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**Customer-initiated Product
Development: A Case Study of
Adaptation and
Co-configuration**

Master thesis

60 credits

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Table of Contents

1. Introduction	1
2. Theoretical perspectives	7
2.1 The changing role of the customer in the knowledge society	7
2.1.1 Knowledge society	8
2.1.2 Expanding customer role in the knowledge society	9
2.1.3 The customer role in product development	10
2.1.4 Critique of the presented literature on the knowledge society	13
2.2 User participation in Adaptive Product Development processes	15
2.2.1 End User Development	16
2.2.2 Meta-design	18
2.2.3 User toolkits	21
2.2.4 Modding	26
2.3 Co-configuration: customer-developer interaction in product development	29
2.3.1 The origin of the term Co-configuration	30
2.3.2 Co-configuration work	34
2.3.3 Co-configuration in the framework of knowledge intensive firms	38
2.3.4 Aspects of activity theory	43
2.3.5 Knotworking and Co-configuration	45
2.3.6 Summary	46
3. Elaborations of research questions	48
3.1. Conceptual framework	49
4. Context: A presentation of the research project KIKK and The Company	51
4.1 Knowledge Practices Laboratory (KP-Lab)	52
4.2 KIKK as part of KP-Lab	52
4.3 Description of the context for the KIKK case – The Company	53
4.3.1 Early history	54
4.3.2 Different customer groups	54
4.3.3 Expansion	57
4.3.4 The Company’s products	58
4.3.5 Customer support	63
5. Methodological considerations	66
5.1 Research design	66
5.1.1 A qualitative approach	66
5.1.2 Case study	67
5.1.3 Ethnographical approach	68
5.2 Techniques used in the data gathering	69
5.2.1 Equipment used in our data gathering	70
5.2.2 Selection of informants	70
5.2.3 Interviews	72
5.2.4 Focus groups	73
5.2.5 Participant observation	75
5.3 Analysis of the material	76
5.4 Quality in qualitative research	78
5.4.1 Reliability	78

5.4.2 Validity	79
5.4.3 Generalizability	80
5.5 Research ethics	81
6. Empirical analysis	83
6.1 The development of Planner	84
6.2 Adaptive Product Development	88
6.2.1 Outer loop: Analysis of customer–developer interaction.....	89
7. Summary and Discussion	127
7.1 Summary and discussion of Adaptive Product Development.....	127
7.1.1 Summary of findings	127
7.2 Adaptive product development in the light of a learning perspective.....	136
8. Conclusions	139
References	144
Attachment 1: KIKK- empirisk design	152
Attachment 2: NSD – godkjenning	160
Attachment 3: Informasjonsskriv til ansatte.....	162
Attachment 4: Intervjuguide ansatte	166
Attachment 5: Planleggingsnotat til datainnsamling i Stavanger.....	169
Attachment 6: Informasjonsskriv kunder	170
Attachment 7: Intervjuguide kunder	174
Attachment 8: Glossary	175

List of Figures

Figure 1: An illustration of the industrial society	14
Figure 2: An illustration of an open office solution in today's knowledge society.	14
Figure 3: The Seeding, Evolutionary Growth and Reseeding Process Model (Fischer 2003:89).	20
Figure 4: An example of Planner.	60
Figure 5: An example of Microsoft Project Platform.	61
Figure 6: An example of Project.	61
Figure 7: An example of Enterprise Developer.	62
Figure 8: An example of Detail.	63
Figure 9: A picture of the Helpdesk where customers have the opportunity to forward Improvement Requests.	64
Figure 10: A picture from the focus group session.	74
Figure 11: The informants placing their post it notes on the white board during the focus group.	74
Figure 12: Adaptive product development; Inner and outer loops. A presentation of the components within Adaptive Product Development.	88
Figure 13: Different stages of Adaptive Product Development.	91
Figure 14: Stage of Adaptation	92
Figure 15: Stage of Specialization	104
Figure 16: Stage of Generalization.	108
Figure 17: Phases within the stage of Generalization	112
Figure 18: Stage of Improvement Request.	116
Figure 19: Stage of Tailoring	122

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Abstract

In this thesis I investigate how customers and developers interact through different forms of constellations in product development processes. This thesis is part of the KP-Lab project, more precisely part of the KIKK research project. We used a qualitative approach during the data gathering that spanned over a one and a half year time period. In the KIKK project we looked into how a software company contains different knowledge practices. My research project focused on the evolution of a mutual development between customers, developers and products. The theoretical foundation in this thesis is made up by a conceptual framework consisting of different product development theories which highlight inclusion of customers in the development process in slightly different ways. More precisely, my conceptual framework consists of the following theories: Knowledge intensive firms, Meta-design, Modding and Co-configuration.

I have identified a form of product development at The Company which I define “Adaptive product development”. Adaptive product development contains two components: Firstly, the professional developers can perform regular, purely in-house development, which I have defined as “inner loop product development”. Secondly, the customers and developers can interact and collaborate in product development processes, which I refer to as “outer loop product development processes”. Going even more into depth about Adaptive Product Development I have identified five different stages or forms of product development apparent at the Company: Generalization, Adaptation, Improvement Request, Specialization and Tailoring. In sum, I will then say that the result of this thesis is that I have investigated how customers are important in the Adaptive Product Development as they are the initiators of further development of the products at the Company. These different forms of product development can be seen as a new form of work or production that includes the customers. In addition the process of Adaptive Product Development points at an interesting learning aspect between the interacting organisations. To shed light on this learning aspect of Adaptive Product Development I have used the theory of knotworking. However, this was not analysed and discussed thoroughly since it was partially outside the scope of my thesis, but it can be direction for further work.

Keywords: Adaptive Product Development, Co-configuration, Modding, Meta-design and Knowledge intensive firms, Inner loop product development, Outer loop product development, Generalization, Adaptation, Specialization, Improvement Request, Tailoring and Knotworking.

1. Introduction

”The development of the post industrial society shows that the classical production based on raw materials and energy is to an increasing extent replaced by the ability to create and develop new products and services. In this connection, knowledge has become the basis for development and innovation, and workplaces are something that is created. A prerequisite for value creation and welfare in the future Norway is the ability to take new technology into use, new products and new organisations- and work forms” (NOU 2007:60).

Writing this thesis was motivated by an interest in how customer roles are changing in the knowledge society from being customers that accept the product as it is made by the manufacturers to now wanting products tailored to their needs. Many customers, for example, are aware that they can ask for a refrigerator that matches their kitchen in colour and style, and are therefore less willing to accept a “standard” white refrigerator (Salvador et al. 2002:62). The customer role has changed toward being participating customers that want to be active on several areas. They do not just want to have tailored products; the customers want to be heard and therefore be part of the development of their own products. When customers enter the arena of product development new kinds of products may emerge with customer and developer knowledge as the basis. This form of Adaptive Product Development between customers and developers may represent a new form of work. Adaptive product development has the potential of promoting learning on both an individual and an organizational level, especially learning between organisations. Adaptive product development as a new form of work (or learning) is a new area of research, to which this thesis will contribute. Also, Engeström addresses the need for further research on new forms for work in today’s society, when he refers to Barley and Kunda saying that “detailed studies of work should be reintegrated into organizational science in order to provide a solid empirical basis for post-bureaucratic theories of organizing” (Engeström 2004:11). In this thesis I will give a detailed study of work where the focus is on Adaptive Product Development and where customers play a vital role in product development processes, and even more precisely initiate further development of the products. The citation below is an illustration of how the Adaptive Product Development process might proceed.

“...a holistic or “rugby” approach – where a team tries to get the distance as a unit, passing the ball back and forth” (Wikström 2006:11 referred after Nonaka, 1986).

This citation illustrates the main idea behind Adaptive Product Development. There are several parties collaborating in order to reach different goals. A main goal in The Company¹ is the enhancement of products in line with the needs of customers, customers who want products that help them solve complex project planning tasks. Further, this collaboration is characterized by a dialectic interaction between the professional developers and the customer organisation, as the ball is passed back and forth. The continuous Adaptive Product Development at The Company includes five stages of development, representing activities which move between the customers and developers.

Case

This thesis is part of the European (funded) research project: KP - Lab. The objective of KP-Lab is to identify knowledge practices in everyday work. KP-Lab consists of several independent research projects, whereas KIKK is one of them. My thesis is part of the research project KIKK located at InterMedia, University of Oslo. KIKK is a Norwegian acronym for Knowledge Management for Internal Communication and Customer Relations. We were one post.doc, one PhD. and five students participating in this research project. In KIKK we used a case study where we investigated a software company named The Company. The Company is a middle sized software company consisting of 26 employees distributed between two offices in Norway. Characteristic for The Company is their close and personalized relationships with their customers. Since the early beginning of the firm, The Company has welcomed their customers' to provide requests for further development of the products, which are described in detail in chapter 6. In the KIKK research project we have used a qualitative approach. We gathered our data by using open ended interviews, some participant observation, and focus groups. My research project was to investigate the mutual development between customers, developers and products. I was interested in the development of the Company's products in relationship to the feedback from customers concerning further development of the products.

Motivation for the thesis: being an interdisciplinary student

I am an interdisciplinary student, which is reflected in the thesis. I am enrolled in a newly established interdisciplinary program called Technology, Organization and Learning (TOOL).

¹ Throughout in this thesis I will use the name The Company when referring to the company I studied. This is done in order to protect my sources.

There is not yet a “template” for how to write a TOOL thesis. The requirement as an interdisciplinary study program is that it should include and combine at least two different theoretical perspectives representing the three areas covered in the program. I have chosen to integrate three theoretical perspectives. In chapter 2 three different sections representing different theoretical perspectives will be presented. Section 2.1 presents a sociological perspective on the changing roles of the customers in the knowledge society. Section 2.2 represents a technical perspective showing user participation in Adaptive Product Development. Section 2.3, with its focus on interaction between customers and developers in product development processes, represents a learning and Adaptation perspective. To integrate them, I have developed a conceptual framework where I have selected relevant elements from each of these theoretical perspectives. The relevance criteria are applications to research questions and data. This will be used to provide different theoretical angles from which to discuss and analyse the empirical findings.

Objective of the study

The main objective of this study is to investigate *mutual development between customers, developers and mediating artefacts at The Company*. To address this issue I will present a detailed description of work in The Company in connection with mutual development. When answering this question I will go into detail on how developers at The Company participate in product development on several levels. This form of product evolution is the result of a mutual dependency between customers, professional developers and The Company’s project management tools as mediating artefacts.

More specified research questions are:

1. *How do the customer roles change over time in relationship to the evolving products?*

The first part of this research question is how the customers have evolved. What I want to investigate in this connection is how the customer roles have changed with the transition from industrial society to knowledge society. Generally speaking, the customer role has changed from being passive customers to active contributors (Fischer, 2002; Fischer, 2007B). The theories I will draw upon are those, representing the knowledge society, which emphasize how the customers are becoming more knowledge intensive, more demanding, and are asking for tailored products (Frønes & Brusdal, 2000). Within the knowledge society, some

companies are knowledge intensive firms (KIFs). KIFs are characterized by, among other things, including customers and listening to their needs in different settings, for example in product development processes (Alvesson, 2004). In sum, there has been a mutual relationship between the development of products and customers needs as they are becoming more knowledge intensive and thereby wanting to participate in the development of products. In turn, companies that are KIFs want to include customers in development processes (Alvesson, 2004) because they understand the need for exploiting the valuable knowledge of customers (Fossestøl, 2004; Gibbert et al., 2002). The purpose of the research question presented above is mainly to give some background information or setting to contextualize my main research question presented below:

2. *How do the customers impact the development of The Company's products?*

This research question is the main issue I want to investigate in this thesis. With this research question in mind, the customer-initiated product development process at The Company will be presented. The focus is on how there exist different forms of product development at The Company where the customers make a difference – where they are active in some way. Roughly speaking, the main idea of this thesis is that there exist two kinds of product development at The Company: inner and outer loop. “Conventional product development” involves professional developers doing in-house development, which I refer to as *inner loop product development*. On the other hand, *outer loop product development* is when customers are involved in the development process in different ways. I have narrowed my scope to research outer loop product development processes. However, to give the whole picture, inner loop product development is briefly described and discussed. Within the outer loop product development process I have identified five co-existing stages of development processes, and four of them represent stages where customers are actively involved, either directly or indirectly.

To shed light on this research question I will combine elements from several theories. The theory of Co-configuration by Engeström will be my main theory since it emphasizes how customers are active participants in product development processes. The Co-configuration theory contains two elements: new forms of work and new forms of learning. I address both elements, but my main focus is on new forms of work. However, the theory does not cover all issues in the product development process occurring at The Company. For example, Co-

configuration does not shed light on how customers can tailor products themselves. Therefore, I have supplied the theory of Co-configuration with other theories. To contribute to filling this gap I will use elements from Meta-design (Fischer, 2003; Fischer & Scharff 2000) and Modding (Jeppesen, 2004). Meta-design distinguishes between design time and use time. *Design time* is development processes where developers solely perform development, and *use time* where the customers can be active and tailor the product themselves (Fischer, 2003). Modding describes how customers can tailor with access to toolkits integrated with tailorable products (Jeppesen, 2004).

The theoretical perspectives will be used to answer these two questions. In order to accomplish that I have developed a conceptual framework that consists of mentioned theories: Knowledge intensive firms (KIFs), Co-configuration, Meta-design and Modding.

Scope of the thesis

This thesis operates with two important terms representing two different levels. *Adaptive product development* refers to a product development process where products are being developed in interaction with customers, as well as solely in-house by the professional developers. Through empirical analysis I have categorized this as outer and inner loop product development. A more precise and narrowed version of Adaptive Product Development is created by the term “*customer-initiated product development*”, which is the title of the thesis. Customer-initiated product development refers to the outer loop product development process.

Adaptive Product Development can be viewed from two different perspectives: Adaptation and Co-configuration. The *Adaptation perspective* mainly focuses on new forms of work, whereas a *Co-configuration perspective* focuses on learning within Adaptive Product Development. In order to narrow the thesis down, I have put more effort into the Adaptation perspective. Thus, the thesis is more about new forms of work or production forms than about learning, without ignoring learning. This is in line with what Pihlaja sees as important: “The ongoing transformation of production has raised discussion about the nature of learning in organisations, as well as about the methods of development and consultancy needed to master the new forms of production” (Pihlaja 2005:2 referred after Adler & Cole, 1994; Kyrö & Enquist, 1997; Tienari, 1999). A goal for me has been to show how Adaptive Product Development can represent a new form of work in product development. In light of this

perspective learning occurs at the organizational level, *between* the customer organisations and The Company. However, as mentioned above, this is currently a speculation and working hypothesis for further work, and is outside the scope of this thesis.

Finally, when mentioning “product development” I refer to a form of product development that is based on a series of existing products and does not focus on “new product development”. Product development processes involving customers may be everything from modifying a product in coherence with customers needs or making a new feature to an already existing product.

Structure of the thesis

This thesis is organized in 8 chapters. *Chapter 1* is a general introduction to the thesis. *Chapter 2* consists of the different theoretical perspectives. This chapter is divided into three main parts, each representing one theoretical direction. *Section 2.1* gives an overview of the knowledge society and how customer roles are changing towards more customer involvement. The aim of this part is to outline how product development occurs in the knowledge society. *Section 2.2* emphasizes how customers actually are participating in product development processes mainly in the software industry. Finally, *section 2.3* looks into how customers and developers act nearly as partners in a mutual development of the products (Victor & Boynton, 1998; Engeström, 2004). In *chapter 3* an elaboration of the research questions and the reasoning behind my conceptual framework will be given. *Chapter 4* contextualizes this thesis by presenting the KIKK case and the Company in more detail. In *chapter 5* the methodological issues will be discussed. In *chapter 6* I present and analyse my empirical findings, and a theoretical discussion will be given after each stage of development. *Chapter 7* summarizes the main findings of the previous chapter and tries to look at them in a broader perspective. Finally, the conclusions are elaborated in *chapter 8*.

2. Theoretical perspectives

In this chapter, different theoretical positions will be elaborated. As explained above, this chapter is divided into three parts, each representing a theoretical position. Firstly, the changing role of the customer in the knowledge society is discussed, followed by participation in Adaptive Product Development process and lastly Co-configuration represented by the customer-developer interaction in product development. I use the following structure when presenting the theoretical positions: First the theory is presented, followed by some critical considerations of the theory will be given. After each critical consideration I present the next theme, which is meant to be a way of overcoming the shortcomings pointed at in the presented theory. This structure is used in the presentation of section 2.1, 2.2 and 2.3, as well as within these sections when presenting aspects of these theories.

2.1 The changing role of the customer in the knowledge society

"Many analysts surmise that the nature of life and work will thus be fundamentally changed for this and all future generations. Since the late 1980's, then, various authors have advanced the idea that the knowledge age is breeding knowledge workers who are employed in knowledge intensive organisations" (Thompson & McHugh, 2002:153, referred after Despres & Hiltrop, 1995:9).

The term 'knowledge society' has come about due to the fact that an increasing number of employees are engaged in managing knowledge in one way or another. In the knowledge society there is a growing degree of knowledge intensive companies; where the competence and knowledge of employees are vital. Examples of knowledge intensive companies are accounting, law and consultancy firms (Gulbrandsen 2000: 195). More and more people are involved in jobs that require intellectual, rather than physical labour in the performance of work tasks. Analytical skills, such as gathering, comparing, and processing information have become particularly important in the knowledge society. The internet is a further example of a context in which analytical skills are used in the trading of products and services. A side-effect of the knowledge society is that the role of product development changes in the direction of including customers to an increasing degree. In sum, the knowledge society is characterized by knowledge workers performing knowledge work, sometimes in knowledge

intensive organisations. An important unintended side-effect of this is the influence this has on customer relationships with service-providing companies.

In this section, the knowledge society will first be elaborated upon, and then the customer society will be briefly described. The customer's role is described on two different levels: the customer's role in the knowledge society in general, and the customer's role in product development, in particular. Through this introduction to the knowledge society I will show how the customer roles have changed, and continue to change.

2.1.1 Knowledge society

Today we are living in a knowledge society (Stehr, 1994). The transition from industrial society to knowledge society has changed the organization and phases of our lives (Frønes & Kjølrsrød, 2005:294). The move towards the knowledge society has been characterized by globalization, communication technology, knowledge and education as the basic competence, and a totally different working life than that which characterized the industrial society (Frønes & Brusdal 2000:29). These elements are important factors in defining the knowledge society. There has also been a shift in the production methods used in the knowledge society. One example of this is the replacement of the classical industry worker by electronically-based operations (Frønes & Brusdal 2000:29). The increasing focus on the knowledge the employees possess has arisen from these changes.

The focus of this chapter will be on how the roles of knowledge workers and customers are defined in the knowledge society. As Engelstad et al. underlines; Norwegian employees are now engaged in a form of production where qualitative elements are determinant, therefore the work is dependent on, and coloured by the employees' knowledge and competence (Engelstad et al. 2004:54). This focus on the *qualitative elements* of production rather than the physical emphasizes the extent to which today's knowledge *workers* rely on their intellectual abilities, in particular, their analytical skills and competence in performing work. Knowledge work is characterized by a goal-oriented, service-oriented and individually-adapted, and flexible manner of approaching work tasks (Fossestøl et al. 2004:22). More and more work requires knowledge and competence in ways that the industry society did not and there are

increasing demands to provide individually-adapted services and products (Fossestøl et al. 2004:15). It is evident that not only the workers role, but also that of the customer is changing in the knowledge society. Customers are becoming more demanding in their desire for specialized and tailored products. As customers, we want the option to put together and choose products and services that fit our individual needs (Fossestøl et al. 2004:15). In summary, it seems that two trends are emerging:

1. Products, skills and techniques make it possible to create specialized products more easily.
2. Customers demand products tailored to their individual needs.

Other terms that have been used to refer to the knowledge society include *informationalism* (Thompson & McHugh 2002:150 referred after Castell, 1996) and *knowledge economy* (Thompson & McHugh, 2002:150). Thompson and McHugh see the term *informationalism* as contained within the overarching term *knowledge economy* (Thompson & McHugh 2002:250). As there has been a transformation from the industrial society to the knowledge society, the knowledge society has also been referred to as the post-industrial society (Frønes & Brusdal 2000:29).

2.1.2 Expanding customer role in the knowledge society

As customers have become an important part in the knowledge society the term *customer society* has evolved to represent how the customer's role in the knowledge society has expanded (Frønes & Kjølørød 2005:476); this underlines the fact that more and more people are becoming customers in one way or another. People demand and require things from their products and services as consumers or users; they expect quality and choices (Frønes & Brusdal 2000:169). An example of this can be seen in health care and education. This is very likely a result of the constantly increasing globalisation and the commercialization that constant increases (Frønes & Kjølørød 2005:476). When the customer's role expands and customers enter several markets, they learn to expect and demand even more. A natural evolution of this process is that the customer changes the client role, putting increased

pressure on the market. The strongest customers solve their problems by getting *exclusive solutions* (Frønes & Kjølørød 2005:477).

2.1.3 The customer role in product development

A customer society also influences the process of product development. One consequence of the customer/ knowledge society is that products are becoming more specialized according to customers needs. Instead of mass production and standardization, much work today is organized in such a way that companies can offer products that are tailored and produced according to requests or demands (Engelstad et al. 2004:53). In today's knowledge society we are dealing with more demanding customers, who expand the traditional role of the customer. In the knowledge society, everybody, including the customer, is becoming more educated and knowledge intensive. This will have consequences on different aspects of working life, such as the greater demand for tailored products etc. In this connection *prosum* is an interesting term, which will be described further below.

The customer as co-producer

Another way to characterize the new knowledge society is by using the term *prosum*. *Prosum* is an amalgamation of the words producer and consumer (Fossestøl et al., 2004). Originally this term comes from Alvin Toffler, who Tian Sørhaug refers to when he uses the term *prosum* to characterize the new knowledge society (Fossestøl et al., 2004). *Prosum* refers to a situation where the production of products and services is closely connected to the customer (Fossestøl 2004:16). There is an implicit understanding that the producer will offer support to the customer using the product, even after the products has been sold and the *customer is involved in the production process*. As Fossestøl et al. says; "The producer assists the consumer with the use of the product and the consumers takes part in the planning and construction of the products" (Fossestøl et al. 2004:16).

Even though *prosum* is a fascinating term for characterizing the active role of the consumer in the knowledge society, it should not be accepted uncritically and needs to be seen in light of

the mode of production. This is because the term *prosum* was aimed at mass production markets, and in my presentation of the knowledge society I have not yet differentiated between mass market and specialized markets. This is because I describe the knowledge society with a general focus on product development involving customers. It is natural to think of software product development as a specialized market, but this is not necessarily the case. Take for example Microsoft, who develop software for the mass market, as well as offering tailored products. Therefore I will not differentiate between mass markets and specialized markets.

Using the term *co-producer*, Wikström states that she wants to take the regular understanding of customers a step forward (Wikström 1995:6). Wikström wants to include the customers in production processes. *Co-production* is defined as “buyer – seller social interaction and adaptability with a view to attaining further value” (Wikström 1995:10). Defining the customer as co-producer suggests that the interaction between the parties should generate value through long-lasting relationships (Wikström 1995:7). This means a shift in perspective, a change from a producer-customer perspective to a co-production perspective (Wikström 1995:9). This focus on the *co-production perspective* is the aspect of the knowledge society in which I am most interested. However, this idea does not provide the concrete examples I am looking for in how to include the customers in the product development process and show how this collaboration between producers and customers may occur.

Knowledge-intensive customers

“With emphasis on knowledge as a key competitive factor in the global economy, corporations may be overlooking a major element – customer knowledge.” (Gibbert et al 2002:459).

Customers in the knowledge society possess a great deal of knowledge; therefore, I suggest that they can be considered as knowledge-intensive. It is important to take this customer knowledge into consideration as it can be useful to take advantage of in the product development process. In this connection, it could be interesting to take a closer look at the term Customer Knowledge Management, since it sheds light on the extent of customer’s knowledge, which is important for companies to take into consideration. Gibbert et al.

define Customer Knowledge Management (CKM) as the management of knowledge from customers, i.e. knowledge resident in customers (Gibbert et al. 2004:459). The CKM approach differs from the Knowledge Management (KM) approach in that CKM focuses on knowledge *from* the customer, rather than knowledge *about* the customer (Gibber et al 2004:461). However, CKM does not say anything explicit about how the customer uses this knowledge or how companies can utilize it.

Related works describing customer involvement in product development

New Service Development (NSD) is another term that describes the co-production of services by a company and its customers (Loch & Kavadias, 2006). However, this term will not be utilized in this paper since its focus is on services rather than product development processes.

Supplier involvement in product development is a term used to describe how suppliers are involved in product development (Loch & Kavadias, 2006). The terms *integral product development* and *modularity product development* are particularly relevant to supplier involvement. *Integral product development* is characterized by a product having many synchronized features in close spatial relationship, whereas *modularity product development* refers to the development of products with interchangeable parts in which there is the option of local Specialization/Adaptation to individual customers needs; the products are individually upgradeable and have standardized interfaces (Loch & Kavadias, 2006). However, this is outside of the scope of this thesis and will not be further explained.

Flexible specialisation is a term describing the process of tailoring products in accordance with customer needs. However, flexible specialisation is a rather wide definition including several aspects. Atkinson has developed a model of flexible organisations (Olberg 2003:7) focusing on how these flexible organisations employ people, what kind of systems they use for paying their employees, what kind of work tasks they assign and how they produce their products. Atkinson defines this as numerical, financial, and functional flexibility (Olberg 2003:12). However, again, I will not go into depth about this as I intend to narrow my focus down to a short description of *how the products are being tailored*.

Flexible specialisation has its roots in the mid-1980's, when Piore & Sabel introduced the term. Flexible specialisation emphasizes the changes in the market situation that have led to the customer's desire for more tailored and specialised products and considers the speed with which the market changes (Olberg 2003:8). In accordance with these theories, we get more niche production, more segmented markets and more customer-adapted or tailored products (Olberg 2003:8). In addition, this niche production naturally is connected to the role of the technology. Modern technology makes it possible to live up to these rapid changes in the customer's needs and demands (Olberg 2003:8).

2.1.4 Critique of the presented literature on the knowledge society

“You are a knowledge worker. You use a silent voice, wear moccasins, use an espresso machine and have a flat PC screen. You make a living of your thoughts. However, the rumors start swirling and as you present your fifth power point presentation that day you think to yourself; Am I producing knowledge or am I just naked in the emperor's new clothes? Have today's office cells become an imitation of yesterday's fabrics?” (Undheim, 2008:73 I SAS Norge magasinet, my translation).

The citation above offers a groundbreaking and paradoxical notion concerning the knowledge society. It points out the similarity between today's knowledge work and the office work of the manufacturing industries of the industrial age of yesterday (modeled after mass production). See illustration in Figure 1 and 2.

Figure 1: An illustration of the industrial society showing a secretarial pool in the 1940's (Greenbaum 1995:35).



Figure 2: An illustration of an open office solution in today's knowledge society.²

“We drain it for complex thinking. White collar jobs, likewise blue collar jobs, are subject to bureaucratization and degrading” (Undheim 2008:73 SAS Norge magasinet, my translation). This paradox is something to bear in mind, because, at first glance, the knowledge society is very appealing. However, it may not be the case that everybody who lives in the knowledge society will be performing knowledge work, in the same way that not everybody after the industrial revolution was employed by the manufacturing industry.

In the presented literature on the knowledge society, the customer society, knowledge intensive customers and the characteristics of *prosum* etc, there is a narrow focus on the customer in these settings. This narrow focus lacks concrete information about what exactly the roles of the customer in the knowledge society are. Some of the presented literature touch on the topic by suggesting that customers are becoming more demanding, but none of the presented literature goes into depth about what the role of the customer actually is, especially in connection with product development. Customers are presented as contributors to product design and development but no information about how this contribution is made is given. For example, customers suggesting initiatives about further development on products are missing. In addition, I have found very little literature on “*knowledge intensive customers*”. That is, customers who are a part of the knowledge society and have a lot of expert knowledge on

² Norges bank: http://www.norges-bank.no/templates/Article_13035.aspx Read: 250508.

their domain of interest. The literature also emphasizes the importance of involving customers in product development etc, in order to give the customers what they want without offering any clear suggestions as to how to involve customers more actively in these product development processes.

The mutual relationship between customers and companies has changed dramatically with the advent of the knowledge society. The knowledge society provides the context for the recent trend towards customer-initiated product development. Some of the criticisms mentioned in connection to the knowledge society will be addressed in following sections through a literature review of research into product development processes involving customers in section 2.2. In the next section, the topic will be narrowed down to the software product development market. The theories presented offer some concrete examples of how customers have been included in the product development process. These theories include that of End User Development, Meta-design, User toolkits and Modding.

2.2 User participation in Adaptive Product Development processes

“Many companies are currently facing the “customization-responsiveness squeeze”, i.e. the need to simultaneously offer their customers tailored products while ensuring short delivery times” (Salvador & Forza 2004:273).

Developing products in coherence with customer’s demands is an increasing phenomenon, as shown in the previous chapter “The changing roles of the customers in the knowledge society”. The reason I want to introduce this theme is because I find it especially interesting to investigate how the customer, to a greater degree in today’s society, is being integrated into product development processes. In today’s knowledge society we are used to having the opportunity of being part of the development of our products. Instead of eating lunch at McDonalds, where the food is standardized, many choose to eat at Subway instead, where each sandwich is made after the customer’s specific needs. Instead of buying a charter trip for a vacation, many of us get our vacation tailored by a travel agent or we do it ourselves through a plethora of online sites. Instead of using Facebook with the profile offered when

first installed, we gather different components to extend it and personalize it, so that it is in line with our needs. On the other hand, if the software program does not have the functions we need in order to fulfil our special needs, we contact the producer and ask them to give us what we want. However, it should be mentioned that even though we have these opportunities not all of us have the time take advantage of them. Nevertheless, these examples show that there is a contradiction between mass standardization and tailoring. As mentioned in the knowledge society skills and activities chapter, now more than ever we are customers on several levels.

In this chapter I will take a look at how the literature presents how customers can be involved in product development processes as active participants. I will start by taking a closer look at End User Development (EUD) and show how this approach engages the customers in software product development processes. Then *Meta-design* and *User toolkits* will be presented as alternative approaches of how to include customer support tools in product development. Next I will introduce the term *Modding*, which may be seen to be a step beyond EUD. Modding refers to a situation where the customers can be parts of developing different components to an already existing platform of products. One of the main reasons I chose to include *EUD*, *Meta-design*, *User toolkits* and *Modding* is because all of these theories have a focus on the customers as active participants in product development processes. This is in line with my main research question – *How do the customers impact the development of The Company's products* – and may therefore serve as a useful literature review in this connection. Therefore have I chosen to dedicate an entire chapter to describing various approaches of including customers in product development processes.

2.2.1 End User Development

End User Development (EUD) is a set of techniques and methods for including end users as active participants in software development. According to Mørch et al, the European end-user development network of excellence defines End User Development (EUD) as follows: “*End user development is a set of methods, activities, techniques, and tools that allow people who are non-professional software developers, at some point to create or modify a software*

artifact” (Mørch et al 2007:4). Out of this emerges the impression that EUD is a technological tool that makes it easier for end users, who typically are not professional developers, to modify or create a software component. Within a general definition of End User Development, it is an umbrella label for the older, related terms End User Computing (EUC), End User Programming (EUP), End User Tailoring (EUT), and Meta-design. I use the term EUD, but I focus on EUT processes. End-user tailoring means that the tailor commits to decisions about the design when he or she tailors the software (Eriksson 2008:8). EUT will be further explained in section 2.2.4, where user toolkits are described. EUT was chosen as the main perspective, since it is about modification in an evolutionary perspective, with less emphasis on creation from scratch. EUT is about modification of existing systems as part of workers development processes.

EUD is a method that attempts to bring programming closer to the users (Mørch et al 2008:4). In doing so, there arises an assumption that this approach will make it easier for the users to participate in adaptation and further development of applications. EUD recommends two techniques to achieve this: *high level (user oriented) programming languages* and the *components approach*. The former is an attempt to bridge the gap between using and creating/modifying a software application. Examples may be tools such as customization forms, templates for frequently performed tasks (Mørch et al 2007:4). The latter supports EUD by users who “interact with components in visual builders to select, modify, and connect components using high level operations rather than writing program code in a text editor” (Mørch et al 2008:4). This means that end users do not need to have the same degree of computer programming competence to be able to perform EUD activities, which makes the program accessible to a broader group of end users.

The *component approach* may be divided into three different sub-processes or strategies: *under-design, over-design and Meta-design* (Mørch et al 2008:45). When a software system is under-designed it is incomplete from the point of use in that it only has generic components and an integration framework, and it is up to the end user tailor to instantiate it into a running application and to identify if more functions are needed (Mørch et al 2008:5). Facebook may be an example of this. When a user’s profile is first established, he or she has the option to add different functions and systems to it. Over-design is when a software system includes a superset of required functionality, so that the challenge is to configure the system for specific needs. Examples of these are photocopiers and cell phones and generic software like

multipurpose accounting applications (Mørch et al. 2008). Meta-design is when “a design environment supports end users in creating high level components from basic building blocks, which can be stored in a visual builder and incorporated in future applications” (Mørch et al 2008:5). Meta-design will be further elaborated in the next chapter.

EUD is a framework for development where customers are included in the process. However, the users are mainly included in their role as end users. This means that the users are included in a phase where a product already exists, and through different EUD activities the customers are given the opportunity to customize, adapt or otherwise modify already existing products within a given framework. This appears to be one of the disadvantages with EUD, namely that it usually limits user involvement at the later stages of product development. In the next section, Meta-design will be further elaborated as an alternative approach where customer needs are seen as vital parts of product development processes.

2.2.2 Meta-design

Meta-design is a term Fischer uses to describe “objectives, techniques, and processes for creating new media and environments that allow the owners of problems to act as designers” (Fischer 2003:88). Within Meta-design the customer focus still is vital, but there is a greater focus on the direct participation and involvement of customers. In my general definition of EUD above, it is suggested that Meta-design is a theory under EUD. Meta-design is to facilitate the processes of EUD and EUT. Fischer states in his paper for the Dagstuhl seminar; “*Meta-design* encourages users to be actively engaged in generating creative extensions to the artefacts given to them and has the potential to break down the strict counterproductive barriers between consumers and designers” (Fischer 2007A:1). Furthermore, seen in the light of product development, Meta-design has the following characteristics: 1) contributing to ongoing product development by integrating professional and end-user development, 2) permitting users to create extensions and customizations on already existing products, 3) shifting control from designers to users, and 4) providing a useful framework for designing the design process (Fischer 2003:89).

Fischer makes a distinction between two different stages apparent in all design processes: *design time* and *use time*. *Design time* describes the time period when system developers create environments and tools before the system is put to use (with or without user involvement) (Fischer 2003:88). *Use time* is when users have the possibility to customize the system themselves based on a running version of the system put into a realistic use context (Fischer 2003:88). As an extension of these terms, Fischer also introduces the term *under design*, which means that the professional developers, at *design time*, create a system that is open for local development (Tailoring) done by the users themselves at *use time* (Fischer 2003:88). *Under design* thus includes aspects of both design time and user time.

