HANNA NORDLUND

Constructing Customer Understanding in Front End of Innovation

ACADEMIC DISSERTATION
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ABSTRACT

The purpose of this study is to understand how customer understanding is constructed in front end of innovation. Front end refers to early phases of innovation process that take place before the formal product development phase. Front end is the least understood and the least studied phase of innovation process. However, during the front end direction for the whole innovation process is set and many crucial decisions are made. Thus, the front end presents the greatest opportunity for improving the effectiveness and efficiency of innovation processes in organizations.

The theoretical frame of this study builds on several discussions in the fields of organization studies, innovation research and front end of innovation as well as marketing and quality management. It combines a practice-based view to knowledge processes with theoretical discussion about front end as well as discussions about customer knowledge creation and customer involvement in innovation activity. Combining these discussions that on many occasions deal with the same topics but have relatively little interaction between them invites us to examine the subject from viewpoints that are not widely addressed in current literature.

In this study 9 individual cases from 9 different companies were studied. The data was mainly collected by using thematic interviews where interpretations of concept developers were studied. In each case one product concept was developed and the attention was focused on front end. According to collective case study, each individual case plays an instrumental role, the main focus being on understanding the collective case. In this study the collective case refers to the construction of customer understanding, the target phenomenon.

Customer understanding is a central concept in this study. The results of this study imply that knowing what customers need and want (referred to as customer knowledge) is not enough. Concept developers need to construct customer understanding, which refers to an understanding about what can be offered to a customer within the constraints set by objectives and possibilities of concept developers. Based on my results I suggest that concept developers construct customer understanding by creating three kinds of spaces: closed, conditionally open and open spaces. Spaces do not refer to physical spaces but to shared contexts for action and interaction that act as tools of understanding and thinking. The spaces and their differences are illustrated in relation to five dimensions: customer consciousness of the concept development, customer commitment to the concept being developed, role of the customer, boundaries and knowledge processes between concept developers and customers. The results of this study also suggest that concept developers construct customer understanding for knowledge creation and for strategic purposes. Thus, knowledge processes are not always open to new knowledge. Strategic purposes include an intention to influence customers and the way they see their own needs but they also include legitimization where concept developers strive to legitimize their own knowledge and understanding. This shows

how power and politics intertwine with knowledge processes where customer understanding is constructed.

This study contributes to existing literature, first, by focusing on early phases of innovation process, the front end, where empirical research is still limited. Secondly, this study addresses a weakness of current innovation literature where innovation is treated detached from knowledge. This study examines constructing customer understanding as a knowledge process offering an alternative approach to the mainstream innovation research and inviting us to address issues that are not much studied. This study directs attention from criticizing customers and their ability to contribute to innovation activity to concept developers' ability to create spaces, their intentions as well as to power and politics. Third, this study takes interest in and describes how customer understanding is constructed in the front end of innovation specifically when most of the existing studies address innovation process more generally. Moreover, constructing customer understanding is studied holistically instead of paying attention to one method only.

Key words: customer understanding, innovation, front end, customer knowledge, knowledge processes, space

TIIVISTELMÄ

Tämän tutkimuksen tarkoituksena on ymmärtää miten asiakasymmärrystä luodaan innovaatioprosessin front end –vaiheessa. Front end viittaa innovaatioprosessin alkupäähän, varsinaista formaalia kehitysprojektia edeltävään aikaan, joka on innovaatioprosessin vähiten tutkittu ja ymmärretty vaihe. Front endin aikana kuitenkin asetetaan suunta koko innovaatioprosessille ja tehdään monia koko prosessin kannalta ratkaisevia päätöksiä. Niinpä front end edustaakin suurinta mahdollisuutta parantaa ja tehostaa yritysten innovaatioprosesseja.

Tämän tutkimuksen teoreettinen kehys rakentuu useiden tieteellisten keskustelujen varaan organisaatiotutkimuksen-, innovaatiotutkimuksen- front endin-, markkinoinnin sekä laatujohtamisen alueilla. Kehyksessä käytäntöihin perustuva näkemys tiedosta ja tietoprosesseista yhdistyy front end –keskusteluun sekä teorioihin asiakastiedon luomisesta ja asiakkaan osallistumisesta innovaatiotoimintaan. Nämä keskustelut, jotka usein puhuvat samoista asioista mutta ovat suhteellisen vähän vuorovaikutuksessa keskenään, kiinnittävät huomion näkökulmiin, joita nykyinen kirjallisuus ei vielä laajamittaisesti huomioi.

Tässä tutkimuksessa tutkittiin yhdeksää yksittäistä tapausta yhdeksässä eri yrityksessä. Empiirinen aineisto kerättiin pääasiassa teemahaastatteluilla, joilla tutkittiin konseptin kehittäjien tulkintoja. Jokaisessa tapauksessa kehitettiin yhtä tuotekonseptia ja haastattelut fokusoitiin front endiin. Kollektiivisen tapaustutkimuksen ajattelun mukaisesti yksittäiset tapaukset toimivat tässä tutkimuksessa välineellisessä roolissa päähuomion ollessa kollektiivisessa tapauksessa, eli asiakasymmärryksen luomisessa ilmiönä.

Asiakasymmärrys on keskeinen käsite tässä tutkimuksessa. Tutkimuksen tulokset antavat ymmärtää, ettei tieto asiakkaiden tarpeista ja haluista riitä. Konseptin kehittäjien pitää luoda asiakasymmärrystä, joka tässä tutkimuksessa esitetyn määritelmän mukaisesti viittaa ymmärrykseen siitä mitä asiakkaille voidaan tarjota konseptia kehittävän yrityksen omien tavoitteiden ja rajoitusten puitteissa. Tämän tutkimuksen tulosten perusteella konseptin kehittäjät luovat asiakasymmärrystä muodostamalla kolmenlaisia tiloja: suljettuja-, ehdollisesti avoimia- ja avoimia tiloja. Tila ei tässä yhteydessä viittaa fyysiseen tilaan vaan toiminnan ja vuorovaikutuksen jaettuihin konteksteihin, jotka toimivat tässä tutkimuksessa ajatuksen ja ymmärryksen työkaluina. Eri tiloja ja niiden välisiä eroja kuvataan suhteessa viiteen ulottuvuuteen: asiakkaiden tietoisuuteen konseptinkehityshankkeesta, asiakkaan sitoutumiseen, asiakkaan rooliin, tilan rajoihin sekä tietoprosessien luonteeseen asiakkaiden ja konseptin kehittäjien välillä. Tutkimuksen tulokset osoittavat myös, että asiakasymmärryksen luomiseen liittyy sekä uuden tiedon luomiseen liittyviä tarkoituksia että strategisempia tarkoituksia. Tietoprosessit, joissa asiakasymmärrystä luodaan, eivät siten näytä aina olevan avoimia uudelle tiedolle. Strategisiin tarkoituksiin kuuluu sekä pyrkimys vaikuttaa asiakkaisiin, ja siihen kuinka asiakkaat itse näkevät omat tarpeensa että konseptin kehittäjien pyrkimys legitimoida omaa tietoaan ja ymmärrystään asiakkaista. Tämä

osoittaa miten valta ja politikointi kietoutuvat tietoprosesseihin, joissa asiakasymmärrystä luodaan.

Tämä tutkimus kontribuoi olemassa olevaan kirjallisuuteen ensinnäkin keskittymällä innovaatioprosessin alkupäähän, front endiin, johon kohdistuvaa empiiristä tutkimusta on edelleen suhteellisen vähän. Toiseksi, tämä tutkimus kiinnittää huomiota tämän hetkisen innovaatiotutkimuksen heikkoon kohtaan eli siihen, että innovaatio ja tieto kohtaavat käsitteellisesti tutkimuksessa vielä suhteellisen harvoin. Tämä tutkimus tarkastelee asiakasymmärryksen luomista tietoprosessina tarjoten paitsi innovaatiotutkimuksen valtavirrasta poikkeavan tavan lähestyä aihetta mutta myös kiinnittäen huomiota asioihin, joita on tutkittu vielä suhteellisen vähän. Tämä tutkimus suuntaa huomion konseptin kehittäjiin, heidän kykyynsä rakentaa asiakasymmärryksen luomisen tiloja ja heidän pyrkimyksiinsä sekä valtaan ja politikointiin sen sijaan, että kyseenalaistetaan yksinomaan asiakkaiden kyky kontribuoida innovaatiotoimintaan. Kolmanneksi, tämä tutkimus kuvaa miten asiakasymmärrystä luodaan innovaatioprosessin alkupäässä, kun olemassa oleva tutkimus keskittyy enimmäkseen innovaatioprosessiin yleensä. Lisäksi asiakasymmärryksen luomista tutkitaan kokonaisvaltaisesti eikä vain yhden menetelmän ja työkalun näkökulmasta.

Avainsanat: asiakasymmärrys, innovaatio, front end, asiakastieto, tietoprosessi, tila

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Doing research and writing this thesis has been an interesting passage in the journey of my life. This has been an extremely interesting field to work in for many reasons. First of all, innovations have become and continue to be a hot topic for which we have high hopes in regard of survival of our companies, the competitiveness of the whole nation as well as our quality of life. Also, the field is going through fundamental changes. It will be interesting to see what it will look like in the next 10 years and beyond. Along the way I have learned a lot together with many people I wish to thank.

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Every post-graduate student knows that writing a dissertation is not a solo, even though only one name stands on the cover of the book. The greatest debt I have to

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In Hämeenlinna, November 2009

Hanna Nordlund

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1. Introduction

1.1 Background

The purpose of this study is to understand how customer understanding is constructed in front end of innovation. The topic has become all the more current lately: it seems that innovation is a word on everyone's lips. Innovations are considered to be the engine of growth in the new knowledge-based economy we are living in. (see e.g. Castells & Himanen 2001; Trott 2002) Innovations are expected to resolve the huge challenges relating to climate change, health and nourishment among others, that we are facing globally. Furthermore, globalization and the current economic downturn will test organizations' commitment to innovation. The prevailing understanding is that organizations depend on innovation for their survival (Gupta & Wilemon 1990; Trott 2002; Börjesson et al 2005).

Innovation has been in the centre of public discussion in Finland lately, not the least because of the new national innovation strategy. Traditionally Finnish organizations have been considered technology-oriented. However, the customer- and user-centric aspects of innovation have been raised to the centre of attention.

> *"In a world where the majority of technologies is available on the markets, competitive strength is often based on the ability to realise the needs of customers, consumers and citizens before competitors do, and to offer corresponding products and services."*
> (*http://www.innovaatiostrategia.fi/files/download/Nationalinnovationstrategy_EN.pdf, 8)*

The statement above is very agreeable. But how to achieve that in practice? How to realize needs of customers and develop new products that correspond to those needs? This study is important for people and organizations searching for an answer to that question because it helps to realize what trying to understand customers is about and how it can be approached and achieved in practice. This study also

provides support for the ones wishing to improve their front end of innovation practices.

And what do we mean when we talk about innovations? Many things, I would say. The concept is defined, understood and used in various ways. Hislop (2005, 158) states that

> *"Innovation is the deliberate modification, or transformation, by an organization of its products/services, processes, or structures"*

Garcia and Calantone (2002, 112) referring to OECD 1991 definition state that:

> *"Innovation is an iterative process initiated by the perception of a new market and/or service opportunity for a technology-based invention which leads to development, production, and marketing tasks striving for the commercial success of the invention"*

Although the latter definition can be considered as technologically-driven, the two definitions highlight several important aspects of innovation. First, innovation relates to an organization's deliberate intention to change its products, services, processes or structures. Innovation preconditions commitment. Secondly, innovation is different from invention. Innovation involves practical application and commercial success of an idea or invention. Since there is no commercial success without customers who wish to buy a product customer-centric aspects belong to innovation by definition. Third, as Garcia and Calantone (2002) state, an invention does not become an innovation until it has passed through production and marketing and diffused into the market. Thus, innovation involves several organizational processes and functions.

We can conceptualize innovation process to consist of three parts: front end, development phase and the commercialization phase. The first phase, front end, refers to activities that take place before the formal product development phase. (Nobelius & Trygg 2002; Koen et al 2001). Front end is the least understood and studied phase of innovation process (Koen et al 2001) and it is also in the focus of this study. The academic interest in front end has escalated since the beginning of

90's and practical experience shows a strong interest among Finnish companies in the subject as well. Since front end presents the least known phase of innovation process, it also presents the greatest potential to improve the effectiveness and efficiency of the whole innovation process (Koen et al 2001; Zhang & Doll 2001; Kim & Wilemon 2002; Backman 2007) and that is something that every company is after while facing the changes and threats of the new economy.

The front end is an important and an interesting context of research for a number of other reasons as well. During the front end, the direction for the whole innovation process is set (Reid & de Brentani 2004) and many crucial decisions in relation to target market, potential of the opportunity and strategic alignment, for example, are made. (Kim & Wilemon 2002). The costs of developing a new product increase drastically as a function of elapsed time (Buggie 2002) and consequently during the front end changes and tests are cheap to carry out. The costs of developing several ideas are marginal compared to implementing any one idea. (Reid & de Brentani 2004) Thus, as Cooper (1997) states, up-front homework pays off. He has found that solid front end work drives up new product success remarkably. Also, both Cooper (1997) and Monaert et al (1995) have found that the quality of planning activities is a discriminating factor between successful and unsuccessful new product projects. Cooper (1997, 21) states that

"The new product game is won or lost in its first five plays"

Innovations emerge all the more often at the boundaries of different functions, different expertise and different organizations. Thus, there is a need to integrate various actors in innovation process, including customers. The importance of knowing and understanding customers in innovation processes is widely acknowledged in innovation literature. (see e.g. Cooper 1996, 1999, 2006; Ernst 2002; Olson & Bakke 2001; Skyrme 2002) Still, thousands of new products fail every year because they fail to address the needs of customers (Leonard 2002; Olson & Bakke 2001; Flint 2002) However, there are not many studies addressing that topic empirically in the front end context (Backman et 2007), although the importance has been acknowledged by several writers. Both Gruner and Homburg (2000) and Gales and Mansour-Cole (1995) found that involving customers in the

front end phase of innovation process presents a significant development target in organizations. This is where the most important contribution of this study lies.

There is also a stream of literature questioning customers' ability to contribute to innovation process generally. Customers are claimed to be unable to anticipate their own future behavior or to see beyond the current ways of using products. (see e.g. Pals et al 2008; Salomo et al 2003; Hamel & Prahalad 1994; Leonard 2002; Vicari & Troilo 1998). Christensen and Bower (1996) even suggest that leading firms fail because they listen to their customers too carefully. Hamel and Prahalad (1994) have written about the tyranny of the served market which has resulted in firms coming to see the world through the eyes of their current customers only. However, the discussion between proponents and opponents is ongoing but it seems to remain on an "argy-bargy" level with no new insight into the subject.

My study provides new insight by approaching the subject from the viewpoint of knowledge processes. The frame of this study builds on several discussions in the fields of organization studies, innovation management and front end of innovation as well as marketing and quality management. Combining these discussions that deal with the same issues but have relatively little interaction between them invites us to examine the subject from viewpoints that are not widely addressed in current literature. In this approach concepts such as intercommunity interaction, interpretation, participation and shared contexts for action and interaction called spaces become interesting targets of research. Furthermore, intentions as well as power and politics become visible.

1.2 Contribution of the study

The early phases of innovation process have been treated insufficiently in the literature (Lichtenthaler et al 2004; Backman et al 2007) and research and framework building in the area of front end has been limited (Kim & Wilemon 2002). The steps of innovation process before development phase remain "vague

and indistinct" (Boeddrich 2004). Furthermore, Lichtenthaler et al (2004) note that only few researchers have studied the front end empirically. Thus, studying and creating new understanding about the front end as a context is needed and that is where the first set of contributions offered by this study is located. Existing studies of the front end have mainly concentrated on the process aspects of the front end (see e.g. Cooper 1997; Cagan & Vogel 2002; Koen et al 2001; Khurana & Rosenthal 1997); success factors of the front end (Kim & Wilemon 2002); and different practices relating to radical and incremental innovation (see e.g. Reid & de Brentani 2004; Lichtenthaler et al 2004; Verworn et al 2008) and management control (Poskela 2009). This study takes interest in how concept developers themselves interpret "how they get their job done" in constructing customer understanding and provides an in-depth description of it. Constructing customer understanding is approached from the viewpoint of knowledge processes. Hislop (2003) states that "a collective weakness" of contemporary innovation literature is its blindness to the importance and role of knowledge in innovation process. (Hislop 2003) The argument is echoed by Trott (2002) as well as Song et al (2006) who state that unfortunately many studies examine innovation detached from knowledge. However, an increasing number of publications are addressing the subject especially in knowledge management literature (see e.g. Andersen & Munksgaard 2009; Basadur & Gelade 2006; du Plessis 2007). My study offers an alternative approach compared to the mainstream research, thus allowing us to pay attention to aspects of the phenomenon that are not much touched in the literature.

Another set of contributions of this study relates to new insight into how customer understanding is constructed in front end. There are many studies that address the subject in innovation process generally but as we know, the front end is a context very different from other phases of innovation process and requires somewhat different practices as well (Koen et al 2001). There are only few studies that address the subject in the front end context specifically (Stappers et al 2008; Dahlsten 2004; Backman et al 2007; Flint 2002;) and some others who take up front end as a phase of innovation process among others (Gruner & Homburg 2000; Gales & Mansour-Cole 1995; Kaulio 1995; Lagrosen 2005; Buur & Matthews 2008). Especially the former studies often examine a particular method of customer

participation. In the latter, different categories of customer participation are brought up but they do not discuss benefits or challenges relating to those categories or how they relate to each other. My study provides new understanding concerning those aspects by examining construction of customer understanding holistically.

Finally, my study contributes to literature addressing integrating customer knowledge/ understanding to innovation process in general. As pointed out by Dahlsten (2004) there are numerous approaches to the subject that acknowledge the importance of customer knowledge and involvement in innovation process generally, but they seldom address how to achieve it. Furthermore, Hislop (2003) suggests we should pay more careful attention to type and characteristic of relevant knowledge involved as well as the mechanisms used to share, integrate or communicate it in innovation process. My study also shows that we need to take interest in the purposes for interacting and knowing customers, thus suggesting that power and politics as aspects of innovation activity are not addressed in the literature enough. Also, by presenting the idea of spaces my study calls us to reconsider the arguments referring to customers' inability to contribute to innovation process (see Pals et al 2008; Salomo et al 2003; Hamel & Prahalad 1994, Leonard 2002; Vicari & Troilo 1998; Ulwick 2002). Actually, in this study I claim that instead of questioning the ability of customers to contribute to innovation activity we should look more carefully at the ability of concept developers and their organizations to create spaces and examine the purposes for which they engage in knowledge processes.

1.3 Structure of the thesis

This report is structured as follows: In the second chapter I build a preliminary understanding for my reader about how constructing customer understanding can be examined from the viewpoint of knowledge processes. Moreover, I bring the discussion to the front end context. Thus, I combine literature discussing knowledge

processes; literature that discusses customer knowledge and participation in innovation activity, and front end of innovation literature.

In the third chapter I present my research questions and methodology. Since the significance of personal, a priori knowledge is important in interpretivist research, I also discuss my a priori knowledge and starting points of this study. Furthermore, I present my philosophical standing points and go through the research process simultaneously reflecting on my choices.

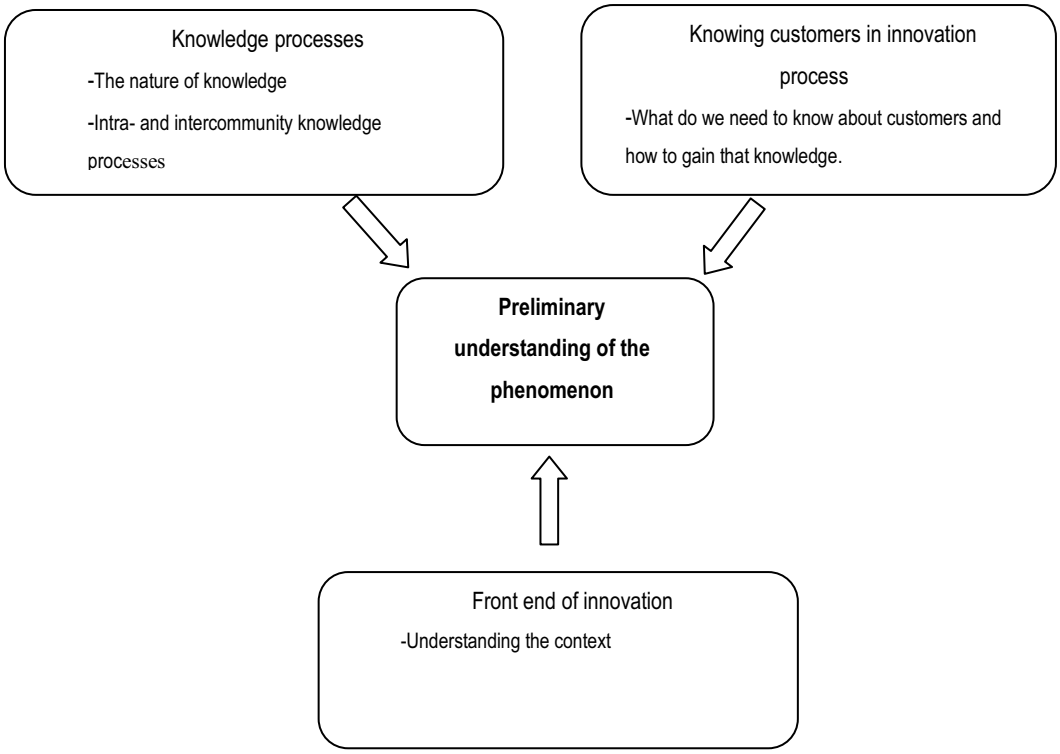
In the fourth and fifth chapters I present the results of my study. I start by discussing the concept of customer understanding in the fourth chapter. In the fifth chapter I present three spaces that I have constructed based on my data and suggest that concept developers construct customer understanding by forming closed, conditionally open and open spaces.

Finally, I discuss my research results and how they provide answers to my research questions. I also assess my study, present managerial implications and suggest future research directions.

2. Theoretical starting points

In this chapter I provide my reader with a preliminary understanding of the phenomenon I study and my approach to it. The framework, presented in the figure below, is versatile in a sense that it combines elements from organization studies, marketing, quality management and innovation research. At the same time it aims to take a comprehensive and fresh approach to the subject. The framework consists of three parts as pictured below.

Figure 1. Theoretical frame



2.1 Knowledge processes in organizations

Innovations are knowledge processes that involve creation, utilization, management and manipulation of knowledge. (Hislop 2005) Hence, knowledge processes act as means for constructing understanding but also as platforms for innovation.

In this sub-chapter I discuss knowledge processes about customers is constructed. First, I specify the conception of knowledge I have adopted in this work. The practice-based view to knowledge highlights the social processes that enable and constrain knowledge processes in organizations. After that I will elaborate the key points of practice-based view and, finally, summarize the sub-chapter in the last section where I bring the ideas to a context and discuss intra- and intercommunity knowledge processes. This creates a basis for understanding knowledge processes that take place between concept developers and customers.

2.1.1 Practice-based view to knowledge

We can approach and define knowledge in many different ways. Being committed to bringing forth multiple voices, I consider it important to present other ways of understanding and dealing with knowledge in addition to stating the one I have adopted. This is for two reasons: first, the practice-based approach that I follow in this thesis has grown partly out of the critique of the objectivist approach. Our understanding of knowledge has evolved in time and, in a way, the journey from objectivist to practice-based view of knowledge presents a temporal continuum. Secondly, since the two different conceptions of knowledge differ significantly, it is easier to understand the essence of the practice-based view to knowledge by comparing it to objectivist epistemology.

