of the project and this requires continued attention and actions in the project contracting process. It is important for business lawyers to understand that an agile approach lengthens the negotiation phase of the

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[56] Turner (2004).

project. Project parties voluntarily leave negotiable items open for later phases in order to avoid bad decisions and to maximize co-created value in the project. This finding also opens an interesting research question on the role of a business lawyer in agile projects, especially in the implementation phase. Also, another interesting question is the roles of individuals participating in the suggested renegotiations during the implementation phase of agile projects, and the formal or informal authority of these roles in negotiations, decision making and in the contracting process.

Many software projects produce a unique and novel solution. Thus, it is impossible to know all the influencing details in the beginning of the project and it is difficult to specify all the requirements at the beginning of a project. To cope with this fact, agile projects take changes as natural and inevitable, and project parties prepare for this mentally by promoting fluent change mechanisms. They leave the detailed list of features and technical choices open to be decided during the implementation phase of the project. The features and order of their implementation is decided when there is enough information on the priorities and related technology. The customer is also allowed to set new requirements during the whole project, and the change requests are considered to be a part of the normal routine of the implementation phase. This flexibility created by an agile approach, as well as the continuous communication between project parties, facilitates cooperation and efficient change management to maximize co-creational value. However, this kind of flexible contracting demands trust and cooperative norms between project parties. Thus, trust, communication and cultural issues between the project parties should be further researched in the context of flexible contracting and the agile project. Flexible contracting and agile project management is a fruitful area for multidisciplinary research, especially because the industries in project businesses seem to be evolving in that direction.

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