Fischer has developed a conceptual framework to support Meta-design, namely the *seeding, evolutionary growth and reseeding (SER) process model* (Fischer and Ostwald 2002). This model is used by Fischer and other researchers in many different papers, some of which are (Fischer, 2003), (Fischer et al. 2005:492) and (Eriksson 2008:18).

In the excerpt below it is stated that the SER model originally were made to support Meta-design activities and that the people performing these activities may be called knowledge workers.

“The SER model encourages system designers to conceptualize their activity as Meta-design [Fischer & Scharff, 2000], thereby aiming to support users as designers in their own right, rather than as passive consumers of systems and information. In this perspective, users are seen as knowledge workers [Drucker, 1994] who do design and solve problems, as well as designers in use [Henderson & Kyng, 1991] who modify their systems as needed to suit their purposes. “ (Fischer & Ostwald 2002:136)

The main idea behind the SER model is to visualize the lifecycle of large evolving systems and information repositories. It postulates that systems that evolve over a sustained time span and must continually alternate between periods of activity and unplanned evolutions, and periods of deliberate (re)structuring enhancement, involving users enacting as designers (Fischer et al. 2005:492). See Figure 3 for an illustration of the SER model.

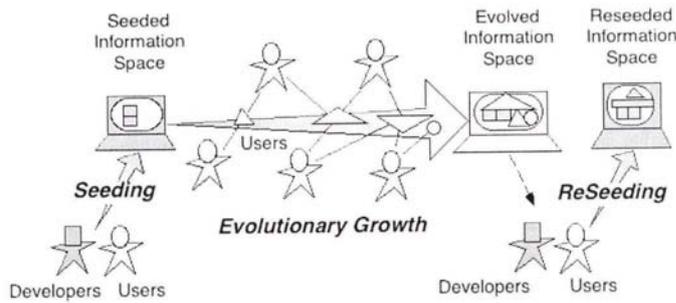


Figure 3: The Seeding, Evolutionary Growth and Reseeding Process Model (Fischer 2003:89).

In this model, Figure 3, three phases in the evolution process model are apparent: *seeding*, *evolutionary growth* and *reseeding*. *Seeding* is when an initial collection of domain knowledge is designed to evolve over time, often created by environment developers and future users in order to be as complete as possible (Fischer & Ostwald 2002:136). *Evolutionary growth* is a decentralized phase where the seed is used and extended to do work or explore a problem, meaning that the users are the only part attending this phase while doing their work, which may include local development (Fischer & Ostwald 2002:136). *Reseeding* is, again, a centralized phase where the focus is to organize, formalize and generalize information and artefacts that are created through the *evolutionary growth phase*, underlining that in this phase information sharing will be apparent when developers are needed to perform substantial system restructuring for speed and efficiency. Users are important resources to give feedback on this (Fischer & Ostwald 2002:136).

Meta-design stresses that customers should be given the roles as active participants and contributors in design processes, rather than as passive consumers (Fischer, 2002). Finally, Meta-design capitalizes on the importance of creating *socio-technical environments* that will help all users who have an interest in being active contributors by allowing them to use an artefact in new ways, evolve it to new needs, and in generally explore its potential for new activities (Fischer, 2002).

Critical considerations

Meta-design is also an interesting concept in that customers are allowed to customize products at *use time*, and developers at *design time*. However, a shortcoming of this is appears to be

that customers are allowed to customize products only at *use time*, and not at *design time*. Usually only the professional developers do the product development at design time. Nevertheless, as Fischer emphasizes, “Meta-design shares some important objectives with user-centered and participatory design, but it transcends these objectives by changing the processes by which systems and content are designed. Meta-design shifts control from designers to users” (Fischer 2004:36). In Meta-design the users are equipped with a framework where they can customize and change the products themselves. Thus, customers are included in product development processes. However, one limitation of Meta-design is that it only allows users to permit changes on already existing products, which means users only get to participate at a rather late stage of the product development process. What if a user wants to participate in product development processes where there does not exist a product already? In addition to this, another aspect that appears to be missing in the Meta-design theory is the collaborative aspect of how the customers actually are involved in product development processes. There is a void of literature on how the users by customizing products themselves actually may become part of a collaborative product development process. Is it possible for customers to be part of product development processes through Meta-design activities, such as customizing? Are end users customizing a product so that it fits their special needs and no one else’s – something that may be called a collaborative product development approach? It appears not.

In the next chapter I will elaborate on *user toolkits* as an alternative product development process where the customers are active participants in product development. *User toolkits* is an approach where professional developers or the producers make a toolkit or framework which is available for customization by end users. This is somewhat similar to the EUD where there also is offered a framework which *affords* customization. To *afford* (or *Affordance*) customization means that the design of the toolkit contains possibilities for customization which is in line with the customer’s overall competence within the area the toolkit is offered.

2.2.3 User toolkits

Above I have described EUD and Meta-design as different approaches where the customers are active participants in development processes, but not necessarily in product development

processes. For example, the SER model presented by Fischer does not take professional product development for a specific market into account, but general design activity like prototyping. In this regard, it is more applicable to Human Computer Interaction (HCI) than Software Engineering (SE). This means that none of these approaches can provide concrete examples of how customers may be engaged in software product development processes. On the other hand, *user toolkits* support end users in product development processes, for companies making commercial products aimed at specific markets.

In contrast to the traditional methods of requirements gathering, such as listening to users and interacting with advanced users, Jeppesen suggests the use of “user toolkits for innovation, which offers a high degree of opportunities for consumer involvement (OCI)” (Jeppesen 2002:27). *User toolkits* are toolboxes integrated with products and adjusted to match the competency of (advanced) customers, so that they can develop the products further. User toolkits have some parallels with Meta-design and EUD in that they provide a toolkit and framework, which makes it possible for end users to tailor the products in the use situation.

The term *User toolkit* is used widely for describing how a company can offer customers of a product a “sandbox” or “micro world” for customizing their products on their own in a secure environment to reduce the risks of malfunction effects. Providing consumers *user toolkits* may be a way of helping them to extend the original product in creative ways (Jeppesen & Molin 2000:5 referred after Von Hippel). Therefore, *user toolkits* in this connection may be defined as a user option (see Chapter 6) where the customers themselves can adapt the products, after they have bought and installed them. Jeppesen and Molin see *user toolkits* as a “sort of consumer driven innovation strategy which exploits consumers’ sticky need related information on location” (Jeppesen & Molin 2000:5).

The term *user toolkits* was coined by Von Hippel (Von Hippel, 2005), who will be used as a reference for further elaboration on the meaning of this term. Von Hippel defines *user toolkits*, or toolkits for user innovations, as “integrated sets of product design, prototyping, and design – testing tools intended for use by end users” (Von Hippel 2005:147). In this manner, a user toolkit is a tool to modify other tools (i.e. a meta-tool). In addition Von Hippel emphasizes that the main goal for *user toolkits* is to “enable non-specialist users to design high quality, producible custom products that exactly meet their needs” (Von Hippel

2005:147). This is also in line with how Mørch defines End User Tailoring (Mørch, 1997). Out of this it can be interpreted that user toolkits are something offered to end users using a tailorable software system, so that they can modify the system themselves in accordance with their local requirements.

A short discussion about the strengths and weaknesses of enabling end-user developers to do the same as software engineers will be given in next section. At this point it should be noted that a user toolkit is unique in comparison to both user centred design (prototyping) and participatory design, since it enables end users (customers) to change the products themselves, and as such it may contribute to the redesign and further development of the product. Von Hippel distinguishes five functions of a high quality *user toolkit* (Von Hippel 2005:154):

- 1) Enable users to carry out complete cycles of trial and error learning.
- 2) Offer users a solution space that encompasses the designs they want to create.
- 3) Be user friendly in the sense of being operable with little specialized training.
- 4) Contain libraries of commonly used modules that users can incorporate into custom designs.
- 5) Ensure that custom products and services designed by users will be producible on manufacturer's production equipment without modification by the manufacturer.

Jeppesen, too, suggests three different dimensions of the user toolkit approach: *the solution space*, *the consumer design capabilities* and *the rates of support that consumers have access to* (Jeppesen 2002:16). The solution space emphasizes which functions over which the user should be able to have control (Jeppesen 2002:16), meaning to what degree they are allowed to modify the products. Consumer design capabilities “signify how effective a customer is at dealing with a toolkit” (Jeppesen 2002:16); that is, what competence is required to use the toolkit. Support is offered to the customers “when they can't deal with the tools they have been provided with” (Jeppesen 2002:17). How this may be accomplished will be discussed below.

To be able to tailor a product the end users need to have some sort of knowledge about how to accomplish this. Jeppesen links the user of toolkits to the amount of support and supervision that companies have to give their customers (Jeppesen 2002:3). This means that he elaborates on the *consequences of offering user toolkits to customers*. Even though

customers have the opportunity to use the toolkits, it is not clear that they have the knowledge to perform these tasks. Jeppesen states that before the tailoring processes can start, some sort of learning is required in the consumer domain (Jeppesen 2003:4). He distinguishes between two different ways learning may occur: through support and supervision from the companies offering the user toolkits, or by consumer-to-consumer interaction (Jeppesen 2002:4). In consumer-to-consumer interaction, the company offering products with user toolkits features has specific strategies to make customers talk to and help each other. One example is to arrange user conferences where the customers meet each other and exchange ideas of how to customize their products with user toolkits etc. Jeppesen says that a consumer learning process may be facilitated if there is established interaction in communities and consumer-to-consumer help functions, which can be seen as a way for firms to ease the burden of support (often a part of implementing/using user toolkits) (Jeppesen 2002:27). However, although user toolkits is a useful approach to including customers in product development processes, it is not certain that customers will make use of this option and be part of the development process. However, the feedback from even a few innovative end users may be valuable enough to justify offering the user toolkits in the first place.

One of the strengths with the *user toolkits* approach is the concrete alternatives of how to design a user toolkit which affords the users the means to customize the product. However, when customers are given the opportunity to tailor parts of their products themselves, they have to be capable of doing it; they need some knowledge about the products, as well as the actual ability to perform the modifications. Therefore, one critique of *user toolkits* is that they require that the customers are able and willing to perform the customization. In addition, what is the risk? Could the user modify a product so that it no longer works? These concerns could be the basis of a critique for all approaches to active user involvement. As Eriksson states: “The contribution here is to embrace the users and tailors in the development of the tailoring capabilities and thereby state that software evolution in the context of end-user tailoring is performed in two steps: firstly, develop the tailoring capabilities and secondly, the tailor evolves the software by adjusting it to the task in hand (Eriksson 2008:46). User toolkits have some parallels with End User Tailoring, in that both enable end users to tailor the products in use and make it possible for customers with non-specialist competence to perform design activities, such as the customization of the products. Therefore, I will move on to a short description of EUT.

As mentioned earlier, End User Tailoring (EUT) is a type of EUD, but EUT has a greater focus on the modification of a software program in an evolutionary way (i.e. further development rather than development from scratch). According to Eriksson, “One way of conducting EUD is end user tailoring (EUT). EUT is an activity allowing end-users to modify the software while it is already in use, as opposed to modifying it during the development process” (Eriksson 2008:107, referred after Henderson and Kyng 1991). Mørch distinguishes between three levels of End User Tailoring (EUT): customization, integration and extension (Mørch 1997:54). Customization is to modify attribute values of components, integration is to add new functionality by scripting (high level programming in the use time environment) or components, and extension is to modify a component by adding new code (code that needs to be compiled like it was a design time activity) (Mørch, 1997).

Critical considerations

As with EUD, Meta-design and user toolkits, the customers are limited to only be part of product development processes which are within the already given framework, in the form of user toolkits, EUD activities etc. However, what remains is the importance of giving customers the ability to be part of initiating the product development process at stages of development where there does not exist a function/framework already, but where customers can promote their own needs. However, a combination involving both end users and users in the early stages of product development processes might be fruitful.

Another issue that can be seen as a limitation with the *user toolkit* approach is that professional developers have to make a framework and toolkits that are in line with user competence. Often this kind of usability and usefulness is hard to acquire. To do this the professional developers have to gather so called *sticky information* from users, which is expensive, and difficult to both gather and use in a new location. With sticky information Jeppesen refers to Von Hippel’s definition of the term, which is: "information that is costly to acquire, transfer, and use in a new location” (Jeppesen, 2002). Sticky information may be understood as information that the product developers need from the customer to understand the customer’s needs, but which may be expensive and difficult to get. Thus, it is labeled

sticky information. In a sense, this correlates to previous comments about the challenges of making user toolkits. Again, the greatest challenge with user toolkits is to make them:

- 1) Easily accessible – easy to access for potential users.
- 2) Usable – easy to use.
- 3) Useful – having some purpose, being enjoyable and interesting (Mørch, 1997).

The main criticisms against user toolkits are the challenges of how to make a high quality user toolkit which actually will be used, and how the offered framework of user toolkits can be a limitation of the customers' idea storming in the manner of initiating of further development on the products. Users have to customize and adjust products in accordance with the already given user toolkit framework, which means that they are prohibited from addressing ideas beyond this. *Modding*, however, may present an alternative.

2.2.4 Modding

Modding is when users modify products by themselves, without direct intervention from professional developers. Wikipedia defines Modding as follows:

"**Modding** is a slang expression that is derived from the verb "modify". The term can refer to the act of modifying a piece of hardware or software to perform a function not originally conceived or intended by the designer".³

Modding can be seen as extending the user toolkit and EUD activities by making it possible for customers to promote an array ideas and needs in the early stages of product development, even before a given framework exists. *Modding* is another alternative of how to include customers in product development processes. *Modding* differs from the other mentioned approaches since it combines the inclusion of customers in both early and later stages of product development, depending on the customer's needs. It is thus an appropriate term to be included in this discussion (though, I am aware that the term Modding originates in the gaming industry (Jeppesen, 2004)).

³ <http://en.wikipedia.org/wiki/Modding> Date: 4/6/2008

“*Modding* is the act by which users modify an existing hardware or software consumer good to perform a function that is not necessarily authorized (imagined or anticipated) by the original manufacturer” (Jeppesen 2004:2). It is safe to add that *Modding* originates from modification, and involves consumers changing an existing product by themselves in coherence to their demands. The outcome of *Modding*, called *mods*, range from minor alterations to very extensive variations of the original product (Jeppesen 2004:2). The modifications and adaptations end users make on the products can vary in different degrees; sometimes it may just be to adapt some local and simple needs, such as changing the design of the product or changing a term on an operation in the product, or it may be a greater modification such as adding an extra functionality to the product. Jeppesen defines what he calls the “*Modding model* of development” in the computer games industry: “It is called *Modding* because it is characterized by users modifying an existing product (in this case a computer game) where the original product serves as a platform onto which new complements are built and can replace parts of “old” original content in certain areas of the original product” (Jeppesen 2004:5). An example of *Modding* from the gaming industry is when hardcore players create hacks or patches and figure out how to develop software add-ons or patches to twist games’ parameters, such as the creation of a “No Jealousy” patch which lets characters have more than one lover without either getting jealous (Knight, 2005). What is even more interesting is how the original product serves as a *platform* for further *Modding* for the customers. Jeppesen states that there exists a “platform with users as complementators” (Jeppesen 2004:4). In this lies the already described understanding of a platform as a place where existing products are being *modded*; however, what is meant by *users as complementators* is that users are the ones who extend and *mod* onto the platforms, with the platforms as a starting point. A *complementator* is a label for users who make mods. When users act as complementators they voluntarily provide freely revealed complements (Jeppesen 2004:5).

*The idea is that complements are produced in a decentralized manner by external developers and that the platform manufacturer can increase platform sales when numerous popular complements are available because this enhances the value that users derive from owning the platform ... The main difference when users are complementators is that they act as voluntary providers of complements, which are freely revealed. Thus, in the *Modding model*, new components appear for free and remain free to all customers (Jeppesen 2004:5).*

In addition, Jeppesen differentiates between various kinds of *mods* that may be created (Jeppesen 2004:11):

- 1) Mods that were user – made, but which at some stage got picked up by the manufacturer.
- 2) “Inhouse mods” made by the manufacturer (i.e those that are included in the original game).
- 3) Supplier-made mods.
- 4) “Autonomous” user mods that drift freely in the community.

Modding as an alternative approach to including customers in product development processes is a noteworthy concept since it engages the customer in different stages of the product development process. *Modding* is based on further development of an already existing platform. However, this must not be misunderstood as meaning the narrowing down of product development to being simply further development of already existing products. It appears that already existing products may also serve as mere ideas to further product development of products, and therefore be a platform for further development. But, this is more of a personal interpretation of the term *Modding*.

The next chapter will seek to fill the gaps concerning user participation in product development, which have been shown as shortcomings in the presented theories. As a brief summary, Co-Configuration is a theory where user engagement in product development processes are of utmost importance, and actually critical for the development process. Co-Configuration, to some extent, overcomes the critiques concerning product development being simply development on already existing products. Such critiques are relevant for EUD, user toolkits and Meta-design, where there are limitations tied to variations within a single framework, system or product family, but this is not the case in Co-configuration work. Co-configuration extends outside technology to organizations by making customers partners with the company in the product development process (Engeström, 2004). The customer is encouraged to enter his or her ideas of further development of the company’s products, as well as ideas to brand new products. In this and several other ways, I am of the understanding that Co-configuration may be an appropriate theory to overcome some of the shortcomings of the theories presented in this chapter. Since the theory of Co-configuration work is the theory that is closest to being about user participation in product development processes I choose to dedicate a whole section to describe Co-configuration work. The chapter will go into depth of

this term, describing its origins, how it may be placed within a knowledge intensive firm, how the activity theoretical terms ‘tool’ and ‘object’ are connected to Co-configuration and lastly how knotworking is connected to Co-configuration by representing a learning perspective.

2.3 Co-configuration: customer-developer interaction in product development

“Co-configuration offers potentially powerful competitive advantages. First among these is the capability to build a product or services that with use and over time matches the customer’s individual needs and wants more and more. ... A second significant advantage created by Co-configuration is the inclusion of the customer in the ongoing value creation system for the company (Victor & Boynton 1998:198).

Co-configuration is an approach to product development where the dialectic relationship between the customers and developers are of the utmost importance. As the statement above shows, there are two clear advantages of Co-configuration: the adaptation of products to customers’ individual needs and an ongoing value creation for the company, for example learning. This thesis interprets Co-configuration as consisting of two aspects: *mutual adaptation* and *learning*. The adaptation of the products within Co-configuration is a mutual adaptation of customers and developers mediated by products. When the customers and developers interact and collaborate in the development of the products, through Co-configuration processes, it may resemble a learning process. Value creation refers to creating value for a company, meaning creating something that the company benefits from, such as learning processes. It is the mutual adaptation aspect of Co-configuration that is focused upon in this thesis.

As will be elaborated below, the term Co-configuration originates from Victor and Boynton. Nevertheless, I will use Engeström’s definition of the term Co-configuration. Engeström uses Victor and Boynton’s understanding as a foundation for interpreting the term. However, he has taken the term a step forward by placing it within a learning context as well, in particular in conjunction with knotworking, which will be presented in section 2.3.5.

This section begins with an explanation of the origins of the term Co-configuration. Next, the term Co-configuration as Engeström perceives it will be described. Other authors writing about Co-configuration will then be mentioned shortly and finally there will be a short introduction of the terms tools and objects. The reason for including a description of the terms objects and tools are because they are chosen on the basis of preliminary analysis the proceeding empirical findings. Finally, knotworking will be presented.

2.3.1 The origin of the term Co-configuration

“Work under Co-configuration is a continuous “human chain” between customer, product and company” (Victor & Boynton 1998:198).

In their book “Invented Here” the authors Victor and Boynton sketch a framework consisting of different types of work: *craft work, mass production, process enhancement, mass customization and Co-configuration.*

- *Craft work* is typically a kind of work where the knowledge about how to do the job is something that has been learned and acquired over time; “it is the application of personal know – how or “tacit knowledge” to create value” (Victor & Boynton 1998:19). To acquire the knowledge of “craft work”, there is typically a relationship between a novice and master. An example of this may be a craftsman doing his work.
- *Mass production* characterized by “repeatable tasks, hierarchical control systems, functional structures, standardized routines and processes, automation and division of labour” (Victor & Boynton 1998:9). When people are doing mass production work they often have specialized parts they are in charge of; however they only do this particular part and in some cases do not know the rest of the mass production chain. In mass production work there are standardized work procedures, which lead to little flexibility on all levels. This has parallels with conventional industrial production.
- *Process enhancement* is a kind of work strategy where the focus is on improving the existing work routines. “Process enhancers share the conviction that every process must contribute to satisfying the customer by constantly achieving higher quality” (Victor & Boynton 1998:74). In this mode of work they try to produce standard products at competitive prices with very high quality (Victor & Boynton 1998:69).

- *Mass customization* to “efficiently make precisely what the customer wants, no less, no more (Victor & Boynton 1998:91). Mass customization in this perspective is to make products that are adjusted to the majority of the customers’ needs, and aims at keeping the prices low by efficient production techniques, often mass production. An example of mass customization is how a cell phone may be produced in different colours and including different personal themes.
- *Co-configuration* is a kind of work where the employees work closely with the customers and adjust products in accordance to their needs. “When a firm does Co-configuration work it creates a product that can learn and adapt, but it also builds an ongoing relationship between each customer – product pair and the company” (Victor & Boynton 1998:195).

Co-configuration is the production technique and mode of work that is most relevant in accordance with this thesis’ focus, research questions and data material. Nevertheless, the other types of work may be apparent at The Company as well, especially mass customization. Certainly, there does not only exist one mode of work at a time at a workplace. On the contrary, given the complex society we live in, different kinds of work types co-exist in a company at the same time, with different allocations. But to narrow the scope of the thesis, I will focus on Co-configuration work.

One interesting aspect of Co-configuration as a mode of work is how the customers and developers interact in product development processes. In this connection Victor and Boynton mention the term *prosum*, as an example of how the customers become an increasing part of product development processes (Victor & Boynton, 1998). As an extension of the term *prosum*⁴ Victor and Boynton underline that “Co-configuration offers the best opportunity yet to integrate the customer into the firm’s business system” (Victor & Boynton 1998:199).

Configuration knowledge

Victor and Boynton use the term “*right path*” to describe how the four ways of working, as described above, can be seen as a connected learning path (Victor & Boynton 1998:7). Each type of work is related to the others in a specific and predetermined way; it is a learning

⁴ The term *prosum* is further elaborated in section 2.1.3.

system (Victor & Boynton 1998:7). To move between these different steps, Victor and Boynton underline the need for so called *transformation processes*. These are *development*, *linking*, *modularization* and *renewal* (Victor & Boynton 1998:120). The first stage, described as craft work, contains a lot of tacit knowledge, includes a transformation process where *articulated knowledge* is being codified (Victor & Boynton 1998:126). Moving on to the second stage, mass production, which is characterized by having articulated knowledge, includes a transformation process containing *linking*. Examples of *linking* are making process documents and team building through building practical knowledge (Victor & Boynton 1998:127). The third stage, process enhancement, where practical knowledge is in focus, the transformation process is called *modularisation*. This process includes a network of interrelated work tasks (Victor & Boynton 1998:127). Finally, Co-configuration is characterized by a dynamic interaction between product, customers and company; providing configuration knowledge which promotes the transformation process *renewal* (Victor & Boynton 1998:127). With the term *renewal*, Victor and Boynton refer to a transformation process where the company brings insights on the firm's capability limits and uses them to direct a process of innovation, and as a result new capabilities arise out of new ideas (Victor & Boynton 1998:127).

Continuous product development between customers and developers

Within Co-configuration work, when performing Adaptation of the products, the company continues to work with a customer-product pair to make the product more responsive to each user, and this makes the development process a continuous one where the product is never a finished one (Victor & Boynton 1998:195). By doing this “the customer in a sense becomes a real partner with the producer” and a living network develops between customer, product and company (Victor & Boynton 1998:195). This network evolves as a result of gathering input from customer, product and company in the development of an enhanced product, and when this is an ongoing process over long time periods, a network between these participants emerges. The citation below underlines this.

“And that partnership can endure as long as the product or service platform can continue to grow or adapt to the customers needs. All three “partners” share Co-configuration work – the company, which can add or upgrade features; the user, who, by interacting, and even “teaching” the product, changes its performance; and the product itself, which adapts to changes in use patterns and potentially “learns” to respond to new situations in new, customer satisfying ways” (Victor & Boynton 1998:199).

Victor and Boynton describe how a phenomenon called ‘customer intelligent products’ is a form for Co-configuration work. These products rely on being responsive to each customer. Victor and Boynton define *customer intelligent products* as “products that customize themselves, not just once, but constantly, in response to what you need and want” (Victor & Boynton 1998:195). These products adjust themselves automatically to changing circumstances. An example of how products can adapt to customers needs themselves is Amazon.com, where the web pages adjust to the customers’ use pattern over time; once a user buys a book, others will be suggested to him or her later on. Customer intelligent products are outside the scope of this thesis and will not be further elaborated.

Critical considerations

Co-configuration work as it is presented by Victor and Boynton is very tempting for many because of the reliance on customers’ actual involvement in product development processes. However, the authors are not very explicit about what roles the customers have. For example, are they doing development alone or in collaboration with developers, or are they the initiators of new product development with ideas? There are two more shortcomings of Victor and Boynton’s understanding of the term Co-configuration: 1) The notion that a company has to go through all of the stages of historical work, chronologically, in order to reach one specific stage, for example to reach Co-configuration. This represents a harmonious perspective and does not show possible complications. 2) The belief in the perpetual creation of a customer intelligent product in Co-configuration is questionable. Engeström et al. also question the emphasis on customer intelligent products within Co-configuration work (Engeström et al. 1999:348). In addition, it should be mentioned that Victor and Boynton do not explicitly define what kind of context Co-configuration appears in. I miss the framing of Co-configuration, for example within a knowledge society setting. As examples of Co-configuration Victor and Boynton solely use customer intelligent products as examples, especially digital hearing aids, which may witness of being uncritical and sketchy (Engeström et al. 1999:348). As an extension of this critique Engeström et al. also add that they are sceptical of the use of corporate success stories as evidence of new forms of organising work (Engeström et al. 1999:348).

Engeström takes Victor and Boynton’s understanding of Co-configuration as a starting point and develops it further. Because of mentioned shortcomings and the fact that Engeström

places Co-configuration within a learning perspective, this thesis will focus on Engeström's notion of the term Co-configuration. He places Co-configuration within an expansive learning framework; though the present study will focus on the close connections between Co-configuration and knotworking, which represent an aspect of learning between organisations. Indeed, looking at Co-configuration work from this perspective suggests that Co-configuration may release some sort of learning within and between companies.

Here I divide Engeström's term Co-configuration into two parts. In the first part he gives a general description of what Co-configuration is; in the second part he uses expansive learning as a framework for understanding Co-configuration work. The former will be the focus here while the latter is out of the scope the present work. The next section gives an elaboration of Engeström's general definition of Co-configuration work.

2.3.2 Co-configuration work

Engeström refers to the term Co-configuration work when he is talking about a new form of work *which involves user participation from customers as well as employees in the development of products*. Presently, little research has been done on Co-configuration work; however, some researchers have mentioned it as an important new form of work to take into consideration. Some of these researches take Engeström's or Victor and Boynton's understanding of the term Co-configuration work as a starting point: (Lundby 2007:201), (Engeström et al. 1999:346), (Digernes & Andresen 2005:29), (Daniels et al. 2007:524), (Engeström & Toiviainen, 2007), (Daniels, 2004), (Kangasoja, 2002), (Hartley, 2007) and (Ryberg & Holmfeld, 2005). This is the research done on this field so far to the best of my knowledge, however, even though it would be interesting to elaborate more in this, it is beyond the scope of my thesis. As a result I will not go into depth on this work, just give a short introduction.

Lundby uses the term Co-configuration to describe the existence of interdisciplinary and infrastructure within a university (Lundby, 2007). In relation to Co-configuration, Lundy sheds light on how courses at the university are customized and have to partly adapt to the conditions of Co-configuration (Lundby 2007:201). Engeström et al. focus on Co-

configuration in relation to long-term relationships in a primary health center or hospital (Engeström et al. 1999:348). Andresen & Digernes suggest the use of Co-configuration in order to look at learning and innovation in the work place (Andresen & Digernes 2005:29). Daniels et al. use Co-configuration theory in accordance with looking at new forms of interagency practice, meaning emphasizing the “learning of professionals in new forms of practice which require joined up solutions in order to meet complex and diverse client needs” (Daniels et al. 2007:522). Engeström and Toiviainen see how Co-configuration can design learning instrumentalities; they look at how to “facilitate Co-configurational processes of design and implementation of advanced instrumentalities of learning” (Engeström & Toiviainen 2007:2). Daniels focuses on Co-configuration in a professional learning setting where the focus is on studying the learning trajectory of young people at-risk, which means they have special educational needs (Daniels 2004:195). Finally, Kangasoja focuses on how Co-configuration implies a new form of work and learning, especially knotworking, and points at this by drawing on empirical findings from a broadband telecommunications firm in Helsinki when discussing learning as joint creation of new knowledge and new practices (Kangasoja 2002:199). Hartley investigates organizational epistemology and elaborates on Victor and Boynton’s understanding of Co-configuration (Hartley 2007:200). Ryberg and Holmfeld focus on challenges in work and education in the knowledge society, and refer to the theory of Co-configuration in this setting (Ryberg & Holmfeld, 2005). Finally, Toiviainen points at how Co-configuration can shed light on future learning challenges (Toiviainen, 2003). Common for all of the mentioned studies is that they emphasize Co-configuration as an interesting new form of work or learning. In the next section I will go into detail on Engeström’s definition of the term, which is my main focus.

Engeström defines Co-configuration as an emerging historical type of work with the following characteristics (Engeström 2004:12).

- 1) Adaptive customer intelligent products or services, or more typically integrated product-service combinations
- 2) A continuous relationship of mutual exchange between customers, producers, and the product/service combinations
- 3) Continuous Co-configuration and customization of the product/service-customer relationship over lengthy time periods
- 4) Active customer involvement and input in the Co-configuration work
- 5) Multiple collaborating producers that need to operate together in networks within

- 6) Mutual learning from interactions between the parties involved in configuration actions.

Engeström's definition of Co-configuration underlines that the products may act as *adaptive customer intelligent products*; however, exactly what is meant by this is not easy to describe. *Adaptive products* may be interpreted as being products that will adapt in accordance with customers needs, however *intelligent products*, could be seen as products that in some way are so called "smart". In some settings this means that the products can adjust themselves in accordance with new requirements. What makes the product *intelligent* is that it adjusts itself by its own initiative in situations where it thinks it necessary. This is what I define as the *adaptable approach* within Co-configuration work, meaning that the products adapt themselves automatically⁵. An example of this may be when, while a user is on e-bay, the search engine shows him or her similar hits on its own initiative. Other examples may be cars (especially BMW's) with built-in Artificial Intelligence (AI). It adjusts the speed and traction control when in a tenuous situation. Even hearing aids, as seen by Victor and Boynton examples, can be seen as *intelligent products*.

The second point in Engeström's definition of Co-configuration is about the mutual relationship between customer, company and product with an emphasis on how this is a situation in which all parties benefit. In opposition to regular product development, where a company would previously simply push products out to the customer, who would then consume them (Fossestøl et al., 2004), without any intervention from customers, now there is *mutual relationship between the parties involved in product development*. Engeström's *third point* underlines how this Co-configuration relationship lasts for long time periods. It is manifest in that a collaborative product development process is not a one-time incident, but something that may last for several years. In Co-configuration work a relationship is being built between company and user that give benefit to both. Both the company and the customer get extra features. Therefore it is important to take notice that Co-Configuration work is an ongoing process that continues over lengthy time periods *Aspect number four* in the definition of Co-configuration states that the *customers have to be active in this product development process*, and active as in giving input to the process. The *fifth point* focuses on the need for *networks to operate together* while doing Co-configuration work. When there are several

⁵ See the end of this section for further elaboration on the notion adaptable products.

parties collaborating together, a form of network arises. Finally, *the last point* underlines that there is a form of *mutual learning* in Co-configuration work. Customers, the producers, as well as the products may gain some learning while attending Co-configuration work.

Critical considerations of the term Co-configuration

Out of this description we can understand the term Co-configuration as a type of work which includes *active participation* from customers in developing their products. One of the characteristics of Co-configuration work is the great degree of customer participation which is required and necessary in order to do Co-configuration work. For example, when developing a project planning product that shall fit to the organisation and its work tasks, then it is important to include active customers in the process since they are the ones who know what kind of work tasks the project planning product are supposed to do. This reliance on active customer involvement is rather extraordinary. Several questions can be raised in this connection. For example, to what degree is the company dependent on involvement from customers? What happens if some customers do not see the value of being part of such Co-configuration work? To what degree do the customers actually participate? To what degree is it reasonable to expect that the customers will attend such participation over lengthy time periods?

Fischer talks about how not all customers would like to take an active part – only a few super users (Fischer 2007A:4). Thinking that customers will have patience to be loyal customers towards one company for many years may be little bit naïve in the context of today's knowledge society. Customers are more demanding and know what they want and how to demand it. What matters today is not necessarily the old relationship with the nice man in the shop next door who gives you great service, but maybe the big shop where you get what you want for the best price. Anyway, if a company wants to establish an ideal relationship, in line with what is described as Co-configuration work, this should also include the development of a product which can be adapted to the changing needs of the users over time. This means that the company doesn't just have to establish a committing and long lasting relationship to knowledge intensive customers, the professional developers also have to create a product that can be the centre in the development and afford Co-configuration. The product has to be one that can adapt and sometimes be adaptable in accordance with customer needs and initiated by them as well. Again, in Co-configuration work the development of the product is rarely

finished; it is a dynamic product. An example of this may be a fancy jacket with zipper-arms. The user can adapt the jacket to his or her needs, as in making it into a vest by zipping off the arms on the jacket. The user can easily do this adjustment without the requirement of complicated skills. Another example of a tool with a multipurpose functionality is the adaptation of a business application in an accounting Company (Mørch et al. 2008:18).

On the basis of the review of Engeström and Victor and Boynton's understanding of Co-configuration, I will show my interpretation of Co-configuration. Engeström and Victor and Boynton are somewhat unclear in their use of Co-configuration; they use it to refer both to the adaptation of products and the creation of customer intelligent products. To this end, I define Co-configuration as having two possible purposes in the further development and creation of products: *Adaptation* and *creating adaptable products*. To explain further, Co-configuration work can be supported by two different approaches:

1. *Adaptable products*: This focuses on products that automatically fit the product to the user.
2. *Adaptation of the products*: This focuses on how the user make the product fit to their needs.

Victor and Boynton mainly talk about Co-configuration in an *adaptable approach*. Creating adaptable products means that the systems in the products are active: they automatically change the product in accordance with the customer's needs. Victor and Boynton's example of a hearing aid that automatically adjusts itself to the changing needs of the user is an example of this adaptable approach. Performing Co-configuration work within an *Adaptation approach* implies that the customers are the active parts. Developing a project planning tool that is tailored to the organisations routines and work tasks is an example of the Adaptation approach. When Engeström uses the term Co-configuration as explained above, he covers both approaches. The remainder of the thesis will focus on the Adaptation approach.