Before moving to the different approaches to knowledge I start by discussing the concepts of explicit and tacit knowledge. They are of central importance since

objectivist and practice-based approaches differ significantly in how they treat explicit and tacit knowledge. Originally, it was Polanyi who distinguished tacit and explicit knowledge. However, the concepts were popularized years after their introduction by Nonaka and Takeuchi (1995) in their famous book "The Knowledge Creating Company". Since then various authors have theorized about the significance and relation of these two aspects of knowledge and have taken quite different standpoints.

Explicit knowledge refers to knowledge that can be articulated relatively easily. Thus, it can be expressed in words, numbers, manuals and universal principles. Thus, explicit knowledge can also be transferred relatively easily between individuals. Tacit knowledge again refers to knowledge that is difficult to articulate using formal language thus it is not easy to formalize. Tacit knowledge is highly personal and deeply rooted in personal experiences and background as well as personal ideals, emotions and values. This makes it also hard to share with others. (Hislop 2002, 2003, 2005; Nonaka & Takeuchi 1995) Tacit knowledge emphasizes the idiosyncratic history of a person. (Kulkki & Kosonen 2001)

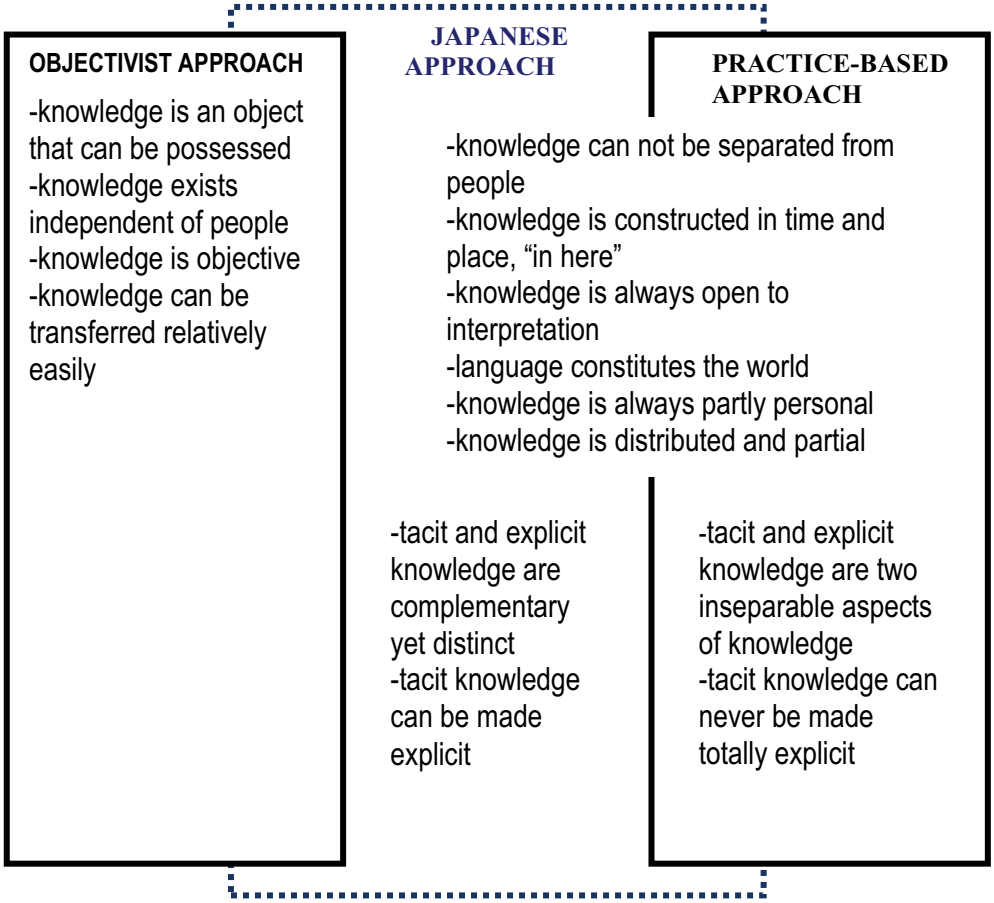
More specifically, there are two dimensions of tacit knowledge. One is a technical dimension and the other is a cognitive dimension. The technical dimension of tacit knowledge includes the "informal and hard-to-pin-down" skills often referred to as know-how. It is the kind of skills that accumulate as a result of years of experience but the principles according to which the skills are performed are often difficult to articulate explicitly. As an example Takeuchi mentions three-star chefs or master craftsmen. Also, highly subjective and personal insights, intuitions and hunches that emerge from bodily experience all belong to this technical dimension of tacit knowledge. There is also a cognitive dimension to tacit knowledge. It consists of perceptions, beliefs, ideas, values, emotions, and mental models that are so deeply rooted in us that we take them for granted. They also fundamentally shape how we perceive the world around us. (Takeuchi 2001)

In the following I make a distinction between three approaches to knowledge as shown in Figure 2. I have constructed the division based on several sources,

especially Hislop (2005, 2002); Nonaka and Takeuchi (1995); Nonaka et al (1998), but also others are included such as Tsoukas and Mylonopoulos (2004); Tsoukas and Vladimirou (2006); Brown and Duguid (2001). Hislop makes a difference between objectivist and practice-based epistemologies. Referring to earlier literature he juxtaposes the approaches in relation to several dimensions such as epistemology of possession versus epistemology of practice, knowledge as truth versus knowledge as socially constructed and knowledge as theory versus knowledge as practice (see Hislop 2005, 14, table 2). Hislop further states that the approach of Nonaka & Takeuchi (1995) combines elements of the both approaches.

Figure 2. Three approaches to knowledge.

Modified from Hislop 2005; Tsoukas & Vladimirou 2006; Tsoukas & Mylonopoulos; Brown & Duguid 2001; Nonaka & Takeuchi 1995; Nonaka et al 2001)



In the following I first describe the objectivist perspective to knowledge (Hislop 2005), which Nonaka & Takeuchi (1995) and Takeuchi (2001) would probably willingly call the traditional Western approach. After that I move on to Nonaka & Takeuchi's (1995) viewpoint to knowledge, which I call here the Japanese approach. Realizing the generalizing connotation of the term, I decided to use the term Japanese approach since Nonaka and Takeuchi (1995) as well as Nonaka et al (1998) themselves make such a sharp difference between the "traditional Western philosophy" and "Japanese thinking" or "Japanese approach" to knowledge creation. This Japanese approach shares many similar axioms with the practice-based approach that I describe the last.

Objectivist approach is rooted in the idea of objective knowledge. Objective means universally valid or tenable to everyone (Eräsaari 2006).The objectivist approach leans on positivist philosophy. Accordingly, knowledge is an entity or object that can be possessed. Knowledge can be codified into explicit form and it exists independently of people in form of documents, diagrams, computer systems, and tools, for example. Consequently, transferring knowledge is relatively easy using language that holds the same meanings to everyone. Knowledge is seen as a collection of objective facts that are valid across time and cultures. Thus, knowledge is free from individual subjectivity. (Hislop 2002, 2003, 2005) Similarly, the world around us is considered as a pre-given object, which we can observe and know objectively. (Venzin, von Krogh & Roos 1998)

> *"...knowledge is shared by the unidirectional transferral of explicit codified knowledge (in the form of text, a diagram or an electronic document) from an isolated sender to a separate receiver. The idea behind this model is that the sender, in isolation from the receiver, can produce some wholly explicit knowledge and then transfer it remotely to the receiver. The receiver is then assumed to be able to take this knowledge and understand it and use it without any other form of communication or interaction with the sender. Further, it is assumed that no important aspects of this explicit knowledge are lost in the transfer." (Hislop 2003, 168)*

It is not difficult to draw conclusions about the role of explicit and tacit knowledge from the text above. Objectivist approach separates tacit and explicit knowledge clearly from each other privileging explicit knowledge over tacit knowledge. Whereas tacit knowledge is regarded as informal, less rigorous,

subjective, embedded in cultural values and assumptions explicit knowledge is objective, formal, systematic and shareable. (Hislop 2002, 2005)

Nonaka and Takeuchi (1995) disclaim themselves from the objectivist approach. They emphasize the fundamental difference between how "Western tradition" sees knowledge and how it has been treated in Japanese organizations.

> *"[Explicit knowledge] has been the dominant mode of knowledge in the Western philosophical tradition…Tacit knowledge has been overlooked as a critical component of collective human behavior…At the same time, however, tacit knowledge is an important source of Japanese companies' competitiveness. This is probably a major reason that Japanese management is seen as an enigma among Western people. "(Nonaka & Takeuchi 1995, preface)*

From the Japanese viewpoint explicit knowledge is just a tip of an iceberg. Knowledge is primarily tacit, which is not easily visible or expressible. Thus, the Japanese approach separates itself from the Cartesian dualism that refers to separating the knower and the known, the mind and the body, the subject and the object. Accordingly, true knowledge can only be obtained by the mind, not the body. (Takeuchi 2001; Nonaka & Takeuchi 1995) It is the mind, the home of intellect that gives orders to the body implementing those orders (Ropo et al 2002). Just the opposite to the objectivist view to knowledge, the Japanese approach again emphasizes the unity of the mind and the body and stresses the importance of the bodily experience. (Takeuchi 2001)

> *"This tradition of emphasizing the oneness of body and mind has been a unique feature of Japanese thinking…" (Nonaka & Takeuchi 1995, 10)*

The Japanese approach welcomes emotions, intuitions and hunches as part of our knowledge (Takeuchi 2001) that are rejected as inferior and even unpleasant (Ropo et al 2002) in the objectivist approach. This means that knowledge can neither be stored in a computer nor can it be managed. It is people we can "manage" by giving them latitude.

Nonaka & Takeuchi (1995) refer to tacit and explicit knowledge as two forms of knowledge that are not "totally independent" (Takeuchi 2001) of each other. Rather they are complementary. The two interact with each other in action. New knowledge emerges from interactions between explicit and tacit knowledge in processes of knowledge conversion. (Takeuchi 2001)

> *"It is precisely during the time this conversion takes place-from tacit to explicit, and, as we shall see, back again into tacit-that organizational knowledge is created."(Nonaka & Takeuchi 1995, 9)*

Knowledge conversion processes, socialization, externalization, combination and internalization, take place when individual knowledge assets interact and are combined in particular contexts, *Ba*s. Nonaka et al (2001) suggest that knowledge creation cannot take place without a specific context, or place, that is a shared context for cognition and action. Socialization is the process of converting new tacit knowledge through shared experiences that accumulate while spending time together or living in the same conditions. In externalization tacit knowledge is articulated into explicit knowledge by using metaphor, analogy and models. Thus, tacit knowledge is made transferable to others. In combination explicit knowledge is gathered inside and outside organizational boundaries and then combined, edited or processed into new refined knowledge. Finally, internalization refers to the process of embodying explicit knowledge as tacit knowledge. When knowledge is internalized to become part of individuals' tacit knowledge base in the form of shared mental models and technical know-how it becomes a valuable asset. (Nonaka & Takeuchi 1995; Nonaka et al 2001)

It is the idea of knowledge conversion processes that captures the difference between the Japanese and the practice-based approaches. Whereas the Japanese approach manifests that tacit knowledge can be converted into explicit knowledge, the practice-based view takes a different standpoint as the following quotations, first from Nonaka and Takeuchi and second from Tsoukas, illustrate.

> *"For tacit knowledge to be communicated and shared within the organization, it has to be converted into words or numbers that anyone can understand." (Nonaka & Takeuchi 1995, 9)*

> *"While Nonaka and Takeuchi were possibly the first to see the importance of tacit knowledge in organizations and systematically explore it, their interpretation of tacit knowledge as knowledge-not-yet-articulated, namely, knowledge awaiting its 'translation' or 'conversion' into explicit knowledge- an interpretation that is widely adopted in management studies-, is erroneous: it ignores the essential ineffability of tacit knowledge, thus reducing it to what can be articulated. Tacit and explicit knowledge are not two ends of a continuum but two sides of the same coin: even the most explicit kind of knowledge is underlain by tacit knowledge."(Tsoukas 2006, 150)*

Thus, the practice-based epistemology claims that tacit and explicit knowledge are not separate or even complementary but they are *two aspects* of knowing and mutually constitutive. (Hislop 2005, 2003; Tsoukas 2006)

> *"Thus, there is no such thing as fully explicit knowledge as all knowledge is 'either tacit, or rooted in tacit knowledge'. (Hislop 2003, 169 quoting Polanyi)*

First, this is because all knowledge is personal to some extent. (Hislop 2002, 2005; Tsoukas & Vladimirou 2006). Knowledge is always related to the background, communities, existing experiences and knowledge base of individuals that are inevitably unique to some extent. (Brown & Duguid 2001; Hislop 2003, 2005) Secondly, theoretical knowledge, practical application and social context are inextricably linked. (Tsoukas & Mylonopoulos 2004). Thus, even the most theoretical knowledge is dependent on skills and cognitions that are not codifiable. (Tsoukas 2006)

> *"In so far as our contact with the world necessarily involves our somatic equipment-'the trained delicacy of the eye, ear, and touch' (Polanyi and Prisch 1975:31)-we are engaged in the art of establishing a correspondence between the explicit formulations of our formal representations (be they maps, scientific laws, or organizational rules) and the actual experience of our senses." (Tsoukas 2006, 145)*

In other words, applying theoretical knowledge always involves personal judgment. Theories, rules or other abstract representations do not apply themselves;

it is people that apply them in light of the specific circumstances and the context that to them seem to be "suitable". Tsoukas talks about the "indeterminacy of practice" to describe how all situations include ambiguity and uncertainty. Consequently, despite clear rules and guidelines individuals still need to make personal judgments. (Tsoukas 2006)

The assumptions underlying the practice-based epistemology that I have adopted in this thesis are quite different from the objectivist approach but share many similarities with the Japanese approach. The practice-based epistemology states that knowledge *cannot* be separated from people. Knowing is regarded inseparable from human activity and it involves both the mind and the body of the knower. (Hislop 2005; 2003) The emergence of knowledge is tied to activities and experiences of the "knower" as well as into communities they take part in. (Hislop 2005) Knowledge is constructed (in here, not out there) in time and space (Tsoukas & Mylonopoulos 2004) within and in relation to a certain context.

Practice-based approach to knowledge manifests that instead of being objective and unbiased; knowledge is always open to interpretation. (Hislop 2002, 2005) People make their interpretations based on their earlier experiences, knowledge base and assumptions that are buried in the tacit dimension of their knowledge. Thus, people know different things and they know things differently. (Brown & Duquid 2001) This means that objective knowledge cannot exist because knowledge can never be free from the background and intentions of individuals. (Eräsaari 2006)

From the practice-based viewpoint language is particularly important. This approach considers transfer of knowledge between people much more complicated than what the objectivist viewpoint described earlier. According to the practice-based epistemology, language is ambiguous; it is not an objective carrier of fixed meanings. The same words have different meanings to different people and different words may refer to a same thing in minds of different people. Consequently, knowledge is inherently ambiguous. Language does not represent the world but it actually constitutes the world. This means that the language we use opens up the world to us in particular ways. (Tsoukas 2006; Hislop 2005, 2003) It is through

language that we name and draw distinctions about significance of aspects of phenomena. Hence, when we try to understand the world - or customers for example - we are simultaneously enabled and restricted by language and other "cultural tools" we employ. (Tsoukas & Vladimirou 2006)

> *"Thus, not only does language not have fixed meanings but the relationship between words and what they signify is fluid. This subjectivity or interpretive flexibility in language thus undermines any claims about the objective status of any knowledge, whether it is totally tacit and personal or whether it is partially explicit and codified in a text." (Hislop 2003, 170)*

Finally, from the practice-based viewpoint, knowledge is not objective, thus it is always open to dispute. (Hislop 2005) Consequently knowledge and power are strongly intertwined. When there is knowledge there is power, politics and conflict involved. (Hislop 2005) Knowledge can be understood as a source of power in organizations. Organizations always entail several conflicting and competing bodies of knowledge and knowledge claims that are shared in communities of knowing but not necessarily between those communities. Organizational politics and games of power shape the criteria based on which these competing knowledge claims are judged. In these processes it is determined what legitimate knowledge is in an organization. (Tsoukas & Mylonopoulos 2004)

Practice-based knowledge is often distributed and partial. It is distributed in that getting things done often requires knowledge of many people. The partiality emerges out of distributedness: no one is likely to have all the knowledge required in order to get things done; rather individual people have parts of what is needed. It is also likely to be improvisational, which means that people constantly adapt their behavior along with the group they participate. Thus, routines are maintained but they are simultaneously adapted to the changing situations. (Brown & Duguid 2001b)

After presenting these three approaches to knowledge I am ready to define the concept of knowledge. From the viewpoint of this definition, the idea manifested in practice-based epistemology that knowledge is never unambiguous and objective, is

important. This is to say that knowledge is constantly open for negotiation and dispute. (Hislop 2005) Thus, knowledge processes presuppose interaction (Tsoukas & Mylonopoulos 2004; Hislop 2005; Nonaka et al 2001). Hislop (2005) further states that innovation process requires blending together diverse and heterogeneous bodies of both internal and external knowledge. Thus, knowledge is an outcome of complex social processes that simultaneously enable and constrain knowledge creation. (Tsoukas & Mylonopoulos 2004) Building on such an understanding of knowledge I have chosen to quote Nonaka et al (2001, 14 emphasis added) who rely on a definition originally presented by Plato and define knowledge as follows:

> ***Knowledge is "justified** true **belief**".*

Just as Nonaka et al (2001) state, the emphasis is more on justified than true. I have decided to use this definition since it is simple to understand and it conveniently describes the aspects of knowledge I find central in this work. The definition describes the social and negotiated nature of knowledge, justifying refers to the need on interaction and assurance. Although the epistemological and ontological assumptions of mine do not recognize existence of ultimate truth the word true in the definition is important in a sense that the legitimate knowledge and conceptions of the reality enacted in organizations become true to them, may I even say their truths. As Hatch (1997) notes the subjective realities held by people do not differ from objective reality for people themselves. The word belief manifests that there is no ultimate truth, there are only beliefs about how things are. Those beliefs are negotiated in interactions between people.

2.1.2 Negotiated nature of knowledge

In order to understand how knowledge is constructed we have to understand where and how knowledge emerges. As already implicated in the previous section concepts of community; shared contexts; common ground; as well as power and politics become important.

The importance of communities in constructing knowledge

Community is an important concept in understanding how knowledge is constructed. I will simply use the word "community" and in discussing the concept I have combined writings of different authors. What I mean by community is close to what Boland and Tenkasi (1995, 351) refer in talking about communities of knowing:

> *"Each such community of specialized knowledge workers is what we term a "community of knowing".*

Although I refer to Wenger (1998) numerous times communities of practice is not exactly what I discuss here due to the somewhat rigid definition of the concept. The front end teams that are central in this work are more like what Hislop (2005) calls formal work groups. Formal work groups have a formally and externally defined clear objective and their performance is measured against those objectives. A formal work group provides a specific product or service, thus such a group exists within a finite time-frame. Work group members have individualized roles and responsibilities in the group. Thus, formal work groups can be equated to teams. Heiskanen (2004), quoting Tuomi, states that in practical contexts teams approximate communities. Thus, it is suggested that we could broaden the definition of both the concepts so that they would overlap. In other words, Tuomi suggests that the definition of team would include the boundaries where participants are not responsible for team goals. Additionally, he suggests that teams could be included in communities of practice. In this work I use the term team to refer to the formal work group that has been given the task of concept development. The concept of community becomes useful in including and describing the different types of participation in concept development. The concept of community allows the inclusion and examination of the more peripheral and "loose" forms of participation that are significant in concept development, specifically when referring to customers for example. The input of those more peripheral participants is sometimes of crucial importance even though they are not committed to the team goals as such. However, the team with formal responsibility represents the "core" of the community.

I also consider it useful to make a difference between "stable" communities and more flexible or open communities as suggested by Heiskanen (2006). She notes that Lave and Wenger as well as Nonaka and Takeuchi are referring mostly to stable communities while what I am describing here is more of an open community in nature.

Communities can be understood through the concept of practice. Namely, individual knowledge exists because of the social practices within which individuals participate. (Tsoukas 2006)

> *"…what we call knowledge is, at any point of time, the outcome of particular social practices that have come to be established, and through which the world is represented"(Tsoukas & Mylonopoulos 2004, 3)*

A social practice joins people together in interdependent activity in trying to achieve a shared enterprise. (Brown & Duguid 2001) Over time, the common pursue of an enterprise results in practices that enable us to achieve the enterprise we are pursuing. A practice reflects the historical and social contexts that give structure and meaning to what we do. Consequently, the practices we participate in strongly affect who we are, what we do and how we interpret the world around us. (Wenger 1998)

Sustained pursuing of an enterprise creates a community. (Wenger 1998) Organizational members operate and participate in knowledge processes as members of different, sometimes multiple, communities. (Blackler, Crump & McDonald 1998; Wenger 1998; Hardy, Phillips & Lawrence 2003) The common enterprise and the specific practice the community has developed bind the community together. (Wenger 1998) Communities develop "unique social and cognitive repertoires" (Boland & Tenkasi 1995) or "social, material and linguistic resources" (Blackler, Crump & McDonald 1998) or "cultural tools" (Tsoukas & Vladimirou 2006) based on which they interpret and act on the world. These include language, stories, shared historical events, discourses, concepts and rules and

frameworks for example (Boland & Tenkasi 1995; Blackler, Crump & McDonald 1998, Tsoukas & Vladimirou 2006).

Out of the repositories that communities develop emerges the particular perspective of the community that both enables and restricts how the community knows and interprets the world. Perspective is a necessary condition for knowledge processes because it is the perspective that determines what is important and unimportant, relevant and irrelevant, anomaly and noise. (Boland & Tenkasi 1995; Tsoukas & Mylonopoulos 2004) Thus all knowledge is based on a perspective (Eräsaari 2006).

We as individuals and members of communities have our personal understanding of the world and about how things work. And it is the communities where we participate that are the places where those personal understandings are developed, negotiated and shared. (Wenger 1998) There is a complex and reciprocal interaction between individuals and communities. We as individuals become socialized into processes and practices of the communities we participate. In these communities we interact with other members and we gradually learn how to deal with different things and situations and why. Furthermore, we learn about the expectations that are held towards us by the other members of the community that are based on the specific rules and standards of appropriateness that have been developed. (Tsoukas & Vladimirou 2006) By socialization we gradually become to share the unarticulated background and taken-for-granted assumptions of the community (Tsoukas 2006) and develop "native competence" (Boland & Tenkasi 1995). Thus, we gradually adopt the perspective of the community. This perspective enables and restricts our knowing (Tsoukas & Mylonopoulos 2004; Eräsaari 2006).

Communities influence its members but the members create, maintain, modify and finally destroy communities. Rules and practices do not apply themselves, it is the members of a community who apply the rules and maintain the practices by repeating them. (Tsoukas & Vladimirou 2006; Kuusinen 2004). Letting new members into the community always includes the possibility that the practice changes. (Wenger 1998)

Corso et al (2009) discuss commitment to business communities of practice. They examine commitment of organization and community members to business community of practice. They name six different phases. During the first phases commitment is lacking from both the parties, or commitment is unbalanced between the parties, one of the two having a stronger commitment and support to the community. Once the parties begin to see benefits from the existence of community, the commitment becomes stronger and full commitment –phase is reached when both the parties are actively involved.