2.3.3 Co-configuration in the framework of knowledge intensive firms

Section 2.1 described the knowledge society we live in today. However, it did not explain how the knowledge society breeds knowledge intensive organisations. The reason for this is

because the theory of knowledge intensive firms (KIFs), will be used in this section as contextualization and background information for understanding Co-configuration work. It is important to understand the prerequisites that may underlie Co-configuration work, such as being a knowledge intensive firm. Therefore in this section, I will describe the characteristics of knowledge intensive firms and thereby provide a framework for looking at the Co-configuration processes.

Knowledge intensive firms (KIFs)

In this part of the chapter I will go deeper into what is meant by knowledge intensive firms. My main theory about knowledge intensive firms is inspired from Alvesson (2003), but to nuance this perspective I will shortly introduce another term which is often used with the same meaning as knowledge intensive firms, namely the competence based firm.

Quale defines the competence based firm by dividing the focus into two levels (Quale, 2003). First he defines the competence based firm as how it exists on the *individual level*, then on the *group level*. Finally he defines it on the *company level* (Quale, 2003). The competence based firm is a company that on the *individual level* is influenced by the employees having responsibility for a set of connected work tasks which are of a problem solving, executing and controlling character (Quale 2003:252). These employees have a lot of autonomy in deciding what work tasks they will perform as well as having the authority to make important decisions. The employees are viewed as assets with great amounts of expert knowledge about their area and the company, and they work independently (Quale 2003:252).

On the *group level* there exist structures and arrangements that support the independent, responsible and competent role of employees in the competence company (Quale 2003:253). Again, there is an assumption in the competence-based company that employees have responsibility for a set of connected work and part tasks that have clear steps on how to achieve them, as well as quality criteria (Quale 2003:253).

Furthermore the *company level*, improving the company strategies and developing the company even further by involving all employees in these processes is a constant aim (Quale 2003:254). By including the employees in these development processes the employees get an opportunity to influence their own work and the future of the company. This also means that

the employees feel some sort of responsibility in the implementation of new solutions (Quale 2003:254).

Making a division between these three levels, like Quale does, may be useful to categorize and simplify the presentation of a competence based company but it may be an over-simplified distinction, where the complexity and interrelations between these factors does not come to light. Therefore, I rather choose to focus on Alvesson (2003) and his presentation of knowledge intensive firms. He makes a clear characterization of the knowledge intensive firm, and describes the complexity and interrelations of the moments apparent in a knowledge intensive company.

Alvesson claims that both work and organizations can be knowledge intensive. He defines knowledge intensive as when a worker uses his or her intellect and does analytical tasks. Usually this requires some theoretical education and experience (Alvesson 2004:1). One example of a knowledge intensive organization is IT consultancies. According to Alvesson (2003), knowledge intensive firms (KIFs) are defined as “large firms employing substantial numbers of people working with complex tasks, that call for autonomy and the use of judgement possibly rendering traditional forms of control inadequate or only partly relevant” (Alvesson, 2004). The reason Alvesson singles out the term knowledge intensive firms is because he wants to differentiate between companies living in the knowledge society and companies actually being knowledge intensive. Many companies contain a lot of valuable knowledge, but nevertheless can not be defined as knowledge intensive firms, in accordance with Alvesson’s understanding of the term.

In general, KIFs are “organizations which offer to the market fairly sophisticated knowledge or knowledge based products” (Alvesson 2004:21). Alvesson distinguishes between two types of knowledge intensive firms: professional service (accounting firms, law firms and computer consultancy companies etc.) and R & D firms (science-based companies, such as pharmaceutical and biotech companies and other are high tech companies based on engineering knowledge) (Alvesson, 2004). Alvesson mainly focuses on professional service firms, which will be the focus in describing a knowledge intensive firm.

Characteristics of Knowledge Intensive Firms (KIFs):

Alvesson mentions the following aspects that are characteristic for KIFs. Though not all of them necessarily need to be apparent for a company to be defined as a KIF, they are usually present to a greater or lesser extent (Alvesson 2004:21).

- 1 Highly qualified individuals doing knowledge-based work, using intellectual and symbolic skills in work.
2. A fairly high degree of autonomy and the downplaying of organizational hierarchy.
3. The use of adaptable, ad hoc organizational forms.
4. The need for extensive communication for coordination and problem solving.
5. Idiosyncratic client services.
6. Information and power asymmetry (often favouring the professional over the client).
7. Subjective and uncertain quality assessment.

The first moment has to do with *highly qualified workers*. Knowledge workers usually have some formal education or theory background; if not, they usually have much expert experience from the field in which they are employed as knowledge workers. This implies an underlying assumption that the knowledge which is important for knowledge workers is cognitive knowledge, which implies emphasizing analytical skills. This also means that the responsibility to take decisions while performing judgment is not only reserved for the managers. Knowledge workers often need to make their own decisions because of the complexity of the work tasks, which lead us to *autonomy*.

Autonomy is highly appreciated in KIFs. This is natural since the knowledge workers in KIFs have much professional expertise/competence and are therefore capable of making good decisions. However, "knowledge work includes the exercise of professional judgment in the effort to solve, complex frequently unique problems" (Alvesson 2004:23). This means that the work tasks knowledge workers often solve are complicated ones; nevertheless, they have the autonomy to solve these problems. In addition do the knowledge workers have the expert knowledge that is needed to take the best decisions; therefore it is natural that they have this high degree of autonomy. Even though this downplays hierarchy, it is the best to have those with the most expertise solve the related problems.

When it comes to the type of *organizational forms*, KIFs are often flexible. "The high degree of customization in PSFs and innovation in other KIFs make traditional management principles such as standardization, routinization, and supervision difficult to apply" (Alvesson 2004:23). When Alvesson underlines the high degree of customization, he aims at the innovation processes going on in KIFs, such as product development. Clearly the standard bureaucratic organization is not the ideal fit within a KIF organization. This underlines the importance of having a focus on KIFs as flexible organizations. It also suggests that a flat organization is what makes the knowledge workers utilize their competence.

The need for *extensive communication and coordination* is apparent to a great extent in KIFs. During complex problem solving, the knowledge workers often have to gather information from different places. "Work in ad hoc settings calls for mutual adjustment" (Alvesson 2004:24) which calls for extensive communication, as well as negotiation.

What is symptomatic of KIFs is that their *client relations* are "highly complex and call for a high degree of customization" (Alvesson 2004:25). It is emphasized that "technical problem solving and substantive matters cannot be separated from social relations" (Alvesson 2004:25). This means that since the work tasks are so complex and interrelated that the problem solving cannot be separated from their customers and the relationship with them. Therefore, the knowledge workers have to give personal service to each client. This underlines the importance of having face-to-face interaction with their customers, which reduces the distance between the market and the knowledge workers. Each client relation is individual and personalized. Alvesson also underlines that "in some KIFs producing a tailor-made knowledge product for a particular customer, such as a prototype or a complicated piece of equipment, the client relations may be important" (Alvesson 2004:25). He also emphasizes that the type of contact with the client may vary; for instance through offering service, product work, consultant or co-workers – relations (Alvesson 2004:25).

Information and power asymmetry is when the knowledge workers have more expertise about a topic than their customers, which may make their clients vulnerable. Nevertheless, it is underlined that this is not the case in every KIF; this is a characteristic dependent on the context and the situation. However, there is power asymmetry in the way that it actually is the

customer who pays for the service offered, and the power to choose whether to offer this customer service usually lies with the knowledge workers.

Quality assessments are often a problem within KIFs. Knowledge workers often handle complex problems, and there is often no best way to solve them. With multiple ways to solve the problem, it is difficult to decide which the best option is. In addition, the customers often work closely together with the knowledge workers and therefore impact what sort of solutions they choose. The customers have a "shared responsibility for problem definition and solving" (Alvesson 2004:25).

2.3.4 Aspects of activity theory

"Broadly defined, Activity Theory is a philosophical and cross-disciplinary framework for studying different forms of human practices as development processes, both individual and social levels interlinked at the same time" (Kuutti 1995:23).

This section will elaborate on different aspects of the activity theory, especially the notion of objects and tools. Only the terms 'objects' and 'tools' will be singled out because they stand out in the light of the empirical findings. However, in order to understand the setting and context, these terms derive from there will be a short description of the main points within activity theory. This will be an explanation of the evolution of today's state-of-the-art third-generation activity systems.

Cultural historical activity theory (CHAT) originates from Lev Vygotsky who first initiated this theory in 1920 and which was further developed by Leontev in the 1970's (Engeström 1999:59). CHAT has evolved over the years, and three generations of activity systems have emerged. *The first generation activity theory* was centered around Vygotsky's idea of mediation (Engeström 2001:134). It focused on the triangulated connection between stimulus, response, and "a complex mediated act" (Engeström 2001:134); however it usually is reformulated to subject, object and mediating artefacts (Engeström 1999:60). *The second generation* activity theory extended the first by representing individual as well as group actions embedded in a collective activity system (Engeström 2001:134). *Third generation activity theory* emphasizes the collective aspect by requiring a minimum of two interacting

activity systems (Engeström 1999:62). Learning within Co-configuration settings is accomplished in and between multiple loosely interconnected (third generation) activity systems (Engeström 2004:15).

Obviously the main focus will be on third generation activity theory. While space does not permit a detailed explanation of activity theory, key terms will be singled out that are relevant according to the theory of Co-configuration: objects, tools and knotworking. Lundby sees the creation of a shared object as following: “When two or more activity systems interact they may shape a shared object” (Lundby 2007:200). As an extension of this, Lundby underlines that the cultivation of shared objects takes place in the mediation processes of the activity systems, which Engeström and Miettinen also see as important (Lundby 2007:200).

Objects

“The object is the constantly reproduced purpose of a collective activity system that motivates and defines the horizon of possible goals and actions” (Daniels 2004:190 referred after Engeström 1995).

In this part I will elaborate on the term *“objects”* within an activity theoretical perspective. Within cultural historical activity theory, the object is in the centre. There is no activity without the object; the object embodies the meaning, the motive and the purpose of a collective activity system (Engeström & Kerosuo 2007:337). Furthermore, the object is not a short term goal but it is an ongoing goal that is durable and “becomes reproduced in each string of actions vital to the activity” (Engeström & Kerosuo 2007:337). What is even more interesting is how the objects can change. “The object is given as raw material to the subjects involved in an activity and is following interpreted, constructed and changed by the subjects actions” (Engeström & Kerosuo 2007:337). It should be remembered that the object may serve as a unified whole, bounded by the efforts of the activity systems engaged with it (Engeström & Kerosuo 2007:337). “By acting on their objects, activity systems both stabilize them and push them into movement” (Engeström & Kerosuo 2007:338 referred after Engeström and Blackler 2005). The final point Engeström and Kerosuo make regarding objects is that within globally spreading runaway objects there is a need for an expansion of our understanding of organizations, work and learning (Engeström & Kerosuo 2007:337).

Tools

A "tool" can be anything which is used in the transformation process, including both material tools and tools for thinking" (Kutti, 1995).

Engeström underlines that tools are dependent on the object of actions (Engeström 1990:181). Namely, in the transformation of the object, the tools also, or mediating artefacts, are transformed (Engeström 1990:181). First this shows that transforming one aspect of the activity system has consequences for the other parts. Secondly, this indicates that Engeström, at the point when this article was written, does not differentiate between tools or mediating artefacts. Since he uses the term *or*, in the quotation, this may indicate that these two terms have somewhat the same meaning. This is strengthened when Lundy makes clear that tools and signs are cultural artefacts (Lundby 2007:201 referred after Wertsch, 1985).

Kutti underlines that the relationship between the subject or actor and the object of activity is mediated by a *tool* into which the historical development of the relationship between the subject and the activity is condensed (Kutti 1995:7). However, Kutti states that the *tool* may be both enabling and limiting: "It empowers the subject in the transformation process with the historically collected experience and skill 'crystallized' to it but it also restricts the interaction to be from the perspective of that particular tool or instrument only - other potential features of object remain "invisible" to subject" (Kutti 1995:7).

Until now tools and objects as aspects of activity theory have been presented. Below knotworking, as the last aspect from activity theory I will take into consideration, will be elaborated. Within work organisations, which are fluid and flexible, Co-configuration work practices are a regular type of work where knotworking becomes important (Lundby 2007:201). Knotworking is connected to Co-configuration work; therefore, I will elaborate on knotworking below.

2.3.5 Knotworking and Co-configuration

Since Co-configuration and knotworking are so closely connected, it is important to have a understanding of what knotworking is. Actually, Co- configuration requires flexible

knotworking in which no single actor has the sole, fixed authority – the center does not hold (Engeström 2004:13). “Knotworking may provisionally be defined as a pulsating movement of tying, untying and retying together otherwise separate threads of activity” (Engeström et al. 1999:346). Out of this we may interpret that knotworking consists of several activities, or activity systems. An illustration of this may be a chain made of beads consisting of different colours. Each different coloured bead represents one activity. Different beads in different colours make out a whole bead chain together. These beads may be removed from the chain, or they may be hooked on again when needed, to make a new chain of beads. Knotworking consists of many different activities, but when these activities are “knotted”/tied together they make out a whole complex activity. Furthermore, Engeström says that “the notion of the knot refers to a rapidly pulsating, distributed and partially improvised orchestration of collaborative performances between otherwise loosely connected actors and activity systems” (Engeström et al. 1999:346). It should be underlined that even though knotworking may seem a term referring to a collective aspect, it may be individual as well as collective (Lundby 2007:201 referred after Engeström, 1999).

2.3.6 Summary

In this chapter I have described the origins of the term Co-configuration, I have elaborated how Engeström perceives the term Co-configuration and finally defined how I interpret the term Co-configuration consists of two approaches: *the Adaptation of products* and *creation of products that are adaptable*. In this thesis mainly the Adaptation approach is used.

Furthermore did I show how Co-configuration can be seen in the framework of knowledge intensive firms. Furthermore have I shortly elaborated on activity theoretical perspectives, and focused especially on the aspects objects and tools. Lastly knotworking has been described, since it has a clear connection to Co-configuration work.

However, the theory of Co-configuration does not cover all areas concerning customer-initiated product development. Within Co-Configuration I lack the macro perspective on the development process. Saying this I mean that I miss a theory that would take the context surrounding the product development process into consideration. Therefore, I tried to give this macro perspective to the Co-configuration theory by putting it in a knowledge intensive firm framework. Perhaps the knowledge society perspective and knowledge intensive

organizations may be an alternative that would enrich the theory of Co-configuration, since this would add a macro perspective. In next chapter I will elaborate on my research questions and thereby legitimate why I have focused on the chosen theories.

3. Elaborations of research questions

“Knowledge societies emerge as adaptations to persistent but evolving needs and changing circumstances of human conduct. Among the most significant transformations in circumstances that face human conduct is the continuous ‘enlargement’ of human action” (Stehr 1994:16).

This chapter will elaborate on the research questions and present the conceptual framework. The research questions, as presented in the introduction, are 1) How do the customer roles change over time in relation to the evolving products and 2) How do the customers impact on the product development process?

The first research question aims at investigating how the customer role has evolved to become a more active and participating element than earlier. In this research question the purpose is to show how the transition from the industrial society to the knowledge society has influenced and changed customer roles. The changing customer role has developed from earlier when the customer roles were characterized by being passive consumers of goods, to being active customers contributing, for example, in product development and the need for more tailored products. This implies that the product development process in the knowledge society has changed as well, influencing the customer role. More precisely, the knowledge society has impacted how the companies are becoming more knowledge intensive, breeding more knowledge workers, acknowledging the customer’s knowledge and thereby wanting them to participate in the development process. The discussion on the knowledge society and the changing customer roles serve as background and context for the empirical findings presented in the following chapters.

The second research question, how the customers impact on the development of The Company’s products, is the main research question and will receive the most attention. The emphasis is on how the product development process at The Company emerges, and especially how the customers are active parts in the development. In today’s knowledge society, knowledge is the essential ingredient in many work situations, including product development processes. Since customers tend to be active participants in product development processes this may represent new forms of work. The thesis seeks to understand if the

Adaptive Product Development process at The Company may be an example of a new type of work and production. In addition this research question to a minor degree point at a learning aspect between the interacting organisations in Co-configuration processes. However, this is not my main focus, as it is outside the scope of the thesis.

In order to shed light on these research questions some of the theories presented in the previous chapters will be selected and integrated in the conceptual framework for analysing the empirical findings. The conceptual framework consists of the theory of Co-configuration, Meta-design, Modding and Knowledge intensive firms (KIFs).

3.1. Conceptual framework

Through using my conceptual framework to look at my empirical findings from different theoretical perspectives the aim is a rich and nuanced picture of the complex reality I have studied at The Company. These different theories shed light on slightly different aspects within software (product) development. As explained shortly in section 2.3 where Co-configuration was presented, this theory is the one closest to the key research question of how there is mutual development between customers, professional developers and mediating artefacts. Co-configuration is the only theory (out of those presented) which clearly covers the aspect of mutual collaboration between customers and developers, and underlines this as an important function in Adaptive Product Development processes. In addition, the theory of Co-configuration is explained in a software product development setting: Victor and Boynton explain Co-configuration as occurring, for example, at Microsoft (Victor & Boynton 1998:200). And Engeström uses a case of another high-tech software development company when investigating Co-configuration (Engeström 2007:31). Seeing Co-configuration in these contexts is in line with the setting for my research project, so the applicability of the theory may be greater.

In section 2.1, “the changing roles of the customers in the knowledge society”, the main point was to show that we are living in a knowledge society and how this implies some changes in the customer roles. Customers are becoming more conscious of what they want and are

therefore demanding more personalized and tailored products. It is necessary to have the knowledge society in mind when looking at Adaptive Product Development in order to understand the setting in which it operates. However, this chapter serves merely as background and will therefore not be a directly part of my conceptual framework.

It is an important link between the knowledge society and how it breeds knowledge intensive firms (KIFs). However, KIFs is not elaborated on in this section because it is used to contextualize the Co-configuration process and is therefore described in section 2.3, Co-configuration: Customer-developer interaction in product development. KIFs is part of my conceptual framework and will be further elaborated below.

Section 2.2 focuses on user participation in product development processes, mainly within software development settings. Several terms for my conceptual framework will be chosen from this chapter: *Meta-design* and *Modding*. *Meta-design* facilitates a process where both customers and developers are part of the development process. The SER model by Fischer conceptualizes this, and thereby is a very interesting theory according to the main research question. Furthermore, *Modding* is also a very interesting term since it focuses on how users act as so-called ‘modders’, meaning users are active in the product development process and create extensions to products themselves. Therefore, these theories complement each other since they offer different views on product development: *Meta-design* shows how both customers and developers interact in the development process, whereas *Modding* shows how customers are active participants in product development processes by performing development themselves in form of creating mods. Therefore is it fruitful to include the terms *Modding* and *Meta-design* in my conceptual framework.

As mentioned earlier, Engeström’s notion of Co-configuration represents my main theoretical position in this thesis. I choose Engeström’s version of Co-configuration since he places it within a learning framework. In addition, Victor and Boynton focus on what I earlier defined as an *adaptable* approach to Co-configuration, whereas Engeström’s focuses on both the *Adaptation approach* and the *adaptable approach*. This thesis mainly looks at Adaptive Product Development from an *Adaptation approach*, and therefore it is natural to choose Engeström’s notion.

In sum my conceptual framework consists of the theories Knowledge intensive firms (KIFs), Meta-design, Modding and Co-configuration. This conceptual framework consists of different specialized theories, where the intention is to shed light on the empirical findings from various perspectives in order to analyse the findings in the richest way possible.

The purpose of using a conceptual framework is to use it to analyse the empirical findings. In chapter 6 where the empirical findings are presented I have created a model of Adaptive Product Development, Figure 13, consisting of five stages of development apparent at The Company. Since the Adaptive Product Development process at the Company contains a high degree of complexity the need for a conceptual framework was apparent. It appears that not one single theory was able to cover the whole spectrum of all five stages of Adaptive Product Development, so a combination of the theories of Knowledge intensive firms, Meta-design, Modding and Co-configuration will be used to analyse the Adaptive Product Development at the Company.

4. Context: A presentation of the research project KIKK and The Company

“...This requires intimate dialogue – what Bill Gates calls high bandwidth communication – between expert and customer...Because there are no standard problems, consultants must treat their customers as individuals. Because consultants cannot standardize their customers, they must either seek customers their people can serve or seek people who can serve their customers” (Sveiby 1997:24).

In this chapter I will elaborate on The Company, introduce the KIKK case, and the KP-Lab project of which the KIKK case is a part. KIKK is an acronym for 'Kunnskapsforvaltning for internt kommunikasjon og kundebehandling' (KIKK). In English the acronym KIKK means 'Knowledge management for internal communication and customer treatment'. First I will elaborate on what KP-Lab is, and then I will clarify what role KIKK has in the KP-Lab project. Next will be given a deeper description of the KIKK case related to this thesis, in which I have been a participant for almost two years. The Company is the main objective of research in the KIKK case. Furthermore, general facts about the Company, such as early history, different customer groups, expansion and a presentation of the Company's products will be introduced. Also, an elaboration of advanced customers at The Company will be presented.

4.1 Knowledge Practices Laboratory (KP-Lab)

KIKK is a part of a bigger project called Knowledge Practices Laboratory (KP-Lab), which is a European collaborative project financed by EU's 6. frame programme for research. There are 22 partners from all over Europe, as well as Israel, participating in this project. The coordinator is delegated to the University of Helsinki. One main goal for KP-Lab is to research on technological development and knowledge practices in education and working life. In order to realize this goal there already are several projects, in line with KIKK, doing research on different aspects of knowledge practices.

4.2 KIKK as part of KP-Lab

KIKK is a collaborative project between InterMedia and the Company. The KIKK project started in July 2006. At that point we were one post.doc, one PhD. student and two master students from InterMedia. Around spring 2007 the project expanded to including two informatics students from InterMedia as well. From The Company we had one contact person, which introduced us to the rest of the employees at The Company.⁶ The data gathering in the KIKK project was temporarily stopped in December 2007, but the duration of the project is until end of 2008.

Empirical design

The intended activities within the KIKK project roughly are divided into three phases: 1) To define today's situation (practice), 2) The design phase of a new web-portal, and 3) Define the new situation (practice). I attended phase 1 and 3; phase 2 is outside my scope. The common intention of the KIKK project is to research on how the development and implementation of technological tools can improve knowledge management in connection to internal communication and customer treatment at The Company. In addition to this, the intention also was to research on the daily work practices of the employees at The Company.

Our research objects can be divided into 1) research on work practices, and 2) prototype development. Research object 1 consists of customer relations, organisation structure, different forms of knowledge representations (explicit, experienced knowledge etc.) and geographical distribution. The second research object focuses on developing scenarios. My main focus is on research object 1, since I focus on Adaptive Product Development, and not the development of a web-portal, which is closely connected to research object 2.

Finally, there already are two students that have finished their thesis in KIKK. Their main focus was on research objective 2, as explained above. These two students programmed and

⁶ For further reading about the process of establishing the project and getting access to The Company, see chapter 5.

implemented a web-portal which was used for a short period at the Company. But because of some changes in the Company's management, the web-portal was removed. For more information about the development of this web-portal, read Nedic and Olsen's work on this (Nedic & Olsen, 2007).

4.3 Description of the context for the KIKK case – The Company

The Company is a software company that produces project management tools for the oil, gas and building industry. As they promote on their homepage, “We combine more than 30 years of practical project management knowledge and experience with innovation and customer dialogue to create project management software solutions that help you better, plan, control and accurately monitor project status and performance”⁷. The Company has one main office located in Stavanger and one newly established office in Oslo. Recently, after we started our data gathering, The Company also established an office in the USA in the autumn 2007. The office in Stavanger has been operating since 1995, while the office in Oslo was established in 2006. Generally speaking, because of their location in Stavanger, this office has mainly customers from the oil and gas industry, while the office in Oslo has customers from the building industry, though there is not a sharp division between which customers belong where. In Stavanger, there are around 16 employees and in Oslo there are 6 employees. As an indication of their impact on the market in which they operate, perhaps the following statement is the most relevant: “Our project management tool is being used in nearly 90% of all Norwegian oil and gas projects” (One of the professional developers at the office in Stavanger).

The following sections will first explain the historical background of the Company and the relation to the products. Then the different customer groups will be presented, along with the expansion process they are going through and their products. Finally, different forms of customer support will be described.

⁷ www.TheCompany.no Date: 15/2-08.

4.3.1 Early history

The Company's core products have roots back to the seventies, because a core of The Company's employment base worked together in another company in the early seventies. Their main product in that company was a project planning tool called Artimus. This company did not further develop their product; therefore, this group, who are now working at The Company, bought out the project management tool and started The Company. This speeded up the development of the project management tools. The Company's products has developed and changed over many years, shaped by the initiatives from their employees. The Company as a company and their products evolved in parallel to each other, which is further explained in section 6.1.

4.3.2 Different customer groups

The Company's customer groups are roughly divided into two groups: oil and building industry. These customer groups represent business customers, not private ones. The main groups of their customers are from the oil and gas industry, have been customers since the beginning of the company. Naturally, this customer group has more experience and knowledge about the products. The second group of customers, from the building industry, has emerged during the last five years, though The Company has had a few customers from the building industry over the years. The Company has around 500 customers in total including both the office in Oslo and Stavanger. The division of customers is around 80/20 percent, oil and gas to building industry, respectively.

There is a difference between the two customer groups in the level of knowledge they have about the products. This is natural since, the oldest group of customers – the oil and gas industry have used the products for a longer time. On the other hand the customers from the building industry are the newest ones, which have more limited experience with The Company's products. This difference in their knowledge and experience of the products has some consequences for the feedback The Company obtains from its customers. The informants from The Company underlined that these customers asked more novice/inexperienced questions. As one of the informants said about the customers in this

category, “We suddenly have to answer to questions that are so basic that we do not think about it” (Informant, Stavanger).

Another interesting aspect connected to these two customer groups is how the customers from the oil and gas industry literally brought the project management tools to the building branch. Indeed, some of the customers who worked as project leaders in the oil and gas industry obtained similar projects in the building branch where they immediately saw a need for these kinds of project management tools as the incorporation of such tools was not a norm. According to the informants, there had not existed any project management tools in the building industry that were good enough. In addition, the informant underlined that if you were supposed to achieve the same level in project management in the building industry as you had in the oil and gas industry, you would need the right tools. The informant naturally was satisfied that the building industry chose one of The Company’s products. As an extension of this, an example is on its place. Under the building of the new central hospital in Oslo (AHUS) the superior/main project leaders, which have worked with project management in the oil and gas industry for more than 20 years, wanted to keep using The Company’s project management tools. To reassure that their sub-contractors also used this project management tools, they actually wrote such detailed demands towards project planning and reporting, that the most natural and easiest choice for the sub-contractors was to start using The Company’s project management tools. As a result, these project leaders spread the product to a large part of the building industry in Oslo.

Advanced customers at The Company

To shed light on the advanced users that are apparent at The Company, I want to introduce excerpt K1, which reveals that the Company has advanced customers as beta testers.

Excerpt K1:

Question: Have you had any extraordinary contact with The Company, since you are such an experienced user of the products?

Answer: I attended the beta test group on the latest version ((⁸ of the product)) and gave some feedback there. And when/if we have found some bugs or there has been something that does

⁸ Throughout the thesis, the signs “(“and “)” are used to signalize my interpretation of the underlying meaning.

not work we have told them this ((The Company)). They gave us feedback very quick. That praise they deserve.

Question; Can you explain a little bit further what you mean by beta test group?

Answer: It was in an early version of the latest version of the Project ((which this customer attended as a beta tester)). Latest version is 3.5 and it was available in a so called beta version to some selected testers. Then I got an early version and the primer goal was that I should test the product.

In this excerpt it is clear that this customer from the building industry has been a part of a so-called beta tester group. Being part of a beta tester group means that the customer gets an early release of a new version of a product, called beta version. The purpose of this is that the customer should use it as he normally uses the products and give feedback to The Company about anything that does not work properly, bugs or needs that are not fulfilled in the beta version. The customer underlines that it only was some selected customers who were a part of the beta tester group. It also underlies an assumption in the statement about how The Company initially asked some exclusive customers, who most likely are customers they know have a lot of expert experience on the products. Clearly, The Company in some way has some customers who are more advanced users than others. Beta test users might be compared to a sort of super users, which means users that have more expert knowledge about the products than other customers. In this way this excerpt may be an example to underline the different categorization of The Company's customers. It should be mentioned that this is quite conventional opposed to user testing of new products to final buyers. However, this excerpt gives an elaboration of the category *advanced users* among The Company's customers.

4.3.3 Expansion

This section describes the transformation process The Company has been going through – its *expansion*. By expansion I mean in terms of the company growing in size, employees, customers etc. In this expansion process, The Company goes from being a small company to a larger one.

Low degree of formalisation

One characterization, which indicates that The Company was a small company, is having a rather *low degree of formalization*. This involves a key characteristic: There does not exist a personal handbook/work description, organisation chart, guidelines for the different positions in the company and no unifying technological tool where everybody can find the same relevant customer information. Most of their communication today is based on ad hoc communication and email. In addition, since the office in Stavanger is the older of the two, most of the decision makers are located there. Therefore, when establishing the office in Oslo, the need for a higher degree of formalization increased. The Company has actually started to develop some unifying tools and guidelines to try to increase the degree of formalization.

Small company

The Company used to be a so-called *small company* because of following characteristics: it had one main office in Stavanger with approximately 16 employees, their customer mass was almost heterogeneous in the manner that 80% consisted of customers from the oil and gas branch, they had a relative big customer mass they could offer very good support services and nearly personal relationships with customer representatives. Since the customers and employees have personal relationships and actually know each other (some of them have worked together on projects, or have been clients, for several years), when they have a problem they just call the professional developer directly to discuss the issue. To have these extended customer relationships has been a clear advantage for The Company, since this has motivated their customers to give feedback to The Company concerning their products. However, after The Company's expansion this has been more difficult to maintain. If they have a lot of customers calling directly to the professional developers they do not have enough time to do development and research. Therefore, when The Company expanded they tried to implement a web support system to channel their customers' requests, so that they could reply to them when the developers found appropriate time. With the expansion of an office in Oslo, at the same time they also got a new customer mass from the building industry. With the establishment of the new office geographically away from Stavanger, it became difficult to train the new employees and share the necessary knowledge. In addition, when the new employees at the office in Oslo were presented with difficult questions they called Stavanger and asked their colleagues there. In practice this means that the workload has actually increased at the Stavanger office. An opportunity for change was when two of the

master students in the KIKK project started developing a web-portal, which was meant to contain log-on possibilities for both customers and employees. It was also planned to be integrated with a CRM system the Company had bought.

4.3.4 The Company's products

The Company has categorized their products into *off-the-shelf products* and *companion products*. *Off-the-shelf products* are products that you just can pick out of a set of different products, install them and they will work. *Companion products* are a bit more complicated because they usually are customized by their end users to meet a customer's specific needs. Like The Company says on their internet page, "In addition to delivering "Off the Shelf" project and program management solutions, The Company Software Solutions, can also provide development objects to enable businesses to develop custom solutions built specifically to their needs".⁹ Objects in this context can be interpreted as the artefacts or tools that are mediated and developed. Again, The Company underlines that they can provide development objects and in this manner customize products according to different companies' needs. 'Development objects' is a term for naming the artefacts that can be subject to further product development. However, what is important is that the initiative and idea of further development of the products derives from their customers needs.

Products are designed in a collaborative environment between the customer and The Company Software Solutions to ensure applicability to requirements, application design, usability and successful implementation".¹⁰ This statement underlines a form of collaboration between customers and developers in further adaptation or development of the products. This is in line with the focus of this thesis, namely Adaptive Product Development where both customers and developers are involved. This will be further discussed in the presentation of the empirical findings underpinning this phenomenon in chapter 6.

⁹ www.TheCompany.no Date: 15/2-08.

¹⁰ www.TheCompany.no Date: 15/2-08.

Off the shelf products

The Company offers the following off-the-shelf products: Planner, The Company for the Microsoft Project Platform and Project. These will be shortly described below. *Planner* is a rather simple project planning product, and at the same time has the ability to be a more advanced one. As The Company says on their webpage, “Combining simplicity with power Planner is easy to use whether you are an occasional or daily user”.¹¹ Using Planner, it is easy for users quickly and easily to create schedules/plans on the screen. In addition, Planner has an interactive Gantt style bar chart editor.¹² See Figure 4 for an example of this product.

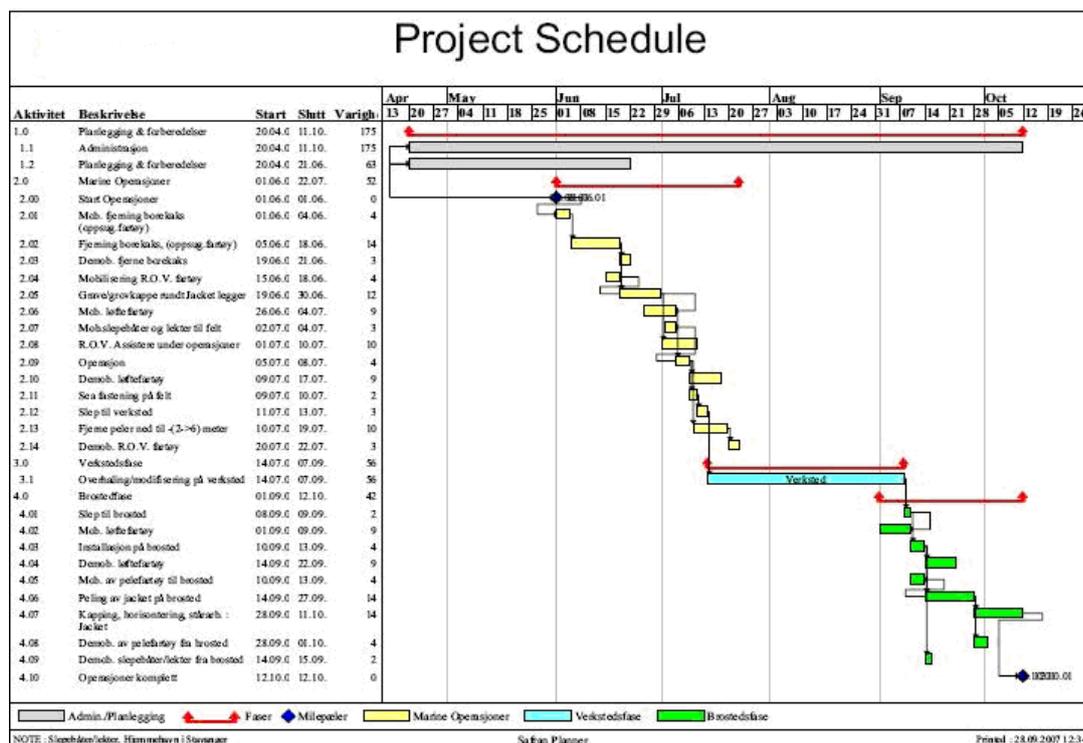


Figure 4: An example of Planner.