The need for a shared context, space

Knowledge needs a specific place to be created. (Nonaka et al 2001; Heiskanen 2004) There is no knowledge creation without such a place (Nonaka et al 2001). Nonaka et al (ibid) suggest that *Ba,* a shared context for knowledge sharing, creation and utilization, represents such a place. Hence, *Ba* is a shared context of cognition and action shared by those who are interacting with each other in creating knowledge. Places for knowledge sharing are not physical places only. Instead they unify physical, virtual and mental aspects. (Nonaka et al 2001; Hernes 2004; Heiskanen 2004, 2006) Physical space refers to the material and structural aspects of space. Social space consists of human bonding and it is created and maintained by interaction and relationships between people. Mental space again is a space for thinking and it emerges from mutual understanding and shared meanings. (Heiskanen 2006; Hernes 2004) A space offers a context for human action and interaction (Hernes 2004) and acts as a platform for knowledge processes (Heiskanen 2004). In my mind *Ba*s act as platforms for emergence of communities. On the other hand, communities constantly create different *Ba*s.

Hence, *Ba* is a shared context where knowledge processes take place. (Nonaka et al 2001) and where social practices meet (Heiskanen 2004). Hernes (2004) states that organizations are about formation of contexts for action and interaction and production as well as reproduction of those contexts over time. However, he prefers to use the term space because of the connotation of immutability and inwardness the word context holds.

The key concept to understanding space is interaction. In interacting people participate in a space and by participating they express their commitment to the space. Thus, active participation is important; participants cannot be mere onlookers and bystanders. (Nonaka et al 2001) In fact, space is a practiced place. By participation and action the potentialities of a place are actualized and a place becomes a space. (Heiskanen 2004) People who actively participate in space also shape it. Thus, space is constantly changing and moving along with the participants. (Nonaka et al 2001) It emerges, lives, changes and ceases to exist along with the changing members that participate in the space. (Hernes 2004; Nonaka et al 2001)

> *"...the knowledge-creating process is necessarily context-specific in terms of who participates and how they participate." (Nonaka, Toyama & Konno 2001, 22)*

Even though space has an ever-changing nature a certain boundary is needed for a meaningful shared context to emerge (Nonaka et al 2001). Space only emerges when a boundary is drawn and space is distinguished from its environment and it is maintained by reproduction of those boundaries. Thus, boundaries are acts of distinction drawing; they make a difference between "insiders" and "outsiders". Boundaries are drawn in interactions and they are constantly reproduced. In other words boundaries define who gets to participate in knowledge processes and who are the one(s) that are excluded. However, due to the dynamic nature of a space the boundaries of it are fluid.

It is easy to see that practices and spaces seem to have a lot of common features. The central difference is that practices have a historical aspect, they develop in time. Spaces again are more emergent, spaces have more "here and now" qualities than communities. (Nonaka et al 2001) That is why they can emerge more rapidly.

The necessity of interaction and building common ground

Knowledge emerges in interaction between individuals and communities where different knowledge is exchanged, evaluated and integrated with that of others. Emergence of knowledge preconditions that different knowledge (of individuals and

communities) is made available to others. Valuing diversity and giving room to unique interpretations and understandings that may seem "esoteric if not meaningless" to others is necessary. Consequently, there is a need to build common understanding, a common ground, on which the knowledge processes can be built. This common understanding emerges in processes of perspective making and perspective taking. (Boland & Tenkasi 1995)

> *"We refer to communication that strengthens the unique knowledge of a community as perspective making , and communication that improves its ability to take the knowledge of other communities into account as perspective taking" (Boland & Tenkasi 1995, 351)*

Perspective making relates to the internal aspect of the community where a community negotiates its specific perspective. Perspective taking again refers to intercommunity knowledge processes where a community tries to understand and create knowledge with members another community. In perspective making a certain community creates and sustains its knowledge and values. Thus, perspective making strengthens the unique knowledge of the community. In perspective taking a community strives to understand the knowledge, values and worldview of another. Perspective taking makes possible to take into account and to integrate knowledge of another community. Hence, perspective taking means opening up to new insights and understandings. (Boland and Tenkasi 1995, Hislop 2005)

Processes of perspective making and perspective taking require willingness to engage in the processes. Thus, motivation to participate in knowledge processes and share knowledge is of vital importance. Von Krogh, Roos and Kleine (1998) state that it is important to understand what individuals (or communities) want to do with their knowledge. External motivators can encourage participation in knowledge processes but a more solid ground is built on intrinsic motivation. (Ives, Torrey, & Gordon 2002) In addition to motivation participants also need to understand why knowledge sharing and participation in knowledge processes is important. This is partly a managerial challenge. Relating to motivation, participants also need to know how the benefits resulting from the process are shared between participants. Furthermore, for knowledge processes to happen there is a need to appreciate the others' tacit assumptions, to listen and to tolerate differences that are inevitable in

most knowledge processes. (Hislop 2005) This means that one needs to have a conception about what s/he knows and is able to do but also what others know and are able to do. (Parviainen 2006) Importantly, both overlooking and over respecting others' knowledge and expertise hinders knowledge processes (Hislop 2005).

Since negotiating knowledge involves both giving and taking and coming to shared understandings they always involve power and politics where members of knowledge processes try to bring forth their own perspective and viewpoint.

Power and knowledge intertwine in knowledge processes

> *"...understanding the relationship between power and organizational knowledge processes is of fundamental importance, and the task of doing so is magnified by the general absence of such an analysis." (Hislop 2005, 87)*

Hislop (2005) as well as Tsoukas and Mylonopoulos (2004) state that power and politics are aspects of knowledge that are often forgotten in theoretical discussion in knowledge management and practice-based view to knowledge as well. Yet, they claim, knowledge and power are fundamentally inseparable. The practice-based view to knowledge (Hislop 2002, 2005) views knowledge as tentative, socially constructed (Blackler et al 1998) and open to dispute (Hislop 2005). Thus, knowledge is a result of negotiations that include continuous interactions, gradual achievement as well as give and take. (Wenger 1998) Conflict emerges out of the diverse interests of individuals, groups and communities, the competing rationalities that underpin their actions as well as their competition over scarce resources. (Hislop 2005) For knowledge there is always counter-knowledge and for expertise there is always counter expertise. The former is the legitimate conception and the latter is the conception that challenges it. (Saaristo 2000)

> *"Organizational politics shapes the validity criteria in terms of which competing knowledge claims are judged..." (Tsoukas & Mylonopoulos 2004, 4)*

Different individuals, groups and communities try to make their knowledge legitimate (Hislop 2005), the dominant way. This again, requires building support in

the organization (Hislop et al 2000) Hence; power is related to resources that individuals, groups or communities are able to mobilize through social relations. To gain support, actors may engage in collaboration (Hardy et al 2003); resort to external resources or to use knowledge that is appreciated and/ or rare in the organization (Hislop 2000). Thus, power is something that is produced and reproduced within and through social relationships and interactions. (Hislop 2005)

Issues of power are also present inside existing communities. In communities there are triadic group relations: masters (old timers), young masters (journeymen), apprentices (newcomers). The less experienced and non-established members socialize into membership by interacting and watching the masters and young masters. (Hislop 2005) Their expert knowledge acts as disciplinary practice that defines how members of a community are expected to behave, what is acceptable and what is not. This is rooted in the practice of the community. By socialization members become docile, obedient and self-disciplined. (Hislop 2005) However, dynamics of sustaining current practices versus changing them always exists in communities. When something is defined as official practice and legitimate knowledge it means that something else is marginalized and ignored. The practice changes as old members leave the community and new ones join and gain membership. Thus, the practice is under constant negotiation as well (Hislop 2005, Wenger 1998) and it is in the power-imbued negotiations and processes of perspective making where it becomes determined what is legitimate (Contu & Willmott 2003).

The relationship between knowledge and power is reciprocal. The use and possession of power have an impact on knowledge processes but on the other hand knowledge processes influence the character and distribution as well as the use of power in organizations. Control and possession of relevant knowledge is a significant political resource. Also, specialized knowledge can act as a source of power because there are only a few people that can use or counter-argument it. (Hislop 2000). Power and knowledge directly imply one another. In other words, power produces knowledge and knowledge produces power. Knowledge can be considered as a source of power when possession or access to certain knowledge

may give a person or a community a position of power. Moreover, all uses of knowledge as well as attempts to shape knowledge are simultaneously attempts to use power. Thus, Hislop (2005, 172) states that

> *"...issues of power and knowledge are inseparable. Therefore, when considering knowledge processes, issues of power, politics, and conflict require to be accounted for. "*

2.1.3 Intra- and intercommunity knowledge processes

So far I have discussed the approach to knowledge I have adopted in this study both from the viewpoint of the nature of knowledge and the processual aspects of knowledge. In this section I finally summarize the whole sub-chapter and further bring the previous ideas to a context. Here, I am talking about intra- and intercommunity knowledge processes that are fundamentally different because the former relates to perspective making and the latter to perspective taking. Knowledge processes between customers and concept developers are often intercommunity knowledge processes in the beginning. In cases where customers become community members, and specifically, when they become insiders of the space knowledge processes take the form of intracommunity processes. However, the focus of this work is more on the former.

Practices are sources of coherence in communities. Practices entail mutual engagement to a joint enterprise for pursuing of which communities develop a shared repertoire of "tools" such as language, concepts, stories, shared events and experiences. Since communities have the historical aspect they create discontinuities between the members and non-members, or between insiders and outsiders. These binding characteristics of practice allow members to understand each other as they "make their perspective", develop their specific worldview. (Brown & Duguid 2001; Hislop 2005; Boland & Tenkasi 1995; Tsoukas 2006; Wenger 1998) Consequently, members of a community understand the values and the assumptions of each other. Members are also likely to trust each other, another aspect that is important from the viewpoint of knowledge processes. (Wenger 1998; Hislop 2005)

The perspective determines what is interesting, important, deserves attention and what is or is not valid as knowledge. (Brown & Duguid 2001b)

Knowledge tends to stick on the boundaries of practices. (Brown & Duguid 2001b) In the conditions of intercommunity knowledge processes a mutual practice, shared worldview, trust-based relations and mutual perspective are not present. This makes intercommunity knowledge processes challenging. Intercommunity knowledge processes take place between people who usually do not work together and have different, often little overlapping, knowledge bases. (Hislop 2005) Participants may also have different values and basic assumptions. Hence, knowledge creation is a complex process involving understandings of multiple communities (Bechky 2003) and possibly differing interests between participants entailing a potential for conflict (Hislop 2005)

Problems associated to intercommunity knowledge sharing relate to three interrelated factors according to Hislop (2005). First, members of intercommunity knowledge processes possess different knowledge (Hislop 2005) that may not be understandable to others (Parviainen 2006). The different knowledge emerges from different expertise and individual knowledge because knowledge is always related to the activities in which people engage and the context where they act (Bechky 2003). The problem arises from the difference between individual knowledge bases and the lack of overlap between them. (Hislop 2005) The same expressions hold different meanings to different people and people of different communities use different language. (Parviainen 2006) Thus, knowledge of one community may be unintelligible to another.

The second cause of problems in intercommunity knowledge creation is traced back to the "stickness" (von Hippel 1998) of knowledge that refers to the context-specific and local nature of knowledge. Knowledge is hard to share and make understandable to others. The third problem relates to epistemological differences that are rooted in different educational, cultural or functional backgrounds for example. Knowledge of a community is integrally related to the ways knowledge is

used (in different tasks for example), developed (in different social relations for example) and applied.

To succeed, intercommunity knowledge processes require creation of common ground and perspective taking. (Hislop 2005) In strong and tightly bonded communities there is a risk that the community becomes inward looking. Their perspective may become so strong that they start to consider the knowledge of others unimportant and irrelevant. Consequently, such communities may become unreceptive to new ideas that come from outside the community. This means that such communities become reluctant to perspective taking. The knowledge processes may become limited and narrow which means that their potential for innovation is weak. Outside members are excluded because the practice and the perspective become basis for exclusion and the communities become "closed clubs". (Hislop 2005) Such communities do not renew because it is the new members and new interactions that possess the seeds of change, renewal and new knowledge.

By now we have an understanding of the approach that I have chosen to take in this research to study construction of customer understanding, and we can move closer to the phenomenon.

2.2 Customer knowledge

> *"Successful new product development requires in-depth understanding of the customers, their situation, their needs and their wants" (Lagrosen 2005, 424)*

The importance of considering the viewpoint of customers in overall success of contemporary and future organizations generally, (Skyrme 2002; Day 1999; Narver and Slater 1990; Kahn 2001); and from the viewpoint of innovation process more specifically, has been emphasized by numerous authors (Lagrosen 2005; Leonard 2002; Cooper 1996; Maidique & Zirger 1996; Joshi & Sharma 2004; Salomo et al 2003, Sioukas 1995; Atuahene-Gima 1995; Cooper 1999). Developing products that

customers find attractive and useful, is a prerequisite for new product success. In order to achieve this, organizations need to feed information related to customers into their product development processes (Hart et al 1999) as well as interpret and process the information.

In the following sections I will review extant literature from the viewpoint of what we need to know about customers, where we can find sources for that knowledge, and how customers can participate in innovation processes. Whereas the previous chapter discussed theories that form coherent and established discussions, this chapter builds on a much more scattered collection of theories from the fields of new product development, marketing, quality management and organization studies.

2.2.1 Contents of customer knowledge

As pointed out earlier, there is vast literature claiming that knowing customers is important when new products and services are developed. However, answering a question about what exactly should be known about customers is harder. As Hart et al (1999) put it, there is not much empirical research about what information about customers is needed. Terminology used in the literature is varying and scattered. Concepts such as customer knowledge (e.g. Salomo et al 2003, Joshi & Sharma 2004), customer input (e.g. Callahan & Lasry (2004), customer interaction (e.g. Gruner & Homburg 2000), and voice of the customer (Cooper 1999) are used in the literature. Frequently, the concepts are defined on a very general level, if at all.

Some definitions from the literature that illustrate my point are presented in Table 1. Although the concepts used vary and the definitions differ in their accuracy, it is easy to see that definitions culminate in customer needs, preferences and requirements in the narrow definitions, while the broader definitions include the factors that influence and shape those needs, preferences and requirements.

Table 1. Concepts of customer knowledge in the literature

Source	Concept used	How is customer knowledge described
Salomo et al (2003) International Journal of Technology Management	Customer knowledge	The concept "customer knowledge" is not defined but the article mentions knowledge about customer needs and relevant product requirements, user experience e.g. with substitution products, obtaining market-related information
Callahan and Lasry (2004) R&D Management	Customer input	The concept "customer input" is not defined explicitly but talks about understanding user needs and requirements.
Danneels (2002) Strategic Management Journal	Customer competence	Talks about customer competence, not in product development context specifically. Customer competence gives a firm ability to serve certain customers and is constituted by such resources as: knowledge of customer needs, preferences and purchasing procedures, distribution and sales access to customers, customer goodwill of franchise reflected in the reputation of the firm and its brands, and communication channels for exchange of information between the firm and its customers during the development and commercialization of the product.
Kohli and Jarowski (1990) Journal of Marketing	Customer focus	Talk about customer focus as one "core theme" or "pillar" of market orientation, not specifically in the context of product development. Customer focus involves obtaining information *from customers* about their needs and preferences and taking actions *based on market intelligence* involving consideration of exogenous markets factors affecting customer needs and preferences as well as current and future needs of customers. Intelligence generation, one of the three elements of market orientation (along with intelligence dissemination and responsiveness) includes also analysis of the changing conditions in customers' industries which impact the needs and wants, monitoring competitor actions, environmental scanning, scientific conferences visited by R&D, trade journals.
Kärkkäinen, Piippo, Puumalainen and Tuominen (2001) R&D Management	Customer needs	Talk about customer needs assessment, in product development context specifically. The importance of understanding customers' "real needs" and potential classes of benefits, "must-be" needs and "satisfiers". State that customer needs and requirements can be recognized by analyzing trends and familiarizing with the needs of customers' stakeholders
Leonard and Rayport (1997) Harvard Business Review	Customer needs, emphatic design information	Talk about customer needs in product development context. By emphatic design information can be gathered about: the triggers of use of a certain product, how does a product interact with user's environment and fit into the system, do users customize the products themselves and why, and intangible attributes of the products, unarticulated user needs.
Ulwick (2002) Harvard Business Review	Customer input	Talks about customer input. Emphasizes that customers should not be asked for solutions but outcomes, what new products should do for them. Brings up uncovering the activity or process underlying the use of a certain product and the difficulties in carrying out the processes, the ideal ways of performing the process

The prevailing understanding about customer needs (and preferences as well as requirements) has become more complex over time. Customer needs refer to the gap between a current and an expected state perceived by customers. (Kärkkäinen 2001) During the era of industrialization organizations produced what they thought customers would need and concentrated first and foremost on making products work as expected. In the face of general scarcity products were easier to sell. Increasing competition meant more choices for the customers. It was acknowledged that customers had needs and they had to be met in order to succeed. Thus, customers needed to be asked what they wanted and act accordingly. Customers were understood to be very conscious of their needs and able to articulate them relatively easily. Today, we understand customer needs in an ever more complex and multi-dimensional way. Today, the emphasis is more on the latent, unarticulable customer needs. (Normann 2001; Senge 2002) To reach these, we need to find new, deeper and more interactive ways of relating to customers.

Asking customers about their current needs as a basis of new product development works when customers are well aware of their needs and the needs can be easily articulated. But often the knowledge and experiences that drive the emergence of needs of a customer are buried in the tacit dimensions of customers' knowledge (Leonard 2002) and bringing them explicitly to developers of new products is much more complex. This brings us to the heart of latent needs. Latent needs are needs that customers are not able to articulate (Hamel and Prahalad 1994) or will not articulate although they are recognized as important in the final product. (Kärkkäinen et al 2001). Much of the relevant knowledge may be related to experiences, routines and environments of customers that are so obvious or unconscious that customers are unable to articulate them. Also, knowledge is so closely intertwined with action that some knowledge may come to surface only when customers are engaged in some action, using a product or prototype for example. Also, some problems may not be experienced as problems by customers because they might be so "normal" to them that they do not come to think them as problems. (Leonard 2002; Leonard & Rayport 1997)

Vicari and Troilo (1998) conceptualize latent needs somewhat differently. They see that latent needs refer to needs that only exist after their expression. This questions the whole idea of "pre-existing" needs of customers and manifests that needs must be created. Joshi and Sharma (2004) further write that customer preferences evolve in the process of engaging in the concepts, they do not pre-exist. It has also been stated that people are poor in anticipating their own future behavior (Pals et al 2008; Salomo et al 2003; Hamel & Prahalad 1994). In addition, customers may suffer from "functional-fixedness meaning that customers concentrate on how products are currently used (Leonard 2002; Vicari & Troilo 1998) thus they are captives of their current experiences and have a limited frame of reference when it comes to new products (Ulwick 2002) Finally, customers are often unable to imagine what is possible, in terms of technology for example. (Salomo et al 2003; Pals et al 2008) Consequently, it is stated that listening to customers carefully might lead to overemphasis of incremental innovations (Dahlsten 2004; Heiskanen et al 2007).

In addition to information and knowledge about customer needs the importance of understanding the factors that influence and shape customer needs are considered important. Kohli and Jarowski (1990) emphasize consideration of exogenous markets that affect customer needs and preferences currently and in the future. Hence, analysis of the changing conditions in customers' industries is a crucial element of customer knowledge.

Even if customers knew what they wanted they may be unable to encode the information (Thomke & von Hippel 2002) thus they cannot transfer that information effectively (von Hippel 1998; Matthing, Sanden & Edwardsson 2004). Hence, customers and developers of new products often lack the common ground and shared language by which the needs could be communicated. Leonard (2002) states that usually the knowledge domain of the developers and customers overlap just a little.

2.2.2 Internal and external sources of customer knowledge

> *"..innovation processes require to be understood as knowledge integration processes, involving the blending together of diverse and heterogeneous bodies of both specialized* ***internal and external knowledge****" (Hislop 2003, 168, emphasis added)*

Innovation processes are often considered involving primarily the integration of new external knowledge into pre-existing internal knowledge. (Hislop 2003) Thus, success depends on the absorptive capacity of the firm, that is, its ability to integrate external knowledge that is important to innovation process. Hislop (ibid) states that a vast body of knowledge has developed around the discussion concerning the internal-external axis. However, information and knowledge about the markets and customers exist both inside and outside an organization (Hart et al 1999).

Organizations have existing knowledge about products, markets and customers. (Nonaka et al 2001b) There are shared beliefs and routines that capture the existing knowledge in organizations, and one cannot escape them in knowledge processes. (Probst, Büchel & Raub 1998) Organizational knowledge base develops over time and organizations develop in-depth understandings about customers and markets. They develop expertise about customers and underlying features behind customers' needs, wants and the market in general. In the long run organizations develop a stable and specified knowledge base that is capitalized by utilizing that knowledge in new development projects. (Atuahene-Gima et al 2005) The knowledge from earlier projects is used again in new projects. (Marsh & Stock 2006)

The existing knowledge about customers and markets is likely to be distributed. The knowledge of organizational members is tied to those products, services, processes and activities that they are involved in, within the scope of their responsibilities. (Hislop 2003) Thus, there is deep knowledge about customers and markets inside an organization and it is gathered in different functions that have their distinct, often differing thought worlds. Furthermore, functions develop their distinct practices and routines of gathering the information and knowledge they need. The existing knowledge about customers and markets is both tacit and explicit

in nature. (Luca & Atuahene-Gima 2007) Thus, there is a need for internal information gathering (Jantunen 2005) and integration (Hislop 2003) in innovation processes.

Organizational members need to engage in identifying and articulating their knowledge about customers and markets in new product development as well as their failures and successes in earlier projects. Sometimes, they need to revise their knowledge and experiences. (Marsh & Stock 2006) The existing knowledge about customers and markets is both tacit and explicit in nature, thus it may be difficult for them to explicate it (Luca & Atuahene-Gima 2007). However, building a shared understanding and giving a shared meaning to that knowledge is necessary. (Marsh & Stock 2006)

Internal knowledge is easier to access and it may also be more specified than external knowledge. But, when the internal sources become inadequate, organizations need to turn to external sources of knowledge and information. (Marsh & Stock 2006)

> "*Effective new product development teams might even need more expertise than can be found inside the company. Hence, there may be value in involving representatives from external organizations, notably consultants and customers, in such teams" (Lagrosen 2005, 425)*

Organizations frequently confront situations where they need to turn to the external sources of customer knowledge, often to customers themselves. Consequently, they face questions about who the "right" customers are and how customers should be involved in the development of new products.

2.2.3 Choosing the customers

When organizations decide that they want to involve customers in developing new products it is clear that all customers cannot be involved. Thus, organizations need to choose "the right" customers. Emden, Calantone and Droge (2006) discuss partner selection in the formation stages of collaborative new product development. Their model resembles stage-gate model in that it consist of three phases and after each phase there is a "decision point". The first phase is technological alignment after which mutual understanding of technologies and their possibilities in the market should emerge. The second phase relates to strategic alignment that examines motivation and goal correspondence. The second decision point is to decide whether a team to develop co-development project specifications should be formed. Finally, phase three consists of relational alignment that relates to examining the compatibility of cultures, propensity of change and long-term orientation towards the relationship. If relational alignment is found, the final decision is to determine financial and legal feasibility of co-development project and create organizational acceptance. Although the main focus of the model is in the selection process as such, it includes three criteria for selection: technical, strategic and relational alignment.

Franke et al (2006) distinguish between innovating and non-innovating customers. They studied the relationship between commercially attractive innovations developed by users and the extent to which the users embody lead user characteristics. They found that high intensity of lead user characteristics in a user has a positive impact on the likelihood that the user develops commercially attractive innovations. Morrison, Roberts and von Hippel (2000) have similar findings in their study in the field of library information systems. They found that innovating users have lead user characteristics and thus they have a high "leading edge status" as well as other additional characteristics such as higher in-house technical capability.

The division between lead users and "ordinary users" is one that is often used in categorizing customers in the literature. The concept of lead users was launched by

von Hippel (1986, 1988) in the late 80's and it is based on the idea of recognizing "advanced" customers.