Microsoft Project Platform, see Figure 5 for an illustration, is a project management tool developed at The Company as a sort of add-on to a Microsoft Project program. The special thing about this product is that it has a special focus on “performance measurement and visibility to the Microsoft Project software you already have”.¹³

¹¹ www.TheCompany.no Date: 15/2-08.

¹² www.TheCompany.no Date: 15/2-08.

¹³ www.TheCompany.no Date: 15/2-08.

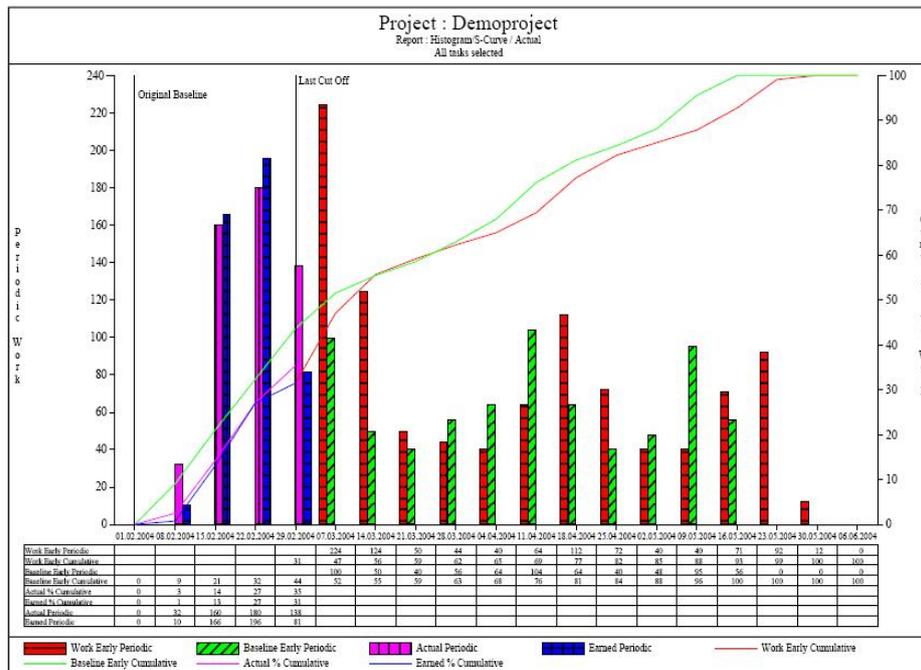


Figure 5: An example of Microsoft Project Platform.

Project, see Figure 6, also is a project management tool, but it is more advanced than *Planner*. *Project* offers a complete project management tool. The Company states on their web-pages that they tailor or customize *Project* to meet their customers' unique requirements.¹⁴

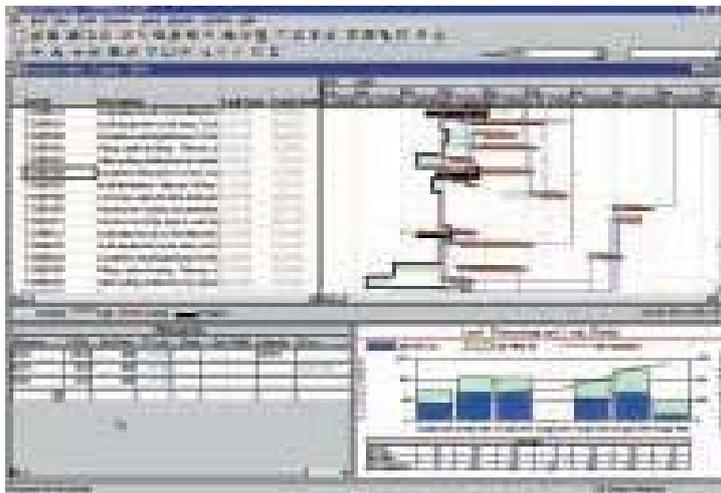


Figure 6: An example of Project.

¹⁴ www.TheCompany.no Date: 15/2-08.

Companion Products

Enterprise Developer, as visualized in Figure 7, is a project management tool which is meant for those customers who have a need to customize their products in certain ways. “The structure of Enterprise Developer allows you to build and deploy corporate, project or even site specific code and seamlessly integrate this with your Project Enterprise Solution.”¹⁵ Site specific code may be programming code that is particular for one site.

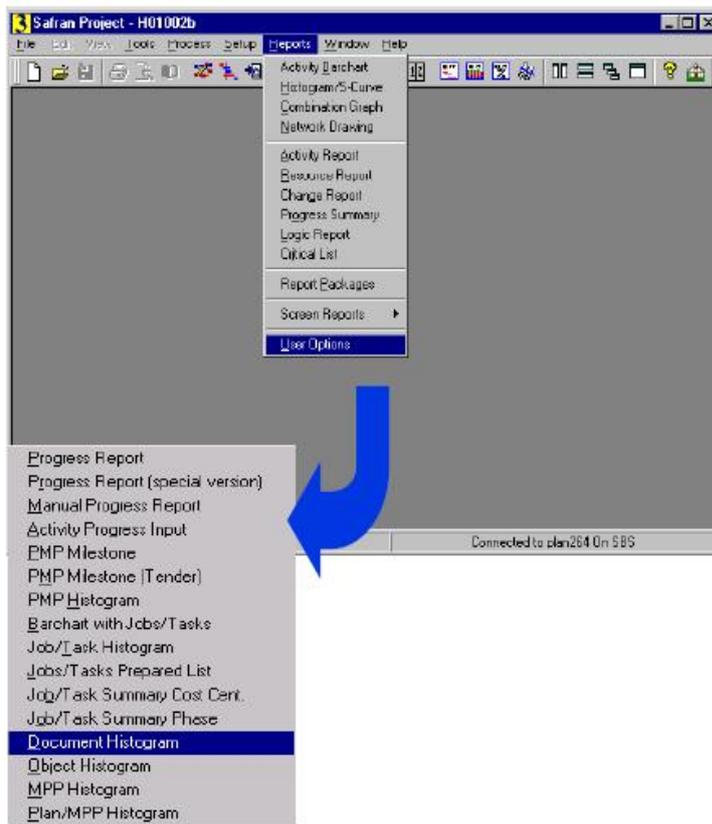


Figure 7: An example of Enterprise Developer.

Detail: “There is often a tension between the level of detail you allow in your planning network and the complexity and details found in the work to be performed.”¹⁶ Detail, as shown in Figure 8, allows one to detail work requirements in accordance with other underlying activities. This customization seems like something the users can do themselves after they have bought and installed this product. Therefore, it seems like this product is in accordance with EUD.

¹⁵ www.TheCompany.no Date: 15/2-08.

¹⁶ www.TheCompany.no Date: 15/2-08.

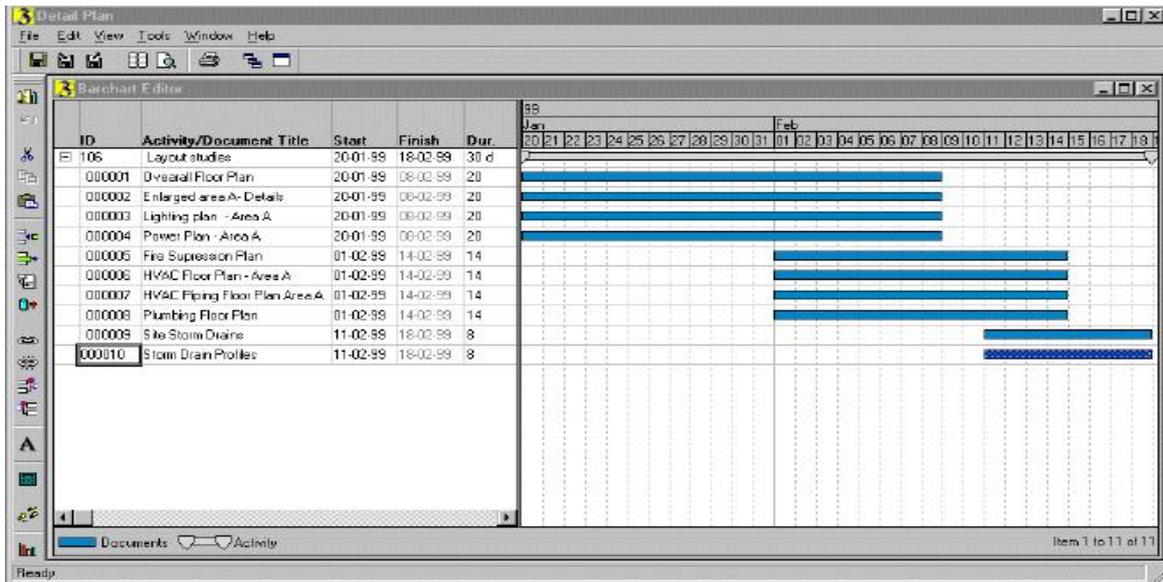


Figure 8: An example of Detail.

4.3.5 Customer support

This paragraph below will show how customers are categorized in accordance with what kind of support agreement they have bought from The Company. In addition, it will be mentioned how a customer can report Improvement Request via web, and how this has changed over the past year. First, the HelpDesk will be described, then the web-portal and finally the customer support connection.

When we started our data gathering in autumn 2006 The Company used a solution available on the web called the *Helpdesk*. See Figure 9 below.



Figure 9: A picture of the Helpdesk where customers have the opportunity to forward Improvement Requests.

Helpdesk was a place where customers could enter different requests, such as a wish for new functionality, error messages, upgrades and new version of the different products etc. In this manner, the Helpdesk was meant as an answer towards the rapid growth of customers wanting support and The Company's expansion in general. One of the researchers at The Company said the following in December, 2006: "We do have a helpdesk; it is a web support system where customers can add product errors on it, and we answer their mail. But it is an old and slow system; it is not really good". Because the HelpDesk was old and slow there was an urgent need for The Company to upgrade their customer support infrastructure.

Therefore when two informatics master students attending the KIKK project were a part of a project group at The Company who developed a web-portal, this was appreciated. They developed a web-portal where the customers as well as the employees could login to different accounts and enter information for different purposes (Nedic & Olsen, 2007). This aspect will not be elaborated on, as it is outside the scope of the present thesis, but it should be underlined that this web-portal was in use for a couple of months before a change in the administration of The Company led to its removal from the website. Instead, The Company bought and implemented the Customer Support Connection.

The Company describes the *Customer Support Connection* as following: “You can use this service to report software defects and to issue Software Enhancements and Improvement Requests”.¹⁷ The customers may log on to the site where the customer support connection is located and get special features. Furthermore, all users are able to notify The Company about error messages in their products, as well as Improvement Requests. All users have the possibility to log on to The Company’s Customer Support Connection, but only the customers who have paid for a support program get the possibility to gain extra features etc. from this site. In addition to these customer support connections The Company offers various Customer Support Programs.

Customer Support Program refers to what kind of support a user has paid for in connection with what kind of product he or she has bought. The Company offers two different kinds of Customer Support Programs: *Named Caller Support* and *Enterprise Support*. *Named Caller Support* “is for customers – often smaller companies – who need occasional, high-level support directly from The Company support personnel.”¹⁸ *Enterprise Support* is for those customers who want the highest level of support and access to personnel who can customize products after their needs.¹⁹ This implies that The Company operates with various agreements among their customers and what one may call different kinds of customer support agreements. This also underlines that within Enterprise Support it is highlighted that the customer may enter requests for customization of products.

¹⁷ www.TheCompany.no Date: 15/2-08.

¹⁸ www.TheCompany.no Date: 15/2-08.

¹⁹ www.TheCompany.no Date: 15/2-08.

5. Methodological considerations

“A methodology refer to the choices we make about cases to study, methods of data gathering, forms of data analysis etc, in planning and executing a research study” (Silverman 2005:99).

To make it easier to understand the reasons behind the choices taken in this thesis and justify my findings, I will examine some of the methodical issues in this chapter. Firstly, the choice of research design will be discussed concerning performing a qualitative case study, as well as how the ethnographical approach was used. Then the techniques/methods used in the data gathering, video and audio recording the interviews and focus group, will be elaborated. In the next section is an elaboration of the empirical data analysis with the use of template analysis and intermediate terms. Moreover, quality issues in qualitative research will be highlighted, especially as the validity, reliability and generalization issues are concerned. Lastly, some ethical concerns in collecting data are presented.

5.1 Research design

When deciding what research design to choose, it is important to have the research questions in mind. The research questions should give a direction for the overall research design. The difference between a qualitative and quantitative approach will be examined along with why a qualitative approach fits best with my research questions.

5.1.1 A qualitative approach

Often, to distinguish between qualitative and quantitative research they are discussed as two opposing theories. This is not necessarily the truth always, depending on the direction and methods chosen within the approach. Nevertheless, to be economical and give a short overview of these two approaches let us discuss them as two opposing theories. In qualitative research the primary goal is to clarify the character or attributes of a phenomenon, whereas quantitative research would attempt to establish the amount of the same (Widerberg 2001:15,

my translation). Quantitative studies usually focus on greater samples of data and informants. In addition, within this approach, the purpose often is to make some general and often as objective as possible assumptions. Qualitative studies, on the other hand, focus on a small sample of informants in order to go into detail about the topics studied. In addition, when going into detail the focus rarely is on being objective, rather the aim is to promote the subjective meanings of the participants. Roughly, you may divide them by saying that the word “qualitative” focuses on the character or attributes of something, whereas the word “quantitative” has to do with the amount of this character or attributes (Widerberg 2001:15, my translation). A final lesson we can draw from this is that qualitative research is *searching* for the content, but quantitative research is *steered* by the content (Widerberg 2001:15, my translation).

My main research question and objective is how there is mutual development between customers, professional developers and products. In addition, in this research question points to the character or attributes of the product development process studied. The focus is clearly not on the amount of product development, rather the process of the development. Therefore, a qualitative research study is most applicable, though, obviously, one approach is no better than the other. Silverman also underlines this when he says that “different questions require different methods” (Silverman 2005:7).

5.1.2 Case study

“The basic idea is that one case (or perhaps a small number of cases) will be studied in detail, using whatever methods seem appropriate. While there may be a variety of specific purposes and research questions, the general objective is to develop as full an understanding of that case as possible.” (Silverman 2005:126 referred after Punch, 1998)

Within the KIKK project there existed several purposes and research questions to be answered since there were six people involved. My focus in KIKK was to study in detail how the product development at The Company occurred. Even though there was a variety of research questions and purposes, the overall objective was to develop a full understanding of the customer treatment and internal communication.

Silverman distinguishes three different types of factors that should be clarified in a case study: the boundaries, the unit of analysis and a limited research problem (Silverman 2005:127). Within the KIKK case we defined the boundaries in the research in one of the introductory meetings where we wrote a contract with The Company. Some of the boundaries established were that we would have collaboration with them until the end of autumn 2007, and that we could interview the employees we wanted, as long as the employee himself wanted it. Since KIKK was part of the bigger KP-Lab project it gave the thematic direction in deciding the unit of analysis right from the start. Early in the process we defined the unit of analysis as being knowledge management in connection with internal communication and customer treatment. This made it easier to know our direction. Nevertheless, it became important to limit my research area and create key research questions early in the process.

Silverman defines three different types of case studies: the intrinsic, the instrumental and the collective (Silverman 2005:127). The collective case study is when a number of cases are studied in order to investigate some general problem. The KIKK project is part of the bigger KP-Lab project; KP-Lab consists of several case studies, where KIKK is one of them. In this way, KIKK and my project within KIKK can be defined as a collective case study.

5.1.3 Ethnographical approach

In using the case study approach in my research project I also undertake an ethnographical approach. An ethnographical approach is useful since in our data gathering in phase one we focused on describing the informants' practices in their everyday work. This is in line with an ethnographical approach where the focus is on giving detailed descriptions of the social activities underpinning a workday in different contexts (Hughes et.al 1994:430). Hughes et al. characterize ethnography in this manner: "It seeks to present a portrait of life as seen and understood by those who live and work within the domain concerned" (Hughes et al. 1994:430). When we gathered our data it was clear that we wanted to look at the employees' daily work practices.

There exist three different views on ethnographic observations: naturalism, semiotics and ethnomethodology (Silverman 2006:98). The present research took an ethnomethodological

approach, meaning I was interested in the methods the persons used in their everyday work life (Silverman 2006:100), especially the methods for improving their products in accordance with customers being active participants. An ethnomethodological approach is concerned with “study members’ descriptive work as it locally assembles some phenomenon” (Silverman 2006:98). The professional developers at The Company were studied to try and understand how they describe the phenomena of the development of their products, which involves customers to a great extent.

Usually ethnography is associated with long time periods in the field. However, Hughes et al. distinguish four different ways to perform ethnography: concurrent ethnography, quick and dirty, evaluative ethnography and re-examination of previous studies (Hughes et al. 1994:432). In gathering data for the present thesis, the quick and dirty ethnography approach was used. The name ‘quick and dirty’ mostly indicates that this form of research involves a short period of fieldwork (Hughes et al 1994:433), as well as it gives a lot of knowledge of the social organisation of work in a short time space (Hughes et al. 1994:434). One of our main data gatherings was performed at the office in Stavanger. We were geographically located 80 miles from the office and chose to gather major parts of our data in three intensive days when visiting The Company in Stavanger. As a result, we gained much knowledge in a short time period. Silverman underlines that an ethnographical approach with an ethnomethodological view has the constructionist approach as an underlying assumption (Silverman 2006:98), though a further description is beyond the needs of the present study.

5.2 Techniques used in the data gathering

According to Silverman, “Methods are linked to methodology and society ... Methods are techniques which take on a specific meaning according to the methodology in which they are used” (Silverman 2005:110).

It is important to choose techniques and methodologies that are in line with the research questions. The techniques chosen for this work are interviews and participating observation. According to Silverman, the techniques normally used are interviews with open-ended questions to small samples, and participating observation used to understand another culture (Silverman 2005:111). Open-ended interviews to a small population were used, with the

intention that the participant observation would give us richer data and an understanding of the Company. We interviewed some selected key persons on two different offices. Firstly I will shortly describe what equipment we used and who we interviewed.

5.2.1 Equipment used in our data gathering

Video and audio recorders were used in our video and data gathering. All of the interviews were audio recorded, but only some interviews were video recorded as well. The reason was that some of the informants did not feel comfortable with being video filmed. Therefore, in order to not inhibit the informants, we chose to not press them on this. A clear advantage by using audio recorder is that it gave the ability to focus on having a good conversation with the informant, instead of needing to write down every word of the informant. Video recording was meant to be used in order to get a richer picture of the meaning of what the informants said. We could then analyze the informants' facial expressions and body language later on when analyzing the data. However, even though we videotaped some interviews, in the end only the audio material was analysed. No interactional analysis of the video material was performed since we did not consider it important because of the nature of our data, and our interviews can not be described as interaction data, since we mainly performed regular interviews.

5.2.2 Selection of informants

As described in the context chapter, The Company had two offices located geographically far away from each other; one office was in Oslo and the other in Stavanger. We gathered data in both offices. The office in Stavanger is their headquarters, whereas the one in Oslo is an office established two years ago. Data from both offices was gathered in order to get a rich as picture as possible. The criteria for selecting who to interview was simple: at the Stavanger office, it was those who had been employed the longest, in order to get a historical view on the development in the company as well as how their work tasks are today. One interesting dynamic which revealed itself is that their special kind of customer-initiated product development has been done, in some manner, since the birth of the company.

Two key customers were selected for the Oslo interview. First of all was this was easy to perform, since we were located in the same city. Secondly, we knew these customers had been using The Company's products for a longer time period and were advanced users with a lot of knowledge, as had been stipulated by our contact at The Company. Both of the customers were advanced users with nearly expert knowledge on the project management tools.

Our data gathering was split over a one and half year time period. It began in *autumn 2006*, with two information meetings. The main impetus in these meetings was to inform each other about the purpose of the study etc. The first data gathering in the field at the Oslo office was in October 2006, interviewing two informants. In December the main data gathering was performed at the office in Stavanger over three days with intensive data gathering. In between these main data gatherings we arranged three short meetings with our contact person in The Company, mostly in order to get some background information, fix administrative things and keep each other updated on the status of the project. In the *spring 2007* we arranged a focus group interview to summarize the data gathering in the Oslo office and the Stavanger office. Attending this interview were two informants from the Oslo office and one from the Stavanger office, along with us from University of Oslo. The University of Oslo was used as neutral ground since we had invited employees from two different offices. The purpose of this meeting was to interview the informants from both offices at the same time. However, it should be mentioned that one of the employees at the Oslo office was the one initiating and asking for this meeting. In addition, we performed one interview with one of The Company's big customers in the building industry, located in Oslo this spring. In *autumn 2007* our last customer interview with another major customer in the building industry was conducted.

According to Silverman, there are four major techniques that can be used by qualitative researchers: observation, analysing texts and documents, interviews and focus groups and audio and video recording (Silverman 2006:18). For gathering data we used a combination of interviews, focus groups and participating observation. I will describe the theoretical issues connected to the chosen techniques below.

5.2.3 Interviews

There are four different ways to organize an interview. Silverman distinguish between the structured interview, semi-structured interview, open ended interview and focus groups (Silverman 2006:110 referred after Noaks & Wincup, 2004). When we decided what kind of interview form we wanted to use it was important to focus on the nature of our research questions and how the different forms of interview would give us different forms of answers. We used open ended interviews, focus groups and participant observation. These will be described below.

Open ended interviews

“Qualitative interviewing is particularly useful as a research method for accessing individuals’ attitudes and values” (Silverman 2006:114 referred after Byrne, 2004).

The use of a joint interview guide in open ended interviews

“An open ended interview is usually thematized in advance, meaning there exists a set of topics or areas of interest which the researchers want to investigate further” (Fog 2004:18, my translation). We created a joint interview guide in advance and used it as a guideline, which is in line with Fog and the idea that an open interview usually has some pre-set topics that the researchers want to investigate. We created an interview guide which was supposed to cover all the research areas of the three different people performing the data gathering. One of us will use the data in her PhD, the other two in our master thesis. This meant that we had to make an interview guide which covered a broad area of topics. We collaboratively created one interview guide aimed at the employees at The Company and another for the customer interviews.²⁰ Our interview guide for the employees at The Company consisted of the main themes: background information about the informants and the company, a short description of their organisation structure, a description of their work tasks, a customer case, customer treatment and thoughts around the design of the web-portal. The customer interview guide²¹, on the other hand, consisted of background information about the informant and the company, as well as the main topic of customer relationships. However, it should be mentioned that a

²⁰ See attachment 4 for a full description of the interview guide used in interviews with the employees at The Company.

²¹ See attachment 7 for full description of the interview guide used in interviews with The Company’s customers.

drawback with using a joint interview guide was that I felt that I did not get to cover my topic of interest as much as I would have liked, since the other participants' areas of interest also were included. In addition, when we had a time limit of around 45 minute's duration on the interviews it is obvious that this limited the degree of depth to our data. Nevertheless, it worked out well and rich data concerning Adaptive Product Development was gathered. On the other hand, it was advantageous to have a joint interview guide since this offered input to other angles by which to examine the same area of research.

Open ended interviews often are characterized by being interviews that are not structured in concrete questions or the order of the presentation of the questions" (Fog 2004:18, my translation). The interview guide was mostly a guideline for us researchers when performing the interview. It was not a set structure for what and how to talk about the themes in the interview. We emphasized getting a conversation started and then let the informant lead the interview. What characterizes a qualitative interview, which is not a structured interview, is how it follows up what the informants starts to talk about, and which may shed light on the informants understanding of the actual theme (Widerberg 2004:16).

5.2.4 Focus groups

Focus groups act mostly as facilitators of a group discussion (Silverman 2006:110). Half the first day in Stavanger was dedicated to a focus group. Our focus group consisted of four researchers and three of the employees at The Company. The focus group session was started by presenting ourselves and our research areas of interest, along with how the day was planned. The last half of the day was reserved for individual interviews and some observation.

In order to get the discussion started in the focus group, we had planned some key questions:

- What are your main work tasks?
- Who do you collaborate with?
- What tools do you use?
- How do you communicate with a) customers and b) the office in Oslo?

We asked the informants to write down their answers in the form of cues on 'post it' notes and then stick them to a white board. We divided the blank whiteboard into four columns before the session started. One column for each name, as well as one column in the middle were the main points singled out. As seen in Figure 10, these are: Oslo (representing the office in Oslo), "Steinar" (representing the administrative owner of the company), the customers and the employees. They wrote on the post it notes for about 15 minutes and then we asked them to stick them to the white board the appropriate place. While doing this we asked them to explain what they meant by their cues. In addition, we wanted them to draw lines between the other participants. See an illustration of this in Figure 11.



Figure 10: A picture from the focus group session.



Figure 11: The informants placing their post it notes on the white board during the focus group.

It is important to note that one drawback, while choosing interview as a form, is that we do not get direct access to the reality as it is; we get the informants' understanding and interpretation of the reality. This is in line with Silverman when he says that "Interviews do not tell us directly about people's experiences but instead offer indirect 'representations' of those experiences" (Silverman 2006:117).

5.2.5 Participant observation

Before we entered The Company, we were determined that we wanted to do participant observation in the office after we had done the individual interviews. However, this was something that appeared to be not highly advantageous. We asked the informants if they were comfortable with us doing some participant observation, and we got the answer that this was in order with them, but we also got the impression that they were not excited about this idea. They managed to dissuade us from doing so. They were approximately six people at the office that day we visited them, and they had an organisational culture for being quiet. Generally, if they were to talk to each other, they went into an office and closed the door. As a result, the informants were suggesting that it would not be useful for us to do participant observation, since "nothing" happened. However, we tried to persuade them by saying that we could put a camera in one office, but they were not comfortable with this idea. We decided not to go through with participant observation.

Using three different techniques in our data gathering can be somewhat compared to triangulation. If we had been able to use the method of participant observation we would have gathered data representing a form of triangulation, but it did not work out this way. Triangulation means combining different types of methods or techniques in order to corroborate different sources (Silverman 2005:121).

Finally, it should be mentioned that prior to analysis I transcribed the most relevant passages of my data. I started out using a software called Transana which is a tool where text, sound and video can be viewed and worked on simultaneously. However after some technical problems I ended up using windows media player to look at the videos and listening to the sound, while I transcribed using a regular word processor. This switch of technology has to

the best of my knowledge not carried any consequences for my transcribing, interpretation or analysis.

While transcribing I used the signs “((“ and “))” to signalize my interpretation of the underlying meaning in the excerpts in my empirical findings. All of my informants have been anonymized, meaning their names are fictive, and so are the names of The Company and their customers. When presenting the different excerpts in this thesis I will label the employees statements with Excerpt x and so forth and customer statements with Excerpt Kx and so forth.

5.3 Analysis of the material

“The template approach can thus be seen as occupying a position between content analysis, where codes are all predetermined and their distribution is analyzed statistically, and grounded theory, where there is no a priori definition of codes” (King, 1994).

This section will elaborate on how the intermediate terms used to describe the model of Adaptive Product Development emerged as a result of analysis done while screening and analysing data. The form of analysis I used is called ‘template analysis’. This means that neither a top down nor a bottom up analysis of the data was performed, but, rather something in between when the intermediate terms were created as “templates”.

Template analysis is the process whereby “the researcher produces a list of codes (a “template”) representing themes identified in their textual data” (King 1994:118). In the chapter “Empirical analysis” I have named some terms, more precisely the different stages of adaptive development, representing different themes I identified in my empirical findings. After identifying these themes, the data was analysed with this in mind, using these themes as a template. King distinguishes three features in template analysis: *defining codes*, *hierarchical coding* and *parallel coding* (King 1994:119).

Defining codes is to label a section of text with a code in order to index it as relating to a theme or issue in the data that the researcher has identified as important to his or her interpretation (King 1994:119). The first time going through my data I had my research questions in mind, however after going through my data sometimes I ended up with some

codes I found that were interesting according to my research questions. First, I found the codes “inner loop product development” and “outer loop product development” interesting, the former representing product development including only professional developers and the latter representing product development processes where professional developers as well as the customers are included. Then I went through my data again and categorized them with this in mind. The categorization of “outer” and “inner” loop product development may be connected with what King defines as *hierarchical coding*.

Hierarchical coding “is codes that are arranged hierarchically with groups of similar codes clustered together to produce more general higher order codes “(King 1994:119). My codes of inner and outer loop product development are higher order codes, roughly clustering my data into two different terrains. I did this with the purpose of creating some higher order terms, or codes to make an overview of the data. Knowing that my area of interest was mostly on the outer loop product development, the data was analysed again for topics within this domain. It was found that within the interviews there existed some sub processes of outer loop product development. I identified these sub-processes as *Adaptation, Generalization, Tailoring, Improvement Request* and *Specialization*. Using these terms, or codes, as a template the data was searched again in order to support these sub processes. King underlines that “broad higher order codes can give a good overview of the general direction of the interviews, while detailed lower-order codes allow for very fine distinction to be made...” (King 1994:120). Therefore, the identified sub processes can be named lower order codes, since they detail the process of outer loop product development, which is a higher order code. In addition to this, I have coined the inner and outer loop product development as a term, or code. Adaptive product development is the highest level of coding, representing data that consists of the theme product development.

In sum the data has been indexed in the following way: product development, Adaptive Product Development, inner and outer loop product development and different stages of outer loop product development. In the process of going through the data by indexing it into different stages of outer loop product development, using lower order coding, the templates of codes had to be, at times, revised. Initially, only four stages were categorized as outer loop product development (*Adaptation, Generalization, Specialization and Tailoring*). However, after some time of analysing the data I found it more advantageous to revise these by including a stage named ‘Improvement Request’ as well. This is in line with King when he

underlines that often the “initial template applied in order to analyze the text through the process of coding, but is itself revised in the light of the ongoing process” (King 1994:122). If my lower order concept of the different stages is defined as a template, it is reasonable to say that my initial template was revised during my analysis. Also at one point during the analysis one of the categories, or codes, had to be revised in order to give it the right meaning. This was the stage of Specialization that earlier was named ‘in-house development’.

Parallel coding is when the same segment is classified within two (or more) different codes at the same level (King 1994:120). In my higher order codes, outer and inner loop product development, the same data was used within the intermediate term inner loop product development and the lower order code Specialization, which is a stage within the outer loop product development. Therefore parallel coding was used in this context.

5.4 Quality in qualitative research

This section will comment on quality in qualitative research, especially in the areas of reliability, validity and generalization.

5.4.1 Reliability

Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions.” (Silverman 2005:210 referred after Hammersley, 1992)

Reliability is, to some extent, based on the counting of members own categories found in the data set (Silverman 2006:220). In the present data template analysis was used; that is a method which actually, to some extent, includes a sort of counting of the creation of indexial codes, or templates, such as my higher order terms inner and outer loop, or the lower order terms consisting of the stages of product development. ‘Counting’ here refers to when creating higher or lower order codes I go through my empirical data with these codes in mind and find appropriate excerpts in line with these categories, and thereby to some extent count

the phenomenon's treating the same higher order code. "Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions." (Silverman 2005:210). We were always at least two people performing the interview; therefore, the degree of consistency of instances is higher than if it was done by only one researcher. Being two in doing the interviews and two or more when analysing the data was an attempt to overcome the reliability issue. In addition, when using an audio and sometimes a video recorder this also is useful in making sure that the data is captured as it was told. This is in line with Silverman when he underlines that to handle the reliability issue connected to interviews all face-to-face interviews should be tape recorded, these tapes should be carefully transcribed and long excerpts should be presented in the empirical analysis chapter (Silverman 2006:287).

5.4.2 Validity

Validity refers to the truth, interpreted as the extent to which an account accurately represents the social phenomena to which it refers (Silverman 2005:210 referred after Hammersley, 1990). A typical validity issue is anecdotalism, meaning that the researcher only represents a few well chosen examples (Silverman 2005:210). To overcome this issue, I have within each of my intermediate terms or codes represented two or more excerpts to underline that this represents a common issue in the company and not just a deviant case or a one-time issue.

Another area of validity is the impact of the researcher on the setting, the values of the researcher and the truth status of a respondent's account (Silverman 2006:290). When we performed our interviews we somewhat were aware from the start that our presence to some extent would affect the informants, meaning that we would *impact on the situation*. We tried to overcome the issue by preparing by talking about this in the research group before the interviews were conducted. In addition, we told the informants during the interview that we wanted to hear their opinion, not what they thought we wanted to hear. Actually, we sometimes saw that this was helpful and the informant changed direction in his or her answer and became more confident with us and thereby talked more with us.

The values of the researcher shed light on an important issue: all people have some kind of pre-set understanding or assumption of the world; all people also have a somewhat theoretical background in their mind. We look at things in certain ways because we have adopted, either tacitly or explicitly, certain ways of seeing things (Silverman 2006:97). Even though it is promoted to be as “theory free” as possible, all people have some kind of theory or pre assumptions in mind. These pre assumptions are important for the researchers to be aware of when gathering data, so that they do not unintentionally affect the data gathering in a negative way. “Research can never be theory free” (Silverman 2006:97). I tried to have this in mind when conducting the interviews, meaning being aware of my underlying assumptions and theories about the world.

The truth status of a respondent’s account is a difficult issue. Whether the informant gives the truth or not is not easy to determine. However, we tried to overcome this by interviewing several informants at the same office, the same company, as well as interviewing two key customers in order to get as representative data as possible of the reality.

5.4.3 Generalizability

Generalization in relation to the research process has to do with if it is possible to transfer some of the findings of this case and apply them to similar cases. Silverman differentiates between four ways of how to obtain generalizability (Silverman 2005:128):

1. Combining qualitative research with quantitative measures of populations
2. Purposive sampling guided by time and resources
3. Theoretical sampling
4. Using an analytical model which assumes that generalizability is present in the existence of any case

Factor number one is not present in the present case since only the qualitative research method was used. “*Purposive sampling* allows us to choose a case because it illustrates some feature or interest in which we are interested” (Silverman 2005:129). The KIKK case was chosen since because they were going to do research on a software company, which was going through an expansion process and was seeking to implement a new technological tool.

Equally attractive was that the company had a special form of product evolution where the customers play a vital role. In addition I thought critically about the case we studied and chose case on the basis of this, which is in line with Silverman's understanding of purposive sampling (Silverman 205:129). *Theoretical sampling* means selecting groups or categories to study on the basis of their relevance to one's theoretical position (Silverman 2005:13). When selecting our informants to interview we did this with the purpose of the study in mind. Due to an interest in product development at the company, in-depth interviews with professional developers were chosen. Since we were several researchers attending the interview, I had to interview some informants that were not completely in accordance with the present thesis, but the data gathering was organized in such a way that I had the main responsibility to lead the interviews with the professional developers, and the other researchers lead the interviews pertinent to their own projects. Lastly, it is safe to say that within any case, some kind of generalizability may be drawn from the research. "Tap into whomsoever, wheresoever and we get much the same thing" (Silverman 2005:135 referred after Sack, 1985). The Adaptive Product Development process described in this thesis may also be applicable for other companies as well.

Even a single and detailed case study can be opened up for generalizability. A case study can actually say something about how particular sayings or doings are embedded in particular patterns of social organization (Silverman 2005:103). In this thesis, I study how the customers are an active part in the product development process at a Software company. At the end of this study I may be able to say something about software product development including customers. Maybe it is possible to say something about product development in general in an effort of generalization.