> "*Lead users are defined as members of a user population who (1) anticipate obtaining relatively high benefits from obtaining a solution to their needs and so may innovate and (2) are at the leading edge of important trends in a market place under study and so are currently experiencing needs that will later be experienced by many users in the market place" (Franke et al 2006, 302)*

The lead user concept contains an idea of assessing the competence and expertise of customers. Lead users are defined as users of a given product or service that possess the following characteristics: They are motivated to innovate and are attracted by innovation-related benefits brought by a solution to their needs. In addition, lead users experience a need for an innovation earlier than the majority of customers in the target market thus they are ahead of the general market. Lead users are not restricted to current markets. Instead, it is even suggested that finding lead users outside the current target markets may offer even more fruitful environment for innovations. (Von Hippel 1988; Lilien et al 2002; Franke et al 2006) Franke et al (2006) write that lead users are more prone to innovate than "ordinary customers" because they often cannot buy what they need.

Working with lead users has been studied in various research projects. Lilien et al (2002) found that ideas of lead users were significantly newer than ideas generated by customers without lead user characteristics. They also found that lead user ideas were addressing more original or newer customer needs, having significantly higher market share and greater potential to start an entire product line. However, applying the lead user method has been criticized as well.

Neale and Corkindale (1998) state that lead user method is a demand-driven technique for new product development and it can also be seen somewhat elitist (Buur & Matthews 2008) in its search for "extraordinary" customers. Olson and Bakke (2001) reported results where concept developers feared to rely too much on lead users because they were either too much or too little ahead of the majority market. This again may lead an organization to develop products that have limited

appeal in markets where majority of users are "ordinary users". (Ulwick 2002) Furthermore, Song et al (2006) as well as Olson & Bakke (2001) found that communication with lead users is time consuming and although it may bring good results, the benefits may still be impaired with the amount of resources it requires. Specifically, finding and recruiting experts and lead users for concept generation is found burdensome. Also, concept developers and lead users may speak a different language. (Olson & Bakke 2001) Kristensson, Gustafsson and Archer (2004) found in a study where value-adding mobile services were developed, that ordinary users created significantly more original and valuable ideas than professional developers or advanced users who again created more easily realizable ideas. The democratizing of innovation generally shows in increasing appreciation of "ordinary users" (see e.g. Stappers et al 2008; Buur & Matthews 2008) and taking their practices and needs as starting points of new product development. Narver et al (1998) emphasize that organizations should value both visionaries and pragmatists who are likely to adopt the new product later.

Lead user method concentrates on evaluating and "ranking" customers based on their advanced and future-oriented characteristics. Another stream of literature presents the closeness of relationships, relational embeddedness, as a crucial determinant of success (Bonner & Walker 2004).

> "*As the relational literature suggests, involving customers who have had close and embedded relationships with a firm's new product organization, such as firm's largest customers, and customers who have been involved in past collaborative activities, should lead to the development of superior products. " (Bonner & Walker 2004, 155)*

Relational embeddedness refers to the degree to which customers have close ties with the NPD organization prior to the start of the project. The relational literature suggests that strong ties motivate collaboration (Bonner & Walker 2004), develop trust (Bstieler 2006) and allow exchange of rich and complex information (Bonner & Walker 2004). Customers that have participated before have established communication channels, the ability to exchange complex information and willingness to exchange proprietary information thus encouraging gaining an in-depth understanding of their needs and preferences (ibid). On the other hand,

especially writers within innovation literature, claim that getting too close to customers can be dangerous. Ernst (2002) states that according to his literature review, concentration on a few customers in new product development, customness, has a negative effect on success. (Christensen and Bower 1996). By getting too close to customers, a firm risks loosing the control over its future. Johne (1994, 52) states in a somewhat provocative manner as follows:

> *"While meeting customers' needs is a prerequisite for successful product change, the danger exists that a business may end up acting as nothing more than a sub-contractor for key customers. When this happens, a business risks losing control over its destiny."*

Gruner and Homburg (2000) and Brockhoff (2003) present a broader set of criteria for choosing customers that are very similar to each other. The criteria they use relate to technological expertise and innovativeness; financial attractiveness and demand potential, and closeness of the relationship. The study of Brockhoff (2003) was conceptual in nature but Gruner and Homburg (2000) tested the criteria empirically. They found that all the categories, except for technically attractive customer, yield positive results which they explain by stating that these customers may have needs that are different from the markets in general. This points towards the same direction that lead user criticism brought up earlier.

2.2.4 Modes of customer participation

In the previous chapter recognizing different customers was discussed. Initial references to involving different customers differently in developing new products were made, and I will further elaborate on them here. Ingredients for the discussion are brought from customer relationship management literature, marketing literature, quality management literature and new product development literature.

The role and participation of customers in innovation activity have evolved over time. Normann (2001) as well as Prahalad and Ramaswamy (2000) have described the historical development of customer role in developing new products. According

to Prahalad and Ramaswamy (2000) customers have been a passive audience until 2000, after which they have transformed into active players. Their role has changed from passive targets of development into sources of information based on which new products were designed into co-developers of value who have a role in educating, shaping expectations and creating market acceptance. This shift is also seen in the increasing number of recent publications discussing various collaborative and participatory methods in customer participation (see e.g. Andersen et al 2009; Buur & Matthews 2008; Pals et al 2008; Dahlsten 2004)

Other descriptions of customer involvement have used depth of involvement and customer influence in making a difference between modes of customer participation. The models of Kaulio (1998) and Lagrosen (2005) as well as Alam (2002) are based on depth of involvement while Ives and Olson (1984) as well as Brockhoff (2003) use customer influence as the main dimension. Gruner and Homburg (2000) as well as Gales and Mansour-Cole (1994) use the frequency of customer contact in differentiating modes of involvement. Some writers have also examined phases of innovation process in relation to customer involvement (Kaulio 1998; Lagrosen 2005; Alam 2002) The dimensions used in examining customer participation in existing literature are summarized in Table 2.

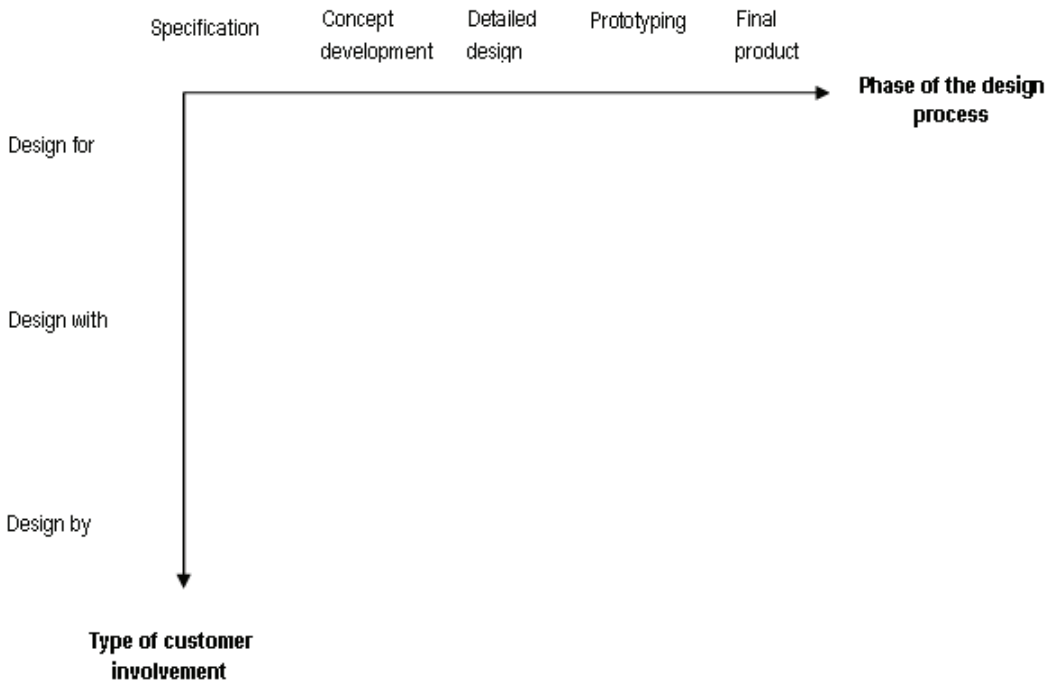
Table 2. Dimensions of customer participation in existing literature

Dimensions of participation	Scale used
Points of participation	Specification, concept development, detailed design, prototyping, final product (Kaulio 1998) Idea phase, development phase, launch phase (Lagrosen 2005) Strategic planning, idea generation, idea screening, business analysis, formation of the cross-functional team, service and process design, personnel training, service testing and pilot run, test marketing, and commercialization (Alam 2002 in service development context)
Depth of involvement	Design for, design with, design by (Kaulio 1998, Lagrosen 2005) Active user involvement, no direct user involvement, reactive user involvement (Pals et al 2008) Passive acquisition, information and feedback on specific issues, extensive consultation, representation (Alam 2002)
Influence of customers	No involvement, symbolic involvement, involvement by advice, involvement by weak control, involvement by doing, involvement by strong control (Ives & Olson 1984, Brockhoff 2003)
Frequency of participation	Likert scale 1= no communication with users to 5= very frequent communication (Gales & Mansour-Cole 1995)

Kaulio (1998) studies product development from quality management viewpoint aiming to evaluate seven methods for customer involvement in new product development. He recognizes two dimensions of involvement: the longitudinal and the lateral. The first dimension refers to the points of interaction between customers and the design process. It divides the design process in particular stages that are specification, concept development, detailed design, prototyping and final product. The latter dimension captures the depth of customer involvement. To evaluate the tools he forms three categories of lateral involvement: design for customers, design with customers, and design by customers. *Design for* refers to approach where products are designed "on behalf of customers". General theories of customer behavior are used in design as well as specific studies of customers such as focus groups and interviews. *Design with* utilizes the same data as in design for approach but complements that with displaying different concepts and solutions to customers.

Finally, *design by* refers to product development where customers participate actively. The framework of Kaulio is presented in Figure 3.

Figure 3. A framework for customer involvement in innovation process by Kaulio (Kaulio 1998)



Lagrosen (2005) uses the same dimensions as Kaulio (1998). He studies customer involvement in new product development from relationship marketing perspective. He uses the same "design for", "design with" and "design by" categories as the lateral dimension. The longitudinal dimension consists of three phases of new product development process that are idea stage, development stage and launch stage. His framework is presented Figure 4.

Figure 4. A framework for customer involvement in innovation process by Lagrosen (Lagrosen 2005)

Level of relationship	Longitudinal customer involvement	Lateral customer involvement	Suitable methods
Transactional	Only in the early phases	Design for the customer	Surveys, focus group interviews, observation
Facilitative	In the early phases, in the testing phase and occasionally in the other phases	Design with the customer	QFD, Delphi method, conjoint analysis, prototype testing, beta testing, team customer visits
Integrative	In all phases	Design by the customer	Integrated product development teams including representatives of both the supplier and the customer

Table III.
A proposed framework for customer involvement in different levels of relationship

The main focus of Lagrosen (2005) and Kaulio (1998) is the depth of customer involvement while Ives and Olson (1984, 590) focus on the customer influence. They present a literature review of computer-based information systems design literature ending up with conceptual framework that summarizes the extant literature. They define the degree of involvement as "the amount of influence the user has over the final product". They recognize six different categories that are based on the work of Lucas (1974). The first category, *no involvement,* refers to users being unwilling or not invited to participate. The second category, *symbolic involvement,* refers to designers making assumptions about users and ignoring user input. The third category, *involvement by advice*, refers to solicited customer involvement in forms of interviews or questionnaires for example. *Involvement by weak control* refers to users having a "sign-off" responsibility at each stage of development process while *involvement by doing* refers to users participating as members of development team. The last category, *involvement by strong control,* refers to product development that is financed by the user.

Brockhoff (2003) focuses on the benefits and costs of customer involvement in new product development projects. He divides between solicited and unsolicited involvement. The first refers to customers participating out of their own enterprise in form of suggestions and complaints. Unsolicited participation again refers to involvement initiated by the supplier. Brockhoff (2003) uses principally the same dimensions as Ives and Olson (1974).

Alam (2002) presents an overview of literature aiming to summarize aspects of user involvement in service development context. The context is somewhat different from this study, firstly due to a focus on service development but also because the focus is on program level rather than on single projects. However, his work is worth mentioning because he brings somewhat new insight into the subject. He discusses stages of customer involvement presenting a more fine-grained description of development process that naturally reflects the service development context. The second aspect he presents is intensity of customer involvement, referring to means of involving customers such as interviews, meetings, brainstorming, observation and feedback, phone and email and finally focus groups. Thirdly, he takes up modes of customer involvement ranging from passive acquisition of user initiated ideas, through information and feedback of specific issues and extensive consultation with users to representation where users become team members. Interestingly, the fourth aspect he takes up is purposes for user involvement. The purposes he mentions are superior and differentiated service, reduced cycle time, user education, rapid diffusion, improved public relationships and development of long-term relationships.

By now we should understand how customer knowledge can be constructed but we still need to understand the context in which that is done, that is the front end.

2.3 Front end context

"Most projects do not fail at the end; they fail at the beginning." (Zhang & Doll 2001, 95).

In the processes of innovation organizations deliberately strive to design and implement changes to their existing products, services, structures or processes (Hislop 2005) in more incremental or radical way. New products can be understood as outcomes of innovation processes. Innovation process can be divided into three phases: the (fuzzy) front end, the product development and commercialization phases (Buckler 1997, Zien & Buckler 1997, Koen 2001) as shown in Figure 5. In

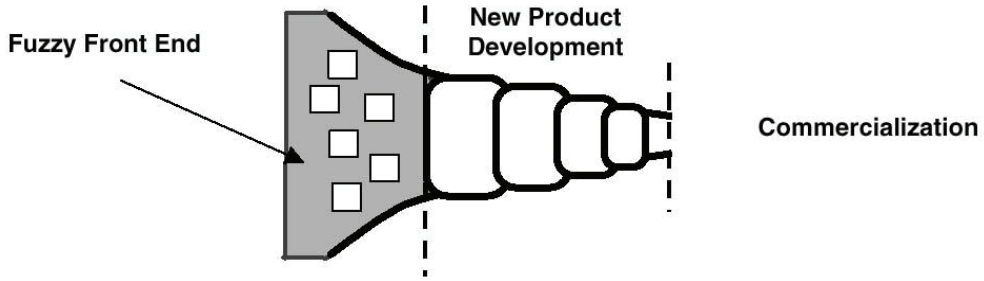
innovation process business opportunities are transformed into a physical form and commercialized into a target market.

Front end is the first phase of the process and refers to activities that take place before the formal product development project (Nobelius & Trygg 2002; Koen et al 2001). Fuzzy front end can be conceptualized as the period of time between when an opportunity is first considered and when an idea is judged ready for development. (Kim & Wilemon 2002).

> *"The FFE [fuzzy front end] begins when an opportunity is first considered worthy of further ideation, exploration, and assessment and ends when a firm decides to invest in the idea, commit significant resources to its development, and launch the project" (Kim & Wilemon 2002, 270)*

Front end is a particularly important phase of an innovation process because during that phase the direction of the whole innovation process is set. (Reid & de Brentani 2004) Crucial decisions are made during front end in regard of size of the opportunity, the target market/ customers, alignment with corporate strategy as well as key resources. (Kim & Wilemon 2002) 70% of the total costs of a project become determined by the decisions that are made during front end although only about 10% is realized. Thus, the costs of developing a new product increase dramatically as a function of elapsed time (Buggie 2002; Trott 2002).

Figure 5. Phases of innovation process (Koen et al 2001)



The term, fuzzy front end, has been introduced by Reinertsen in 1985. (Reinertsen 1985) It represented the starting point for a concentrated effort to create a better understanding of the early part of innovation process. However, NPD scholars have discussed the "up-front activities" for more than 20 years (Reid & de Brentani 2004). Still today, front end is often referred to as "the early phases of innovation process" (e.g. Hart 1996) and the up-front of innovation (Kim & Wilemon 2002). Currently, the prefix "fuzzy" is often left out manifesting an idea that the inherently fuzzy phase can be managed and made more systematic (Koen et al 2001).

> *"…we use the term "Front End of Innovation" (FEI) as opposed to Fuzzy Front End (FFE). We strongly believe that FFE implies that this portion of the innovation process is mysterious, and this attitude often results in a lack of accountability and difficulty in determining who is responsible to manage the activities in this area. The use of the term FFE incorrectly suggests that unknowable and uncontrollable factors dominate the front end, implying that this initial part of the innovation process can never be managed." (Koen et al 2001, 46)*

Introduced 1985, the concept started to gain wider attention during the 90's and several studies emphasized the different inherent nature of front end (FE) compared to the other stages of innovation process, that is the product development and commercialization phases. (e.g. Buckler 1997, Koen 2001) Zien and Buckler (1997) talk about "micro cultures of innovation" in referring to the different phases of innovation process. They emphasize that each of these cultures have specific characteristics and requirements that are incompatible with others. Yet, they all are essential from the viewpoint of innovation. Thus, the practices suitable for the later phases are not applicable in front end which creates a need for new understanding and research in front end (Koen et al 2001) and entitles a separate discussion in theory.

2.3.1 Characteristics of front end

Front end literature has much concentrated on suitable process and organizing of front end (e.g. Cooper 1997; Koen et al 2001; Reinertsen 1994; Verworn et al 2008), success factors of front end (Kim & Wilemon 2002), reduction of uncertainty in front end (Brun & Saetre 2008); and recently, to an increasing extent, the contextual issues related to organizing front end especially when it comes to different innovation types and organization of radical innovation process. (Reid & de Brentani 2004; Lichtenthaler et al 2004). Also, the special traits of front end, first and foremost compared to other phases of innovation process have been addressed by some writers (Koen et al 2001; Zien & Buckler 1997; Kim & Wilemon 2002; see also Table 3).

Uncertainty and unpredictability are central characteristics of front end as opposed to clear and defined product development phase. (Koen et al 2001; Zien & Buckler 1997) Uncertainty can be defined as "as the inability to assign probabilities to outcomes" (Zhang & Doll 2001, 97). Gupta and Wilemon (1990) as well as Zhang and Doll (2001) state that uncertainties relate to technologies, competition and customers. Customer-related uncertainty again comes from changing customer needs and requirements; uncertainty of demand and appropriate product characteristics. Activities during front end aim at reducing uncertainty and ambiguity. (Koen et al 2001; Kim & Wilemon 2002) Monaert et al (1995) found in comparing unsuccessful and successful projects that the successful ones reduced on average the same amount of uncertainty during planning (i.e. front end) than the unsuccessful ones during the complete innovation cycle.

Koen et al (2001) describe the nature of work during front end as experimental and chaotic as opposed to structured, disciplined and goal-oriented product development process. The experimental and chaotic characteristics are closely related to the "trial and error" –type of working which is also intrinsic to front end. Consequently, a high failure rate is typical in front end. Smith et al (1999) write that for every 3000 unwritten ideas there are 125 written ones ready for stage-gate

development. Out of these 125 written ideas one, on average, leads to commercial success. As opposed to new product development phase where funding is accurately budgeted, during front end budgeting may be variable (Koen et al 2001): usually small or even non-existent (Kim & Wilemon 2002). Many projects may be bootlegged in the beginning while others need funding to proceed. (Koen et al 2001) Revenue expectations during front end are often uncertain involving speculation, whereas product development phase involves believable and increasingly accurate revenue expectations. (Koen et al 2001) Hence, tolerance for ambiguity and uncertainty are important when it comes to front end. Furthermore, front end is dynamic and unstructured in nature. It has also been characterized by low levels of formality and non-routine working as well as ill-defined processes as opposed to the highly formal product development phase. (Kim & Wilemon 2002) Eureka-moments cannot be scheduled or planned beforehand (Koen et al 2001) Also, front end is not linear, rather it involves iteration between innovation height and knowledge depth and between the various internal phases. Ideas require deep dives into certain areas to reduce uncertainty and increase knowledge. (Börjesson et al 2005)

Table 3. Comparison between characteristics of front end and development phase (Kim & Wilemon 2002, 270)

Factors	General characteristics of the FFE phase	General characteristics of the development phase
State of an idea	Probable, fuzzy, easy to change	Determined to develop, clear, specific, difficult to change
Features of information for decision making	Qualitative, informal, approximate	Quantitative, formal and precise
Outcome (/action)	A blueprint(/diminishing ambiguity to decide whether to make it happen)	A product (/making it happen)
Width and depth of focus	Broad but thin	Narrow but detailed
Ease of rejecting an idea	Easy	More difficult
Degree of formalization	Low	High
Personnel involvement	Individual or small project team	A full development team
Budget	Small/none	Large designated
Management methods	Unstructured, experimental, creativity needed	Structured, systematic
Visible damage if abandoned	Usually small	Substantial
Commitment of the CEO	None or small	Usually high

Typically, in front end there are lots of things that are unknown. Hence, front end is characterized by seeking knowledge and learning as well as being creative. On the

other hand one must learn to accept solutions that are approximate rather than exact facts. The quest for precision even becomes counterproductive. (Kim & Wilemon 2002) The information available for decision making during front end is typically qualitative, informal and approximate as opposed to quantitative, formal and precise information during product development phase. Front end also involves ad hoc – decisions. (Kim and Wilemon 2002) Zien and Buckler (1997) describe front end as unbusinesslike, which may be controversial and difficult to manage in mature organizations.

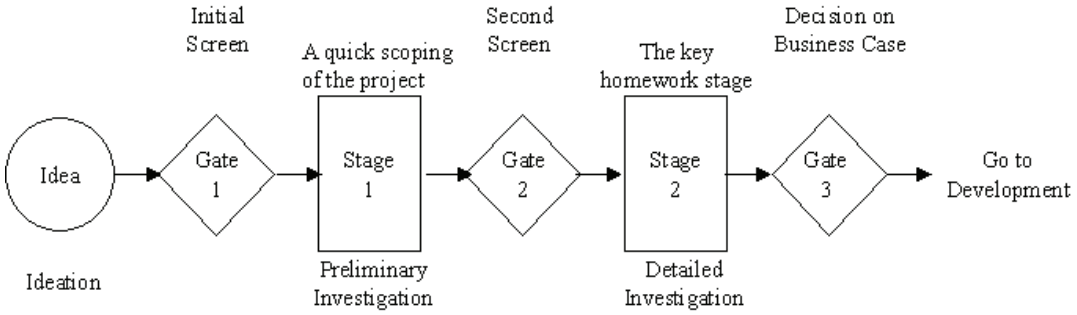
In front end speed is important (Gupta & Wilemon 1009; Reinertsen 1999) Reinertsen (ibid) found that process costs of front end are dominated by costs of delay. Gupta and Wilemon (1990), referring to a study by McKinsey & Co, emphasize that high-tech products that come to market six months late but in budget earn 33% less profits over five year period. Instead, products that are launched on time and 50% over budget cut profits only 4%. Smith et al (1999) emphasize that in front end it is important to find the failures fast and reduce risks fast in a process where numerous ideas are sifted fast to find the most promising ones.

2.3.2 Process models and activities

In the literature, there are numerous process models that strive to describe and organize the front end –phase of innovation process. (see e.g., Cooper 1997; Cagan & Vogel 2002; Koen et al. 2001; Khurana & Rosenthal 1997) The main objectives of my work do not relate to the process models as such. However, they will be discussed here to the extent that they can help us to understand front end as a context and give basis for understanding what happens in the operative processes of front end. During front-end a product concept is formulated and based on that, a decision whether or not the organization will invest in the concrete development of the idea, is made. (Monaert et al 1995) Hence, during front end "new product ideas gain the shape, justification, plans, and support leading to their approval and subsequent execution" (Khurana & Rosenthal 1997).

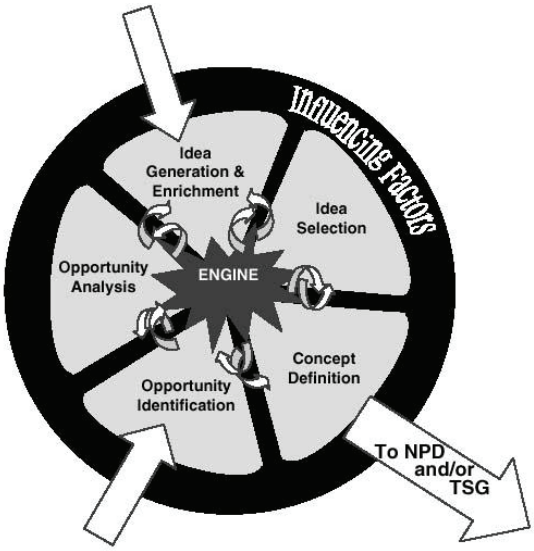
The stage gate process presented by Cooper (1997) presents a linear description of front end. Stage gate process involves three stages and three decision gates for front end. In every gate the viability of the concept is assessed and a decision whether to proceed in the concept development work or to kill the concept is carried out. The process starts from an idea which is initially screened based on largely qualitative criteria in the first gate. The following gates consist of more detailed and rigorous selection process and criteria. The stage-gate model is presented in Figure 6.

Figure 6. Stage-gate process model for front end (Cooper 1997)



Hislop (2005) states that stage models and linear models in general become not only inadequate but oversimplifying as interactive learning and combining different knowledge come to feature innovation processes. Processes are no longer linear but different phases overlap. The model developed by Koen et al (2001) presents a non-linear approach to front end process. As opposed to the linear models such as the Stage-Gate model presented before, the model allows “looping back” and “redirect and redo” which are associated to delays, added costs and poor project management in the linear models. Between the two extremes of linear and non-linear models there are several “middle way” process models (see e.g. Cagan & Vogel 2002; Khurana & Rosenthal 1997).

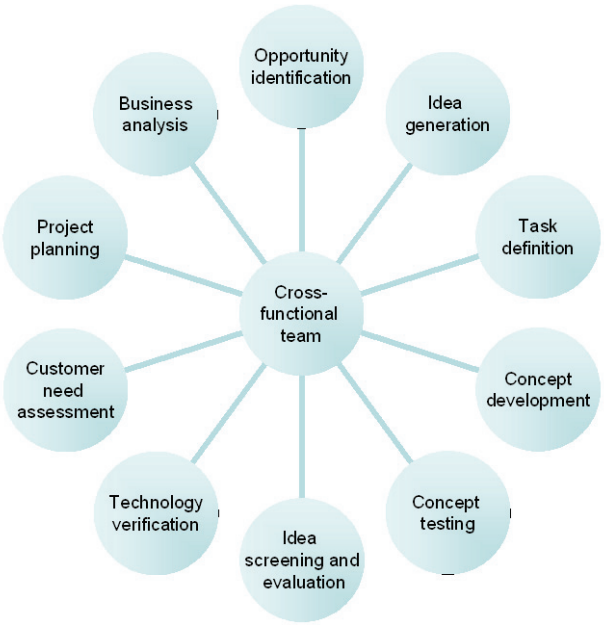
Figure 7. Concept development model by Koen et al (2001)



New concept development model developed by Koen et al (2001) consists of three key parts as shown in Figure 7. The inner area of the "wheel" is called Front End of Innovation and it consist of opportunity identification; opportunity analysis; idea genesis; idea selection and concept and technology development. The engine or "bull's eye" that drives the five elements is leadership and culture of the organization. Finally, the influencing factors in the figure consist of organizational capabilities, business strategy and outside world as well as the enabling science. The wheel-like description of the process suggests that the FE process is non-linear and ideas circulate and iterate inside and between the elements in random order and possibly returning to one or more elements more than once. Kim and Wilemon (2002) summarize based on literature that the output of fuzzy front end phase should be a well defined product concept, clear development requirements, and a business plan aligned with the corporate strategy.

Compared to process models a more concrete idea about what is happening in front end can be gained by looking at activities of front end. Front end activities are summarized in the Figure 8.

Figure 8. A conceptual process model of the front-end activities (Poskela 2006)



Front end models presented in the literature include certain activities that should be carried out during front end. The activities have been discussed by Cooper (1997), Koen et al (2001), McGrath (1996), Cagan and Vogel (2002), Khurana and Rosenthal (1998), and Nobelius and Trygg (2002) and further summarized by Poskela (2006, 2009). Accordingly, front end activities include opportunity identification, task definition, idea generation, idea screening and selection, concept development, concept testing, customer need assessment, technology verification, business analysis, and project planning and they will each be discussed here briefly. By carrying out these activities, front end should end up with a well defined product concept, clear development requirements, and a business plan aligned with the corporate strategy. (Kim and Wilemon 2002)

Opportunity identification starts the front end of innovation. Organization identifies opportunities that might appear appealing, typically examined in the light of current business goals. It may relate to smaller improvement for existing products or an opportunity to change the business drastically. Opportunity identification may take place more or less intentionally, from formal process to ad-hoc sessions and discussions by the coffee dispenser. (Koen et al 2001) Once an opportunity has been identified by a member or members of the organization it is collectively shared in *task definition.* During task definition, the opportunity is integrated to wider

strategic organizational objectives. Also, the development team is formed and the task is defined in more detail. Task definition is an important activity since it provides the direction for the development team in form of strategic goals, performance objectives as well as team composition. (Poskela 2006)

In *idea generation* the opportunity is developed and refined into a concrete idea. It is not a straightforward process but involves building, tearing down, reshaping, modifying and upgrading in a process of examination, studying, discussion and development. Often, various functions as well as actors outside the organization, such as customers, are involved in idea generation. Idea generation may take place in a formal process or in a more informal setting. After idea generation *idea screening and selection* take place during which the aim is to recognize the most profitable and valuable ideas. (Koen et al 2001) Literature presents various lists of criteria based on which the ideas can be evaluated. (Rochford 1996; de Brentani 1996; Cooper 1998) Typically, the lists reflect the organizational goals and objectives of development in order to direct the innovation activity to a direction that the organization desires. It is emphasized in the literature that the generation and evaluation of ideas should be separated in order not to kill the creativity.

Concept development concretizes the ideas that have been developed and evaluated. Khurana and Rosenthal (1997, 3) state that "The product concept is a preliminary identification of customer needs, market segments, competitive situations, business prospects, and alignment with existing business and technology plans" and it should be so clear that based on it can be evaluated whether the opportunity is worth exploring. Product concept can be further concretized with help of sketches, three-dimensional models (Khurana & Rosenthal 1997), spec sheets, dummy brochures, working models (Cooper 1998) or with prototypes (Cagan & Vogel 2001). In *concept testing* the concept can be initially tested before the actual product development phase (Poskela 2006). In concept testing the proposed product concept is presented to users and customers, and opinions, purchase intents, as well as price sensitivity can be monitored (Cooper 1998).

The definition of the product concept in the previous paragraph referred to information about customer needs as a part of the product concept. *Customer need assessment* has been recognized as a significant factor from the viewpoint of successful new product development (Ernst 2002; Zien & Buckler 1997; Zhang & Doll 2001; Cagan & Vogel 2002) and front end (Gruner & Homburg 2000; Smith et al 1999; Gales and Mansour-Cole 1995). This activity is broadly discussed throughout this work.

Technology verification involves proposing a technical solution with which the concept is realized and assessing the technical costs, risks and times. Furthermore, the technical feasibility is proven. This involves both desk research and laboratory work. (Cooper 1998). Often, these may be carried out in a separate technology development process that may be either partially or completely outside the front end. (Koen et al 2001)

In *business analysis* a business case is built. In business analysis estimates of market potential, customer needs, investment requirements, competitor assessments, technology unknowns, and overall project risks must be taken into an account. Cooper (1997) states that a lack of market analysis is the number one reason for new product failures.

In *project planning* a formal project proposal for the new concept is delivered and this activity often presents the final activity of front end before the concept is moved to the actual development phase. (Koen et al 2001) In the project plan priorities, resource plans and project schedules are addressed. (Khurana & Rosenthal 1997)

2.3.3 Front end team and customer participation

> *"New product development is a complex, iterative process requiring input from various functional groups with their own "thought worlds". Getting these groups to cooperate and coordinate their efforts is a key to successful product development…to accelerate NPD, key groups such as R&D, marketing, engineering, and manufacturing should be involved very early in the process" (Gupta & Wilemon 1990, 36)*

Front end involves more individual activity and smaller project teams compared to other phases of innovation process, (Zien & Buckler 1997) especially the development phase, where a multi-functional, full development team (Kim & Wilemon 2002; Koen et al 2001) is assigned to the task. Many researchers emphasize the significance of cross-functional cooperation where R&D, marketing, manufacturing, suppliers and customers are present. (Kim & Wilemon 2002; Zhang & Doll 2001; Cagan & Vogel 2002; Gupta & Wilemon 1990) In addition, the team should be complemented by expertise relating to the specific product being developed (Cagan & Vogel 2002) within and outside the organization (Monaert et al 1995) Early involvement of various functional groups helps to define product requirements before too much money has been spent and positions have become solidified. (Kim and Wilemon 2002) Furthermore, uncertainty is best reduced in a team where different expertise exists, thus the team members look at the uncertainties as well as the customer requirements and market potential from different viewpoints and have different knowledge. (Gupta & Wilemon 1990, Zhang & Doll 2001) Importantly, early involvement creates commitment and creates a sense of urgency thus reducing organizational response time during front end. (Gupta & Wilemon 1990)

The reverse side of the versatile expertise and cross-functional participation is that the team members present different thought worlds. (Gupta & Wilemon 1990) Consequently, they may interpret the same situation in a different way (Zhang & Doll 2001) and perceive the potential of a concept differently since all the concepts usually consist of elements with potential for both success and failure. (Kim & Wilemon 2002) Also, members from different functional groups often consider their own area as the most important and put a relatively stronger emphasis on the issues

they experience important. (Cagan & Vogel 2002) Getting these groups to cooperate and coordinate their efforts is a key to successful new product development. (Gupta & Wilemon 1990) In order to succeed, the team needs to build shared knowledge bases (Cagan & Vogel 2002). Thus, it preconditions mutual trust, mutual respect and appreciation of others and their area of expertise (Cagan & Vogel 2002), knowledge on how the different expertise come together to complement each other (Cagan & Vogel 2002; Monaert et al 1995) and conscious reaching out to others as well as time (Zhang & Doll 2001). As Gupta and Wilemon (1990) point out: succeeding in front end requires the right mix of people.

Customers represent one source of external expertise in front end. Understanding customer needs is generally considered important in front end (Ernst 2002, Zien & Buckler 1997; Zhang & Doll 2001; Cagan & Vogel 2002; Smith et al 1999; Verworn, Herstatt & Nagahira 2008; Dahlsten 2004; Reinertsen 1999). However, there are not too many studies addressing customer viewpoint in front end –phase specifically and Dahlsten (2004) states that the subject is somewhat neglected in research. More often front end is addressed as a phase along with the other phases of innovation process.

Dahlsten (2004) studied the involvement on female potential users, Hollywood wives literally, in the development of Volvo Cars first sports utility vehicle XC90. The group of women met with the product development team members throughout the whole three-year project. Dahlsten states that these interactions had a significant impact on the final product. He describes that the role of these potential users was more confirmatory than idea generating. The participation of these users also had other benefits. The meetings enabled the product developers to create a shared view of customers. Also, the input from customers has been useful in supporting argumentation inside the organization. They also found that they learned new things about the role of car in the everyday lives of their customers. Finally, such involvement of users gave the car a lot of publicity because journalists found it very interesting.

Buur & Matthews (2008) studied a project in Danfoss where opportunities for new products to control wastewater treatment processes where looked for. The team employed an ethnographic approach, studying the activities of several technicians by "shadowing" them. After that they arranged workshops where the concrete ideas where searched for and designed. Based on the experiences of the study the authors develop a framework for participatory design.

Stappers et al (2008) discuss participatory techniques in the early phases of design using three cases. The cases they describe were graduation projects of students of Design for Interaction-course. Each case featured a user group requiring a distinctive effort for the designer to 'step into the user's shoes'. In each case, users participated first in a context mapping study, and later they used prototypes in their home. They state that they were surprised by the eagerness and expertise of customers. Generally, they see that different phases such as exploration and evaluation as well as design and research have merged. In addition, they state that researcher; user and designer roles are overlapping.

Flint (2002) studied significance and creation of customer understanding in front end of innovation by carrying out a literature review. He discusses formal methods and techniques to gain deeper customer understanding. He claims that using these techniques improves the likelihood of repeated success. He suggests that formal processes designed to develop deep customer understanding during ideation are important. Moreover he suggests that technique called customer value determination as well as ethnographic methods are suitable for further understanding of current customer needs while technique called customer value change helps to understand future needs.

Gruner and Homburg (2000) studied the intensity of customer interaction in new product development process and characteristics of involved customers in machinery industry. They divided the new product development process into six stages that are idea generation, product concept development, project definition, engineering, prototype testing and market launch. The first two phases belong to front end of innovation. They found that the intensity of customer interaction in the

first two stages (which represent front end) yields significant effects on new product success. Gruner and Homburg (ibid) also investigated the factual intensity of interaction in the different stages of the process. They found that the intensity of interaction during the front end is minimal irrespectively of the fact that the performance effect was found to be significant. Similar observation is made by Gales and Mansour-Cole (1995) who studied frequency of user involvement and number of users contacted in toxic waste treatment projects. They found that frequency of user interaction varied by project stage increasing for each of the three first stages (idea generation, project i.e. prototype design, technology development) but not between the last two phases. They also found that the number of users contacted varied across the different stages of projects with the smallest number of contacts at the initial stage and the largest in the last two stages.

Lagrosen (2005) studied customer involvement in new product development in small local Swedish companies and multinational enterprises during idea stage, development stage and launch. Lagrosen (ibid) finds that new product development processes in large enterprises are more specified and structured. Moreover, he states that the level of customer involvement varies a lot yet having nothing to do with company size. Lagrosen also finds a u-shaped curve for participation in relation to phases of new product development.

So far I have reviewed literature from the viewpoint of knowledge processes, customer knowledge and front end. In the next sub-chapter I summarize the literature from the viewpoint of how these three separate streams can be set to interact with each other and simultaneously to support each other.

2.4 Summary of theory: Examining constructing customer understanding as knowledge process

Hislop has stated that a weakness of current innovation literature is its "blindness" to the importance of knowledge in innovation processes (Hislop 2003). The claim is echoed by Song, Bij and Weggeman (2006) as well as Trott (2002) who consider that despite the importance of new knowledge creation in innovation activity only a limited number of publications have addressed the issue. Rather, innovation is detached from knowledge. However, my reader has probably noticed by now that the pieces of literature presented in the last three sub-chapters talk about the same things yet there is relatively little dialogue between them. In the following I summarize the literature by bringing it together and show how the different discussions not only share similar concerns but also help to understand each of them better. Moreover, this also gives us a fresh viewpoint and enables us to better understand the phenomenon I am studying here.

Practice-based view to knowledge suggests that customer knowledge is constructed in social interaction and negotiation between people inside and outside an organization. Thus, customer knowledge is not facts, rather it consists of interpretations of various people and it is always open to negotiation and dispute. (Hislop 2005; Nonaka & Teece 2001; Tsoukas & Vladimirou 2006) I already stated earlier that in the literature customer knowledge is defined in various ways and various terms are used and sometimes a definition is totally lacking. And when knowledge literature advises us to understand knowledge as constructions of individuals we need to take interest in what they themselves are looking for in trying to know and understand customers. Despite the definition, organizations have existing knowledge, prevailing routines, and previous experiences from working with customers which over time develop into shared understandings about customers and their needs, underlying features behind customers' needs and the market in general. This knowledge and understanding is capitalized by using it in new innovation projects. (Nonaka et al 2001b; Probst et al 1998; Atuahene-Gima et al 2005; Marsh & Stock 2006) Practice-based knowledge is distributed and partial however (Brown & Duguid 2001), and that is why there is a need to integrate

knowledge from inside and outside the organization into front end. That is discussed in customer knowledge literature in terms of the importance of integrating customer knowledge in innovation process (see e.g. Lagrosen 2005; Salomo et al 2003; Hart et al 1999) and in front end literature by emphasizing the importance of cross-functional teams and customer participation (see e.g. Kim & Wilemon 2002; Zhang & Doll 2001; Cagan et Vogel 2002) However, whereas concept developers' knowledge about customers is not factual or "true" as such, the needs of customers and their own understanding about their needs is not that clear or stable either. Rather, they evolve over time.

The practice-based view allows us to see that a concept development task assigned for a front end team in an organization is a common enterprise that the team members are engaged in. (Wenger 1998) In time, the pursue of a common enterprise creates a community. In the beginning the community becomes engaged in perspective making during which it negotiates its unique perspective that involves for example its particular knowledge, worldview and values. Without such a perspective the team cannot achieve its goals. (Boland & Tenkasi 1995; Hislop 2005) Team members interpret all knowledge about customers from the viewpoint of their particular perspective. This perspective determines what is considered important, relevant, unimportant, irrelevant, interesting and new. (Tsoukas & Mylonopoulos 2001; Brown & Duguid 2001; Boland & Tenkasi 1995; Hislop 2005) There are references to the need of perspective making in innovation literature as well. Kim and Wilemon (2002) state that in cross-functional teams team members may perceive the potential of a concept differently. Cagan & Vogel (2002) further continue that members from different functional groups tend to consider their own viewpoint the most important. Thus, they need to negotiate their perspective first. Despite the references both customer knowledge literature and innovation literature fail to see the significance of perspective. Instead they are looking at the contents of the knowledge we need about customers. In this work I use the term customer understanding to highlight that concept developers understand customer knowledge from the viewpoint of their perspective.

The concept of community also helps us to understand participation and membership. Interest in customer participation is apparent in customer knowledge literature where the modes of customer participation are discussed in relation to the depth, significance and frequency. (Lagrosen 2005; Alam 2002; Kaulio 1998; Brockhoff 2003; Ives & Olson 1984). It is clear that the front end team is responsible for the goals set by the organization but on the other hand there are a lot of other people involved who are not responsible for the goals as such but whose role may be significant from the viewpoint of end result. Practice-based view to knowledge encourages us to pay attention to participation and the role of different participants. In talking about communities a difference between active participants and more loosely coupled peripheral participants is made. (Wenger 1998; Hislop 2005) This implies that participation of customers is an interesting research target. Although literature recognizes different modes of customer participation it does not address adequately how these different levels of participation interact and, on the other hand, what kinds of situations are related to particular ways of participation.

The different modes of participation relate to the practice of a community. Every community creates its own practice in order to get its job done. The practice is reflected in roles, documents, tools, language, embodied understandings and invisible rules of thumb for example. (Wenger 1998) Knowledge literature invites us to take interest in those practices, that is, the concept developers' own interpretations about how they get things done instead of paying attention to the process models and "official" ways of organizing front end to which the extant literature has taken more interest in. (see e.g., Cooper 1997; Cagan & Vogel 2002; Koen et al. 2001; Khurana & Rosenthal 1997)

Each of the three streams of literature talk about the challenges in interaction and customer participation. Leonard (2002) states that knowledge domains of customers and concept developers often overlap very little. In the literature customers are suggested to be poor anticipators of their own behavior in terms of their needs or buying preferences (Salomo et al 2003; Hamel & Prahalad 1994), and being captives of their current way of using products (Leonard 2002; Vicari & Troilo 1998; Ulwick 2002) to which Salomo et al (2003) add that they are unable to

imagine what is possible. Thus, they all question customers' ability to participate in innovation activity. In front end literature Cagan and Vogel (2002) talk about the need to create shared understandings and mutual trust as well as respect for the expertise of others. Knowledge literature invites us to understand the situation as an intercommunity knowledge process. In intercommunity knowledge processes concept developers and customers who come from different communities, who have different knowledge bases and perspectives and who seldom work together, meet each other. Customers and concept developers also often have different values, interests and basic assumptions. For such intercommunity knowledge processes to happen participants need to build common ground. (Hislop 2005; Boland & Tenkasi 1995) Inter-community knowledge processes precondition perspective taking where concept developers try to understand the perspective, worldview, knowledge and values of others. It also means that both parties need to take genuine interest in the knowledge and expertise of others and understand other ways of knowing. In other words they need to give their perspective "up for grabs". (Boland & Tenkasi 1995) Sometimes communities may become so inward looking that they overlook knowledge of others thus they become unwilling to commit to perspective taking. (Hislop 2005)

For knowledge processes to take place, a shared context for action and interaction, a space, is needed (Nonaka et al 2001; Hernes 2004) Knowledge construction is integrally tied to time, space and context (Tsoukas & Mylonopoulos 2004). Although literature lists various modes of customer participation (see e.g. Kaulio 1998; Lagrosen 1995; Ives & Olson 1984) or ways of gathering customer knowledge, the idea of space does not seem to be present there. However, the idea of space helps us to further understand the phenomenon. Once again participation becomes highlighted because people express their commitment to a space by participation. (Hernes 2004) It is participants who create, maintain and destroy a space. Thus, the space looks like its participants and that is why it is not indifferent who participates and how they participate. Consequently, this implies that we should take interest in spaces where customer understanding is constructed as well as the context of activity.

The importance of who participates is addressed in customer knowledge literature as well. A considerable attention is given to choosing "the right" customers to be involved in innovation processes. (see e.g. Emden, Calantone & Droge 2006; Franke et al 2006; Von Hippel 1988 ; Lilien et al 2002 ; Neale & Corkindale 1998; Olson & Bakke 2001; Franke et al 2006). These can be understood as acts of distinction drawing based on which insiders and outsiders of a space are determined and boundaries for a space are set. (Hernes 2004) However, the selection of "suitable" customers is presented to be more rational manner in innovation literature where as in knowledge literature the membership (of communities) seems to be considered more emerging. An aspect brought up in knowledge literature but more often ignored in customer knowledge literature is the importance of motivation and individuals' aspirations to use their knowledge as well as the importance of trust-based relations. (Von Krogh, Roos & Kleine 1998; Ives, Torey & Gordon) This helps us to understand and pay attention to the aspects of the phenomenon that are not much discussed.

Finally, an aspect that is important in practice-based view of knowledge but largely missing from both innovation and customer knowledge literature is power. The practice-based epistemology makes it possible and actually invites us to ponder over the role of power in constructing customer understanding, a viewpoint that is very little addressed in the existent literature. It also makes us to pay attention to the motives of knowledge processes.

By now I hope that my reader understands how we can examine construction of customer understanding in front end as knowledge process or constellation of knowledge processes and what kind of research questions are interesting from this viewpoint. Based on this I now move on to define my research questions and the methodology I have employed in looking for answers to those questions.

3. Research questions and methodology

In the following sub-chapters I describe the background of this study to my reader, present the objectives and research questions as well as walk my reader through the research process.

3.1 Background, objectives and research questions

Before describing the objectives and research questions it is important that my reader understands the background of this study and has an idea about my a priori knowledge because they have influenced in this study a lot.

During the past years I have been involved in various research projects that have given me an opportunity to interact with many organizations, practices, topics and people. These organizations have ranged from small content producers to large industrial organizations. These projects have enlightened the phenomenon I study in this thesis from different angles and have provided me with insight into the subject that has both enabled and restricted the way I understand and approach it.