5.5 Research ethics

According to Silverman the goals which should be fulfilled in order to achieve ethical research are (Silverman 2006:323):

- Ensuring that people participate voluntarily.

- Making people's comments and behaviour confidential.
- Protecting people from harm.
- Ensuring mutual trust between researchers and the people studied.

In order to perform our research with the present directions concerning ethical issues around doing research and while preserving the audio and video interviews we had to report our research to NSD (Norwegian Social Science Data Services). This was a standardized schema we filled out and had approved.²² As shown in attachment 3 and 6 we informed our informants and customers in an information letter we sent them in advance of the interviews. In the information letter it was stated that participation was voluntary and that they at any time could withdraw from attending the research project. This is in line with the concept of informed consent (Silverman 2005:258). In this information letter we also underlined that all information they share with us is confidential and will be anonymized. One important intention with providing the informants with this information letter was to create trust with the informants before the interview started. Finally, we asked our informants to sign the information letter so that we were reassured that they had read it and understood what it meant to be part of a research project.

Getting access in the field can often take some time. We knew one of the people working in The Company, which gave us easier access. She functioned as a gatekeeper (Silverman 2005:254). In getting access there often are two different research settings: private settings and public settings (Silverman 2005:255). Since we researched an organization, we operated in a private setting. In addition one important issue for us was to use what Silverman defines as overt access, meaning informing subjects and getting their agreement (Silverman 2005:255). We used our contact person, or gatekeeper, to help us spread information.

²² See attachment 2 showing the approval, for gathering and collecting the data in our research project, from Norwegian Social Science Data Services (NSD).

6. Empirical analysis

“...By managing the knowledge of their customers, corporations are more likely to sense emerging market opportunities before their competitors, to constructively challenge the established wisdom of ‘doing things around here’, and to more rapidly create economic value for the corporation, its stakeholders, and last, but not least, its customers” (Gibbert et al. 2002:460).

In this chapter, the most important aspects of the empirical findings will be presented. The empirical findings will be analyzed and compared to theory in the light of my conceptual framework.²³ The data consists of 22 hours with audio and 10,5 hours of video. Naturally, I cannot refer to all of the data gathered; the important events will be highlighted. This is based on the research perspective on the analysis that has emerged in parallel to collecting and screening the data. While gathering the data we used an open interview guide. We collected data in accordance with the chosen research perspectives. My research perspective is how mutual development processes between customers, employees and mediating objects are constituted and maintained.

This chapter is organized in the following way: Firstly, the development of Planner and how it developed in parallel with the expansion of The Company will be shown. The findings showing the development of Planner is a concrete example of customers participating in product development processes. Therefore, it can also be seen as an introduction to what the core in Adaptive Product Development is and it provides a stepwise introduction to this theme before it is elaborated further below. Next, I have conceptualized my main empirical findings in two different empirical models. The first model visualizes the *inner and outer loop product development process* through a macro perspective, see Figure 12. The inner loop development is product development performed by professional developers, and the outer loop development process includes both customers and professional developers. Since my focus is on customer-initiated product development, the focus will naturally be on the outer loop development process. As a result, of this I have categorized the outer loop product development process into five different trajectories: *Adaptation, Specialization, Generalization, Improvement Request and Tailoring*, see Figure 13. When discussing and analysing these stages, the following structure will be used: 1) empirical findings will be

²³ See section 3.1 for an elaboration of my conceptual framework.

presented, mainly structured by intermediate terms, and 2) a theoretical analysis of the presented excerpts will be given. The conceptual framework is the starting point for the analysis. It consists of four different theoretical positions introduced in chapter 2. Theoretical perspectives are KIF, Co-configuration, Meta-design and Modding. Not all of the theories within the conceptual framework will be used for analysing all of the moments within Adaptive Product Development. To be economical and avoid repetition the most relevant theories have been chosen and used on the most relevant stages in Adaptive Product Development. A discussion and summary of which theories are applicable to which moments in Adaptive Product Development will be given in chapter 7.

6.1 The development of Planner

This section underlines how Planner has developed in parallel with the development of The Company as a company. Planner has developed from a relatively simple product to a more complex product over several years. At the same time, The Company as a company has expanded and developed over time. The excerpt below is from an interview at The Company's office in Stavanger, in December 2006.

Excerpt 1:

Question; Can you tell me something about how Planner has developed?

Answer: Yes, well, Planner is only one of our products; it is kind of the little brother product. It started out with that it was supposed to do the few things you really needed. You see, many people have been complaining that Microsoft Project has too many functions and menu choices, so they do not understand how to use it. What you found out how to do last Tuesday, you don't remember today, right. Our scope was to make a product which consisted of the 20 % of functions you use in 80 % of the time; that was the scope when we started (the company) It was supposed to be a quite simple product, which could make simple plans easy and quick, as well as be easy to print. Microsoft Project earlier had problems with printing, but we have not tested their latest versions, but it used to be problems there with printing, it did not get printed the way you saw it ((on the screen)). Our main customer, OilCompany, has developed ((and expanded)) themselves, which lead to spreading this [pointing back to the product] all

around, and then we have got more questions about making new functionality on the product. We have agreed in doing this as long as they pay for the product development. As a result, there has become more functionality on the product.

Planner is one of the core products the company originally started with. As explained in the context chapter, Planner is only one of The Company's products, nevertheless it has played a core n important role in the company's development. The Company started out as a relatively small company with a stable customer mass. At that time, they had the resources to offer their customers personal and specialized service. This often included fulfilling the customer requests towards new functions on different products. Planner was one of the products that rapidly evolved to become more complicated because of the feedback from the customers. This increasing feedback naturally had an effect on the company's development. As The Company grew in number of staff and customers, they continued to offer their personal service, resulting in even more customers who wanted extra functionality to their products. The product development is parallel with the company's development in general. The company's expansion took place simultaneous to product development and also became more complex.

The relationship between Planner and Project

In the excerpt (1) above, the informant underlines that Planner is the "little brother" product. The reason why Planner is named "little brother" is because it is a less complicated project management tool than Project. The relationship between Planner and Project is important in order to understand how the expansion of The Company influences the development of their products. Planner and Project are different products with different intentions. The intention of Planner is that it is intended to be a relatively simple and easy to use already from the birth of, even though it is complicated in its own way. Project was intended to be a more advanced and complicated product. More about the consequences of the relationship between these two products will be elaborated at the end of this paragraph.

Parallel co-evolution between the Company and its products

Excerpt 1 also emphasizes that Planner started out as a relatively simple product. As mentioned in the excerpt, the slogan was to produce a product which contained 20% of the

features you use 80% of the time. Planner is still a relatively easy product, compared to Project, which is why it got the name “little brother project”. Nevertheless, Planner has developed and become more advanced than it was in the beginning. The references to Microsoft Project could suggest that Planner, as an easy and simple product, was a type of competitor to Microsoft Project. One interpretation may be that the employees at The Company understood that there was a market for an easier project management tool. Furthermore, the informant in this excerpt states that their main customer, OilCompany, has been the initiator of further development of Planner. This was again a result of how OilCompany developed as an organization and therefore needed further functionality, which they asked The Company to tailor for them. Product development has mainly been driven by their customer’s initiatives. By adapting the tool upon request, The Company has fulfilled their customer’s needs. Another important issue in this excerpt is that the development of Planner has not been a one-time development. The product has continually evolved to meet customer needs over several years. Finally, this is not a smooth trajectory, but a complex one interrelated with contradictions and tensions. Naturally, when the customers and the professional developers meet, there have to be negotiations of how to change the product. There are several stages here, some that are problematic, others that are not. Negotiating can sometimes be a difficult processes, as well as fruitful. Unfortunately, no data was gathered showing negotiation, there is data with customers telling about how they negotiate with their customers.

The excerpt below (2) underlines the development of Planner, from an easy-to-use to a more advanced product. It is from a focus group interview conducted at The Company’s office in Stavanger, during December 2006. The people present were professional developers, as well as one project coordinator. This excerpt is from after lunch, rather late in the interview situation. There is only one person who is referenced here, called Informant 1.

Excerpt 2:

Informant 1: Like, Planner which originally/first was a simple system, or simple is relative of course, but there have become so many functions in that system that it has become a different product than it was the time it was ((originally)) developed. It ((the original product)) has become a much more complex system, which ((originally)) had a simple starting point.

As mentioned above, the original intention of Planner was that it was supposed to be an easy project management tool, but after receiving numerous requests from several customers wanting different specialized functions, Planner developed into a more complex and specialized product. Nevertheless, it was not the intent for The Company to make simple products more complex; it happened as a result of the customers' Improvement Requests.

Later that day, when interviewing Informant 1 alone, in an open-ended interview, she had another comment on the development of Planner.

Excerpt 3:

Question; Can you tell me something more about Planner, which you mentioned earlier, how it has developed?

Answer; Planner can be compared to Microsoft Project. An advantage of Microsoft Project is that Planner is easier ((to use)), and it has developed mainly from ((feedback from)) our customers. But I am not the right person to answer about issues around our products.

Roughly, it has changed a lot. But someone will say that it has grown into too many functions. For example, I know someone in OilCompany that thinks it is overloaded with features.

This excerpt underscores that Planner has developed to become a more advanced product than it was originally. The informant says that Planner is an easier product than Microsoft Project. Even though Planner has evolved to be more advanced, as already mentioned, it is not too complex to use. A possible interpretation of this contradiction may therefore be that Planner still is a relatively easy product to use compared to Microsoft Project. However, it has become slightly more difficult to use because of the new features which are continually added through the interaction with customers and influenced by the evolution of the company as well.

It should be mentioned that The Company has other products where especially Project is interesting to mention in this context. The intention of Project is to be a more complex and specialized product concerning project planning than Planner. As they underline on their webpage Project is a “powerful tool for Project Control”²⁴. Project is intended to be a complete project management tool. Therefore, in comparison to this, it is reasonable to say that Planner still is rather easy, but has been tailored to meet customer requests. A result of

²⁴ www.TheCompany.no/project.htm. Date: 15/2-08.

this may be that Planner has become even more useful to their customers, since it has changed in accordance with what some customers wanted. However, it should be mentioned that since Planner successively increases in complexity in accordance with the company's expansion, tension may arise between Planner and Project. If Planner continues to evolve, as it most likely will, Planner will become more advanced, which may create some tension with Project's intension of being the product reserved to be the complex one. The Company has sought to aim at different customer groups, and if this division between the products and their intentions becomes blurry, this may have a negative effect on the customers if they are unsure what the difference is between some products. The worst case scenario would that some customers choose the wrong product and do not feel that their needs and expectations are fulfilled.

The development of Planner may be seen *as an example of Adaptive Product Development*, which is always characterized by a high degree of customer involvement.

6.2 Adaptive Product Development

Developing products with customers as a vital part is an increasing and important phenomena, as shown in earlier literature review chapters. Adaptive product development means product development which may be tailored in coherence to either customer or employee demands. In my empirical findings I have found two phenomena in connection to Adaptive Product Development, which are of interest. The first phenomena I want to address are what I will refer to as the outer loop process.

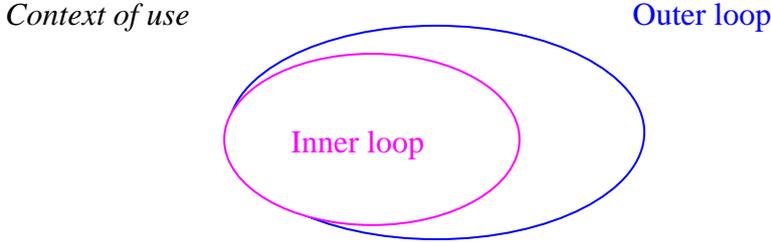


Figure 12: Adaptive product development; Inner and outer loops. A presentation of the components within Adaptive Product Development.

Put in its simplest way, the outer loop process may be defined as a product development process where the customers are a central part of the development process. Inner loop process is the development where professional developers are the central actors. I only give a short introduction to the inner loop here because this is not the main focus of the thesis. These processes are visualized in Figure 12. The intention of Figure 12 is to simplify and give a stepwise introduction to the complex Adaptive Product Development processes at The Company, especially within the outer loop product development. Figure 12 focuses on the components in the Adaptive Product Development process. The outer loop process makes the longest trajectory of development, since it includes both customers and professional developers. Inner loop development consists of professional developers doing software development; therefore, it has a shorter development trajectory. In addition, the inner loop does not overlap or interact with the outer loop. The outer loop interacts and overlaps to some extent with the inner loop. This section assumes two different levels of models; Figure 12 makes out the first level of the model, consisting of both inner and outer loop development processes and provides a macro perspective on the Adaptive Product Development processes. The second level of the model, Figure 13, represents mostly outer loop processes, which will be presented below. As we move downwards in the different levels my focus of research is narrowing down correspondingly.²⁵ The reason that Figure 13 mostly represents outer loop process is because it contains an element which may include the inner loop product development process as well, but this component will not be given great attention. This will be further elaborated below. Outer loop product development processes will now be presented.

6.2.1 Outer loop: Analysis of customer–developer interaction

In this section I will show how the customers can be part of product development processes through five different variations of the customer-company-product relationships, as visualized in Figure 13. Customers contributing in the development of the products bring value to the company. These four relations will be elaborated below through the empirical findings. Naturally, the focus will mostly be on the outer loop process, since it is this loop that includes

²⁵ This is naturally done in coherence with my research questions.

the customers. Outer loop product development refers to a situation where the customers request new functionality on already existing products or tailor products to their local needs. Often as a result of these requests, the company decides to develop further the existing products in accordance with customer needs.

To better understand the Adaptive Product Development process that occurs in the outer loop process, I have made a categorization of five different stages of development:

- *Adaptation*: Adaptation is when a customer requests an improvement to an existing product and the company chooses to fulfill the request. It becomes an Adaptation just for this specific customer. Sometimes the customer has to pay for this; other times not.²⁶
- *Specialization*: Specialization is when the professional developers at The Company create in-house builds. This is common in inner loop development processes where they improve the products for their own internal work as well. This could have the potential of introduce new product features, but most often it entails perfecting the product and to remove bugs.
- *Generalization*: Generalization occurs when a new version of an existing products is released and is available to all customers.
- *Improvement Requests*: This is when customers enter requests to The Company about extra functionality, bugs etc., and viewed from the customers' perspectives.
- *Tailoring*: Tailoring is characterized by involved end users who make adaptations on their own.

I have conceptualized these five stages in a model named Adaptive Product Development visualized in Figure 13 which consists of the five stages of development described above. The Adaptive Product Development model illustrates the empirical findings and analysis. The arrows in the model indicate that a process of Adaptive Product Development may go in several directions. The relationship between these arrows is mutual, meaning that theoretically a product development process may wander between all stages during a long time period. This model has emerged during my data collecting and analysis. In addition, the model narrows down my research area. My focus is mainly on the process of Generalization and Adaptation,

²⁶ More about these nuances within the stage of *Adaptation* will be explained below.

since it is in these phases that the customers are involved. In addition, the primary goal with the model is to visualize and conceptualize my empirical findings, with its focus on customer-initiated product development. Roughly, the model represents who the initiators of further product development are, not who actually does the product development. It is divided into two different contexts: customer-initiated activity and developer activity. *Tailoring*, *Improvement request*, *Adaptation* and *Generalization* are activities that are initiated by customers, whereas *Specialization*, partly *Adaptation* and partly *Generalization* are initiated by developer activities. Furthermore, the phases of *Adaptation* and *Generalization* are visualized as being placed halfway in the developer activity and halfway in the customer-initiated activity. This is because the stages of *Adaptation* and *Generalization* usually are initiated by customers, but it is the professional developers performing the actual programming, who thereby have the power to judge if the Improvement Requests entered from customers should be fulfilled.

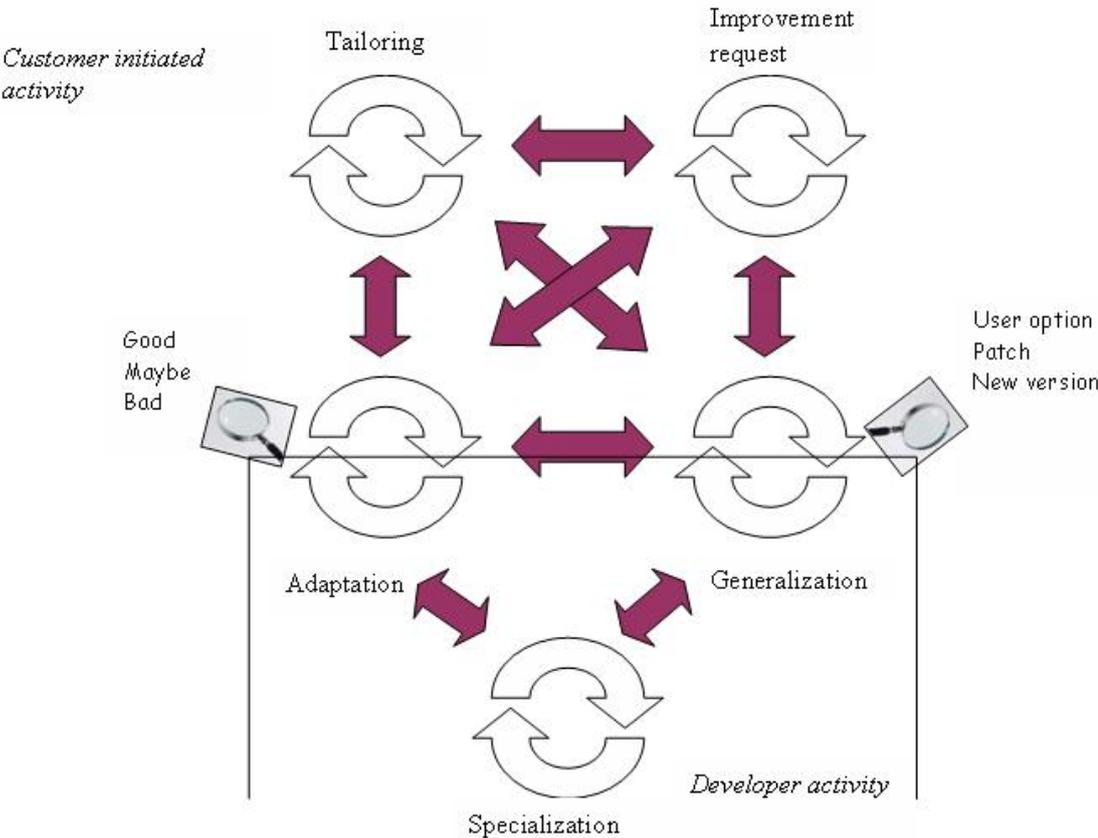


Figure 13: Different stages of Adaptive Product Development.

This conceptual framework will also be used as a structure for presentation of the empirical findings in this paragraph. Therefore, I will start with introducing the stage of *Adaptation* by showing excerpt 4 as a clarifying of the informants’ perception of the terms *patch*, *build* and *version*. Excerpt 5 and 6 also underline the process of Adaptation: Excerpt 5 shows how customers enter requests for further development of the products and excerpt 6 shows the nuances in this process. Then the stage of *Specialization* will be presented by showing the excerpts 7 and 8 as underlining that the developers perform in-house development. Excerpt 9 will underline the stage of *Generalization*. It may be seen as an example of where a product becomes available to all customers. Furthermore, excerpt 10 is presented as an example of how often Generalization actually occurs. Following is another example of Generalization presented in excerpt 11. Then the stage of *Improvement Request* with the excerpts K2, K3 and K4 points at how customers enter requests to The Company. Finally, the stage of *Tailoring* will be presented with the excerpt K5, showing how a customer with good programming skills made an adjustment of the product himself.

Adaptation stage in outer loop product development process

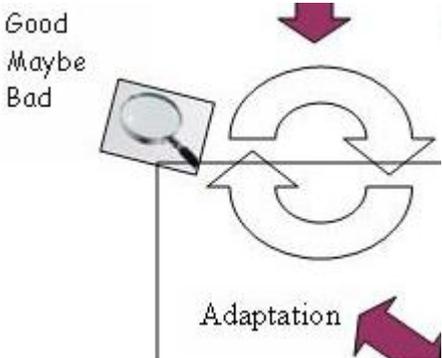


Figure 14: Stage of Adaptation

If a customer is not satisfied with a product, for example a software product, the customer may contact the producer and ask them to modify or add features in accordance with the customer’s needs. A company may fulfil the request if the customer pays for it, or it may fulfil it anyway when it is judged to be a good suggestion. This is what I defined as the process of

*Adaptation*²⁷. An elaboration of this stage can be seen through the sub processes of categorizing customer initiatives as *good*, *maybe* or *bad*. An Improvement Request is labeled *good* when the customers do not have to pay for the development. It is labeled *maybe* when the request for new functionality is accepted, but the customers have to pay for the development. Finally, an Improvement Request is labeled as *bad* when the company rejects to fulfill this customer's needs. If a request is categorized as *good* or *maybe*, the next level within Adaptation takes place. It is during the second level of Adaptation that terms like patch, build and version become relevant, as will be explained in excerpt 4.

Excerpt 4:

“There are three levels; we have a so called patch which is a quick fix to some sort of a problem. This is being sent out to the customer, which is a ((solution)) just right there and then. After the customer installs the patch, tests if it works and then the problem is fixed. After a while, when we have made enough patches like this, we find new errors and the customers find errors and then we make a new complete program that is what we call a build. On top of this we have something we call versions; they could be ((called)) 3.4, 3.5, 3.5.1. They have more content and much more functionality.”

In this excerpt the different terms patch, build and version are explained. Patch, build and version are the developers' response to customers forwarding Improvement Requests in the stage of Adaptation. *Patch* is understood as a quick fix to a problem. Patches are packaged extensions that fit specific versions. For example, if Word is being used to write some text and one's references in EndNote²⁸ are lost each time text is converted into PDF, The Company could be contacted²⁹. They will fix it and send back a so-called *patch*, which is small program that may be installed on the computer and linked with the main program, and the problem is fixed. *Builds* result if The Company has had many quick fixes, similar to the example with Word, and 2nd order problems emerge (i.e. problems connected to the compatibility of patches). Then they create a *build*, which is a single compiled program (not

²⁷ Adaptation is my own categorization label slightly adapted from the data. This also counts for the other stages within Adaptive Product Development, such as: Specialization, Generalization, Improvement Request and Tailoring. This is also the case with the labels good, maybe, bad and patch, user option and new version.

²⁸ EndNote is an add-on to Word which is used to systematize the references used in a document.

²⁹ Of course does not The Company work with Word, EndNote and PDF, which are only used as examples here. The Company does similar improvements on The Company's own software.

separate patches). Finally, a new *version* is an extension of builds, but includes more new functionality and features. A *new version* is a stable system given to the customers when they are due for an upgrade according to their contract.

Excerpt 5 will focus on how to judge the Improvement Requests of the customer, which also includes a power (in terms of decision-making) aspect of what sort of Improvement Requests to take into consideration. The power to judge whether or not a customer Improvement Request should be accepted lies in the hands of the professional developers at The Company. This excerpt does not go into detail about how exactly these Improvement Requests enter The Company, but it does elaborate in what way the customers ask for Improvement Requests.

Excerpt 5:

Informant: often when they ((the customers)) want Improvement Requests they ask me if I can make a change ((to the existing product)), according to some needs they have. In addition they put it ((the Improvement Request)) into a list we have on the internet. We receive a lot of Improvement Requests and some of them are actually such good ideas that we want to integrate them into our products. And there are other ideas that are really bad. There are also some ideas that are not so good ((but they are doable)), therefore we incorporate them if they pay for it. When doing this we make special libraries for that particular customer. Then this does not become a part of the system ((the product)).

Excerpt 5 starts out with the informant saying that when the customers want extra functionality to their products, they will get it if they pay for it, assuming it makes sense. This is actually a turning point in the present empirical findings, because this is the only informant who shows an economic perspective of product development. Maybe this is because it is an underlying assumption, by professional developers, that the customers have to pay for their requests associated with further development of the existing products.

The excerpt is another example of how the customers propose changes to The Company's products. Furthermore it is said what an Improvement Request is: it is when a professional developer creates a new feature to an already existing product in accordance with the customer's demands. At the end of this excerpt the informant introduces the theme of how they get both good, maybe/doable and bad ideas for further development. When an idea is

categorized *maybe* it means that the idea is plausible, but will not become a part of the general product. Instead it turns into a local Adaptation. Excerpt 5 is an example of the sub processes within the process of Adaptation. The Improvement Request received by The Company's developers may be labelled *good, maybe or bad*. If an idea is labelled *good* it is accepted as it is. An idea labelled *maybe* is accepted under contract (with payment). Finally, an idea labelled *bad* is outright rejected. Implicit in this example lies an assumption that the employees at The Company judge if the Improvement Requests they receive are in the category of *good, maybe or bad* and that they have the freedom to make those distinctions.

How to judge what category an Improvement Request should belong to is not a straightforward task.³⁰ Some sort of common ground or common meaning about what is good and what is bad needs to exist among the developers. When The Company was a smaller company this grounding of common understanding happened naturally since they talked together on a daily basis. When staff increased and offices were distributed, this process became increasingly more difficult. Therefore there may now be a need to formalize what is meant by *good, maybe and bad* ideas. Excerpt 6 below (from day 1 of data gathering in December 2006) helps us elaborate on how the Improvement Requests are differentiated.

Excerpt 6:

Question: So, the rationale for a given upgrade lies at a specific customer, which means that a customer can be a part of setting the standards for what other customers receive?

Answer: mm, but if what one customers suggest is far off, then we just make a local adaptation for that specific customer.

Question: So, then this becomes a new version for you then?

Answer: What we have in addition to every menu choice is a so called user option, it is placed in an own library which can be linked, that allows us to do further product development.

What triggered the statement above is that one of the interviewers asked how The Company develop their products. In sentence number two the informant answers that if the customer's request is "far off" they just make an Adaptation for this particular customer, as long as the customer pays for it. As mentioned above, this corresponds with an Improvement Request

³⁰ It should also be mentioned that the topic about how to judge the product development ideas The Company receive from their customers has also been, to some extent, elaborated in excerpt 9.

labeled *maybe*. The current excerpt shows how an Improvement Request labeled *good* may become available for all customers. An interesting aspect in this is how the informant agrees that the customers are to some extent setting the standards for what other customers receive of product upgrades. They do this through being active with respect to suggesting Improvement Requests and other customer-initiated activities like Tailoring.³¹ The drawback to this may be that it is important that the customers are up to date on relevant domain knowledge so that their Improvement Requests are in fact good ones. If not, the risk may be that they give The Company more work to than necessary.

Analysis and comparison to related work

Co-configuration

Adaptation as described above has some commonalities with Engeström's notion of Co-configuration work.³² Factor number two in the definition of Co-configuration is about the *mutual exchange between customers, producers and the product-service combinations* (Engeström 2007:24). Mutual exchange occurs in Adaptation as well, between the customers issuing requests to The Company and the professional developers handling these requests. The exchange for customers is getting the development they want, while The Company receives money for performing the development (or more satisfied customers). If the customers suggest ideas that are labelled *good*, they do not have to pay for the development. Then the mutual exchange is even clearer. The customers get their software products adapted in accordance with their needs and the professional developers get good ideas for improving their products, which they may choose to incorporate into the product in general. This also has some elements in common with how Engeström underlines that *within Co-configuration multiple producers need to operate together in networks within or between organisations* (Engeström 2007:24). When the customers and the company collaborate in the product development process, they construct a kind of network between the organisations. However, this depends on how *network and producers are defined*. If we temporarily define a network to be two or more different parties involved, The Company and their customers would make out a network between the organisations. In this way The Company's customers are considered co-producers. However, this is only valid if the customers are indeed *producers of*

³¹ See the section of Tailoring and improvement request for more information.

³² An elaboration of how Engeström defines Co-configuration work is given in chapter 2.3.

ideas. This may apply to some but not all of The Company's customers. However, in Co-configuration work the customer works closely with professional developers, so it may be relevant to define customers as "producers of ideas," or contributors as Fischer would call them (Fischer, 2007B), and the term contributors has a lot in common with the term producer. Victor and Boynton say that there is a very close relationship between the customers and the professional developers, when saying that customers become "real partners" with the producer (Victor & Boynton 1998:199). A producer has a greater focus on the production process than a contributor has. The customers at The Company can be seen as *producers* when entering ideas, even though they are not performing the actual production process. In other words, they are contributors when it comes to product features; the customers contribute to the Adaptive Product Development process by producing ideas and contributing with features (from bug reports to Tailoring) that The Company's developers incorporate into the system. Therefore, it can be said that at The Company there exists a network between multiple producers (of ideas) in networks doing Co-configuration work.

According to Engeström, Co-configuration *emphasizes active customer involvement and input, and enables mutual learning from the interactions between the parties involved* (Engeström, 2007). During Adaptation there is active customer involvement and input from the customers. For example, when customers ask The Company to add extra features to their products, they give input to The Company by giving them different ideas concerning product development. Though they are actively engaged in the product development process, this input is limited to offering ideas and not doing the development themselves (but see Tailoring section for a more nuanced picture). Mutual learning occurs at The Company when the developers get good ideas from their customers and the customers receive enhanced products which they have to learn how to use. This is similar to Bjercknes et al.'s description of mutual learning, that developers learn from users and users learn from developers (Bjercknes et al. 1985). In their Florence project, mutual learning was found to be important when pointing out that nurses, acting as users, learn from the system developers and how the system developers learn from the nurses (Bjercknes et al. 1985). Getting new ideas of how to adapt their product may escalate some learning processes for the professional developers at The Company. The professional developers may, for instance, through problem solving and framing of problems, learn new ways to program solutions or add-ons to the products etc. Often customers learn through performing their work; however, when they meet problems, they usually are interested in learning enough about the system in order to solve the problem and be able to

continue where they let go. This is related to what Mørch et al. refers to as "learning scenarios," which are visualizations of future work situations with the use of theatre techniques (Mørch et al. 2004:146).

Meta-design

Adaptation can be compared with the SER model, where Fischer distinguishes *Seeding*, *Evolutionary growth* and *Reseeding*. In the *seeding* phase the main impetus is to collect domain knowledge that should be designed to evolve over time (Fischer & Ostwald 2002:136). Both users and developers are active in the seeding phase. The Adaptation stage can be seen as an example of *(re)seeding*. When customers enter ideas for further development, this provides user input to the *(re)seeding phase*. The creation of a new version (build or release) by the developers is an example of reseeded. When the customers use the products, they may convey areas where they feel that the products do not fulfil their needs. In these cases the product may be said to be a part of an *evolutionary growth* process when it is used in the different customer organisations. However, this is not something that is explicit and done consciously by the professional developers at The Company. The elements of *evolutionary growth* that occur with, for example, Planner are often unintended side effects, having been a part of product feedback that was not initially planned for or sought after. The evolutionary growth happens naturally through everyday use of the product, including identification of breakdowns (problems or inefficient tasks), suggesting areas of software that should be improved, and submitting Improvement Requests or doing local development.

The last phase in Fischer's SER model is *the reseeded phase*, where the professional developers do substantial modifications on the systems (products), and this being a stage of information sharing (Fischer & Ostwald 2002:136). In the reseeded phase, it is the professional developers who do all the programming and development of the products, even though the customers are active parts in giving ideas and issuing their requests. This is in line with how the process of Adaptation of products at The Company proceeds. The customers are active parts and enter ideas and requests of how to change the product, whereas the professional developers perform the development. Excerpt 4 above defines three different levels of product development: patch, build and version. This has a lot in common with the example Fischer uses to explain the reseeded phase where open source software systems often evolve for some time by adding patches (evolutionary growth), but eventually require major reorganizing in order to incorporate the patches in a coherent fashion (reseeded)

(Fischer & Ostwald 2002:136 referred after Raymond & Young, 2001). In excerpt 4 it is evident that Software development at The Company, to a large extent, proceeds like Fischer describes with the SER model. First the product evolves locally as a result of patches created in response to customer requests, and when this becomes unwieldy the professional developers at The Company create a build. Lastly, when the modifications become many in number, they create a new version of the product. However, Fischer does not distinguish between build and version. He uses the term reseeding for all developer activity associated with reorganising multiple local versions (patched systems) into unified (seamless) versions. For example, Planner evolved like this, see excerpt 2 and 3. In addition, these patches and builds are often made as a result of customer feedback on the products.

In the following statement, Fischer makes clear *how the SER model is motivated by input from users*, which in many cases were not predicted from the professional developers.

“The SER model is motivated by how large software systems, such as Emacs, Unix, MS Word, and MS Office have evolved over time. In such systems, users develop new techniques and extend the functionality of the system to solve problems that were not anticipated by the system’s developers...” (Fischer 2002:9).

This has a lot in common with Adaptation at The Company, since the customers frequently ask them to develop specific features. The features requested are, most often, not what system developers have anticipated since they are not included in the product in the first place. One of the reasons why the customers ask for unanticipated Improvement Requests can be that the customers experience situations in everyday use of the product, which the professional developers do not. These two contexts rarely coincide. In addition, customers sometimes have company specific needs, which are difficult for the professional developers to incorporate in the general product. This means the professional developers have to take into consideration that they, at some point in time, will have to make Adaptations towards specific customer needs even if the request for change originated late in the development process. What the customers want is usually very specific for their organisation; therefore, when professional developers make an adaptation just for these customers, it is a prime example of what I mean by Adaptation. However, when Fischer states that the system developers have not anticipated all the requests they receive, this is not entirely in line with how it occurs in the present empirical findings. Though the professional developers cannot, by hindsight, anticipate and predict all the features and function customers want of a software program, they do not want

to make all features available to all users because they are too specific and would lead to featurism (unnecessary features added to a product for which one only uses a few). Another aspect of this is that they cannot make a project management tool that is overloaded with functions because it slows down work and the learning curve becomes high. However, to meet the customers' needs, The Company invites the customers to put forward Improvement Requests, as is shown above.

In the SER model, Fischer distinguishes between *design time* and *use time* (Fischer 2002:9). In design time system developers create environments and tools, and in use time users tailor the system themselves (Fischer 2003:88). This thesis I will argue that design time can be seen as an example of inner loop³³ product development and use time as an outer loop product development. The SER model combines elements of both inner and outer loop product development in the same model. In this setting this means that adaptation when seen in the light of outer loop product development can be analyzed against Fischer's term *use time* and *design time*. Adaptation actually covers the whole SER model meaning both design time and use time. *Use time* can be mentioned as an example of the outer loop development process through the stage of Adaptation, since it includes both customers and professional developers. Within the stage of Adaptation, The Company's customers are actively engaged in forwarding ideas concerning further development of the products, and, depending on the level of the request, the professional developers usually listen to their customers' demands and create and extend adapted products. The professional developers are the ones who receive the Improvement Requests and decide whether to fulfil them or not. During Specialization, the focus is on the activity of professional developers and therefore what Fischer calls design time.