It was my advisor Marja Eriksson who led me into research after my graduation. I started in a research project where we studied knowledge management in product development and other contexts followed by other projects concentrating on leadership and expertise. The idea of postgraduate studies started to emerge in my mind while working in those projects. In October 2003 I joined a research group in Helsinki University of Technology that introduced me to a whole new culture. I

became responsible for studying and developing business intelligence and customer-orientation in front end of innovation in a research project that has affected this thesis considerably. My knowledge and understanding of innovation activity developed significantly with people who had studied this specific topic for years. Tight connections to several industrial organizations kept the research close to practice and gave me a chance to interact intensively with companies. I got involved in company-specific research assignments that were guided by objectives and challenges of organizations for which they wanted specific practical solutions. Soon the focus of my research became narrowed down from business intelligence to customer orientation in front end, guided by the interest of participant organizations of the project. Consequently, I got a chance to discuss the subject with various representatives of different organizations and to reflect my ideas and their relevance from the viewpoint of companies. The project also gave me an opportunity to go really deep into front end context and gain unique and interesting data on the subject. From these starting points I now present the objectives and research questions of this study.

The purpose of this study is to *understand* how customer understanding is constructed during front of innovation. I approach the subject from viewpoint of knowledge processes where such understanding is constructed subjectively in interaction between people in processes where power and politics integrally intertwine. Such understanding is always tied to people and the interactions these people engage, thus we need to specify whose constructions we take interest in. This means that in addition to the actors and the actual activity we also need to take interest in intentions of people involved.

From those starting points the main research question is formulated in the following way:

> ***How and why concept developers construct customer understanding in front end of innovation?***

In order to find answers to the main research question I first need to conceptualize what customer understanding means in my data. That is, to examine the

constructions of concept developers of customer understanding. Hence, I formulate the first sub-question as follows:

How do concept developers define customer understanding?

Furthermore, in this study concept developers construct customer understanding in a specific context, the front end of innovation. Front end is a particular context that is relatively little known and different from other phases of innovation process (see e.g. Koen et al 2001). In addition, as knowledge is tied to the context in which it is constructed, (see. e.g. Hislop 2005) and it is important to tie the phenomenon studied to its context, (see e.g. Stake 1995) the main research question can be elaborated with another sub-question:

How does front end as a context influence in how concept developers construct customer understanding?

The paramount objective of my study is to understand and describe how and why concept developers construct customer understanding in front end of innovation. Through that description and improved understanding I aim to provide my readers with opportunities for learning and new knowledge creation which can also be used in developing and improving front end practices in companies. Another objective of my study is to enrich the theoretical understanding of both the phenomenon and the context.

3.2 Methodological choices

> *"The researcher approaches the world with a set of ideas, a framework (ontology) that specifies a set of questions (epistemology) that are then investigated (methodology, analysis) in specific ways." (Denzin & Lincoln 1994)*

In this sub-chapter I bring forth my philosophical assumptions and the method I have employed.

3.2.1 Philosophical assumptions

The field of qualitative research has been categorized in various ways. These categories have been called paradigms (see e.g. Burrell & Morgan 1979; Burrell 1996; Lincoln & Guba 2000), perspectives (see Hatch 1997) and modes of explanation (Scherer 2003) among others. These categories are sometimes confusing because the same labels are used to refer to different contents, same concepts are used to refer to (approximately) same issues and the categories of different authors sometimes overlap. These categories are distinguished by the purpose of research and by the ontological, epistemological and methodological stances.

> *"[A paradigm]…marks out, in an agreed and deep-seated sense, a way of seeing the world and how it should be studied" (Burrell 1996, 647).*

The different paradigms (or categories) have different axioms. This means that different issues are of interest and relevance within different categories. Although paradigms have been claimed incommensurable, (Denzin & Lincoln 1994) we have also noted that paradigms begin to interbreed (Lincoln & Guba 2000). Lincoln and Guba (2000) remind that such categories are fluid and the boundaries between paradigms keep shifting, as they are our own constructions (Tsoukas & Knudsen 2002). Tsoukas and Knudsen (2002) also claim that although researchers have different preferences they seldom are "paradigm warriors" adhering strictly and

exclusively to one paradigm. Rather, researchers are oriented and inspired by one paradigm having simultaneously sympathy to other paradigms. The paramount objective of my study to understand and describe is clearly tied to interpretivist ideas but at the same time I aim at improving practices in companies, which implies that I have sympathy towards managerialism and improvement as well. (Hatch 1997; Scherer 2003; Willmott 2002)

I have chosen not to "label" my study strictly under a certain category or paradigm. Instead I will simply present my philosophical starting points that are guided and inspired by ideas from different authors, the most important ones being the symbolic-interpretive perspective (Hatch 1997); organization theory as interpretive science (Hatch & Yanow 2002); interpretivism (Scherer 2003) and constructivism (see e.g. Denzin & Lincoln 1994; Lincoln & Guba 2000; Eriksson & Kovalainen 2008). These ideas have emerged as a response and critique towards positivism and a central starting point is that the social world cannot be understood and studied in the same way as the physical world. In addition, they share a common interest in understanding social processes from the viewpoint of the actors themselves. (Hatch & Yanow 2002)

Understanding means making interpretations (Schwandt 2000; Hatch & Yanow 2003; Hatch 1997) and finding meaning in action (Schwandt 2000). What we call knowledge emerges out of interpretation of our perceptions, not out of uninterpreted grasping of them. (Hatch & Yanow 2003) This is why a same smile can be interpreted as a friendly grin or as an arrogant smirk or as a hostile grimace depending on the person making the interpretation, the situation in which the interpretation is made and the knowledge the interpreter has about the smiling person beforehand. Understanding is to "look over the shoulder of the actor" and trying to find out what the actors themselves are doing (Schwandt 2000). Quoting Geertz Martin (2003) crystallizes the idea pleasantly:

"*The trick is to figure out what the devil they think they are up to " (Martin 2003, 399)*

Thus, interpretation requires “an empathic identification” with the actor, an ability to see things from the viewpoint of the actor (Schwandt 2000).

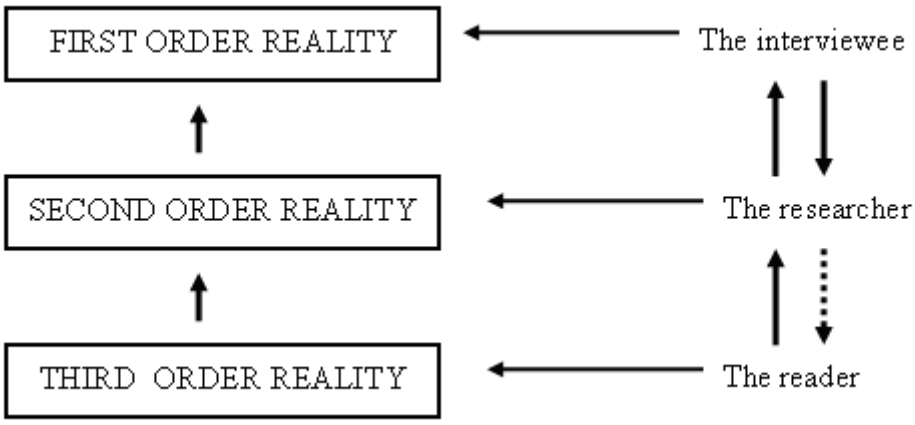
Ontology is concerned with what can be known (Hatch 1997). Thus, it consists of assumptions about the form and nature of reality (Guba & Lincoln 1994, Martin 2003). My approach in this study is that we make interpretations in social interaction and at the same time we construct social reality. Accordingly, we can also change the way we view and understand reality in those interactive processes. Thus, my assumptions are attached to subjective or constructivist ontology. (Eriksson & Kovalainen 2008). Such standpoint denies the positivist argument about existence of one objective reality that exists independent of our knowledge of it (Hatch & Yanow 2003; Hatch 1997; Scherer 2003; Guba & Lincoln 1994; Lincoln & Guba 2000). Hence, although reality is considered objective and “true” to those who construct it (Hatch 1997) the social reality is constructed differently by different people and multiple constructions of the reality coexist. Furthermore, such standpoint also denies that “the true state of affairs” could be grasped through strict scientific methods. (Guba & Lincoln 1994) Adopting this kind of an ontological understanding means that reaching “the truth” is not a relevant research focus in my study. Instead, a relevant focus is to understand and to provide different interpretations. (Hatch & Yanow 2002)

The question of epistemology is concerned with how we can know the world (Hatch 1997). Thus, it defines the relationship between the knower and what can be known. Often objectivist and subjectivist epistemology is juxtaposed and the former is attached to positivist and the latter to “new paradigms”. Whereas objectivist epistemology states that we gain knowledge (of the objective reality) by independent observation (Hatch 1997) where the researcher must stay objective, detached and value-free to avoid any bias (Guba & Lincoln 1994), subjectivist epistemology states that all knowledge is filtered thought the knower (Hatch 1997). Thus, subjectivists argue that everything that would seem to be an objective fact is always subjectively perceived by humans and processed and given meaning by human sense making (Weick et al 2005).

Methodologically I see, as suggested by Guba and Lincoln (1994), that interaction between the researcher and the researched, (the respondent), is important. (Guba & Lincoln 1994) Meanings and interpretations I present are constituted in communicative processes between me and my interviewees.

Tsoukas (2003) states that meanings are embedded in people's actions and those meanings can be reached by looking at what people do. Consequently, I take an interest in what concept developers themselves were doing in constructing customer understanding. I am interested in their interpretations of it. However, I do not believe that asking my interviewees to describe how they constructed customer understanding is a way to find out "what really happened" and it is not even relevant here. In relation to cases I studied, I was an outsider. I have not been involved in the cases as such, I have only asked questions and read material about them retrospectively. Thus, I can only *access interpretations* of my interviewees. In other words, the interviewees picture their subjective "in here" reality that is called the first order reality (Hatch and Yanow 2003; Scherer 2003).

Figure 9. Three levels of realities in research



The second order reality develops out of my interpretation of my interviewees' subjective realities. (Sherer 2003) I cannot grasp their interpretations in a way that would keep them unchanged. In order to understand them I have to interpret them, and my research objectives as well as my former knowledge shape my interpretations. Prior knowledge has grown out of my past experience, education,

training, family-community-region, national background and personality. All these things together form my lived experience through which I understand the world around me, including the realities described by my respondents. (Hatch and Yanow 2003) This again is reflected in what I consider important and interesting, and on the other hand what I choose to leave untold as uninteresting, unimportant or irrelevant. Although I am committed to being "true" to the meanings and realities of my interviewees the text that emerges is my story and my interpretation.

In order to provide my readers with opportunities to learn I try to pass on my interpretations. My work will encounter different audiences who will read and interpret it, enabled and limited by their own capacities of interpretation and sense-making, and will inevitably arrive at different interpretations and readings of the texts. (Altheide & Johnson 1998) Out of interpretations of my reader the third order reality finally emerges.

3.2.2 Collective case study

Case studies have become one of the most popular inquiries in the field of qualitative research (Stake 2000). Case studies are also well suited for business research. In case studies complex and "hard-to-grasp" business issues, such as organizational or managerial issues, can be presented in accessible and vivid format. (Eriksson & Kovalainen 2008) However, there are several ways of approaching and defining a case study. Yin (1994) defines case study as a research strategy while Stake (1995, 2000) argues that case study is a choice of what is being studied. Stake (1995) states that his approach to case study is deeply rooted in ideas of qualitative research and he attaches it specifically to constructivism. Stake himself considers Yin's approach more quantitative. I also see several allusions to modernism/positivism in Yin's approach.

Yin (1994) states that constructing a preliminary theory before entering fieldwork is important because researcher needs to understand what is being studied. To him a

complete research design embodies a theory of what is being studied as well as theoretical propositions. Naturally he notes that the available theoretical basis varies according to the subject but advises that even in explorative studies the research design should include statements about what is being studied, the purpose for exploration, and the criteria by which the exploration is considered successful. In my mind this line of thinking emphasizes the etic position of researcher who brings his/her own questions and categories into the inquiry, giving the issues that the objects of a study consider important, less attention. Stake (1995) again notes that:

> *"..we enter the scene with a sincere interest in learning how they function in their ordinary pursuits and milieus and with a willingness to put aside many presumptions while we learn" (Stake 1995, 1).*

Yin (1994) advices/tells to avoid "unsuspected slippages" where relevant research questions change and evidence starts to address different questions. Although he notes that flexibility has been considered a strength of case studies, in general the greatest critique towards case studies is targeted to studies where due to such a shift the research design becomes incompatible with the questions. The research design is not totally inflexible, but he reminds that the possibility to change the research design concerns the initial phases of research process (early data gathering and pilot study) and only allows choosing different cases from the ones initially chosen. He simply tells to start over again if the relevant questions really change. Stake (1995) again explicitly emphasizes the flexibility of research questions. He says that the questions might be changed along the way if the original questions do not work or if new, more interesting, themes come up. He considers this a natural path in the research process because in getting to know the case better etic issues give way to emic issues.

Careful selection of cases is emphasized in Yin's approach. In multiple case studies where more than one case is studied, Yin (1994) advises to regard the cases as multiple *experiments*. Replication is of primary importance which means that the cases included are predicted to present similar results or contrasting results but for predictable reasons. Stake (2000) agrees that in collective case work we need to choose the cases to be studied. Yet he states that in collective case study the

individual cases can or cannot be known to have some common characteristics in advance, and/in other words they may be similar or dissimilar. The cases are seen as opportunities to study the phenomenon and the sample should build on variety and opportunity for intensive study. However, the most important criterion is the opportunity to learn. (Stake 1995; 2000)

Yin (1994) states that interviews are an important source of data in case studies. Most often, he says, the interviews are open ended including both facts and interviewees' opinions. He further goes on:

> *"In some situations you may even ask the repondent to propose his or her own insights into certain occurrences…." (Yin 1994, 84)*

Yin advises to report and interpret interviews from the viewpoint of the interviewee but to be cautious and treat interview data as verbal reports only since they are subject to the common problems of "bias, poor recall and inaccurate articulation". Stake (1995) again states that the case will not be seen the same way by everyone and one objective truth about what happened does not exist. Yin (1994) also calls for converging lines of inquiry. This he illustrates in a figure where different sources of data lead to *fact*.

Finally, Yin states:

> *"As with criminological evidence, the process should be tight enough that evidence presented "in court" –the case report- is assuredly the same evidence that was collected at the scene of "the crime" during the data collection process; conversely, no original evidence should have been lost, through carelessness or bias, and therefore fail to receive appropriate attention in considering the "facts" of the case. " (Yin 1994, 98)*

Stake (1995) puts a great importance in interpretation and states that each researcher brings his/her unique contribution to a study of a case and each reader draws unique meanings out of it. He continues that what a researcher concludes does not fully correspond to what we observe in the field: in our interpretation we draw from understandings deep within us, understandings where personal experience, scholarship and conclusions of others are mixed. Thus, objective

evidence that could be interpreted the same way by everyone simply does not exist, nor can (or need) evidence be transferred to others in the exact same form. Interpretation interferes with every step. (Stake 2000)

Stake's approach to case study seems to match the objectives and philosophical assumptions of my study better. Thus, in the rest of this report the ideas of Stake (1994, 1995, 2000) are strongly present.

"The aim is to thoroughly understand the case" (Stake 1995, 9)

Although I feel that the philosophical standing points of Stake's approach to case study correspond well with mine in this study I also find the approach challenging in some points. The background is in education. The studies that explicitly employ the approach that I have found, also come from the education/ learning context (see e.g. Matthews 2003; Phelan et al 2006) although for example Johansson et al (2005) study university spin offs. Stake (1995, 2000) states that a case is a choice of what is being studied. He further continues that a case is a purposeful, specific, bounded and functioning thing. He exemplifies that people and programs are examples of cases while events and processes fit the definition "less well". (Stake 1995, 3) Thus, he does not exclude anything as such. In my study the individual cases are front end enterprises (that are close to projects) that are studied instrumentally, that is, the attention is mainly in the collective case.

Stake (1995, 2000) makes a difference between intrinsic, instrumental and collective case study. In an *intrinsic case study* the interest is in understanding a particular case. In other words the case is not chosen because it represents some other cases or because it illustrates a certain trait or problem. In *instrumental case study* a case is chosen because it gives insight into an issue. The case itself is of secondary interest and plays a supportive role: the interest is not in a particular case but in understanding something else through that case. Thus, the case as such facilitates our understanding of something else. Finally, *collective case study* is instrumental study extended to a number of cases. In collective case study a number of cases are studied in order *to understand a phenomenon, population or general condition.* Thus, even less interest is placed on one single case. The individual cases

are chosen because understanding them is expected to lead to an improved understanding of the collective case. (Stake 1995) In other words, in this study I have chosen to study several individual cases because I believe that they help me to understand how and why concept developers construct customer understanding in front end.

3.3 Research process: description and reflection

> *"As long as we strive to base our claims and interpretations of social life on data of any kind, we must have a logic for assessing and communicating the interactive process through which the investigator acquired the research experience and information" (Altheide & Johnson 1998, 284)*

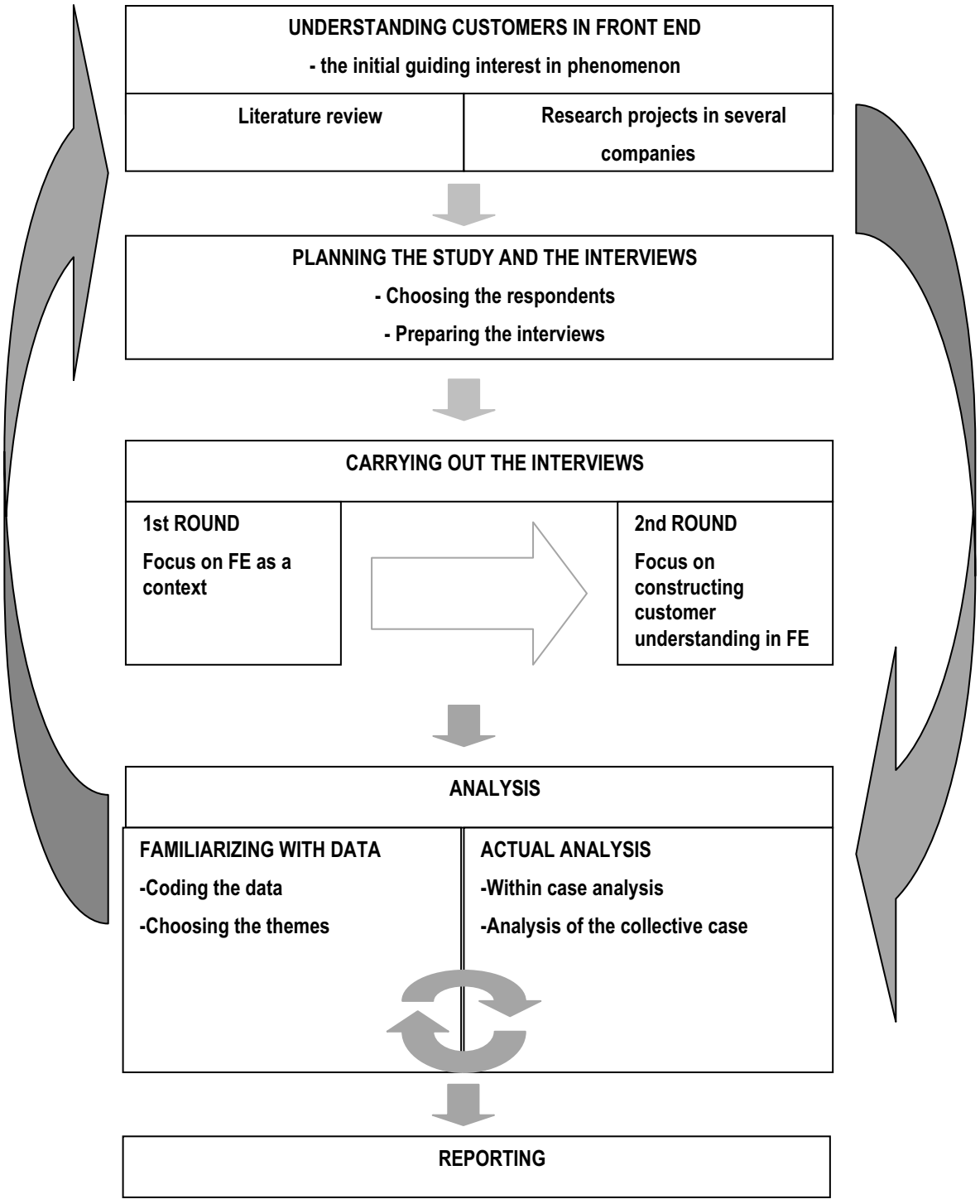
In this sub-chapter I describe the research process and simultaneously critically inspect my role in it. (Eriksson & Kovalainen 2008) In other words I reflect on the process and my role in emergence of the story I am about to present. In the following I use terms enterprise and case. I talk about enterprise when I describe the cases from the viewpoint of the organization or the interviewees. I use the term case to refer to these enterprises when I describe them as targets of my research, from an outsider's viewpoint. Before moving to description and reflection I will first discuss reflexivity briefly.

Reflexivity is meant to increase the transparency of knowledge production process, knowledge claims and the relationships between researcher and subject of interests (Eriksson & Kovalainen 2008). Calás and Smirchich (1999) state that interest in "knowing about knowing" in management research dates back to late 1970's. During the traditional era (1900-1950) researchers were concerned with offering valid, reliable, and objective as well as un-biased and value-free interpretations in their studies. The "other", the one studied, was considered alien and strange. During the golden age (1950-1970) there was a strive to formalize qualitative methods. Along with the blurred genres –era (1970-1986) the old

approaches gave way to more pluralistic and interpretive approaches. Simultaneously, more attention was paid to the role of researcher and his/her presence in the texts since strict rules about the text and its evaluation no longer existed. Thus, the idea of reflection started to gain attention. During the era of blurred genres researchers had a wide range of paradigms, methods and strategies to employ which later lead to crisis of representation (1986-1990) that refers to the notion that researchers cannot capture lived experience as it is, but rather, lived experience is created by researchers in the texts they write. Consequently, the researcher does not have a role of an objective outsider but that of an active constructor of meaning. Simultaneously this led to erosion of the traditional evaluation criteria for qualitative research. Validity, generalizability and reliability as criteria became questioned. The present moment (1990-) emphasizes local and "smaller" theories instead of grand narratives and welcome "tales of the field" as well as stories of the previously silenced groups. Researchers are called to reflect on their role in the research process.

Calás and Smirchich (1992) state that reflexivity draws attention to the relationship between processes of knowledge production and the role of knowledge producer. No longer can the researcher hide "under a veil of neutrality or objectivity" (Fine 1994). Fine (1994) talks about "working the hyphen" with which she means unpacking the notions of scientific neutrality, universal truths, and researcher dispassion. She suggests that researchers should ponder what is their relation to the contexts they study and with their informants. "…whose story is being told, why, to whom, with what interpretation, and whose story is being shadowed, why, for whom and with what consequence". (Fine 1994, 72) In the following, side-by-side with describing the research process I try to answer the call of reflexivity as well. The research process is visually illustrated in the following Figure 10.

Figure 10. Research process



3.3.1 Starting point of the research: some background for the choices

In the name of reflexivity especially, I consider it important to enlighten the background of my research since it opens up the conditions under which the research has been planned and carried out. I find that those conditions have affected my study considerably.

My research is closely linked to a three-year research project COINNO (Customer-oriented innovation in network economy) that was carried out between 2003 and 2006. The planning of my research, data gathering and partly the analysis were carried out as part of the project.

The research project had been started some months before I joined the group. The position into which I was recruited had been profiled based on research needs and interests of participating companies, which meant that objectives and my research focus were partly pre-determined. Hence, there were certain "givens" that have affected my choices in the course of this research. Entering a technical university with a background in business sciences meant a need to build common ground with the research group consisting of people with background in engineering sciences (at that time). That naturally influenced my orientation a lot and had a huge effect on my approach and understanding of the subject. At the same time I maintained a connection to my "home" university and I discovered that the worlds differed significantly in their approach and thinking.

Another important issue is the process of data gathering. The project and its focus directed the sample of organizations that I studied. Another important thing is that the data gathering of my research is partly combined with another study. Partly the same material has been utilized in the two different studies. However, the focus of the two is totally different; the other concentrating on the process of front end as well as management control. The planning of research, including the interview questions, as well as part of data gathering was done in close interaction with

another researcher. That is why I will talk about “we” in some instances in the following description of the research process.

3.3.2 Empirical data: Nine individual cases form the collective case

The empirical data of my thesis consists of nine innovation enterprises in nine companies where front end –phase was studied mainly retrospectively. These nine cases together form the collective case where the main interest is in the phenomenon of constructing customer understanding in front end, not in individual cases per se (Stake 1995). In each case one product concept was developed. The cases are described later when I talk about the analysis of research data.

The companies included are established and significant, large and middle-sized, Finnish industrial organizations from the fields of forestry, mechanical engineering, electronics, metal and consumer discretionary**.** The choice of industries and companies was determined by the focus of the research project during which the empirical data was gathered. Thus, we chose companies purposefully (Stake 2000) so that they belonged to the span of interest of the project (Hirsjärvi and Hurme 2001). We assumed that in larger and established organizations front end – processes/ practices relating to constructing customer understanding were more likely to exist. Selection of companies was naturally a choice that has influenced the results of this study considerably. From the viewpoint of learning, choosing companies that recognize the existence of front end and have practices for carrying it through is appropriate since it makes a dynamic phenomenon available for research. At the same time it is evident however, that the voice of larger companies is heard while the voice of smaller companies is silenced. The practices might be different in smaller or younger (more agile) companies but on the other hand large companies often have dedicated resources for trying and developing new practices.

We wanted to include a range of different cases in our data in order to add variety which was expected to contribute to learning. (see Stake 1995; 2000) Company representatives chose the cases we studied according to criteria stated by us, the researchers. Consequently, we could control the variety only by increasing the number of cases until we reached the level of variety we considered sufficient. Generally in case studies where more than one case is studied there is no right answer to how many cases should be included. The number of cases is tied to the aims of the study and the contribution extra cases bring to the study. (Eriksson & Kovalainen 2008) However, on the other side of the richness of data arisen from variety, there is the difference and special nature of different categories of innovations (radical vs. incremental, market pull vs. technology push, consumer vs. business-to-business) that make development of such innovations different. As Garcia and Calantone (2002) state, the labeling of innovation is important in order to understand the development processes of different innovations. Being aware of this, I have still chosen to include different cases because my method gives room and is actually seeking different interpretations and understandings. Secondly, these classifications or "labelings" would have a totally different significance in process analysis or contingency analysis where these contextual factors could explain differences between cases. But here each case is understood to add something new to the collective case.

In addition to the industrial sector of the company the cases differed in terms of other things as well, which are summarized in Table 4. First, there are incremental, really new and radical concepts included (Garcia and Calantone 2002). Incremental innovation refers to product improvements that employ existing technology and are targeted to existing markets. Really new innovations either employ existing technology to new markets or new technology to existing markets. Radical innovations again employ new technology to new markets. In each case the interviewees were asked about the newness of both the technology and the market components. Based on their answers as well as discussions between researchers the newness was determined.

Both technology-push and market-pull stimulated cases are included in the data. Technology-push innovations are initiated by technological development while the

market-pull innovations depart from customers' needs and requirements. (Trott 2002) Finally, in some cases industrial products were developed while others focused on developing consumer products. Industrial customers are said to have more expertise than consumers. In addition, there are fewer customers in b-to-b markets than in b-to-c markets and they are much larger. Often the relationship between developing company and the customer is closer compared to b-to-c markets but at the same time the buying processes are more complex involving several people with specialized roles of decision maker, buyer and user. (Kärkkäinen, Piippo & Tuominen 2001). Wilson (1996) again states that there is not much difference between the two types of market other than that it might be easier to understand the "true needs and preferences" of customers in b-to-b markets.

Table 4. Individual cases included in the data

	Industry sector	Type of innovation	Initial impulse	End product
Case 1	Forest	Radical innovation	Market-pull	Industrial
Case 2	Mechanical engineering	Incremental innovation	Market-pull	Industrial
Case 3	Electronics	Radical innovation	Technology- push	Industrial
Case 4	Consumer discretionary	Incremental innovation	Market-pull	Consumer
Case 5	Electronics	Really new innovation	Technology- push	Industrial
Case 6	Electronics	Really new innovation	Technology- push	Consumer
Case 7	Mechanical engineering	Really new innovation	Technology -push	Industrial
Case 8	Mechanical engineering	Incremental innovation	Market-pull	Industrial
Case 9	Metal	Incremental innovation	Market-pull	Industrial

Empirical data about the cases studied in this research was mainly gathered through theme interviews (see Hirsjärvi & Hurme 2001), which is a form of semi-structured interview (see e.g. Fielding 1996; Eskola & Suoranta 1998; Robson 1995 for definitions of semi-structured interview). Theme interview proceeds with the help of themes rather than specific questions concentrating on the subjective experiences of the interviewed of a certain situation or process. The themes stay the same for all the interviewees but the questions may be formed differently or presented in a different order. (Hirsjärvi & Hurme 2001) We chose interviews as the

main source of data because front end was then, and still is, a relatively unfamiliar context. Thus, we assumed that the concepts used in the interviews must be clarified and negotiated with the interviewees. Also, interest in the subjective meanings of the interviewees told in their own words using their own concepts and language supported interviews as the primary source of data. (Koskinen et al 2005)

Koskinen et al (2005) state that written sources should not be left out in qualitative research. Especially when the research involves processes of organizations, written documents are important since no one is able to remember the complex processes accurately. The documents used in this study can be classified as confidential institutional sources (internal process models, other related work such as reports, master's thesis written about topics related to our area of interest), public institutional sources (public information about the cases and products such as brochures, press releases, communications) and confidential personal sources (interviewees' own illustration about the cases). However, interviews are the main data source and the written sources served the purpose of gaining preliminary understanding of the company as well as complementary data about the product concepts. The data is summarized in the following Table 5.

Table 5. Research data

	Interviews			Documents		
	First round	Second round	Total number of pages in transcribed material	Process description (official)/ document templates	The interviewee's illustration of the case	Other documents
Case 1	1	1	51	X		2 research reports from 2 company-specific research projects, master's thesis
Case 2	1	2	59	X	x	
Case 3	1	1	32		x	
Case 4	1		22		x	
Case 5	1	1	49	X	X	Master's thesis, research report from company-specific research project
Case 6	1	1	36	X	X	Master's thesis, research report
Case 7	2	1	70	X	X	Master's thesis, research report
Case 8	1	1	54	X		Master's thesis
Case 9	2	1	61	X	X	Master's thesis, research report
Total	11	9	434			

So far I have presented the data I have used in this study but in order to evaluate my work and to learn, my reader needs to know how the interviews were carried out. Thus, I will walk my reader through the research process in the following.

3.3.3 Collecting data: Case-based interviews

The data collection consists of planning and preparation phase followed by carrying out the actual interviews. The significance of preparing and "doing homework" is not to be undermined when collecting empirical data (Eriksson & Kovalainen 2008). In this section I describe the data collection of my study.

Preparing the interviews

Preparing the interviews began initially by a literature review that I had been doing in the beginning of the research project. That gave me a preliminary understanding of the phenomenon along with my work with companies involved in the research project. The literature review was not meant to create a pre-set theoretical framework or theoretical propositions to be tested in empirical research. Instead, it was to help me to understand what was expected to take place in front end. Naturally ideas about the themes that I wished to discuss in the interviews were based on my pre-understanding of the phenomenon. Front end could be approached from numerous angles ranging from knowledge processes (that I chose) to decision making, management, leadership or gender positions. Had I chosen another approach my results would certainly be different.

Based on my preliminary understanding I formed themes for interviews (see Appendix). I did that together with another researcher. We discussed the themes together and gave feedback to each other. We formulated questions under each theme but they served more as a check-list of topics related to the themes that could be used in organizing our memory during the interviews (Koskinen, Alasuutari & Peltonen 2005) than a guideline that needed to be accurately followed.

We decided to focus the discussion in each interview on one single front end enterprise. We had the assumptions that first, the term front end might be unfamiliar, and second, that the companies may lack systematic front end practices and thus, not be able to describe their interpretations about "how things are usually done". Also practices might vary according to the features of the enterprise. Thus,

by concentrating the discussion on one enterprise only, we could avoid asking questions that were too general or hypothetic (Foddy 1993).

When we approached the companies we asked to speak with persons that were responsible for carrying out new product development projects. Typically we were directed to product development managers or project managers. We asked the company representatives to choose enterprises in which the front end –phase was already carried out in order to get a thorough picture about what was happening during the front end –phase. However, product development project or the commercialization phases could still be unfinished. Also, we asked them to choose enterprises that were relatively recent so that they could remember them accurately. Furthermore, we asked them to choose enterprises that focused on developing a product concept that could and probably would involve some service development, but we wanted to exclude enterprises of pure service development. This was because of the inherently different nature of product and service development and the focus of the research project. Furthermore, we wanted to exclude enterprises that involved only minor improvements because we assumed that in those enterprises shortcuts are taken or front end is not necessarily carried out at all.

Deciding the aforementioned criteria based on which we asked the company representatives to choose enterprises to be included in the study, was a major choice in the research process that certainly affected the results. Naturally, it limited the amount of possible cases and, importantly, it was the choice of the project managers, not ours. We did not have much influence over the choice of cases and one can always speculate if, from the viewpoint of learning and understanding the phenomenon, better cases would have existed. At the same time the criteria gave a sharper focus for the study. We were a bit afraid that only “model cases” that were thoroughly carried out successfully without significant problems would be involved because they are the ones people often rather speak about. But as it turned out, the cases were not pure “success stories” and the interviewees openly told us about failures, traps, challenges and problems that they had faced during concept development.

We stated the criteria for the representatives during the first contact already. They had time to think about suitable enterprises before the actual interview situations. In the interview situation the interviewees sometimes had several enterprises in mind and based on their descriptions we could choose the most suitable one together. Such selection is naturally dependent on the kind of enterprises that have been carried out. We succeeded quite well in finding cases that were completed in terms of front end. However, in some cases front end was not yet finished, but we accepted them because they were really close to conclusion of front end and all the activities had been mostly carried out. Many other cases were still in the product development or commercialization phases. Although we wanted to exclude small improvements there were cases that we considered as incremental innovations. Those were also accepted because they were cases where significant changes to current products were developed.

Carrying out the interviews

Since meaning of individual words, even everyday words, differs (Foddy 1993), we assumed that the concept of front end would be understood differently by different people. For that reason we carefully prepared an introduction that explained what we meant when we talked about front end. (Koskinen et al 2005). In each interview a funnel picture of innovation process was shown where front end was presented as a separate phase of innovation process and the introduction was given. As expected we came to discover that front end was not a familiar concept for everyone, sometimes it was not consciously regarded as a phase of its own. Furthermore, we found that some organizations had their own concepts for talking about it. This means that we had to negotiate what we were talking about and at the same time we created and defined the phenomenon we studied together with the interviewees (see Hatch 1997). Since questions should be fixed in meaning, not in form (Foddy 1993; Hirsjärvi & Hurme 2001) we used the terms of the interviewees in talking about front end. This was also done to avoid creating question threat arising from using unfamiliar concepts that might appear difficult to the interviewees. (Foddy 1993).

We tried to define the topic as well as the purpose of the interviews for the interviewees clearly so that they would understand what information we were looking for and why. Foddy (1993) states that unless the researcher implicates what s/he is looking for the respondent tries to figure it out him/herself and answer accordingly. Also, he states that the motivation of the interviewee to answer increases when s/he is aware of the purpose of the question. We also tried to keep the interviews on a very concrete level.

Once the case we concentrated on in the interviews had been decided we did two interview rounds in each of the nine cases. As I already mentioned, data collection of two separate studies was combined and each interview round was the main source of interview data for one of the studies and complementary for the other. During the first interview round, two interviewers were present in every interview. There was a research assistant involved as well and I was present in six of the first round interviews. In the second round three interviews were carried out in pairs and the rest of them by me alone. The presence of two investigators and carrying out two interview rounds with different respondents, relate to both data- and investigator triangulations that are important confirmatory strategies in case studies (Stake 1995)

The first interview round was carried out with a person responsible for the concept development in the front end process. Interviewees in the first round were project managers of the enterprises studied. All the interviewees seemed motivated to participate and we only got a few refusals for our interview requests. We motivated the interviewees (Koskinen et al 2005) by promising them a summary of all the interviews that would offer them a possibility for benchmarking. The front end –phase and innovation process generally are quite close to the strategic core of organizations and we considered it important to emphasize the confidential nature of the interviews as well as the anonymity of interviewees, companies and products. Many interviews have been carried out under confidentiality agreement, which naturally is reflected in the openness of my reporting as well. Consequently, the companies, product concepts or interviewees cannot be specified here.

The main function of the first interview round was to uncover phases, processes, activities and resources involved in the front end. Also, the first interview round included information about the product concept as well as some closed factual questions (Koskinen et al 2005). Importantly, the purpose of the first interview round from the viewpoint of this study was to uncover the features of front end as a context of action and a context for understanding customers especially. After the interview, the interviewee was asked to name the person responsible for creating customer understanding in the project. That person was then asked to be the second interviewee.

The person named by the first interviewee was contacted for the second interview round. However, some persons had left the company and could not be interviewed, which caused me to drop some cases from the second interview round. The second interviews also discussed the same particular cases chosen in the first interview round. After the first interviews I did an initial analysis of the interview and the case it described. The analysis served several purposes: It created an initial understanding about the case that deepened the discussion in the second interviews. Furthermore, the analysis uncovered gaps in our knowledge and understanding of the case that could be addressed in the second interviews. Finally, the analysis offered us a point of comparison where the answers of the second interviewee could be reflected. If we noticed differences they could be specified during the interview. The focus of the second interviews was acquiring, refining and using information about customers during the front end phase as well as interaction with customers during the enterprises.

We thought that the persons responsible for the whole concept development enterprise and constructing customer understanding were the best sources of data because they were expected to have a holistic picture about activities involved. In other words we thought that they would be the best ones to help us in understanding the cases studied. (Stake 1995) Choice of interviewees is one more major choice that influences the findings of my study. To some extent it is the voice of decision maker managers that is heard here and the “doers” are missing to some extent. However, in the front end context relatively few people are involved; they may be

only one or two persons and others are only loosely connected to the concept development process.

For the most part, one interviewee was interviewed in each round unless the interviewees considered that there were other persons of equal responsibility. In one case only one interviewee was interviewed because he had a dual responsibility for the overall process and creating customer understanding. During each interview round a pilot interview was carried out in which we put special focus on discussing the topic and our questions as well as our approach to the topic. In both rounds the pilot interview was a very fruitful one. Some new topics emerged and I even added a new theme to the interview structure. However, the interview structure was flexible during the rest of the interviews as well.

The theme interviews lasted between 1 and 2,5 hours and they were all recorded. One recording failed partly, thus, one interview has been analyzed based on notes only. Although researchers had defined the themes and questions, the interviewees were free to comment and challenge the questions as well as to point out if they considered that some essential point of front end and creating customer understanding were disregarded (Foddy 1993)

3.3.4 Analyzing data: Understanding the phenomenon through the individual cases

> *"...we do not just encounter empirical material and let it lead somewhere, rather we are always doing something with it" (Alvesson & Kärreman 2007,1269)*

My analysis proceeded in three steps. First, I did a theme analysis after which I proceeded to within-case analysis. Finally, I analyzed the collective case. The steps, are summarized in the following table.

Table 6. Steps of data analysis

Step of analysis	Objective	Technique used
Familiarizing oneself with data and choosing the themes	To create a holistic picture about the data and choose the themes to be analyzed in the study	Theme analysis
Within-case analysis	To see how the chosen themes show and vary in each case	Case descriptions
Analysis of the collective case	To analyze and understand the collective case through the individual cases	Inductive analysis (see Tuomi & Sarajärvi 2002)

Familiarizing oneself with data and choosing themes

I started the analysis of my data by familiarizing myself with the data and subsequently forming the themes that aimed at creating a holistic picture of the data and based on that I chose the most interesting themes to be further analyzed in this study.

Koskinen et al (2005) divide the analysis into preliminary familiarizing with the data and a subsequent, more analytical phase. In a way, the preliminary analysis already started during the interviews (Hirsjärvi and Hurme 2001). I took careful notes in each interview already then, marking down interesting points, questions, and gaps in knowledge considering something important, interesting and relevant. After the interviews the interview material was transcribed by a research assistant. When I got the transcribed material back I listened to all the interviews while reading the transcriptions at the same time. Besides recalling the data this was important in order to correct some terms that the research assistant had gotten wrong and fill in some gaps that the assistant had not captured. I read the transcribed files a couple of times before starting to code the data.

In coding instances, features, themes or issues in data are classified and given a label (Eriksson & Kovalainen 2008) I simply used drawing inks of different colors in coding my data. I preferred to do it manually because it gave me a sense of managing the data better and getting a "feeling" for it. Simultaneously, I wrote

down questions, thoughts and interesting observations. I used thematic coding and started with the themes I had in the interview outline. During the first readings however, some new themes started to emerge in my mind. In other words, some themes were predetermined while others emerged from the data (Hirsjärvi and Hurme 2001). I wrote down the themes, and listed them in an excel-table. After that, I started reading the interviews again paying attention to the new emerging themes and collecting observations relating to the new themes. During this step I examined the cases individually.

The first interview round concentrated on what was developed in the case and what kind of activities took place. Many new themes did not emerge from the data, but the ones used in the interview outline seemed to describe the data pretty well. Themes such as "starting point of the enterprise", "type of innovation", "actors involved", "activities", "acquiring knowledge about customers", and "role of customers in front end" seemed to describe the data well. However, one new theme emerged, which was very important from the viewpoint of my study. In reading the transcriptions I found that the interviewees were characterizing front end as a context quite often, although they were not asked about it directly. At this point, I used issue questions, which are questions posed to the data rather than to the interviewees (Eriksson & Kovalainen 2008). I asked what kinds of features are related to front end as a context and looked for answers in the data. At this point, I already started paying attention to the collective case, meaning that I did not care about the boundaries of cases instead, I looked for answers in all the cases and was aggregating impressions (Stake 1995). Aggregating impressions refers to gathering pieces of information together and coming to a conclusion where something can be said about them as a class.

Data analysis of the second interview round was much less simple compared to the first round. A lot of issues and themes emerged from the data that I did not expect to find. Furthermore, I found totally different answers to some of my questions from what I had expected. Thus, the data surprised me numerous times. In the beginning of the analysis I had themes such as "what needs to be known about customers", "gathering customer knowledge", "analyzing customer knowledge",

"classification and categorization of customers", "customer involvement", and "contribution of customers". My interest was mainly in how customer knowledge was gathered and further analyzed.

Reflecting on a time earlier in the research process, before starting the empirical data collection, I had carried out a literature review in order to gain preliminary understanding of the phenomenon. The review was guided by my research interest but also partially "given" by the research group. So interests of different people, research group and participating organizations were intertwined with my personal ones. However, I was determined in my efforts to be "truly inductive" and I tried to be open to everything new emerging from data. Since the data did surprise me at several points I find that I succeeded in my inductive efforts. Being completely inductive is impossible though. We cannot escape our prior knowledge and experiences. Thus, clear-cut inductive analysis seldom exists (Eriksson & Kovalainen 2008). I noticed that in the beginning the literature review directed me a lot and at first I tried to force the data to fit my preliminary understanding. But it did not. I soon realized that the observations that did not fit were in fact some of the most important findings which I am presenting in this book.

In the beginning I was also too tied up with what was really written into the interview transcriptions, what was "really" on the paper. I did not dare to pose issue questions to my data or let room to my own interpretation. At that time I read a lot of methodological literature and sought support from there in how to make my story, in which I present the interviewees' realities as I saw them, explicit. In trying to make sense of what happened in the research process at that time I would say that I was striving to internalize the essence of interpretivist research.

Returning from reflection to description of the research process, as I was saying, new themes and issues appeared from the data and I also allowed myself to read between the lines. In reading the transcriptions a lot of new viewpoints and interesting issues emerged. I began to understand that knowledge about customers was not enough for concept developers, what they needed was customer understanding as I came to call it. Also, the role of confidentiality and trust –related

issues seemed to be of greater importance that I had understood. In addition, in coding the "classification and categorization of customers" I noticed that the perceived customer expertise did not play such an important role in classifying and categorizing customers which was, again, surprising to me.

Having all the themes listed I realized that I had to leave some themes out. There were so many paths to follow that it took quite a while to choose what to include and on the other hand, what to leave out. Thus, I had come to a point of choosing what the "story of the case" is, in other words which parts will be included and which ones excluded in the report. (Stake 1995) I tried to make the decision based on two criteria: First, I tried to include themes that seemed to come up repeatedly as important in the data from the viewpoint of my interviewees. Naturally, I also chose themes that I considered interesting and relevant from the viewpoint of learning and contribution. Second, I tried to critically examine what questions I could really answer with my data. At this point I made a choice to concentrate on what concept developers need to know about customers and how they relate to customers "in getting their job done". Another really interesting theme was the purposes of engaging in constructing customer understanding because it seemed to attach power and politics into these front end knowledge processes. The concrete processes of perspective making in the front end team, as well as the ways they made sense and analyzed knowledge about customers, would have been interesting as well, but examining those aspects would have required observatory, ethnographic methods. Furthermore, the concrete criteria for involving customers in front end and the seemingly absent aspects of expertise was another really intriguing theme that I finally choose to leave out. Along with choosing the themes I also rephrased the research questions many times.

Within-case analysis

After choosing the most important and interesting themes from the viewpoint of learning and contribution I carried out a within-case analysis. Within-case analysis refers to analyzing each case separately (Stake 1995; Eriksson & Kovalainen 2008).

The objective of this step was to see how the chosen themes show up and vary in each case.

At this point I analyzed the cases individually. I already had the themes listed in an excel-table and now I added a second dimension to a matrix and made notes about how I thought that a certain theme was evident in each case. For example, confidentiality as a characteristic of front end was evident in one case as a willingness to hide the whole concept development from customers, in other cases it manifested itself as a factor restricting communication while in one case it did not play a hindering role. Instead, being really open about the new concept under development, increased customers' interest towards the company.

I went through all the themes case by case and wrote a case description accordingly. When cases have an instrumental role in analysis and in understanding of something else, a detailed description of each case is not the main focus of study or reporting (Eriksson & Kovalainen 2008). In the following, I present the case descriptions, which I wrote during this phase.

Table 7. Descriptions of individual cases

Case	General description of the case
Case 1	In this case a radically new product concept was developed. The work was carried out in ventures-division of a company acting in paper industry. The concept related to a whole new business and very little competence about the target market existed. The technology was new as well, but the concept development enterprise was preceded by three related technology development projects and competence on related technologies existed in the company. The initial impulse to the front end project came from a customer who approached the company with a product request. It was an idea of a product with certain functionality but the customer had no competence to consider how the concept could be realized. The interviewees said that the objective was very clear but in the beginning they had no clear idea about how to get there. Thus, there were a lot of open questions and a lot of new knowledge needed. The interviewees described that the concept developers were very conscious of the need to learn a lot and create a lot of new knowledge. They acknowledged that the target market was so new and unfamiliar to them that there was very little knowledge about it in the whole organization, thus they acknowledged a need to engage in intensive new knowledge creation with outside actors, including customers.