When Fischer states that the SER model "postulates that systems that evolve over a sustained time span must continually alternate between periods of *unplanned evolution* and *deliberated (re) structuring and enhancement*" (Fischer 2002:9), this is also characteristic of Adaptation. Customers using the product, submitting Improvement Requests and doing local Tailoring are examples of unplanned evolution. Restructuring is the developer activity that includes deciding whether or not a customer's initiative is labelled good, bad or maybe. It is called unplanned evolution because the request for new functionality was not something the professional developers at The Company anticipated. This is also in line with Fischer when he

³³ This will be discussed in the theoretical discussion of the stage *Specialization*.

says that future users and problems cannot be completely anticipated at design time, when a system is being developed (Fischer 2007A:1). The reason the professional developers cannot anticipate unplanned activities is that the project management tool is being used in so many different contexts and customer organisations; different contexts require different adaptations of the products. It should be mentioned that the SER model encourages users to be active in the same way as the Adaptation stage does. The SER model supports that the users should act as designers in their own way, rather than as passive consumers of the tools (Fischer 2002:9). Excerpt 5 and 6 are examples of where customers initiate further development of The Company's products and drive the development forward. In this setting, the divide between customers and professional developers is clear: the customer may enter ideas or make local modification and the professional developers perform the Adaptation of the products at a more general and optimized level. Though customers in the Adaptation stage do not act as designers, that is, performing actual development, this does not mean they are passive. However, it should be mentioned that the users in the *Tailoring* stage act as designers when they create extra features to the products. When The Company's customers suggest new ideas to the products, they are active participants in the development phase. Therefore, the Adaptation stage has several elements in common with Fischer's SER model and the Meta-design approach. The customers are allowed to act as designers when they do Tailoring, but not when they provide Improvement Requests. Whether this is a weakness or not, is an issue open to discussion and further work.

Fischer states that one of the aspects in Meta-design, which is in the spotlight today, is to recognize and *reward users that contribute* to product development processes (Fischer 2007A:4). Customers proposing suggestions on further product development, which are labelled to be good, meaning it will become integrated to the product in general, get the product development without paying.³⁴ Therefore the customers get rewarded for entering good ideas, which is in line with Fischer's statement above. However, ideas labelled maybe, meaning the customers which have to pay for their development, which belongs to the stage of Adaptation, are not rewarded in this manner.³⁵

³⁴ In the stage of adaptation it is described in more detail about how an improvement request is labelled good and the consequences of this.

³⁵ In the stage of adaptation it is described in more detail about how an improvement request is labelled maybe and the consequences of this.

In the Adaptation stage, *Modding* can be applied to show how the original products at The Company are the background for further development of the products and how customer Improvement Requests may result in different variations in the degree of change. Modding is characterized by users modifying existing products, with the original product serving as a platform for further development (Jeppesen 2004:5). In the stage of Adaptation, the customers enter Improvement Requests to The Company on the basis of already existing products that they have been using on their workplace. In this way, it could be said that The Company's products serve as a platform for further development of the products. The outcome of *Modding*, called *mods*, range from minor alterations to very extensive variations of the original product (Jeppesen 2004:2). This is related to Mørch's distinction between simple extension and complex extension in end-user tailoring (Mørch 1997:59). The outcome of customers' proposed changes to The Company's products may take on two forms: First, they may result in a categorization of the ideas into *good, maybe* and *bad; and second, they* can lead to the development of new patches, builds or even versions. Making adaptations to the products can result in minor or greater changes.

Knowledge intensive firms (KIFs)

Alvesson underlines that knowledge intensive firms (KIFs) employ *highly qualified knowledge workers doing knowledge based work* (Alvesson 2004:7). Clearly, the professional developers at The Company are knowledge workers and perform knowledge based work. When they develop products they are using their intellectual and analytical skills (Alvesson 2004:7), not their bodies which is the opposite of doing knowledge work. In addition, along with their formal education the professional developers at The Company have more than 20 years of expert knowledge in using and developing project management tools. They are highly qualified knowledge workers, performing knowledge based work.

When it comes to the *degree of autonomy and the downplaying of the hierarchy* (Alvesson 2004:7) both of these aspects are apparent at The Company today. Autonomy can be divided into two aspects: the degree of having the authority to make decisions and the degree of deciding how to accomplish the work tasks. The Company's developers have a relatively high degree of autonomy when it comes to making their own decisions. This is intertwined with their high level of competence and knowledge. Upon observation, it is clear that they are individuals doing their work in their own way, without any strict rules for how to perform it.

Having the authority to make decisions when it is necessary requires having the appropriate knowledge at hand. The employees at The Company are experts, since they have a lot of experience in using project planning tools, as well as they have the knowledge. Based on direct observations and interviews, I got the impression that the professional developers at The Company have a lot of control and autonomy in what kind of work tasks they choose to do and when to accomplish them. A further aspect is how having this autonomy and the downplaying of hierarchy includes an aspect of *judgement*. As explained in excerpt 5, how to decide if an *Improvement Request* is *good, maybe* or *bad* is something that is up to the professional developers at The Company to judge. At the point of collecting the present data, there did not exist any kind of guidelines as to how to make such decisions.

The need for extensive communication and coordination is raised by Alvesson as an aspect of KIF (Alvesson 2004:7). The Company has been a small company where all of the professional developers were situated under one roof. However, the recent expansion³⁶ has created the need for extensive communication and coordination.

Alvesson also underlines the importance of having *idiosyncratic client relations* (Alvesson 2004:7). As shown in the empirical findings, The Company operates with personal client relations, and this has been their main strength from the beginning. The client relations The Company has are also personal in the manner that they are individualized for each customer, which Alvesson refers to as *idiosyncratic relations* (Alvesson 2004:7).

Information and power asymmetry as part of a knowledge intensive firm (Alvesson 2004:7) can be discussed in two ways. Firstly, it could be interpreted to which extent the customers are sub ordinate to the professional developers concerning the degree of expert knowledge. Second, it could be interpreted as to who has the final power in deciding what to do in a given situation. The majority of The Company's customers are what can be defined as knowledge intensive customers. This means that they have a lot of expert knowledge about the products, mainly through experience. Therefore a great degree of information and power asymmetry in this manner is not apparent. As to the second way of viewing information and power

³⁶ See chapter 4.3.3 for an elaboration of the expansion process.

asymmetry, at The Company it is obvious that the professional developers make these decisions.

Specialization stage in outer loop product development



Figure 15: Stage of Specialization

In many software companies it is customary to employ professional developers who have product development as their main work task. They perform research on and drive the development of the products in the company forward. This may be done individually or in teams with other professional developers employed at the company. As depicted in Figure 15, I refer to this as the process of *Specialization*. I will not spend much time to this stage of development as it is partly outside the scope of my thesis.

In Figure 15, the possibility to go through the different stages in the model of Adaptive Product Development is visualized. The relations and possible transformation trajectories the products may pass through include or start within the stage of Specialization. Specialization is meant to improve a product in self-directed ways, for instance as a result of an error detection test, identification of areas that need a second round of development, refactoring of code for removal of redundancy, and optimization for better performance of product (faster execution and efficient use of resources like memory). It is likely that a product or feature the professional developers have developed isolated from the customers may be reacted to by customers in different ways, for example through Tailoring. One of my main points of the empirical chapter is that the producers at The Company are open to for further customer-initiated development of the products at any time in the development stage, regardless of which stage it originated in: *Specialization, Adaptation, Tailoring or Generalization*.

Specialization is the main activity of the inner loop development process. Actually, the description of the inner loop and the Specialization stage overlap, or are more or less the same. Within the inner loop development process the intention is to underline that it is the professional developers at The Company that actually have the power to determine and make decisions concerning issues around further product development. In this manner the customers have no formal influence on the direction of the development. To underline that the developers at The Company are the ones who decide and direct the actual product development forward by among others incorporating the suggested changes from customers, excerpt 7 will be introduced. “Tom” and “Nils” work as professional developers, whereas “Petter” is the manager.

Excerpt 7:

When it comes to that which is about customers and product development it is “Tom”, “Nils” and “Petter” who discuss what we should do with the products, how we are going to develop them even further, they are the ones involved in that area.

This excerpt makes clear that the employees at The Company initiate development of their products. When the professional developers are the ones proposing changes to the products, they are in the unique situation of also having the power make those changes a reality. This is further described in the section on Adaptation which shows that the power to categorize an Improvement Request as good, maybe or bad lies in the hands of the professional developers.

Excerpt 8 will be introduced below, revealing the background of The Company as viewed from a historical perspective. It will also uncover how the products have been a part of this process of general development. The excerpt is from an interview conducted in Stavanger, in December of 2006. It is gathered through a group interview, but only one informant is represented here.

Excerpt 8:

Informant 3: Yes, Artimus. It is old project management system. It is a sort of mainframe system for mini computers; it had nearly 80 % coverage in the market, but when “Tom” and the others saw that it did not mature ((in the present company)), they looked around for

another alternative. They started making some prototypes and presented them for their customers and tried to create interest in the old customer group. After this, they entered Blisma ((another customer, accounting company)) – I think it was almost a finished product by then, and “Petter” ((the original developer)) followed the product to Blisma. But later on when Blisma did not function well, they ((Blisma)) decided that they did not want to continue with project management tools anymore. Therefore ((“Petter” and the others)) bought out the products)).

Interviewer2: So this was also in Stavanger?

I3: Yes, it ((the product)) has been in Stavanger all the time.

Some of the core people at The Company are a group who worked together in another company in the early seventies. Their main product in this company was a project planning tool called Artimus. After those working on the product bought it out and started The Company, this drove the development of project management tools further. Mainly this excerpt shows how the owners of The Company already, from the beginning of the seventies, had their focus on project management tools, which underlines their expert competence and experience concerning such tools. Furthermore, this excerpt uncovers that the project management tools The Company offer today have roots all the way back to the seventies. Clearly, The Company’s products have evolved over many years, also by the initiative of their employees. This is why this excerpt is an example of the Specialization process.

Analysis and comparison to related work

Meta-design

Within the stage of Specialization the emphasis lies on product development performed by professional developers. This is related to what Fischer associates with the term *design time*. *Design time* refers to all development activity necessary to put a system together so that it can work and be presented to customers. It thus embraces the methods of software engineering and HCI (Fischer & Ostwald 2002:136). Design time, as explained in section 2.2.3, is defined as when system developers create environments and tools (with or without users) (Fischer 2003:89). There is a gap between design time and use time because “at use time, users or stakeholders use the system, but their needs, objectives, and situational contexts can only be anticipated at design time, thus, creating a system that often requires modification to fit the

user's needs" (Fischer 2003:88). This means that, during design time, professional developers should aim at developing products that to some extent are adaptable to customers' needs. At The Company the developers have close relationships to their customers, so even though the professional developers do their development in-house, they have their customers' needs in mind when they develop. They try to create products that are adapted to their customers' needs. In addition, when there only are professional developers perfecting products without any direct intervention from customers in this stage, this has something in common with Fischer & Ostwald's notion of the *reseeding phase*. In the reseeding phase the developers perform modifications or changes on already existing products (Fischer & Ostwald, 2002), which is what the developers do in the Specialization stage. However, Fischer and Ostwald underlines that the reseeding phase usually involves the customers in some way (Fischer & Ostwald, 2002), which is not the case with the Specialization stage. However, since the Company creates commercial products they, to some extent, are intended to fit user's needs and are therefore to a small degree involving customers as well.

Modding

The theory of *Modding* can partly be seen in the light of the Specialization stage. Modding often occurs as a result of customers using original products as platforms for further development. Within the stage of Specialization the professional developers at The Company create products, such as Planner. These products are, in turn, objects of further development by the customers. In this manner the customers use the original products developed in the Specialization stage as a platform for further *Modding*. One important aspect within the Specialization stage is the importance of the professional developers creating products that are open for future modification, or *Modding*, by potential users. When this is being done it is important to remember that when the professional developers during design time create a product that is adaptive, it makes it possible for potential users to use the original products as a platform for further modifications. This design for future modification is challenging because future needs cannot be fully predicted, but it can be addressed in several ways, for example by giving users different access rights to perform changes in products (Stevens & Wulf, 2002). It is possible to make different interfaces, for example one for regular users, one for super users and one for modders. Another possibility is to create a user toolkit (Jeppesen, 2002; Mørch, 1998; Von Hippel 2005:147), which "...facilitates customers in carrying out need related tasks themselves by equipping them with design tools..." (Jeppesen 2002:8).

When professionals during design time create simplified solutions of how the customers can modify the product at use time, they can take advantage of creating user toolkits.

Knowledge intensive firms (KIFs)

In the Specialization stage where the professional developers perform further development on the products without interaction with customers, most of the mentioned moments concerning KIF in the Adaptation stage are valid³⁷: In this stage the developers perform knowledge based work, they have a great degree of autonomy and there is a hint of information and power asymmetry. However, when it comes to the need for extensive communication and idiosyncratic client relations this is not apparent to a great degree, because when the developers do the development themselves there is not such need for extensive communication with customers, so the idiosyncratic relationship is not highly important.

Generalization stage in outer loop product development

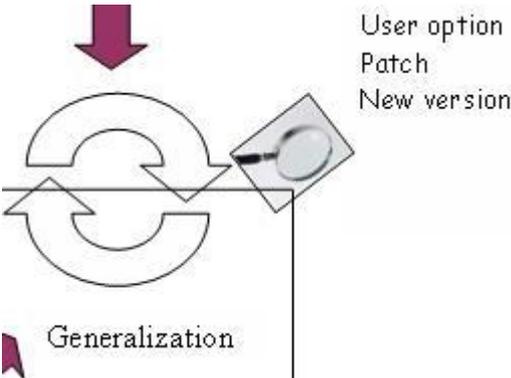


Figure 16: Stage of Generalization

³⁷ For a throughout discussion of these moments see the stage of Adaptation.

Generalization is characterized by *releasing new versions/products*, as a result of customer's feedback on already existing products. This is what differentiates *Generalization* from the other approaches within outer loop product development. The stage of Generalization can be even further nuanced: within this stage there exists a trajectory, which the products follow in order to be "generalized". The trajectory is visualized in Figure 17; the products start out as *user options*, made specifically for a specific customer, then they take on the shape of a patch (patches are packaged extensions that fit specific versions) until they end up in *new versions* of the product.³⁸ Various empirical examples will shed light on the generalisation stage. The first excerpt (number 9) is from an open-ended interview with a professional developer, conducted in December 2006. Excerpt 9 is an example of how Generalization often is initiated by customers requesting new or modified features. Excerpt 9 and 11 are placed chronologically, and could be introduced as one long excerpt, but for practical purposes, they have been split.

Excerpt 9:

Interviewer: Are there any customers that have participated in the development of your products?

Informant 3: This is typical for OilCompany ((A large customer in oil and gas sector); it was a major determining factor in development. Much of what is incorporated into The Company Project comes from our customers ((requests)).

Interviewer: How do you receive customer requests?

Informant 3: Customers send us wish lists for [or questions about] new functionality. And during development, if ((the request for new functionality)) seems reasonable, e.g. if also others are asking for it, if it is an area we should look closer into and maybe look at in a broader perspective. For example, if you are writing reports and ((someone)) wants new reports functionality, we may include it because we are already working on it ((altering the report-module in the program code)). This enables late requests to be taken into account, assuming it doesn't have side effects, requiring changes to many of the other modules as well.

The excerpt underlines that The Company's customers are a vital part of product development, especially when we see that the feedback from one of their main customers has been a major determinant in their general product development process (Mørch et al. 2008).

³⁸ The terms user, option, patch and new version will be defined in excerpt 11 below.

When the informant says “Much of what we put into Project comes from our customers,” he means that it is the customers’ feedback that drives the development of Project forward. As mentioned in the context chapter, Project is one of The Company’s products. However, the informant does not elaborate how Improvement Requests are being issued by this customer. He only elaborates on how the requests are handled and evaluated by the company once they have been entered (Mørch et al., 2008). The excerpt also shows that Improvement Requests imply a certain division of work, power and autonomy – the developers are clearly the ones judging if they will go through with the Improvement Request. This theme will be further elaborated in the section below, as well as in excerpts 10 and 5.

In excerpt 9, the informant says that they, as professional developers, judge whether they think the request for new functionality is reasonable or not. Even though the customers are important and their needs for new functionality are welcomed, it is in the realm of the professional developers where it is decided whether the company should either accept, put on hold or decline the suggestions (representing the phases of good, maybe and bad within the Adaptation stage). Even though developers can turn down customer requests, this seldom happens. As is stated in this excerpt, if what the customer wants is something really unique to his organization, The Company makes an adapted version of the product, which is named a *maybe idea* within the stage of Adaptation because it is financed by the customer.

Excerpt 10 is from the same interview as the other excerpts in this section, but from a later session in the interview. This statement was produced around 25 minutes into the interview, illustrating aspects of the decisions-making process. We should bear in mind that this is the informant’s interpretation of the situation and there is likelihood for some degree of exaggeration.

Excerpt 10:

Question; If a customer contacts you and wants an extra functionality or something like that, how do you proceed? How do you proceed in finding out what kind of ((new)) functionality the customer wants?

Answer: I tell him that he can put it ((his request)) into the Helpdesk or send an e-mail

Question; How many customers do it this way?

Answer; Almost everybody, or no, maybe that is an exaggeration. The smaller customers, ((where the companies only consist of)) 2-3 persons, from them there are fewer requests. But

in larger environments, there the bigger customers have more action and driving force in their organizations. Typically we receive a request and we confirm that we have received it, and are considering it. Then we are dependent of where we are in the product development cycle ((for this being evaluated at all)) and then we go through this ((request for new functionality)) at a later stage and say that we will look at it. We consider to take it into account for the product ((development)).

In this excerpt the informant speaks rather cryptically and it is not easy to understand what the excerpt really is about without detailed explanation. In the first sentence the informant admits that when he says that almost all of their customers enter Improvement Requests to The Company (concerning further development to their products), it is an exaggeration. The Company has about 500 customers and in a total there are 22 employees in the company. It would be impossible for them to attend to all customers' Improvement Requests. The customers who do not have special needs for new functionality are the smaller customers, who are being defined as companies with only 2 or 3 employees. The argument is supported by the claim that in bigger organizations there are more opportunities for identification, and bigger momentum for succeeding with the Improvement Requests towards The Company. Customers coming from large organizations are the ones making up the majority of their user base, and as a consequence the main initiators of further product development. There also lies some hint at categorization of their customers in this statement.³⁹ The next excerpt is a continuation of excerpt 9 and is more directly focused on customer-initiated product development.

Excerpt 11:

Question: Do you have other examples of customers initiating new functionality to the product?

Answer: Yes, we have done it for BuildingCompany, ABB...((two large European engineering and consultancy companies))

Question: What sort of new functionality did they want?

³⁹ This is mentioned earlier in the context chapter, see chapter four.

Answer: Yes, well, it is. I don't remember, it was years ago. I know that when they bought the product they had specific demands/requirements that were originally not part of the product. But we wrote it into the contract as the functionality they wanted.

Question: Ok, so it was a part of the contract?

Answer: Yes, they wanted it within a specific time period. Their demands were rather demanding regarding what they wanted us to make.

Question: Was it an add-on specifically made for BuildingCompany or.. Answer: No, it became a part of the product. Yes, it started as a patch, what we call a user option.

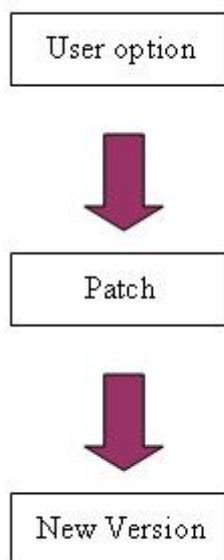


Figure 17: Phases within the stage of Generalization

In this excerpt it becomes clear that the request for new functionality that BuildingCompany asked for was something specific they needed. The Company wrote their demands into the contract. As a result, the informant underlines that this request for new functionality eventually became part of The Company's general product portfolio, and available for all of their customers. This is an example of *Generalization*. In the last section of this excerpt, it is being said that the extra functionality BuildingCompany asked for, not only was being made to this specific customer, but also made available for all other customers by being incorporated in the next release of the system. This is actually the same point as in excerpt 9 where the informant underlines that if the customers enter *good* Improvement Requests, they

will be incorporated into the next version of one of their products. The excerpt also illustrates the transition from Adaptation to Generalization of one specific product (Planner). The product develops from small local extensions (patches, user options) added to a current version of a product towards a new (reorganized) version where generally useful local extensions are incorporated into the new common product. In the last sentence of the excerpt, three different levels of abstraction of the different states the product can be seen. First, the extra functionality BuildingCompany asked for is a *user option*, which means it is only available for this specific customer. Then they want to make this available for other customers, so they make a *patch* which the other customers can get access to, for example via their web pages. Finally, when there is a *new version* of the product, the extra functionality (patches and user options) have been incorporated in the product and therefore made available for all the customers. In other words, we may say that there is a gradual development of The Company's products over the years, many of which are based on local initiatives of development and Improvement Requests to generalized versions and back to new initiatives for further development as new user contexts appear. This excerpt is then an example of how the products evolve from specialized products to more general ones in interaction with customers (outer loop), when they go from a system extended with user options and patches to being integrated with the general product as a result of customers Improvement Requests.

Analysis and comparison to related work

Co-configuration

The first excerpt introduced in this section, excerpt 9, describes how the customer initiates further development of the products and how these ideas have become integrated in the products in general, meaning that the development becomes available for everybody. Co-configuration with its focus on a *continuous relationship of mutual exchange between customers, producers and the product – service combinations* (Engeström 2007:24) is interesting in terms of the Generalization stage. When customers enter questions about local adaptations of the products, The Company may get some good development ideas. Especially in the stage of Generalization where all ideas the customers enter are so good that they are made available for all customers. An example of this is the development trajectory of Project as shown in excerpt 9. Customers gain from getting their development requests fulfilled, and sometimes they do not have to pay for the development. Clearly, it is a relationship of mutual

benefit within the stage of Generalization. However, as Engeström emphasizes as the *continuous Co-configuration and customization* this is something that goes on for lengthy periods of time, and is not a one-time incident (Engeström 2007:24). The Adaptive Product Development that occurs in the stage of Generalization, as well as at some of the other stages, is characterized by being a continuous process lasting for long time periods. In excerpt 9, the OilCompany serves as an example of how what is integrated in Project are initiated by OilCompany, as is one of The Company's big customers. An underlying assumption in that excerpt is how Project has evolved over several years. Following excerpt 9 is an example of how this also has been a Co-configuration over lengthy time periods. When it comes to *how Co-configuration has to do with multiple collaborators operating in networks* (Engeström 2007:24) this is the same as explained in the stage of Adaptation. The element in Co-configuration work which focuses on mutual learning from the interactions between the parties involved (Engeström 2007:24), is apparent at The Company. The excerpts best describing mutual learning are the ones presented within this stage of *Generalization*. In this stage is namely the reciprocal relationship of mutual learning apparent. The customers learn by articulating and sending Improvement Requests to The Company, as well as when getting their requests fulfilled and having to learn how to use the new product. On the other hand, The Company learns from the input from their customers. Obviously, there is a mutual relationship between the customers, products and The Company, as a result of the interaction between these parties.

Meta-design

The Generalization stage strongly parallels Fischer's notion of the *reseeding phase* in the SER model. This is because in the Generalization stage it is the professional developers who make changes to the products. These changes include restructuring the existing code and integrating it with local extensions to make the system applicable to a broader group of users. This is in line with Fischer's statement that in the reseeding phase it is the professional developers who do modifications to the products (Fischer & Ostwald 2002:136). In connection with this it is clear that the Generalization stage represents what Fischer calls a design activity. As mentioned earlier, a design activity is characterized by developers performing the development (Fischer 2003:88).

Modding

What is mentioned in the stage of Adaptation regarding using The Company's products as platforms in connection to the theory of Modding is valid also for the stage of Generalization.⁴⁰ Jeppesen underlines how a defining characteristic of Modding is how "*final mods often are freely revealed*, meaning that no users are excluded from using the new modified version" (Jeppesen 2004:7). In the same way as final mods are freely available, the Adaptations made on products based on some customers' ideas become available for all customers in the stage of Generalization, when the suggestions from customers are integrated into the original product. This is in line with Jeppesen's comment that final mods are made available for all customers.

"In computer games, mods are made by the general consumer public. These user innovators, or modders as they are called in the industry, are usually highly motivated consumers with technical abilities and specific needs for a novel product feature or solution to a given problem regarding a product." (Jeppesen 2004:6)

In the stage of Generalization, as well as adaptation, the development ideas forwarded to The Company originates with their customers. In the citation above, it is underlined that the consumers are the ones making mods, which is not the case in the Generalization stage. There it is the professional developers making the development, but the users are active in giving ideas. Jeppesen's comment about the consumers being motivated and attaining a lot of knowledge, is applicable to The Company's users. In the theory of Modding Jeppesen says:

"the users act as voluntary providers of complements to a commercial manufacturer platform and manufacturers complement portfolios are increased at no cost while the value for consumers of owning the platform also increases because all complements remain free to them." (Jeppesen 2004:6)

In the citation above it is the users who provide complements to a commercial manufacturer platform. At The Company, especially within the Generalization stage, the users do not provide complements that they have developed, but the users provide ideas that are fulfilled and made available to everybody. When The Company's customers forward these ideas of further development on the products to The Company and The Company chooses to fulfil them, The Company as a manufacturer increases their portfolio because their products are enhanced with more features.

⁴⁰ See the stage of adaptation for more information about this.

It is important to bear in mind that designing for possible future modifications of the products requires that developers during design time give room for this through programming. i.e., that customers (users) can access tailoring toolkits and so forth, when using the system (use time). Fischer proposes facilitating this with the notion of “under design.” By this he means that systems in *design time* need to be designed so that they facilitate modification of the users at use time” (Fischer 2003:88).

Knowledge intensive firms (KIFs)

Alvesson’s characteristics of KIFs are the same for the Generalization and the Adaptation stages: The professional developer performs knowledge based work, they have a great degree of autonomy, they have the need for extensive communication, they have idiosyncratic client relations and to some extent they have information and power asymmetry.

Improvement Request stage in outer loop product development



Figure 18: Stage of Improvement Request

Improvement Request is when customers enter requests to The Company about extra functionality, which can range from identification of bugs to suggestions for future modules. Improvement Requests emphasize how customers initiate and forward requests to The Company. It does not include how the requests are being handled by developers (this is being done in the stage of Adaptation and Generalization). In this section, some excerpts from interviews with two different customers at The Company will be introduced. Both of these customers work in the construction industry. The excerpts are included because it is important

to show first-hand information about how the customers view the product development process, to complement the professional developers' perspective on what their customers do with and think about their products. The first extract is from a customer who is a sub-contractor at a bigger project. In excerpt K2 the customer elaborates on how he has given feedback to The Company regarding different issues in the product he is using. Especially, he underlines the issues concerning how to construct a new "baseline."

Excerpt K2:

Question: Have you requested any adjustments or improvements to the product?

Informant: Yes, I have given them ((the company)) some tips concerning making a new baseline; it is about the theory of software project planning, but there are some discrepancies in it. I don't write down hours worked and percentage completed on all the technical ((projects)) at all times, and if I was to construct a new baseline I had to move everything out ((of the active project)) to make a new baseline. The Company had to help me with this a couple of times; they also had to do that in their database. It had to be done in a certain way that I could not do on my own.

It becomes clear in this excerpt that the customer has given feedback about some issues in the product he is using to The Company. The issue brought up here was how to make a new baseline in the current project plan. A baseline in his terms is the original plan he makes in Project. If a user wants to make a new baseline after the original plan is made, she has to move all of the data out of the active project plan and into a new project plan, in order to make a new baseline. Out of this excerpt, it may be interpreted that this is cumbersome, because a user might operate in the order of 4000 different activities in the project plan. Having identified this as a problem, the customer contacted The Company and they helped him by making an easier solution for making a new baseline. Therefore, you may say that this excerpt is an example of how customer-initiated product development is seen from a customer's perspective. The interesting point to notice is that what the customers say about customer-initiated product development, is to a large extent coherent with what the professional developers say about it, i.e. as elaborated in the Adaptation and Generalization stages.

The excerpt is also an example of how an Improvement Request often leads to Adaptation – the product is adapted to this customer’s specific needs. However, this will not be discussed further here, since the focus of this stage is on how the customers propose Improvement Requests, not on how the professional developers handle them.

In the next excerpt another problem raised by this customer is identified, namely the problem with deleting an activity from the baseline. The excerpt below illustrates a feature in the product that is poorly adapted to the customer’s needs, which leads the customer to enter an Improvement Request to The Company. This is followed up by The Company telling the customer they will fulfill the request.

Excerpt K3:

Informant: This does not bother me now ((two earlier mentioned problems)). There is another thing which is a little ((annoying)), which they ((the Company)) say they are going to fix. This is if you delete an activity after you have made a baseline ((the original project plan)), and then you find out you are not going to do that activity after all ((after the baseline is made)), like, I do not want to have that activity in my plan, I delete it. However, I have experienced that the numbers ((the data registered in the project plan)) associated with the deleted baseline still are there ((even after the activity has been deleted)). So when I check if I am finished with this activity, it was not 100 percent ((registered as finished)), so then I compare ((the plan)) with numbers ((the data registered in the project plan)) which are not accomplished. Then I can not go in ((the plan)) and change it either. The consequence then, is that I end up with this activity only being ((registered)) as 95 percent ((finished)), and this is very unfortunate because I can not go into the database and change it. I have a couple of entrepreneurs now who is finished ((with their projects)), but those are only registered as 98 and 99 percent ((finished)) ((but should be registered as 100% finished)).

In this excerpt the informant tells us about problems with the baseline, which is the original project plan, as mentioned above. If this customer wants to change the baseline after it has been saved as the original plan, different problems occur. The main problem is that it is not possible to change the plan after saving it as the baseline. The result of this is that when this activity is deleted from the plan, it is still saved in the underlying baseline. Therefore when you show the total plan, with this activity underlying, the percentage of finished projects is

not correct. Maybe you just get 98 percent finished, even though all your activities shown in the plan are registered as finished and thereby imply 100% finished. This happens because behind this plan, the underlying baseline has not yet removed the activity that you wanted to delete. Finally the customer informs us that he has informed The Company about this problem with the baseline function. In addition he also says that his request for improved functionality has been taken into consideration. Finally, the request has been considered useful (good, maybe) by the developers and the function has been changed in accordance with his needs. In the next excerpt, which is a continuation of this one, it becomes clear that the customer has given Company useful information about the issues he has experienced with the products.

Excerpt K4:

Interviewer: Is this (a specific Improvement Request in one of the products) something you have reported back ((to the producer))?

Customer Informant: I could have done it; yes actually I have reported this back to them before, and they told me it was to be changed for the next version. That is; if I delete it (an activity) in Project, or Microsoft Project, it should also be deleted in The Company (their database). (It will be fixed in) next version but I don't know when that will be.

This excerpt crystallizes how this customer has given feedback concerning the situation described above that to delete an activity in the current project plan is problematic. What is brought in here in addition is that the feedback the customer got from The Company when he reported this suggestion for improvement to Project, was that this was something that was going to be incorporated in the next version of the product. The feedback implies that the Improvement Request from this specific customer has broader implications than a local bug fix because it will materialize into new functionality that will be available to all customers.⁴¹ Note that the informant underlines that his request will be fulfilled when the next *version* becomes available.

⁴¹ This is the same phenomena as is described in the Generalization stage.

Analysis and comparison to related work

In the stage of Improvement Requests it is clear that there exists a relationship of mutual exchange between The Company and this specific customer from the construction industry. The customers get their Improvement Requests fixed and The Company gets their products improved. This is in line with what Engeström means about Co-configuration work consisting of a relationship of mutual exchange between customer, producer and the product-service combinations (Engeström 2007:24). Excerpt K2, showing how the customer from the construction industry has contributed to getting the product adapted to his needs, represents an example of a continuous Co-configuration process where there is a customization of the product/service combinations over extended time periods (Engeström 2007:24). It is fair to say that there exists a collaborating network among customers and The Company. This is in line with Engeström when he mentions how collaborating producers often need to operate in collaborating networks within or between organisations (Engeström 2007:24). The excerpts show that these customers exist in meaningful relationships with The Company when they propose Improvement Requests and thereby act as producers of ideas. One can say there is a network between the customer organisation and The Company providing an infrastructure for the exchange of ideas and products updates. When it comes to the mutual learning from interaction between the parties involved in Co-configuration activities (Engeström 2007:24), excerpt K2 suggests how a customer has asked The Company to change the product for him and The Company has responded positively. These mutual exchanges also lead to some form of mutual learning (but there are no direct data to support this claim).⁴²

Meta-design

What has been discussed in the stages of Adaptation and Generalization concerning Meta-design also counts for the stage of Improvement Requests, meaning that Improvement Requests also is in line with Fischer's SER model. Products being used motivates the SER model, customers are active by forwarding Improvement Requests, and there are periods of planned/unplanned activity in product development as a result of not being able to predict when customers will forward Improvement Requests.

⁴² For a further discussion of the benefits of mutual exchange between customers and developers during Adaptive Product Development, see Adaptation stage (section 6.2).

When Fischer states that many computer users and designers today are domain professionals and competent practitioners, this means the customers are not naïve users. “They are motivated to contribute to create good products, they care about personal growth, and they want to have convivial tools that make them independent of “high tech scribes” (Fischer 2007A:1). This citation has some parallels in common with the customer in excerpt K3. If we look at excerpt K3 in the stage of Improvement Requests, we see how this customer, which has a lot of domain knowledge about the construction industry where he uses The Company’s project management tool, wants to learn how to adapt or change the product himself. The customer also says that he thinks it is “stupid” that he does not have the possibility to do this adaptation himself, which shows how he wants to be an end-user developer (see Tailoring stage).

The stage of Improvement Request has a lot in common with Fischer’s notion of seeding phase. Seeding is a central element of the Improvement Request stage. When customers propose Improvement Requests they make a contribution of an idea to the Company about further development of the products. One of the main points with my empirical findings of Adaptive Product Development is how the customers are producers of ideas and initiators of further development on the products. The empirical findings show how customers initiate ideas about further development of the products, for example through Improvement Requests. As such, this differentiates from Fischer’s SER model which underlines that users act as designers, whereas my data show that customers mainly act as producers of ideas. They initiate more than they create local adaptations. This is further elaborated in the Adaptation stage.

Seeding is also important from the point of professional development, i.e., making an evolutionary tool end-user tailorable. The seeding phase in the SER model is associated with the assumption Fischer makes about how “software systems must evolve, they cannot be completely designed prior to use” (Fischer 2002:7). When the customers enter Improvement Requests to The Company they do contribute to seeding by initiating further evolution of The Company’s software products by the developers. In addition, when Fischer states that “software systems must evolve at the hands of the user” (Fischer 2002:7), it is in line with how the products at The Company develop. This is related to the evolutionary growth phase in the SER model and is further analyzed in the Tailoring stage.

Tailoring stage in the inner loop product development process



Figure 19: Stage of Tailoring

Customers increasingly accumulate knowledge on several areas of interest, which also affect their role as customers. The customers in today's knowledge society have a lot of expert knowledge in several areas and are therefore more demanding towards the services and products they buy, as mentioned in section 2.1: "The changing roles of the customers in the knowledge society". However, some customers use the knowledge about their area of interest to their own advantage by developing ready-made products even further, so that they become tailored to their specific needs. This is what I define as the sub process *Tailoring*. Through this process customers may exploit already existing products in a smart way by changing the products themselves. The present empirical findings show the process of *Tailoring* occurs within software product development. More specifically this means that the customers locally adjust a software product by adding some locally developed program code to it. Excerpt K5, from an interview with a customer in the building industry, shows a customer stating that he has adjusted the product himself by writing code in the domain-specific language SQL. This interview was gathered in October 2007.

Excerpt K5:

Question: Have you requested any wishes or needs for local adaptations?

Answer; No, we have not got any major special local adaptations on the products. The reason for this is because I knew a great deal about how to do SQL from earlier experience;

therefore I managed to go find a shortcut ((of how to do it myself)). I do know the whole structure of the system, but it is available through ordinary documentation. There you get the whole table structure and that has made it possible for me to find the shortcut through Access and allowed me to make some special ((local)) adaptations.

Question; So, in reality you have made your own adaptations to the products?

Answer; Yes, you may say that.

In the first sentence of this excerpt the customer states that The Company has not done any adjustments to the products they use. It is uncovered that the reason for this is because the customer has made some adaptations to the product himself. He has *tailored* the product. This has been possible for the customer since the products are well documented. In addition when this customer knows how to perform SQL, which is a high level database query language, it was natural for him to fix the problem himself, in accordance with his needs. This excerpt is an example of what I refer to as *Tailoring* in the Adaptive Product Development process model. In Tailoring the customer actually locally adapts the product without any involvement from The Company.

Analysis and comparison to related work

Co-configuration

Engeström's Co-configuration term does not detail how the process about the *Tailoring* the customers make on their own can be included as parts of the product development processes of the general products.

Meta-design

The theory of Meta-design has some features in common with the stage of *Tailoring*. According to the SER model, it is important in Meta-design to design for seeding, evolutionary growth and reseeded. "The SER model advocates *building seeds that can be evolved over time* through the small contributions of a large number of people" (Fischer & Ostwald 2002:135). When the professional developers at The Company create products that the customers can either tailor themselves or ask The Company about further development

through Improvement Requests, it can be seen as an example of creating seeds.⁴³ When customers *tailor* products themselves they use the original product as a sort of *seed*, which lives its own life by being used in a context and under the right conditions grows further. Mørch defines three levels of tailoring: customization, integration and extension (Mørch, 1997). Customization is to modify attribute values of components, integration is to add functionality by scripting (interpreted code that executes in use time environment), and extension is to modify the source code (code that needs to be compiled like it was a design time activity). The excerpts shown here are examples of tailoring by integration. When the product is installed and used in the customer organisation in its original shape, it is a “seeded product.” When the product later is tailored it goes through a process of *evolutionary growth*. Evolutionary growth is a decentralized incremental modification process where the seed is extended in order to do additional work or correct a problem (Fischer & Ostwald 2002:136). When The Company’s products (the seeds) are being used in different customer organisations and the customers choose to *tailor* these products one or more times, this can be said to be a decentralized evolution process. In addition, Fischer underlines that in the phase of evolutionary growth the professional developers are not directly involved (Fischer & Ostwald 2002:136), which is also the case in *Tailoring*. After being in the evolutionary growth phase for some time, the customer reveals the product’s strengths and weaknesses and wants to resolve possible mismatches between needs and the software system. The product will then enter the *reseeding* phase.

When customers adapt the original products through Tailoring, this is in order to work around user difficulties with The Company’s product. In the actual Tailoring process professional developers are not involved. Tailoring is therefore a *use time activity*. Furthermore, Fischer claims, “In order to accommodate unexpected issues at *use time*, systems need to be under designed at design time” (Fischer 2003:88). That is, during design time systems need to be developed so that they facilitate Tailoring during *use time* by users, in order to resolve unexpected issues. A prime example of this is that The Company offers products called companion products⁴⁴, which are developed in the stage of Specialization, but are created so that customers can tailor and customize them by themselves. This is in line with how Fischer thinks that professional developers during design time should take into consideration that products shall be under designed and available for customization by end users in *use time*.

⁴³ See the stage of Improvement Request for more information about this.

⁴⁴ Companion and off-the-shelf products are described in more detail in the context chapter, see section 4.3.4.

Modding

Modding is also an appropriate perspective by which to describe the *Tailoring* process. This is because *Modding* is a “theory” where the *modders* – also known as users – create their own features to products, named mods (Jeppesen 2004:2). The *Tailoring* shown in excerpt K5 can be seen as an example of how a user creates a mod, based upon an original platform made by the manufacturer. The platform in this case is one of The Company’s products, which the building industry customer adapts to fit his special needs in project management. The citation below shows how *Modding* is a process where the customers use the *original products as platforms* when they initiate further development, (this is described in more detail in the stage of Specialization).

“It is called Modding because it is characterized by users modifying an existing product (in this case a computer game) where the original product serves as the platform onto which new complements are built and can replace parts of “old” original content in certain areas of the product” (Jeppesen 2004:5).

Jeppesen states that “opening up of the products was in fact initiated by users – not manufacturers. The users broke apart the products through hacking, and created their own solution spaces and tools that helped satisfy their specific needs” (Jeppesen 2004:2). In the above situation a customer develops a work-around by adding some use time code to the products themselves. This requires that users are able to “break apart” and “create their own solution spaces and tools”. This involves figuring out how the program works (my documentation) and how to add new code so that the product will be better adapted for his company’s project management tasks. The customer does this with the purpose of *Tailoring* the product so that it fits his special needs, using the tools at his disposal (e.g. the SQL editor). What is interesting with *Modding* is that this “theory” focuses on how users are modifying an existing product where the *original product serves as a platform for further development* (Jeppesen 2004:5). In *Tailoring* the customers modify Planner themselves, and thereby use Planner as a platform. Furthermore, Jeppesen underlines how many different models can be added to the same basic platform architecture (Jeppesen 2004:4). This means that Planner, as a platform for further development, may be used several times by different customers creating different local mods. “The idea is that complements are produced in a decentralized manner by external developers...” (Jeppesen 2004:4). In *Tailoring* processes when the customers

adapt the products they can be called external developers. Two related terms are local developers (Nardi, 1994) and super users (Åsand & Mørch, 2006). Furthermore, when they are Tailoring products that originate from The Company it is fair to say that this is being done in a decentralized manner.

In the next chapter a summary and discussion of the empirical findings and analysis presented in this chapter will be given.

7. Summary and Discussion

“...smart companies realize that corporate customers are more knowledgeable than one might think, and consequently seek knowledge through direct interaction with the customer” (Gibbert et al. 2002:461).

This thesis distinguishes two different approaches to customer-initiated product development: Co-configuration and adaptation. The *adaptation approach* is about adaptive development and the direct involvement of users in this process, which is supported in the empirical findings. Most of the data relates to how this form of work can be analyzed within the theoretical frameworks of Meta-design, Co-configuration, Modding, and KIFs. This approach received most attention in the previous chapter. The *Co-configuration approach* is about how customer-initiated product development at The Company can be seen as a new form for learning. Co-configuration represents the learning perspective in this thesis. The present chapter will give an overview of the main findings in the analysis chapter and put them into a unifying framework. It starts with a summary and discussion of the main points of Adaptive Product Development. Next will be a description of how knotworking can represent a learning perspective during Adaptive Product Development. Finally, Planner, the project planning tool, will serve as an example of how this tool actually alternates between being a tool and being an object in the Adaptive Product Development activity at The Company.

7.1 Summary and discussion of Adaptive Product Development

In this section I will present a short summary of the main points in the empirical analysis, which is summarized in a bullet list. Then the interrelations between the stages in the model of Adaptive Product Development will be discussed. Finally, the key points from the bullet list will be singled out and discussed in more detail in order to give a macro perspective of my findings.

7.1.1 Summary of findings

The key points will be extracted and presented in a bullet list, independent of the stage of development or theory it belongs to. The lists are organized according to what parts of the conceptual framework they originate. A few key points that are relevant to the focus and conceptual framework of this thesis are discussed in depth. This is done in order to narrow down the thesis. The relevance criteria for selecting key points for deeper discussion is that they can be discussed by two or more of the theories selected for the conceptual framework. I believe this can provide multiple perspectives on key issues and hopefully rendering the analyses more validity.

Findings according to the Meta-design framework

- Customers as producers of ideas.
- Interaction between customers and professional developers.
- Professional developers adapting the product in accordance with customers' needs as a form of further development of the product.
- Project planning tools evolving as a result of being used in specific contexts.
- Serendipitous requests about product development as motivation for further development.
- Customers being active either as designers or as producers of ideas.
- Rewarding users who enter good Improvement Requests.

Findings according to the Co-configuration framework

- Both customers and professional developers gain from customer-initiated product development.
- Customers forwarding Improvement Requests and the Company handling these form a sort of network.
- Customers are active in the product development process.
- Customer-initiated product development is a continuous process lasting for a long time.
- When customers and professional developers interact in intimate ways to develop products, they can be considered collaborators.

Findings according to the Modding framework

- Changes made to The Company's products by users vary in complexity.
- Some changes are solely made by the users.
- Some modifications made on the products become available for all customers.
- Customer-initiated product development motivates technical-minded users.
- Customers suggesting or designing new features to a product, in a way, "open it up".
- Customers creating new features may be called complementators.
- When customers develop new features, it can be seen as a decentralized development activity.

Findings according to the KIF framework

- Professional developers act as knowledge workers.
- Professional developers retain a high degree of autonomy.
- Time is set aside for extensive communication, coordination and problem solving.
- Customer relations are individual and personalized.
- To some extent, there exist information and power asymmetries.

The following points will be singled out and discussed in more detail: *Customers as producers of ideas, customers and developers as collaborators, active customers, serendipitous product development where customers give input, professional developers performing enhancement of products in accordance with customers needs and extensions of the original products as a result of feedback from customers.* After discussing these issues I elaborate how Planner is an example of Adaptive Product Development, and finally, how The Company can be described as a knowledge intensive firm.

Customers as producers of ideas

Fischer presents SER as a model for how evolutionary software development may occur (Fischer & Ostwald, 2002). Processes of *Tailoring* resemble how *use time* is apparent, meaning that the customers are the ones making adaptation to the product, contributing to evolutionary growth. On the other hand, *Adaptation* and *Generalization* entail both *use time* and *design time* activities. The customers do not perform local development (*Tailoring*) of the products in the *Adaptation* stage, but they create Improvement Requests and other innovative ideas concerning further development. *Design time* activities include *Generalization* and *Specialization*. *Generalization* is to make generally useful customer adaptations available to a

larger group of users by becoming part of a future release/version of the product. This is a decision making process that involves profit estimates balanced against user satisfaction. *Specialization* is design time work to incorporate customer adaptations through a process of reseeded. This makes the software more compact and efficient in terms of speed.

In sum, Fischer's term *use time* can be used to explain *Tailoring*. In addition, the term *design time* represents the stages of *Specialization* and *Generalization*. An overall assumption drawn from this may be that it is evident that the professional developers represent most of the development of The Company's products (Fischer & Ostwald 2002:135). In spite of this, during Adaptation and Tailoring the customers are actively engaged in the development process, directly (local development, Tailoring) and indirectly (Improvement Requests). In light of this one can say that customers are producers of innovative ideas. This is not captured by Fischer's model, since he does not focus on intermediary development activities between local development (Tailoring) and professional development (Specialization), but this is captured by the stages of Adaptation and Generalization. *In sum*, what my empirical findings show is that the customers at The Company are active in the development of the products, not primarily as designers and end-user developers but as producers of innovative ideas.

The main point with *Adaptation* was to show how The Company customizes products to customers based on their requests. Depending on the quality of these requests (good, maybe, bad) the developers at The Company fulfils these requests in interaction with the customer. Viewed from a Meta-design perspective, the empirical findings point out that the customers do not act as "designers" but are better described as producers of innovative ideas. On the other hand, when viewed from the perspective of *Tailoring*, it is apparent that the customers do act as designers. The reason that some customers perform Tailoring while others are pleased with just sending Improvement Requests to The Company is dependent on what competence and interest the different customers have. Mørch et al. also speak of this when defining a typology for how customers can have different roles in development processes, such as regular users, super users and local developers and professional developers (Mørch et al. 2007:7). What we can interpret from this is that the different stages of Adaptive Product Development contain different processes of customer-initiated product development. This points out that each of the stages has a certain degree of autonomy, which means that not all stages are needed at all times, and some of the stages by themselves may have a large impact in certain situations. Furthermore, this shows that The Company's customers can operate as

designers in some situations and not in others. Most importantly, overall, The Company's customers are vital members in providing input about the direction of further development on their products.

Customers and developers as collaborators

“Meta-design addresses one of the fundamental challenges of a knowledge society (Florida, 2002): to invent and design a culture in which all participants in a collaborative design process can express themselves and engage in personally meaningful activities” (Fischer 2003:91).

Customers and developers collaborate in the way that the customers provide The Company with good ideas and The Company follows up on those ideas. Examples of this have been shown in the stages of *Generalization*, *Adaptation* and *Improvement Requests*. This can be compared by Fischer when he says that in Meta-design there is close interaction between customers and professional developers (Fischer, 2003). Engeström supports this when he underlines that there are multiple collaborators operating in networks (Engeström, 2004). The theory of Modding does not support the findings that customers and developers act as collaborators. In addition, the stages of Tailoring and Specialization do not support the point that customers and developers act as collaborators. A clear advantage of the collaboration between customers and professional developers at The Company is that this form of interaction may foster innovation (Stjernström 2006:8). In the stage of Generalization when innovative ideas from customers lead to extensions of The Company's already existing products, it is an example of user-driven innovation. However, a disadvantage with collaboration with customers is that it may increase the development time (Stjernström 2006:7). As visualized in Figure 12, showing the components in the Adaptive Product Development, it is clear that the outer loop process is a longer effort than inner loop development.

Active customers

Customers' being active is one of the most supported claims I have identified in my empirical analysis. Meta-design, Co-configuration and Modding support this claim by underlining the importance of participation from customers in Adaptive Product Development. Fischer's notion of *informed participation*, where participants take ownership of problems and thereby signal to contribute actively to their solutions (Fischer, 2002:6), is an example of how The

Company's customers participate. In addition Modding underlines the same point in highlighting how customers create mods themselves and thereby are active customers (Jeppesen, 2004). The empirical findings show that the customers can be active in two ways. First, they are active as producers of ideas when they enter Improvement Requests, for example in the stages of *Adaptation*, *Generalization* and *Improvement Requests*. Alvesson's statement that one of the dynamics in KIFs is how the customers being in relationship with knowledge workers create idiosyncratic client relationships also supports the present findings on The Company, that customers are active. This is because when customers, through complex customized and individualized client relations achieve their knowledge – product tailor-made, it is obvious that the customers are active in these processes (Alvesson 2004:25). Examples of this may be seen in the stage of Adaptation, Generalization and Improvement Request. However, the stage of Tailoring naturally is an example of active customers since in this stage focus is on customers Tailoring the product themselves. But the stage of Specialization is not apparent here since it does not include customers directly in the development. So, including active customers in product development processes is advantageous because it may give birth to new ideas and new ways of doing business (Wikström 1995:7).

Serendipitous product development where customers give input

When customers propose innovative ideas concerning product development it is an input The Company most likely has not anticipated. This is serendipitous product development. This is most apparent in the stage of *Improvement Request*, *Adaptation* and *Generalization*. Meta-design supports this by underlining that in Meta-design processes there often occurs unanticipated product development. Fischer promotes that what he calls “periods of unplanned activity” occur in product development and motivates the SER model (Fischer, 2002:9). When unanticipated Improvement Requests from The Company's customers are forwarded, it clearly is not something The Company can control nor is the customer's need for adaptation of the products something The Company can predict. A consequence of unanticipated Improvement Requests is that afterwards usually periods of enhancement of the products emerges, meaning that this main point usually implies further development of the products. Co-configuration underlines that in product development there usually exist periods of unplanned activity (Engeström, 2004), of which the input from The Company's customers may be an example. The theory of Modding underlines how the creation of mods made by customers is a form for decentralized activity (Jeppesen, 2004), which is an example of an

unplanned activity. This may be exemplified in the stage of *Tailoring*. The professional developers cannot plan when the customers will proclaim a need and solve it themselves by *Tailoring*. In sum, all of the stages in Adaptive Product Development except *Specialization* figure as examples of serendipitous product development.

Professional developers performing enhancement of products in accordance with customers' needs

It is supported in my empirical findings that The Company's products are being adapted and enhanced in line with customers' requests. Examples of this can be seen in the stages of *Adaptation*, *Generalization* and *Improvement Requests*. Fischer mentions how products are being improved during *reseeding* in accordance with customers' experienced problems (Fischer & Ostwald, 2002). This is also in line with Engeström's notion of Co-configuration where the main impetus is to make products that are adapted to customer needs (Engeström, 2004). The theory of Modding is not particularly relevant in this regard, since it emphasizes how customers create changes on the products themselves. Naturally, neither of the stages *Tailoring* or *Specialization* is apparent here since they focus on Tailoring the product themselves or professional developers creating in-house mods. What is mentioned earlier concerning KIF and idiosyncratic relations and its connection to making tailor-made products is also apparent here. Creating adaptations on the products implies a need for individualized client/customer relations and therefore this may be an indication of The Company having some qualities of a KIF. So, what does it mean in a broader perspective that The Company operates to a great extent with a product development form which emphasizes adaptation of the products? It means that customers get the products exactly the way they want them. Final customers are demanding more choice of product features, and they are less willing to buy a product that does not satisfy their constraints perfectly (Salvador et al. 2002:62). Adapting products in line with customer needs is what attracts customers in the knowledge society. Enhancement of the products becomes therefore important for The Company to maintain. In addition, enhancement leads to extension of the original products, either as new features just for specific customers or as broader changes available for all customers. At The Company, if customers enter ideas that are labelled 'good', this means that the product development will be made available for all customers in next version.

According to Wikström "Involvement in a tailor-made solution causes more uncertainty, since the outcome cannot be inspected in advance as in the standardized alternative" (Wikström

1995:12). One drawback with adapting products in accordance with customer needs may be that it causes more uncertainty for the customer concerning what product they get. One more drawback is that the new changes cause existing parts of the system to work less efficiently than before. For example, new extensions can make old parts stop working. This has been one of the main critiques of *Tailoring*.

As mentioned in the context chapter, The Company has been and is going through an expansion process.⁴⁵ Usually when companies go through expansion processes the need for formalization emerges. Clearly, this is The Company's experience. Therefore it is important that they manage to maintain their individualized customer relationships and Adaptive Product Development as it is today, even though they get formal guidelines to follow. In sum, it is important for The Company to maintain the Adaptive Product Development process as it is in order to keep the good client relations, especially since The Company benefits from this form of development in both pleased customers as well as being provided with good ideas.

Extensions of the original products as a result of feedback from customers

Customers proposing ideas of how to adapt the product further which is labelled *good* by the professional developers, might lead to a change to the already existing product (improved version). This is apparent in the stage of *Generalization*. However the stages of *Adaptation* and *Improvement Request* also are applicable since the products may be extended on the basis of requests from customers. Meta-design supports the Generalization of products by the process of *reseeding*, which, according to Fischer, occurs when professional developers need to modify existing products in order to meet customer needs for use and adaptation (Fischer & Ostwald, 2002). Reseeding is apparent in the stages of both Specialization and Generalization. Examples of reseeding, as mentioned earlier, are when the developers create new builds and versions. Co-configuration supports the extension of products in line with customer needs when they promote how customers are active in these processes etc. (Engeström, 2004). Modding also supports that products are being extended as a result of customer requests when they underline their aspect of how mods created by modders increase the manufacturer's portfolio (Jeppesen, 2002). So, what can be interpreted from the main point that customers enter ideas to The Company which leads to extension of already existing products? Even though many customers want to provide The Company with product development ideas which

⁴⁵ For more details about the expansion at The Company see section 4.3.3.

may lead to extensions of their products, it does not mean that all customers want to engage in this activity (Fischer & Scharff 2000:396).

Findings according to the KIF framework

Finally, I will mention that Alvesson's characteristics concerning knowledge intensive firms (KIFs) have been analysed in connection to the process of Adaptive Product Development. Data indicate that five of the characteristics of a KIF are apparent at The Company: doing knowledge based work, having a degree of autonomy, needing extensive communications, practicing idiosyncratic client relations and operating within a certain degree information and power asymmetry. The qualities absent are the factors of ad hoc organisational forms and subjective quality assessment. These factors may merely be absent from the data as they are outside the scope of this thesis. Within the stages Adaptation and Generalization all of these factors are present, as well as in the stage of Improvement Request though not apparent to the same extent. However, in the stages of Tailoring and Specialization are none of the factors representing KIF present. The reason for this is that, on the one hand, Specialization focuses solely on in-house development, meaning not including customers. On the other, Tailoring does not include The Company as a KIF. In a broader sense, this means that The Company is a knowledge intensive firm which may affect the Adaptive Product Development process.

Planner as an example of Adaptive Product Development

The empirical examples underlining the development of Planner show examples of Adaptation and Generalization. This can be seen in excerpt 2 where the customers from OilCompany have entered requests for a new function of the products. It is clear that customers entering requests get their request for new functionality fulfilled as long as they pay for it. However, it is somewhat unclear from this excerpt if this has contributed to the extension of the product in general or has resulted in local Adaptations. It is possible that there is an underlying assumption that the requests have resulted in both Generalizations and Adaptations. This is because this is mentioned in the same sentence as the development of Planner which counts for all customers. For the product to develop in general, some of the Improvement Requests have to result in extensions of the product in general. This shows that, most likely, Planner is an example of both of the stages of Generalization and adaptation.

However, it should be underlined that this is a tentative hypothesis and further evidence (more data) is necessary to either confirm or falsify it.

7.2 Adaptive product development in the light of a learning perspective

“...knotworking is a historically significant new form of organizing and performing work activity, connected to the emergence of new Co-configuration models of production” (Engeström et al. 1999:346).

I have chosen the theory of knotworking to shed light on the learning that occurs when customers and professional developers interact in the further development of the products. The reason for choosing this theory is that it is closely connected to the Co-configuration term (Hartley 2007:200) and therefore matches my conceptual framework. Another important reason is that it focuses on learning between organisations. Adaptive product development occurs between the customer organisations and the Company. As a result of this, the theory of knowledge creation, originating from Nonaka & Takeuchi (Nonaka & Takeuchi,1995), would not be appropriate since it focuses on learning *in* organisations not between as is the case with my findings.

The definition of knotworking, as described in section 2.3.5, is defined as a pulsating movement of tying, untying and retying together otherwise separate threads of activity (Engeström et al. 1999:346). The different stages in Adaptive Product Development represent different knots that are tied, untied and retied: If a product is being further developed in the stage of Adaptation and the customer’s needs are fulfilled this knot of activity may be temporarily tied, meaning closed. However, a product development in Co-configuration work never ends in a finished product (Victor & Boynton 1998), which is true for product development at The Company. Therefore if a knot is tied, meaning an activity of development, after being in the Adaptation for a while it can be untied, meaning the product can somehow be further developed by the customers or it can transition to the Generalization stage (if a customer enters a idea labelled good). After being in the Generalization stage, this knot or activity of development may be retied for the time being. The process of development will continue in this manner for a long time. It should also be mentioned that if a knot of

activities originally occurring in the Adaptation stage, transitions to the Tailoring stage, this is in line with what Engeström means when he is saying that within knotworking the focus is constantly changing:

“The tying and dissolution of a knot of collaborative work is not reducible to any specific individual or fixed organizational entity as the center of control. The center does not hold. The locus of initiative changes from moment to moment within a knotworking sequence” (Engeström et al. 199:346).

The development transitioning from Adaptation to Tailoring represents a shift in initiative and locus of control from the professional developers to the customers regarding how to tailor the products. This sequence of knotworking activities is then an example of when the center does not hold. The center in this context is the Adaptive Product Development process. In addition, one important characteristic of knotworking is the emphasis on collaboration between the partners or parties involved, which takes shape without strong predetermined rules or central authority (Engeström 2005A:6). In the Adaptive Product Development at The Company clearly there is collaboration between the customers and professional developers, which as a starting point is not strongly predetermined by rules. The customers enter Improvement Requests or tailor the products themselves when they have a need for it.

So, by using knotworking in combination with Co-configuration it becomes apparent that there exists a new form of learning between the customer organisation and The Company. The learning occurs between the organisations in different constellations of activities, which are identified by working knots. In the broader (organizational) perspective this means that Adaptive Product Development has implications for learning.

Because of restrictions upon the size of the present thesis, further discussion of knotworking shall be reserved for further work. In addition, a further investigation of whether or not learning through a combination of knotworking and Co-configuration exists at The Company, more longitudinal studies and evidence would be needed.

The development of Planner as an example of how The Company's products alternate between tool and object

Planner is a concrete example of how an Adaptive Product Development process may occur. In addition will I in this section analyse these findings in the light of the theoretical assumptions of tools and objects. However, it is important to include this to point at the factor that the project management tools at The Company alternate between being a tool and an object.

The Company's project management tools may be seen as objects for the customers when they are being used. One characterization of an object is that it consists of a long time goal (Engeström, 2005B). The project management tools at The Company most likely consist of the goal of being used as a project management tool by the customers in everyday settings for planning work. Furthermore it is stated that the object is interpreted, constructed and changed in accordance with customer activities (Engeström, 2005B). The project management tools at The Company are naturally being used in different contexts and thereby embedded in different work routines; they change in accordance with the activities for which they are being used.

Project management tools may operate for the customers as both material tools and tools for thinking (Kuutti, 1995). They operate as material tools when being used in the actual context and as tools for thinking when driving customers to think forward and plan their activities, without actually using the system.

What is interesting to consider is how the project planning products alternate between tools and objects. When customers enter ideas about further product development, the products are objects to change, in order to fit customer needs. However, when these requests are fulfilled the customer uses this product again and thereby it functions as a tool for project planning. Since adaptation is a continuous process, this means that The Company's products alternate between being a object for change or a tool in use.

8. Conclusions

“The idea is that when a user is conceived as a co-producer, the interaction between the parties should generate more... Above all the new business logic presupposes a very much longer relationship between buyer and seller, and a highly refined distribution of roles....In particular it is assumed that the deeper relationship will create opportunities for acquiring more knowledge, thus making the company better able to adapt to the customer and provide higher quality” (Wikström 1995:7 referred after Bardaracco, 1991; Brown, 1991; Christopher et al., 1991; Milgrom & Roberts, 1990; Wikström & Lundkvist, 1995 and Womack et al.,1990).

The objective for the thesis as raised in the introduction was to identify the stages of mutual development between customers, professional developers and mediating artefacts. More precisely the research questions for this thesis are: 1) *How do the customer roles change over time in relationship to the evolving products?* 2) *How do the customers impact the development of The Company’s products?*

The first research question was answered by focusing on the knowledge society and how it fosters knowledge intensive customers and how the customer role has changed in the direction of more demanding customers wanting their products tailored. I addressed this question by presenting literature showing the customer’s connection to the products. This research question was meant mostly as a contextualization and background information for the Adaptive Product Development presented. In the setting of Adaptive Product Development the knowledge society and information about customers changing roles explains a lot about the behaviour of the customers and the professional developers: The customers transition from passive to active contributors in product development processes and the professional developers often work with knowledge based work and acknowledge the knowledge customers assets, meaning they want and see it as important to include customers in the product development process. Living in a knowledge society with knowledge intensive customers it is important to take them into consideration. Many customers have expert knowledge and thereby may provide companies with useful everyday knowledge of their products. For companies to exploit the customers’ knowledge it is advantageous to include them in product development processes.

Research question number two, how the customers impact the development of The Company’s products, is the main research question addressed in this thesis. I have addressed

this research question by describing how the product development process at The Company proceeds, which I have defined as Adaptive Product Development. Characteristic for the development process is how customers and professional developers interact during the product development, and that development processes where only professional developers are involved occur. The former is what I defined as *outer loop product development* and the latter as *inner loop product development*. Inner and outer loop product development shows the components in Adaptive Product Development, which represent the basic processes. When going deeper into how the processes unfold I have identified five stages of Adaptive Product Development at The Company; *Adaptation, Generalization, Improvement Request, Tailoring and Specialization*. These stages represent different product development activities, ranging from purely in-house development towards collaborative development with customers and user-tailoring of products. This represents a customer-developer continuum apparent at The Company.

The empirical findings concerning *the development of Planner* give a concrete and in-depth example of how one product has adapted in line with some of the processes of Adaptive Product Development. More precisely the findings show that the development of Planner in particular is an example of the Adaptation and Generalization stage.

The Company fulfils five of the seven characteristics that define a knowledge intensive firm, according to Alvesson (Alvesson, 2004). In being a knowledge intensive firm, the Adaptive Product Development at The Company can be contextualized within this framework. This means that when the empirical findings show how processes of Adaptive Product Development occur, this may be applicable to knowledge intensive companies only. In a broader perspective, the point of framing Co-configuration within a knowledge intensive firm is to underline that the context has to be taken into consideration when discussing Adaptive Product Development processes.

In a gentle effort of Generalization I will indicate that in Adaptive Product Development the customers are actively engaged in the product development processes. They act as producers of ideas which they submit to The Company. When customers initiate ideas of product development to The Company, the customers and professional developers act as collaborators. In addition, the ideas are serendipitous requests for The Company; they are not expected. Entering these requests often results in the professional developers enhancing the product in

accordance with customers needs, which means that the original product sometimes are extended by either new features just for this customer or features that become available for everybody who uses the product in the future.

One of my main points is how the *customers and professional developers collaborate* in the development of products. Usually the development proceeds along the following path: 1) The customer enters ideas and requests of how to develop the product further; 2) the developer decides whether the idea should be incorporated, depending on if it is labelled good, maybe or bad, implying some consequences for the customers regarding payment; and 3) the professional developers' response to the Improvement Request is that they create either patches, build or new versions in accordance with the ideas. In sum, the customers' contribution of ideas brings value to The Company. As Wikström puts it, "Thus it is no longer a question of creating value for the customer; rather, it is about creating value with the customer and incorporating the customers' value creation into the system (Wikström 1995:9).

In the introduction, two different approaches for looking at Adaptive Product Development were presented. The *Co-configuration approach* looks at Adaptive Product Development from a learning perspective. The outcome of this may be in the form of inter-organizational learning between the customer organisations and The Company. The knotworking theory was discussed in this connection in previous chapter and can, as a result, indicate that this supported the customer-initiated product development process at The Company. However, this approach has not been given much attention since it is outside the scope of my thesis. The *adaptive approach*, which is my main objective, focuses on how Adaptive Product Development and especially customer-initiated product development represents a new form of work or product development. This approach has been presented and modelled by the empirical findings underpinning Adaptive Product Development. I have developed a model representing this phenomenon, as is shown in Figure 13.

Theoretical implications

Adaptive development at The Company may represent a *new form of work* or product development within the research areas investigated in this thesis. This is noteworthy because none of the theories chosen to shed light on the empirical findings can stand alone to explain the Adaptive Product Development process at The Company. Co-configuration is a theory underlining that customers are of the utmost importance in product development processes,

and the theory is therefore, in many ways, the most relevant one. However, this theory alone does not explain all the complexity of Adaptive Product Development process occurring at multiple levels at The Company. It especially does not cover the area of *Tailoring*. This is because Co-configuration focuses on how customers are active partners in the development process, as initiators of ideas towards further development, not as local developers or end user-tailors. To enlighten this process as well, I used the theories of Meta-design and Modding. These theories also do not cover the whole Adaptive Product Development process. What is missing in the theory of Modding is the element of professional development. Neither Meta-design nor Modding integrates with the professional development of products.

As a result of using my theoretical conceptual framework in this thesis some theoretical implications can be made. Firstly the theory of Co-configuration can be expanded with some theory describing Tailoring processes, for example the theory of Modding. The process of Tailoring is not covered to its full extent by Meta-design theory; however, some components are covered. Secondly, the theory of Meta-design can thereby also be extended with a theory for describing the process of Tailoring to its full extent. For example, the SER model of Fischer, in the phase of evolutionary growth supports the Tailoring processes occurring at The Company. Thirdly, the theory of Modding can be expanded with theories such as Meta-design or Co-configuration to elaborate on how processes of Specialization and Adaptation occur. Finally, the theory of KIF is only included because it provides the necessary contextualization for describing Adaptive Product Development and will not be given any theoretical implications. As a consequence of this it is evident that my empirical findings represent a unique form of Adaptive Product Development or work, since it combines several levels of development at the same time.

My contribution

My main contribution with this thesis is to show how a complex Adaptive Product Development process, which is initiated by customers, represents a new form of work in software product development. Often, product development processes either focus on professional developers performing the development purely in-house or they focus on collaboration between customers and professional developers. Therefore, my thesis is a contribution to showing a product development process where *both* in-house development by professional developers *and* collaboration with customers is occurring. In addition, I briefly

have pinpointed how the outcome of Adaptive Product Development can be inter-organizational learning, viewed in the light of knotworking theory. Often, learning is described within organisations and not between them. In sum, my main contribution with this thesis is the model I have developed showing different levels of Adaptive Product Development, which is mainly customer driven. This model is visualized in Figure 13.

Limitations and directions for further work

The case study conducted in this thesis has some limitations. It could be expanded by performing additional interviews with customers, in order to bring the customers' view on the product development process even more to the forefront. In addition, as explained in the methodological chapter, I did not get the opportunity to video capture the work setting. It could be interesting to do this in order to identify the mechanism of how customers enter Improvement Requests. Furthermore, it is important to bear in mind that there is difference between what the informants state they do and what they actually do. In order to reassure that the information the informants have given is in line with actual work practices it could be interesting to do some participating observation. My empirical findings do not say anything about how the actual development takes form; it only shows how different kinds of product development are apparent and that customers often are initiators. Directions for further work could be to choose another methodology where the purpose is to follow one customer or professional developers in a process of adaptation of the product over a certain time period. This is in line with Engeström when he in his methodology chapter states: "Follow the actors!" (Engeström 2004:16).

During the analysing of data the learning aspect became more apparent, but because of the chosen research questions it was not followed up. Therefore it would be interesting to take a closer look at the Adaptive Product Development process from a learning perspective and go deeper into detail about this. Evidently, there emerges a new form of inter-organizational learning between the customer organisation and The Company, which I referred to as knotworking. Directions for further work concerning the learning aspect could take a closer look at how Adaptive Product Development represents a form of mutual learning and boundary crossing activities. Performing new case studies with this topic in mind and integrating it with Adaptive Product Development processes could be exciting research.

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Attachment 1: KIKK- empirisk design

Prosjektbeskrivelse for KIKK: Kunnskapsforvaltning for Intern Kommunikasjon og Kundebehandling

KP-Lab prosjektgruppen, InterMedia, Universitetet i Oslo

1. Innledning

KIKK prosjektet er beskrevet ved først å gi en introduksjon til fenomenet vi ønsker å studere (en bedrift), deretter plasserer vi dette i en større kontekst (KP-Lab EU prosjektet). Videre presenteres tre ulike fremgangsmåter (studentprosjekter), som munner ut i forskningsspørsmål. Vi presenterer det empiriske designet på basis av dette og hvilke metoder vi vil bruke. Vi avslutter med en tidsplan og foreløpige ideer om forventet resultat.

1.1 Fenomenet

The Company er en relativt liten teknologibedrift i Norge som leverer prosjektstyringsverktøyet *Planner*. Bedriften har per dags dato 26 ansatte. I tillegg til dette produktet tilbyr bedriften konsulenttenester og pakkeløsninger knyttet til prosjektstyring. Hovedkvarteret befinner seg i Stavanger, i tillegg er det nylig opprettet et kontor i Oslo. Bedriften er en del av "AB" gruppen, som tilbyr prosjektstyringsverktøy globalt. Konsernet har 40 kontorer fordelt på 28 land og rundt 600 ansatte.

Bedriften ønsker å reorganisere og kvalitetssikre sine rutiner for kunnskapsforvaltning knyttet til intern kommunikasjon og kundebehandling. For å realisere dette, ønsker de å utvikle en ny webportal. Denne skal støtte intern kommunikasjon og kunnskapsforvaltning, ekstern kommunikasjon med kunder, samt at den skal være en informasjonskanal for etablerte, nye og potensielle kunder. Pr. i dag foregår produktutvikling i Stavanger og kundesupport i Oslo og Stavanger. Den opprinnelige staben med base i Stavanger kjenner hverandre svært godt og flere har felles bakgrunn fra petroleumsbransjen, mens flere av de nytilsatte har annen bakgrunn. Mye av den tekniske kompetansen befinner seg i Stavanger.

Organisasjonen er inne i en ekspansjonsfase. Som et resultat av dette, har det oppstått et behov om at programmererne som i praksis har tatt seg av mye support, får avlastning. Dette

skaper behov for en gjennomgang og bedring av bedriftens interne kommunikasjonsrutiner. Organisasjonen har videre behov for effektive og kvalitetssikrede verktøy for kunnskapsdeling.

I tillegg til at organisasjonen internt er i forandring, er også kundemassen i ferd med å forandre seg. Fra å være relativt homogen med gode kunnskaper om produktet, er kundemassen i ferd med å heterogeniseres og kunnskapen om produktet er variabel. The Company ønsker å opprettholde sitt gode kundeforhold til gamle kunder samtidig som de gir et kvalitetsmessig like bra og tilpasset tilbud til nye kunder.

2. Kontekst og fokus

2.1 KP-Lab prosjektet

KIKK inngår som en case i KP-Lab prosjektet. InterMedia er sammen med 21 andre deltakere med i prosjektet "Developing Knowledge Practices Laboratory" (KP-Lab). KP-Lab er et "Integrated Project" finansiert av EUs 6. Rammeprogram for forskning, IST programmet. Prosjektet utgangspunkt er at læring og kunnskapsdannelse skjer i samspill av kunnskapsutvikling, sosial samhandling, og bruk av IKT, og at disse sammen bidrar til forandring, innovasjon og transformasjon av aktuell praksis. KP-Lab fokuserer bl.a. på kunnskapsutvikling i profesjonelle nettverk og utnyttelse av teknologi for å støtte dette. Prosjektet har derfor ett fokus mot analyse og utvikling av teoretiske modeller for læring og kunnskapsutvikling innen og i overgang mellom utdanning og arbeidsliv, og ett fokus mot forskning og design av samhandlingsteknologi. Metodisk arbeider vi med ulike tilnærminger og teknikker, inkludert observasjon, intervju, feltforsøk, deltakende design og evt. utvikling av informasjonssystemer.

2.1 Det sosiokulturelle perspektivet og deltagende design

Trenger noe tekst her på disse to overordnede perspektivene

2.2 Individuelle bidrag

I doktorgradsprosjektet til Kathrine Nygård er fokus på det de kollektive sider ved kunnskapsdanning slik de kommer til uttrykk gjennom de samhandling internt i The Company og eksternt mellom The Company og organisasjonens kundemasse. Målsettingen med

prosjektet er å bidra i diskusjonen om hvordan vi skal tolke og forstå hvordan mennesker skaffer seg kunnskap og måten den kommer til uttrykk på ved at de deler den med andre over tid. I det empiriske arbeidet ønsker hun å belyse hvordan kunnskapsbegrepet kommer til uttrykk gjennom handling, dialog og kommunikasjon og via medierende artefakter i konkrete situasjoner. Det viktig å fokusere på de digitale artefakter som finnes i bedriften og deres rolle og hvordan disse utvikler seg over tid. Bedriften planlegger innføring av et nytt digitalt verktøy. Prosessen rundt dette må forfølges over tid for å identifisere endringene. Hun vil videre studere den konkrete bruken og dens rolle i kunnskapsdanningen. Dette vil tilnærmes ved å se på hvordan kunnskap representeres og hvordan deltakerne samhandler.

I mastergradsprosjektet til Shazia Mushtaq er fokus på design, utvikling, og anvendelse av informasjonssystemer. Arbeidet vil være rettet mot informasjonssystemer brukt for kunnskapsforvaltning og kommunikasjon mellom de ansatte og mellom ansatte og kunder. Det er også ønskelig å studere de spesifikke informasjonssystemene som anvendes i bedriften (f.eks. Planner). Problemstillinger inkluderer hvilke faktorer som påvirker design av nytt system (web-portal) og hvilke designbeslutninger som ligger bak valg av komponenter i dette systemet, og hvordan de ferdige systemene brukes. Hun ønsker videre å se nærmere på hva som kan bidra til å øke utnyttelse av potensialet i de enkelte informasjonssystemene.

I mastergradsprosjektet til Renate Jacobsen⁴⁶ er fokus på å identifisere sentrale avhengigheter mellom ansatte, ledelsen, verktøy og organisasjonsstruktur. Kunnskapsutvikling vil være det overordnet tema for dette. Det vil bli studert fra ledelsens perspektiv og de ansattes perspektiv. Hovedvekten vil ligge på de ansattes perspektiv, men vil nødvendigvis berøre ledelsens perspektiv også. I sammenheng med dette vil jeg analysere læringsbegrepet som en del av en kunnskapsutviklingsprosess som foregår i bedriften. Det blir da viktig å se på hvordan de medierende verktøyene kan bidra til kunnskapsutviklingen eller begrense den. Hun vil også studere hva slags organisasjonstype bedriften er og hvordan denne påvirkes av de andre faktorene.

⁴⁶ Jacobsen is my maiden name. During the work with this thesis I got married and thereby changed my last name to “Andersen”.

2.3 Foreløpige forskningsspørsmål

Datainnsamlingen skal foregå kollektivt og derfor har det vært hensiktsmessig å formulere noen felles hovedproblemstilling for de ulike studentprosjektene som er ment å belyse det feltet som skal beskrives fra ulike ståsteder. På et overordnet nivå adresserer vi i første fase:

- Hva er dagens praksis for kunnskapsforvaltning i forbindelse med 1) intern kommunikasjon og 2) kundebehandling
- Hvordan legger organisasjonsteori/organisasjonsstruktur/organisasjonstype føringer på kunnskapsutviklingen?
- Hvilke type oppgaver anvendes bedriftens ulike informasjonssystemer
- How can we capture different modes of knowledge and knowledge practices and transform them to shared objects of reflection?

I den neste fasen i prosjektet vil fokuset være på designprosessen av den nye webportalen. Denne prosessen kan forstås som en intervensjon i dagens praksis, der et nytt verktøy innføres med sikte på endre praksis i forbindelse med kunnskapsforvaltning i bedriften. Designprosessen vil være styrt av bedriften, mens InterMedia skal fungere som ressurs og ha en rådgivende rolle i arbeidet. Det sentrale forskningsspørsmålet i denne fasen av prosjektet vil være å undersøke:

- Hvilke metoder, designprinsipper og verktøy som kan være nyttige for å mediere endring i eksisterende praksis.

I den tredje og siste fasen i prosjektet er den nye webportalen ferdig utviklet og forhåpentligvis tatt i bruk som et nytt verktøy som er en aktiv ressurs i bedriften. Det vil da være ønskelig å undersøke:

- Hvorvidt innføring og bruk av den nye webportalen har ført til endring i eksisterende rutiner og praksiser, og i så fall: I hvilken grad og i hvilken fase av adopsjonsprosessen påvirker den nye portalen eksisterende rutiner og praksiser?
- How does knowledge in an organization evolve over time? Hva er de ulike bestanddelene i denne utviklingsprosessen og hvordan kan de analyseres?

3. Empirisk design

Datainnsamlingen vil foregå i tre faser, der fasene delvis vil overlape hverandre. Spesielt fase 1. og 2. vil gå i hverandre, da denne prosessen allerede er delvis påbegynt

1. Fase: Kartlegge dagens situasjon (praksis)

- Artefaktet: Følge prosessen fra en versjon til neste av Planner
 - i. lagring av dokumenter i forbindelse med oppgraderinger
 - ii. hvordan de ansatte snakker om dette (ulike perspektiver)
 - iii. Identifisere motsetninger (f.eks. behov for lokale tilpasninger kan motstride bedriftens standardiseringsbehov)
- Objektet: Følge prosessen rundt planlegging av ny webportal
 - i. Utvikling av objekter og nøkkelpremissgivere (aktører)
 - ii. Analysere prosessen rundt integrasjon med eksisterende verktøy og tilrettelegging av bruken
- Aktørene
 - i. Følge nøkkelpersoner i bedriften i forbindelse med informasjonsutveksling
 - ii. kartlegge kontinuitet og brudd i kommunikasjon og samhandling mellom aktørene i arbeidssituasjonen
- Kunnskapsutvikling
 - i. Kartlegge organisasjonens ev. føringer for informasjonsutveksling i bedriften
 - ii. ”Forfølge noen objekter”, slik som bedriftens visjoner og ansattes ideer omkring rollen til ny portal;
 - iii. Se på de sosiale nettverkene i bedriften og i hvilken grad de støtter opp under kunnskapsutviklingspraksisene;

2. Fase: Designprosessen av en ny kunnskapsportal

- Bruke av scenarier for å representere systemkrav
 - i. identifisere historier og problemer med nåværende praksis og rutiner
 - ii. ”negasjon” av problemer som innputt til design representasjoner
 - iii. design workshop som korreksjon til portalsystemutviklingen

3. Fase: Kartlegge ny situasjon (praksis)

- Identifisere diskrepanser mellom planlagt og faktisk bruk av ny portal
- identifisere komponentene i en ev. ny praksis, og hvordan er de blitt endret over tid
- Hvordan kan endringene spores på aktivitetsnivå? Hvilke teoretiske tilnærminger kan vi benytte for å få tak på dette

4. Datainnsamling

Forskning innen det sosiokulturelle perspektiv krever at datainnsamlingen foregår i den sosiale situasjonen som er gjenstand for undersøkelse. En viktig målsetning er å tilegne seg forståelse av relasjonen mellom mentale funksjoner og kulturell, institusjonell og historisk kontekst. *Case som forskningsdesign* egner seg for å belyse problemstillinger knyttet til nåtidige fenomener og spørsmål av typen *hva og hvorfor*. Kvalitative forskningsdesign har gjerne en høy grad av økologisk validitet ved at man oppnår følsomhet med det fenomenet som studeres.

Dataene som hentes inn vil bygge på *feltarbeid*. Det innebærer at forskeren oppsøker, og oppholder seg i den sosiale situasjonen som studeres, og deltar aktivt. Kvalitativ forskning, og spesielt feltarbeid, benytter seg av fire hovedmetoder i datainnsamlingen. Disse er observasjon, intervjuer, videoopptak og tekst- og dokumentanalyse.

Vi vil kartlegge dagens situasjon slik den kommer til uttrykk gjennom informantenes handlinger. Vår rolle vil være *aktivt deltagende observatører*. Videofilming vil bli brukt i kombinasjon med feltnotater for å få et innblikk i praksiser i feltet. Det er viktig å understreke at det ikke skal filmes med det formål å gjennomføre analyser som er svært detaljerte i forhold til dialog og samhandling som for eksempel diskursanalyse. Formålet med *videodokumentasjon* i denne sammenhengen, vil være å få mer utfyllende situasjonsdata (lyd, bilde i kombinasjon) enn for eksempel feltnotater alene ville gitt. Filmen gir eksempelvis data om menneskers gester, stemmeintonasjon, artefaktbruk etc. Dette er data det er vanskelig å dokumentere i feltnotater.

Det vil bli gjennomført *seminstrukturerede intervjuer* med et mindre utvalg. Denne metoden egner seg for å kartlegge informantenes fortolkninger av dagens situasjon samt deres uttrykte

oppfatning av de forestående endringer. Under intervjuene vil det bli benyttet en intervjuguide med hovedkategorier som er operasjonaliseringer av forskningsspørsmålene over. Alle hovedkategoriene skal adresseres i løpet av intervjuet. I tillegg vil intervjuguiden inneholde stikkord under hver kategori. Disse skal hjelpe intervjueren å konkretisere temaene. Det vil bli tatt opp lyd av alle intervjuer.

Det vil bli fortatt *dokumentanalyser* for å besvare spørsmål av typen: Hvilke skriftlige artefakter finnes? Hva er deres rolle i forhold til kunnskapsforvaltning? Er de systematisk ordnet? Hva mangler etc.

Alle metodene vil bli brukt i kombinasjon. I tillegg til å være et ledd i ivaretagelsen av undersøkelsens *validitet*⁴⁷, vil en kombinasjon av disse metodene for innhenting av data være en måte å belyse fenomenet fra ulike vinkler på.

Vi vil også benytte metoder fra systemutvikling og *deltagende design*. spesielt vil vi bruke en kombinasjon av *iterativ utviklingsprosesser* der det er mulig å komme med bidrag tilbake til bedriften underveis i prosessen. Dette er tenkt gjennomført blant annet ved å samle inn de ansattes opplevelser, hverdagshistorier rundt sine arbeidsoppgaver og deretter i samarbeid med dem beskrive en ønsket framtidssituasjon for deres arbeidspraksis. Dette oppsummeres i et *scenario*, og det vil videre bli bearbeidet etter metoden for scenariobasert design og vil kunne bli benyttet som en innputt til en design workshop med brukere og utviklere.

5. Tidsplan

Vi planlegger og gjennomføre det empiriske designet over en periode på 1 år, og aktivitetene vil fordeles på de ulike måneder og årstider omtrent slik:

1. November 2006
 - a. aktivitet 1 (Stavangerkontoret)
 - b. aktivitet 2 (Kundeintervju)
2. Desember 2006
 - a. aktivitet 1 (etc.)
 - b. aktivitet 2 (Design workshop)
3. Januar 2007

⁴⁷ Dette skal sikre at det opprettes korrekte, operasjonelle mål på det som studeres. Dette må gjøres gjennom å velge spesifikke fenomener som skal studeres. Videre må man kunne vise at målene som brukes, faktisk belyser denne konkrete typen fenomener.

a. etc.

4. Februar 2007
5. Mars 2007
6. Våren 2007
7. Sommeren 2007
8. Høsten 2007

Attachment 2: NSD – godkjenning

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES



Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Anders Mørch
InterMedia
Universitetet i Oslo
Postboks 1161 Blindern
0318 OSLO

Vår dato: 30.11.2006

Vår ref: 15642/JE

Deres dato:

Deres ref:

KVITTERING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 26.10.2006. Meldingen gjelder prosjektet:

15642 *Kunnskapsforvaltning for intern kommunikasjon og kundebehandling (KIKK)
Et delprosjekt av: Knowledge Practices Laboratory (KP-Lab). Developing knowledge
Practices, KP-Lab 27490, Integrated project, FP6-2004-IST-4
Universitetet i Oslo, ved institusjonens øverste leder*
Behandlingsansvarlig *Anders Mørch*
Daglig ansvarlig

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

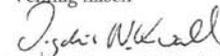
Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i melde skjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

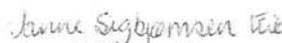
Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, <http://www.nsd.uib.no/personvern/endrings skjema>. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://www.nsd.uib.no/personvern/database/>

Personvernombudet vil ved prosjektets avslutning, 31.12.2010 rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen


Vigdis Namtvedt Kvalheim


Janne Sigbjørnsen Eie

Kontaktperson: Janne Sigbjørnsen Eie tlf: 55 58 31 52

Vedlegg: Prosjektvurdering

Avdelingskontorer / District Offices:

OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kjyrre.svana@ov.ntnu.no
TROMSØ: NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. nsdmas@sv.uib.no



Personvernombudet har vurdert prosjektet og finner at behandlingen kan hjemles i personopplysningsloven § 8 første ledd.

Revidert informasjonsskriv per 29.11.2006 finnes tilfredsstillende.

Av direkte personidentifiserende opplysninger registreres navn og videoopptak. Personene vil også være indirekte identifiserbare på bakgrunn av lydopptak samt opplysninger om alder, kjønn, arbeidssted, arbeidstittel, ansiennitet og utdanning.

Ved prosjektslutt 31.12.2010 skal datamaterialet anonymiseres. Anonymisering innebærer at direkte og indirekte personidentifiserende opplysninger slettes eller omkodes (grovkategoriseres), videoopptak, lydopptak og koblingsnøkkel destrueres.

Attachment 3: Informasjonsskriv til ansatte



UNIVERSITETET
I OSLO

Informasjon om datainnsamling i forbindelse med forskningsprosjektet KIKK

I samarbeid med [redacted] har InterMedia startet opp et forskningsprosjekt der målsetningen er å undersøke hvordan utvikling og innføring av nye digitale verktøy (IKT) kan bedre kunnskapsforvaltning knyttet til intern kommunikasjon og kundebehandling i [redacted]. I den sammenheng ønsker vi å kartlegge rutiner for kunnskapsforvaltning i bedriften slik de er nå, vi vil følge designprosessen av den nye webportalen (for intern kommunikasjon) og bistå i denne prosessen etter avtale med bedriften. Vi ønsker også å kartlegge i hvilken grad den nye webportalen endrer bedriftens kunnskapshåndtering.

Samarbeidet mellom InterMedia og [redacted] inngår som et av flere eksempler innen prosjektet Knowledge-Practices Laboratory (KP-Lab). Dette er et europeisk samarbeidsprosjekt finansiert av EU's 6 rammeprogram for forskning. Det er 22 partnere fra hele Europa og Israel, og prosjektet koordineres av Universitetet i Helsingfors. Målsetningen til KP-Lab er å legge til rette for innovative praksiser knyttet til arbeid med kunnskap (arbeidspraksiser) i utdanning og arbeidsliv. For å realisere denne målsetningen, er partene bl.a. i gang med prosjekter for å undersøke forutsetninger for, og utvikling knyttet til kunnskapsforvaltning og kompetanseutvikling. Det legges vekt på aktiv brukerdeltakelse i utvikling av teknologiske verktøy.

Førsteamanuensis Anders Mørch er ansvarlig for prosjektet og [redacted]s kontaktperson er [redacted]. I tillegg vil Kathrine A. Nygård (stipendiat), Shazia Mushtaq (masterstudent) og Renate Jacobsen (masterstudent) delta. For å samle data i dette prosjektet, vil vi bruke teknikker som observasjon, notater, intervjuer og bilder/video for å kartlegge dagens rutiner. Vi ønsker å ta lyd- og/eller videoopptak av intervjuer og møter.

Vi vil være tilstede, men ønsker ikke å legge unødige beslag på din tid. Selv om vi vil stille spørsmål når det er anledning for det. Vi vil også holde intervjuer med noen personer. Intervjuene vil ta inntil en time og vil være lagt opp som en samtale der to personer fra prosjektet deltar.

Det er ingen risiko ved å delta, selv om noen kan synes det er uventet å bli observert av fremmede. All informasjon som hentes inn vil bli behandlet slik at de opplysninger du gir ikke kan tilbakeføres til deg personlig i masteroppgavene, doktoravhandling, rapportene og artiklene som skrives på basis av studien.

Prosjektet er meldt til Personvernombudet for forskning, NSD. Dette er en instans som skal sikre at prosjektet holder seg innenfor de gjeldende forskrifter for personvern.

Vedlagt (side 2) dette informasjonsskrivet finner du en samtykkeerklæring som vi ber deg fylle ut. Det er frivillig og delta og du har mulighet til å trekke deg fra studien når som helst. Prosjektet avsluttes 31.12.10, og etter denne dato vil all data bli slettet.



På side 3 finner du et skjema der vi ber deg oppgi noen korte opplysninger om deg selv og den arbeidssituasjon. Vi håper du tar deg tid til å besvare disse, da denne informasjonen vil være til stor hjelp for oss.

Ta gjerne kontakt dersom du har ytterligere spørsmål eller ønsker en prat:

- Anders Mørch, anders.morch@intermedia.uio.no eller tlf. 22 84 07 13
- Kathrine A. Nygård, k.a.nygard@uv.uio.no eller tlf. 22 84 07 27/ 959 01 444

Dersom du ønsker å lese mer om våre aktiviteter og prosjekter kan du finne på InterMedia sine nettsider: <http://www.intermedia.uio.no/projects/research-projects-1/kp-lab-knowledge-practices-laboratory> eller på KP-Lab sine prosjektsider: <http://www.kp-lab.org/>

Med vennlig hilsen

Anders Mørch, Kathrine A. Nygård, Shazia Mushtaq og Renate Jacobsen

Samtykkeerklæring

Jeg har lest informasjonen om KIKK (Kunnskapsforvaltning for Intern Kommunikasjon og Kundebehandling) Jeg er villig til å la meg observere i mine arbeidsomgivelser. Jeg er stiller meg også til disposisjon for å delta på et eventuelt intervju.

Jeg er kjent med at informasjonen jeg bidrar med, blir bruk i dette forskningsprosjektet. Jeg er også inneforstått med at informasjonen jeg bidrar med ikke kan tilbakeføres til meg personlig. Informasjonen jeg gir oppbevares i låst skap som bare prosjektets medarbeidere har tilgang til.

Jeg er kjent med at deltakelse i prosjektet er frivillig, og at jeg på ethvert tidspunkt kan velge å trekke meg fra studien.

Navn: _____

Stilling: _____

Tlf. _____

ePost: _____

Personopplysninger

Alder:	Kjønn:
Stilling:	
Antall år/mnd i stillingen:	
Utdanning/bakgrunn:	
Tidligere arbeidserfaring:	
Hva ser du på som de største utfordringene med intern kommunikasjon?	
Hva ser du på som de største utfordringer i kundebehandling?	
Hvilke forventninger har du til en ny webportal?	

Attachment 4: Interjvuguide ansatte

Intervjuguide for KIKK- prosjektet

(Innledningen er workshopen)

1. Personens bakgrunn (10)

- Om mulig: ref til skjema m bakgrunnsopplysninger, dersom dette er fylt ut snakker man om det.
 - Navn
 - Alder
 - Stilling/antall år /mnd.
 - Utdanning/bakgrunn
 - Tidligere arbeidserfaring

2. Bakgrunnsinformasjon om bedriften (5)

- Historisk informasjon:
 - Oppstart
 - Antall ansatte
 - Personlig forståelse av bedriftens utvikling
- Hva er din oppfatning av The Company sin visjon?
 - kjenner du til den –
 - hvilket forhold har du til den?

3. Organisasjonsstruktur (5-10)

- Oppfatning av organisasjonsstruktur (tegn og forklar)

4. Beskrivelse av arbeidsoppgaver(10)

- Beskriv dine arbeidsoppgaver raskt
- Finnes det noen skriftlige retningslinjer for arbeide ditt?
- Opplever du at det er samsvar mellom den og arbeidsoppgavene dine?
- Hvordan ser en god dag på jobb ut – beskriv
- Hvordan ser en dårlig dag ut – Beskriv
- Hvilke type utfordringer møter du på?
- Hvordan prøver du å løse disse? – utdyp

HALVVEIS!

5. Kundecase

Tenk deg at en kunde ringer inn og ønsker en oppdatering eller tilleggsfunksjon i en verktøyeme (project, planner..). Du tar i mot tlf, hvordan går du fram? Hvordan kan andre kollegaer finne ut om denne tilleggsfunksjonen/oppdateringen? (internt og eksternt) Hvordan kan andre kollegaer følge kundeoppfølgingen?(få fram oslo kontor og stvg kontor samspill)

6. Kundebehandling (5)

- Har du noen kundekontakt og evt hvor ofte er du i kontakt med kunder?
- Hvor stor del av arbeidsdagen din / uka består av kundekontakt?
- Hvordan beskriver du kundene du er i kontakt med? Erfarne, gamle, olje/ byggebransjen? – hyppighet?
- (østland / vestland)
- Hvor mye kunnskap har kundene om produktene? Har dette noen sammenheng med bransjen?
 - kan du fortelle om hvordan den beste testeren av kundene blir kåret, bakgrunnen for det?
 - Hvordan anvender dere tilbakemeldinger fra kunder når det gjelder produkter? (- i hvilken grad er kundene på denne måten er med på å utvikle produktene?).
- Har du en oppfatning om at kundemassen har forandret seg?

- Og i tilfelle hvordan?
- Hvilke krav stiller kundene til dere som bedrift?
- Opplever du at kravene er forskjellige ut fra ulike kundemasser?
- Utfordringer m intern kommunikasjon og kundebehandling? (muligens fjernes)

8. Design av webportal (5-7) kartlegge dagens situasjon på webportalen

- Når og hvordan fikk du kjennskap til dette?
- Hvilket forhold har du til den nye webportalen som kommer?
- Hva ønsker du at denne skal inneholde?
- Kan denne gjøre arbeidet ditt enklere? Gi et eks
- Ønsker du å være direkte involvert i utviklingen? Hvorfor?
 - hvem vil webportalen være nyttig for? (kundene, oslo kontoret).
 - Hvilken innflytelse har du på utviklingen av webportalen?

Attachment 5: Planleggingsnotat til datainnsamling i Stavanger

Workshop hos The Company, Stavanger

Deltakere, The Company: “Mari”, “Tom”, “Ole”, “Per”

Deltakere, InterMedia: Anders, Kathrine, Renate, Shazia

Dato: Desember, 2006.

Forslag til agenda:

10.00-10.30: Bli kjent / Hva er det viktigste? Hva kan vi gjøre?

10:30-11.00: Plan for resten av dagen

11.00-12.00: Dagens praksis kartlegging (tavle m/postIt):

12.00-13.00: Lunsj

13.00-17.00: Intervju/observasjon/dok.server

intervjuer/observasjon

Tid	Intervjuer	Observasjon og dokument server
13-14	Person 1	
14-15	Person 2	
15-16	Person 3	
16-17	Person 4	

Deltakerne: (velger selv tid):

Attachment 6: Informasjonsskriv kunder



UNIVERSITETET
I OSLO

Informasjon om datainnsamling i forbindelse med forskningsprosjektet KIKK

I samarbeid med [redacted] har InterMedia startet opp et forskningsprosjekt der målsetningen er å undersøke hvordan utvikling og innføring av nye digitale verktøy [redacted] kan bedre kunnskapsforvaltning knyttet til intern kommunikasjon og kundebehandling [redacted]. I den sammenheng ønsker vi å kartlegge rutiner for kunnskapsforvaltning i bedriften slik de er nå, vi vil bidra i og dokumentere designprosessen av en ny webportal (for intern kommunikasjon og kundebehandling) etter avtale med bedriften. Vi ønsker også å kartlegge i hvilken grad den nye webportalen endrer bedriftens kunnskapshåndtering. I tillegg ønsker vi å undersøke relasjonen mellom bedriften og noen av dens kunder.

Samarbeidet mellom InterMedia [redacted] inngår som et av flere eksempler innen prosjektet Knowledge Practices Laboratory (KP-Lab). Dette er et europeisk samarbeidsprosjekt finansiert av EU's 6 rammeprogram for forskning. Det er 22 partnere fra hele Europa og Israel, og prosjektet koordineres av Universitetet i Helsinki. Målsetningen til KP-Lab er å legge til rette for innovative praksiser knyttet til arbeid med kunnskap (arbeidspraksiser) i utdanning og arbeidsliv. For å realisere denne målsetningen, er partene bl.a. i gang med prosjekter for å undersøke forutsetninger for, og utvikling knyttet til kunnskapsforvaltning og kompetanseutvikling. Det legges vekt på aktiv brukerdeltakelse i utvikling av teknologiske verktøy.

Førsteamanuensis Anders Mørch er ansvarlig for prosjektet og Safrans kontaktperson er [redacted]. [redacted] tillegg vil Kathrine A. Nygård (stipendiat), Shaszia Mushtaq (masterstudent) og Renate Jacobsen (masterstudent) delta. For å samle data i dette prosjektet, vil vi bruke teknikker som observasjon, notater, intervjuer og bilder/video.

All informasjon som hentes inn vil bli behandlet slik at de opplysninger du gir, ikke kan tilbakeføres til deg personlig. Du har også mulighet til å trekke deg fra studien når som helst.

Prosjektet er meldt til Personvernombudet for forskning. Dette er en instans som skal sikre at prosjektet holder seg innenfor de gjeldende forskrifter for personvern.

Vedlagt (side 3) dette informasjonsskrivet finner du en samtykkeerklæring som vi ber deg fylle ut. Denne må fylles ut av alle som deltar i forskningsprosjektet.

På side 4 finner du et skjema der vi ber deg oppgi noen korte opplysninger om deg selv og den arbeidssituasjon. Vi håper du tar deg tid til å besvare disse, da denne informasjonen vil være til stor hjelp for oss.

Ta gjerne kontakt dersom du har ytterligere spørsmål eller ønsker en prat:



- Anders Mørch, anders.morch@intermedia.uio.no eller tlf. 22 84 07 13
- Kathrine A. Nygård, knygard@uio.uio.no eller tlf. 22 84 07 27/ 959 01 444
- 

Dersom du ønsker å lese mer om KP-Lab kan du gjøre dette ved å gå inn på InterMedia sine nettsider: <http://www.intermedia.uio.no/projects/research-projects-1/kp-lab-knowledge-practices-laboratory> eller på KP-Lab sine prosjektsider: <http://www.kp-lab.org/>

Med vennlig hilsen

Anders Mørch, Kathrine A. Nygård, Srazia Mushtaq og Renate Jacobsen

Samtykkeerklæring

Jeg har lest informasjonen om KIKK (Kunnskapsforvaltning for Intern Kommunikasjon og Kundebehandling) Jeg er villig til å delta på et intervju.

Jeg er kjent med at informasjonen jeg bidrar med, blir bruk i dette forskningsprosjektet. Jeg er også inneforstått med at jeg bidrar med ikke kan tilbakeføres til meg personlig. Informasjonen jeg gir oppbevares i låst skap og i lukket datasystem som bare prosjektets medarbeidere har tilgang til.

Jeg er kjent med at deltakelse i prosjektet er frivillig, og at jeg på ethvert tidspunkt kan velge å trekke meg fra studien.

Navn: _____

Stilling: _____

Tlf. _____

ePost: _____

Personopplysninger

Alder:	Kjønn:
Stilling:	
Antall år/mnd i stillingen:	
Utdanning/bakgrunn:	
Hvor lenge har ditt firma vært kunde hos <input type="text"/>	
Hvilke produkt/tjenester har ditt firma kjøpt a <input type="text"/>	
Hva ser du på som de største utfordringer i kundebehandling?	
Hvilke forventninger har du til en ny webportal/et nytt kundebehandlingssystem?	

Attachment 7: Intervjuguide kunder

Intervjuguide KIKK – kunder

1. Innledning.

- Presentasjon
- Vi opplyser om at vi bruker båndopptaker

2. Personens bakgrunn

- Om mulig: ref til skjema m bakgrunnsopplysninger, dersom dette er fylt ut snakker man om det.
 - Navn
 - Alder
 - Stilling/antall år /mnd.
 - Utdanning/bakgrunn
 - Tidligere arbeidserfaring

Kundeforhold

- Hvor lenge har dere vært kunder
- Hvem har du kontakt med
- Hva har dere kontakt om
- Hvor ofte
- Hvem tar kontakt?
- Hvilken type? (tlf/mail/oppsøkende/web – hyppighetsgrad)
- Hva er du spesielt tilfreds med?
- Hva vil du endre på/ hva kan bli bedre?
 - Har du opplevd å måtte vente urimelig lenge på svar om en forespørsel?
 - Hva er urimelig lenge
- Vet du at The Company er i ferd med å utvikle en ny webportal som et ledd i kundebehandlingen?
 - Hva ønsker du at denne skal inneholde (trenger oppfølgingsspørsmål)
- Avsluttende kommentarer

Attachment 8: Glossary

Adaptive Product Development refers to a product development process where products are being developed in interaction with customers, as well as products being developed solely in-house by the professional developers or in interaction with other developers.

Inner loop product development is when solely professional developers perform in-house development.

Outer loop product development is when customers and professional developers interact and collaborate in the development of software products.

Adaptation is when a customer requests an improvement to an existing product and the company chooses to fulfill the request. Then it becomes an adaptation just for this specific customer. Sometimes the customer have to pay for this other times not.

Specialization is when the professional developers at The Company create in-house builds. This is common in inner loop development processes where they improve the products for their own internal work as well. This could have the potential of introduce new product features, but most often it entails perfecting the product and remove bugs.

Generalization occurs when there is released a new version of an existing products, available to all customers.

Improvement Requests is when customers enter requests to The Company about extra functionality, bugs etc., viewed from the customers' perspectives.

Tailoring is characterized by involved end users who make adaptations on their own.

Patch is understood as a quick fix to a problem. Patches are packaged extensions that fit specific versions.

Build is a single compiled program (not separate patches).

A new version is a stable system given to the customers when they are due for upgrade according to their contract.

Baseline is the original project plan the informant created.

Use time is when users have the possibility to customize the system themselves based on a running version of the system put into a realistic use context (Fischer, 2003).

Design time describes the time period when system developers create environments and tools before the system is put to use (Fischer, 2003).

End user development (EUD) "is a set of methods, activities, techniques, and tools that allow people who are non-professional software developers, at some point to create or modify a software artefact" (Mørch et al. 2007:4).

End-user tailoring is a design method for modifying computer applications with techniques and tools that are associated with levels in the application system, starting with user interface and ending with program code. The three basic tailoring techniques are customization, integration, and extension (Mørch, 1997).

Meta-design is a term Fischer uses to describe "objectives, techniques, and processes for creating new media and environments that allow the owners of problems to act as designers" (Fischer 2003:88).

Knotworking may provisionally be defined as a pulsating movement of tying, untying and retying together otherwise separate threads of activity (Engeström et al. 1999:346).

Co - configuration is a new form of work which involves a great extent of user participation from customers as well as employees in the development of products. *Co-configuration has to aspects: mutual adaptation and learning:*

- *Mutual adaptation:* The adaptation of the products within Co-configuration is a mutual adaptation of customers and developers mediated by products
- *Learning aspect:* Co-configuration may evoke some learning processes.

Knowledge intensive firms (KIFs) are “large firms employing substantial numbers of people working with complex tasks, which call for autonomy and the use of judgement possible rendering traditional forms of control inadequate or only partly relevant (Alvesson, 2004).

Modding is when users modify products by themselves, without direct intervention from professional developers. In addition it refers to the act of modifying a piece of hardware or software not originally conceived or intended by the designer (Jeppesen, 2004).

Users as complementators is that users are the ones who extends and *modds* onto the platforms, with the platforms as a starting point (Jeppesen, 2004).

User toolkit is a term used for describing how you can offer the customers of a product a toolbox for customizing their products on their own. (Von Hippel, 2005).

What is meant by *consumer - to - consumer interaction* as a learning process is roughly that the company offering products, which have user toolkits features, has some strategies offered to the customers to make them talk to each other and in that way help each other (Jeppesen, 2002).