	The original customer played an important role and joined the concept development team from the beginning. The customer also requested exclusive rights for the final product for a certain period of time. However, the interviewees emphasized the importance of not taking the idea of the customer as a matter of course but making sure that there really is business for the company. Thus, concept developers went through large amounts of external studies, they interviewed other customers, and they used the internet a lot to gain information about the market as well as to benchmark the viability and parameters of the product with other customers. At the same time, they had a ongoing dialogue/discussed with the partner customer in order to form a common understanding about the requirements for the concept. They also tested prototypes and in doing so they developed in-depth understanding about the usage context of the concept. The project succeeded very well because the concept corresponded to the request fully. The interviewees considered the knowledge they acquired from customers crucial from the viewpoint of the concept.
Case 2	In this case a significant improvement for an existing, business-wise important product was developed in a mechanical engineering company. It is classified as an incremental innovation but due to the scope of changes a thorough front end was carried out. The primary impulse for the enterprise came from inside the company. Due to internal restructuring a factory in Finland was given a new machine for production that did not fit the existing infrastructure of the factory, nor was production of the machine cost efficient for the company. Furthermore, the current product did not fulfill customer requirements to a satisfactory extent. Hence, in the case a concept for a machine that would replace the current one was developed. The cost-efficiency objective was the primary objective. The product was targeted to a familiar market in which the company had operated for a long time, yet the segment was new. Traditionally, the company had been producing products to high end segment but this concept was targeted to middle/ low end segments. However, the interviewees felt that the company was well familiar with the dynamics of the markets as well as with the needs and requirements of customers. Due to the changes, the new product was expected to increase the market share of the company in mature markets. The interviewees described their customers as very conservative and not easily accepting of new products. Also, the price competition in the market is fierce. Concept developers felt that they already knew the customers very well and believed that customers themselves would not bring them anything new. In acquiring knowledge about customers concept developers relied heavily on the existing (tacit) knowledge they themselves as well as other organizational members held. Although customers were told about the concept development they participated relatively little. Some interviews were carried out and customers that visited the factory were talked to. Concept developers mainly sought knowledge from the existing product specifications that customers had given and went through a huge amount of specifications. One of the three interviewees said

	that the specifications were "customers' voice". Concept developers also interviewed some customers and discussed informally with others and relied on the knowledge of sales functions and international sales offices. The interviewees considered that nothing new was gained in communicating with customers, rather they felt that discussions with customers were to reassure their own understandings. The huge amount of information that was scattered between different people and different places was considered the biggest challenge by the interviewees. In addition, they described that compromising between controversial requirements of different customers was difficult. Also, they considered that they had to do a lot of interpretation themselves and it was sometimes hard to understand the reason behind the requirements. Often they did not have the option to check the matter with customers either. The somewhat tight internal objectives set limits for the concept and sometimes also overrode other important aspects. The interviewees described that some customer requirements had to be ignored because they could not have been realized within the scope of internal objectives.
Case 3	In this case a radically new product concept was developed in an electronics company. According to the interviewees the first idea for the concept was "thrown in the air" by a visionary, and "radical" (as the other interviewee described) person (who also was one of the major owners of the company). This happened in a meeting with a few people with managerial positions and the idea was refined right away. The major bottleneck in realizing the idea was that although the technology had been theoretically discussed in some scientific conferences, manufacturing it was impossible at the time. One of the members of the group took the responsibility for the further development of the idea. The ideation started as technology development, thus the first years of front end were very technology-push oriented. During those years the ownership of the company changed twice and after the first change the person (responsible for the further development) kept the enterprise hidden"under the table". He also got external finance and the technology was advanced by an external technology developer. After another change in ownership the enterprise was made public for a larger group of people and more resources were engaged to the concept development. Hence, the technology development dominated in the beginning. One of the two interviewees (the key person who had taken care of the project for many years) said that they thought very little about customers at that time but they had an extremely strong faith in the concept since they believed/knew it would create huge new possibilities in several end user markets. Later, the concept was discussed with a potential customer company under confidentiality agreement. The customer company became interested in it and offered to become a development partner. The interviewee said that this started a new ideation phase since the customer brought new viewpoints and unexpected requirements that had not been thought of before. Some critical choices regarding the concept were already made but they were not accepted by the customers. The customer was very tightly integrated in the concept development and provided requirements and limitations but also significant amount of new ideas and new

	knowledge. In negotiation processes the concept got its final shape because the customer learned about the technology and had to compromise some requirements. Some other customers were also interviewed and discussed with. The interviewee said that the knowledge and expertise that the partner customer brought to the concept development was very important and influenced the concept a lot. Even after the partner customer joined the concept development it was this technologically-oriented person who took care of the project. The collaboration was very informal and this caused juridical problems in later phases. The interviewee himself stated that someone else should have taken over the lead as the customer joined the enterprise since he did not have the knowledge and competence to lead such joint enterprise from management and juridical viewpoints; instead he knew the technology extremely well. In this case the radical vision and commitment of the key person were the driving forces that kept the project going. Later on the partner customer affected the concept a lot.
Case 4	In this case a new product concept that aimed to improve the current product was developed. Thus, the impulse for development was shortcomings of existing products that had been acknowledged by organizational members, sales especially, and stated by customers also. Thus, this case can be understood as incremental innovation. However, since the product they were looking for was of a whole new type, the front end was carried out. The emphasis was on enduring quality of the product as well as on addressing both professional and "ordinary" users. The interviewee described product development as a relatively independent and influential function in the company with significant freedom. He said that the target market is very stable and they have had a long presence in the market. He also considered customer needs as very stable. Consequently, he considered that the concept developers already had a lot of knowledge about customers and relied on their internal, existing knowledge a lot. However, they also discussed with professional customers and concentrated on understanding the essence of the problem they were addressing. In the company the practice includes a lot of learning by doing and learning by trying, thus the interviewee said that they aim to build prototypes as early as possible. Thus, testing the prototypes was a key way of acquiring knowledge about customers. However, this was mainly done by the concept developers themselves with help of other organizational members, not that much by customers. The interviewee said that they do not want to relay information about the concept to outsiders before they have a patent for it. The interviewee said that one of the best ways to learn about the user (who does not have to be external to the company, a lady from financial department is as good as external user if she fits the target segment as he put it) is to observe him/her because that way it is easy to see if the user understands the product and if s/he is able to work with it.

Case 5	In this case a new product concept was developed in an electronics company. The initial impulse for the concept development came from the company's managing director who wanted to "challenge his forces". The interviewees said that the concept development enterprise was strongly supported by the management but at the same time the development team felt there was pressure and high expectations for them. Both existing technologies were used in the concept and in addition, some totally new technologies were developed. The concept made the emergence of a whole new market possible, but it was also suitable for some existing markets. Based on the interviewees' description and our own judgment we classified the concept as really new innovation. In the beginning concept developers recognized more than a hundred potential target segments for the concept and the interviewees said that it was difficult to prioritize them. Many of the segments were new to the company and little foreknowledge existed. Thus, the interviewees said that they had no alternative but to approach customers to learn about the markets. They also visited fairs where a quick and through understanding about certain markets could be created. The interviewees said that they interacted intensively with customers and told them openly about the concept. They said that they were conscious of the risks relating to confidentiality and they purposefully concentrated on talking about the functions of the concept without revealing any of the technological details. However, one of the two interviewees stated that they did not get as many customers to participate as they wanted. He described the customers that participated as "outside consultants". In the beginning of front end the concept developers used a formal technique (self-modified QFD) to gather customer requirements. However, one of the two interviewees said that since they challenged some axioms with the product, customers did not fully understand the concept without a prototype of it; he said that it was difficult for customers to grasp the concept based on power points only. Later the same customers tested the prototypes. Customers commented on the concept and its features and also gave information about technical issues several times. The interviewee said that once they made progress with the concept they went back to the customers to get their opinion about the changes. However, he felt that this could not be done many times; customers do not have time for it. The interviewee also said that they learned a lot about customers' environment, about for what purposes, how and in what context the products are used, that is how the product becomes part of the customers' system. Knowledge about customers was also acquired by informal discussions. The interviewee emphasized that it is important to evaluate the quality of feedback from customers. Furthermore, the concept developers did a market study and used external research organizations as well. Finally, the internal knowledge in the organization in Finland and in international offices was made use of. According to the interviewees the knowledge acquired about customers changed the concept considerably if compared to their original ideas. They also said that it is important to get customers to participate because that way they also become committed to the product and they are ready to buy it immediately after it is launched. Furthermore, they said that it is easier to justify the concept in the organization when they can say that they have communicated with customers.

Case 6	In this case a new product concept was developed by an electronics company. The impulse for the project came from the company's motivation to develop a new product for an emerging market with a significant business potential. The market already existed but the technology used and the concept's functionality were totally new, thus, the concept could be classified as really new innovation. A research and technology development project had been carried out earlier with an external partner and the project had a strong technology-push approach in a sense that the interviewees said that they had the technology, they knew what they could do with it and they wanted to find out if that suited customers and how it could be sold to customers. The company already had products in this market and they felt that they knew the market and customers quite well. In the course of concept development concept developers relied heavily on their existing knowledge and they also had a person in the development team who had operated in the customers' side for a long time and had in-depth knowledge. The interviewees considered tacit knowledge very important in constructing customer understanding. Also, they used available public research data about the market, which was conveniently available. They also communicated directly with customers and asked them for comments about the concept. Prototype testing presented an essential way of acquiring knowledge about customers. First, customers participated in testing the technology and only a few other questions, relating to for example the concept's benefits, were asked. A second prototype was also built during front end, which resembled the final product more and in testing customers were also asked questions relating to their willingness to pay, how and where they would use the product and so on. Also, company's employees tested the product and gave feedback on it. One of the two interviewees said that they were first and foremost teaching customers and preparing them for the product. He said that customers had difficulties in understanding the concept because it was so new. One of the two interviewees stated that knowledge gained from customers did not influence the concept significantly; but it did help them to understand how they should talk about the concept and how they can sell it. They also said that communicating with customers gave the concept developers peace of mind because it made them better able to justify their own choices in relation to the concept internally in the organization.
Case 7	In this case a new product concept was developed in a mechanical engineering firm. The impulse for the enterprise came originally from an inventor's technological invention and he himself stated that he came up with the idea in "a boring meeting". The potential of the invention was quickly recognized in the company and the enterprise had a strong support from management. As the inventor said a prototype was build in record time. However, although management support was strong right from the start, sharing the vision with other company members was sometimes difficult. In terms of technology the concept was new to the organization, and actually, new to the world as well, but the market was familiar. In the beginning, constructing customer understanding was concentrated on finding the most suitable and attractive market for the product, thus the

	enterprise was very much technology-push in nature. The company was very strict when it came to confidentiality; the concept development enterprise was first kept from everyone, except management and members of the team. The customer viewpoint was brought to the concept development very early, however. The interviewees stated that long term knowledge and experience of certain visionary people played the most important role in constructing customer understanding in this case because the concept was revolutionary. Customers were later approached and told about the concept, both in Finland and abroad. Concept developers asked international offices to approach customers, to tell customers about the concept and to ask for their comments and opinions. As already said, a prototype was built very quickly. First, prototypes were installed at few reliable customers "in silence". At that point the main concern was testing the technology in user environment. One of the two interviewees said that customers could not say what they need or want, rather, they gave their opinions if the concept was good, bad, suitable, too noisy and so on. Later, more prototypes were installed and tested in customer's environment in order to first gain new user experience but also to find out how attractive the paying customers consider the product and how the practical aspects of delivery, for example, should be taken care of. One of the two interviewees said that they have a practice where all the signals from customers are documented and handled. If they can be considered useful they are reacted on, but they can also be considered useless in which case the concept developers decide not to react on them. Concept developers also interviewed other customers and they said that it was important to find out about the technical details of customers to see how the concept fits the existing infrastructure of the customer. The interviewees stated that customers did not bring anything significantly new to the concept, mainly they "filled some gaps" and had an influence on the details. One of them said that the tacit knowledge and ingenious internal vision have been the most important sources in constructing customer understanding.
Case 8	In this case a new product concept was developed in a mechanical engineering firm. The impulse for development emerged from shortcomings of a current product that was business-wise a very significant product for the company. The need for improvement had been brought up by sales function as well as customers. Thus, the company aimed to develop an improved version of the product and it could be classified as incremental innovation. The concept development was taken forward in a determined manner from the beginning. The concept was targeted to a familiar market. Concept developers had direct informal conversations with customers. They also did a survey to which they only got a few responses. Furthermore, they asked customers to send samples of raw material to them in order to test the concept. This was considered the most important way of acquiring knowledge about customers. Overall, the interviewees said that they were disappointed with the input and effort from customers both in terms of quantity and quality. The concept developers also had meetings with people inside the organization who had relevant knowledge related to the concept. Knowledge acquired from customers confirmed the existing view concerning the customers. As one of the two interviewees stated: it produced nothing that would

	not have been understood before.
Case 9	In this case a new product concept was developed in a company operating in metal industry. The impulse for development emerged from a need to improve one feature of a product that was significant for the company. This need had been strongly manifested by both sales function and customers. The concept was targeted to an existing market and existing technology was used, thus it could be classified as incremental. The concept development enterprise was kept from customers the whole time. One of the two interviewees said that they did not pay that much attention to customers since they were so content with the concept they had come up with. The concept developers used information about the problems and improvement needs of the current product in constructing customer understanding. However, the existing explicit and tacit knowledge and experience were considered the most significant sources of customer knowledge. The concept developers also communicated with customers and they acquired knowledge to be used in concept development without customers realizing it.

Although everything I present here is my interpretation, the level of it is much "lighter" in the descriptions above compared to analysis of the collective case that I am presenting next.

Analysis of the collective case

The last step in my analysis was the analysis of the collective case, which aimed at "really understanding the collective case" through individual cases (Stake 1995, 2000). Usually in studies where multiple cases are included within-case, analysis is followed by cross-case analysis (Eriksson & Kovalainen 2008). In my study this phase corresponded to cross-case analysis only loosely because in cross-case analysis individual cases are compared. I did compare the cases but not with an intention to study how the cases differed or varied but rather to see how the *themes varied*. Thus, I examined what new the individual cases offered in terms of understanding each of the themes.

At this point I no longer paid attention to the individual cases and their boundaries. I combined the cases, and handled the data as a whole. At this point I used inductive analysis technique described by Tuomi and Sarajärvi (2002). In

inductive analysis one looks for meanings in texts and it is essential to pursue the "invisible" as well. I chose content analysis because it aims at producing a description of the phenomenon studied in a general and compact form. (Tuomi and Sarajärvi 2002) Thus, I tried to look at the collective case informed by the individual cases yet forgetting the case boundaries. In the following tables I present simple examples about how I carried out the content analysis. The content analysis begins by clustering (Miles and Huberman 1994; Tuomi and Sarajärvi 2001), which means reducing observations and combining them into sub-classes. I collected all the phrases and parts of phrases that related to a theme into an Excel-file keeping cases still separate. For each phrase or part of a phrase I formed a reduced observation by trying to capture the meaning and find what was invisible and hidden. In this phase, I read the original transcriptions many times in order to capture the meaning that I thought the interviewee had meant. I present a couple of examples for reducing observations.

Phrase or part of a phrase in the transcription (describing the purposes of constructing customer understanding)	Reduced observation (=meaning)
"well, we knew right ahead that we cannot know that much about his business and we have to go and ask questions from customers"	Need for knowledge, admitting a lack in the existing knowledge base
"part of the applications, that we are after, were strange to us so we were in a situation where we had no other choice than to involve as many customers as possible"	Admitting a lack of knowledge, appreciating customers' knowledge
"we went to seek assurance to what we already knew"	Seeking assurance for existing knowledge
"we knew very well what we were doing, if I can put it this way. Then we only needed support for our plans…"	Seeking support for plans, not looking for new knowledge
"We did see that…[the knowledge gained from customers] was important; and we hope that customers remember that they were given a chance to participate and I hope that they commit to the product this way.	Seeking commitment through participation
"peace of mind…we can justify everything that we have done"	Safeguarding one's own back
""…we are the snow plough that tries to push something to them [to the customers]."	Being proactive
"Surely this is familiarizing and teaching the market"	Teaching customers

After that reduced observations were combined into classes:

Phrases in the transcription	Reduced observation	Reduced observations combined as a class
"we went to seek assurance to what we already knew"	Seeking assurance for existing knowledge	Seeking reassurance for existing knowledge
"we knew very well what we were doing, if I can put it this way. Then we only needed support for our plans…"	Seeking support for plans, not looking for new knowledge	

Next I abstracted the data, which resulted in forming of upper classes. (Tuomi and Sarajärvi 2002).

Classes	Upper classes	Main concept
Seeking reassurance for existing knowledge	Legitimizing one's own knowledge	Strategic purposes
Safeguarding one's own back with customer knowledge		
Teaching the market	Influencing customers	
Enforcing commitment by participation		

Finally, I combined upper classes into main concepts. For me the main concepts presented variations of a theme in the data. For example main concepts under the theme "purposes for constructing customer understanding" were knowledge creation and strategic purposes.

After doing the inductive analysis I had all the themes listed, described and analyzed but I was still trying to figure out what was going on in the data. I felt that I still could not answer my main research question concerning how concept developers construct customer understanding in front end and that was the issue question I kept posing to my data. I had the cases analyzed individually and I had several means of acquiring knowledge about customers listed, but I still felt that the answers I had were lacking something. At this point of analysis I went back to theory. As Eriksson and Kovalainen (2008) state, applying inductive analysis does not mean that prior theory could not be used when analyzing data. I looked for suitable sensitizing concepts that could help me to describe the meanings in my data. I discovered the most important concepts from very close at a time when I was reading literature related to expertise. In there, places, spaces and boundaries were discussed. Suddenly I could name the things I was "seeing" in the data. I had read about *Ba* and spaces in regard to knowledge earlier but they were discussed differently in the book I was reading and that was one major turning point in my analysis.

I began to note that between the lines the interviewees were talking about "insiders" and "outsiders". They did not want to let in that many customers as insiders yet they were depending on what was "outside". It started to seem to me that in concept developers were forming different "places" and different opportunities for different customers to participate and those places influenced in how customers became to know the concept and how concept developers themselves became to understand customers. I realized that these places, that I only later came to call as spaces, and how those places were restricted were central in constructing customer understanding.

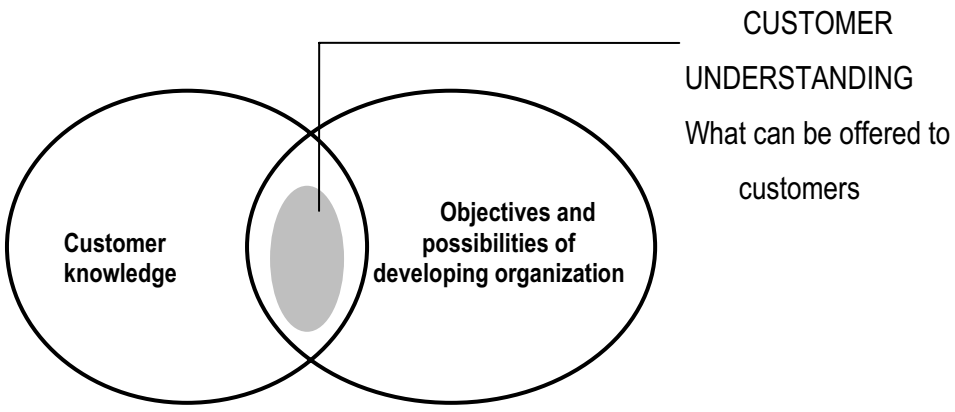
By now my reader knows how I have gathered and analyzed my data and I am ready to present the results.

4. Customer understanding crystallizes what can be offered to customers

In this chapter I discuss the concept of customer understanding. I will provide an answer to the first sub-question that I posed in the beginning about how we can define the concept of customer understanding. I also talk about actors that were involved in constructing customer understanding in the cases that I studied.

In the interviews I asked the interviewees to tell what they needed to know about customers during front end. They gave me various answers based on which I present what customer knowledge consists of. However, in the interviews I noticed that the interviewees constantly brought up the objectives of concept development set for the team as well as the technological and other possibilities that needed to be compromised with what customers seemed to need and want. I started to see that concept developers not only need to know customers and their needs, but they also need to figure out what they can offer to customers within the limits they are acting in their organization. That is where the concept of customer understanding emerged. The central idea of customer understanding is presented in the following figure and the idea is further elaborated in the following sub-chapters.

Figure 11. The concept of customer understanding



In discussing the concept of customer understanding I also describe front end as a context for constructing it. I try to convey the "spirit" of front end, as my interviewees have described it, to my readers. Thus, I also provide answers for the second sub-question about how front end as a context affects constructing customer understanding. However, the features I present are once again my second order reality descriptions. The interviewees were not asked to describe front end as a context. Instead, the interviewees described what happened in front end, what kind of activities took place, what kind of challenges they faced and how they acquired knowledge about customers. That is where I have picked up the characteristics of front end context.

4.1 Objectives and possibilities of concept developers as the first element of customer understanding

My results show that constructing customer understanding is tied to, and centrally defined by, the overall concept development task in front end. Acquiring knowledge about customers is one part of concept development task and a responsibility that according to my data is given to one or few people, usually other than the project manager, who is responsible for the whole front end enterprise. A task definition states what the front end team should be doing. In some of the cases included in my data task definition was very open and sometimes even an ill-defined statement given by company management, while in other cases it was more formal such as a "set-up letter". My results imply that even in the best case, the task definition states what should be done but how that should be achieved remains undefined. Thus, the starting points where front end begins are often very open. Consequently, the concept development team first needs to negotiate what the task is about and how they should proceed. Some interviewees said that in the beginning it was hard to "get a hold" of the task, especially when a more radical concept was being developed. Some of the interviewees mentioned that when the team has not yet

created a clear understanding to itself about what it is doing, it is also difficult to communicate with outsiders, such as customers.

Although such open starting points may cause a feeling of uncertainty and confusion among team members, it also provides the team with freedom. Some interviewees described how pre-determined assumptions and guidelines hinder creativity because they direct action to a certain direction and existing assumptions may not be questioned enough.

> *"…it's a really tricky thing as I said, like how to start with the [development task]… how to get a handle on it. But really the only way is just to try…"*

> *"It was our luck that we had that technical option right from the beginning. In other words, we didn't get stuck with just one thing, otherwise it wouldn't have worked."*

> *"… the work that had been done previously [during the technology development project with an external partner]… That was quite much. And on the other hand, with these [new co-operation partners] the situation starts from zero again…so also with them we began the work from the very beginning, even though we had previous information…Just to make sure that we are on the right track. Because very often you get mentally stuck if you get something finished in front of you, your can't get passed that in your thinking."*

Objectives set for concept development is a central part of task definition. The potential of various ideas, but also the success of the concept, is typically examined in relation to these objectives. My data shows that objectives for the cases included in this study varied a lot. The different objectives included for example making a machine to a certain market with significantly lower costs, creation of a new market, serving a certain customer segment better or developing a product for customer segments where current products were too expensive. The various choices and compromises that have to be made in the course of concept development are constantly reflected against these objectives. One interviewee said for example, that some aspects of the concept, considered important by customers, were discarded because they would have made it impossible to meet the cost saving objectives that were set for the team. In other words, some customer needs would have been too expensive to realize. In another case features that customers desired were left out of

the concept because they would have elevated the price too much and the objective was to develop a concept for low-end segment. In other words, the objective of making a product to low/ middle end category was prioritized over what customers wanted.

> *"…this cost saving target, in other words, your own costs must be under control, it's definitely number one. On that expense, unfortunately, we have had to compromise on other [requirements]… "*

The interviews also reveal that customer needs have to be balanced with the technological-, competence-, and infrastructure-related possibilities of the organization. Everything cannot be realized within the realms of existing technology, for example. Several interviewees described compromises that had to be made during the concept development. In one of the cases the customer required a product smaller than what was possible to produce and consequently the customer needed to adjust its parameters. In another case features that were required by customers could not be combined in one single product and the features needed to be prioritized. Thus, compromises play an important part in concept development.

> *"So from this point of view the [product concept] is a compromise between [customer's] wishes and usability of this technology."*

Overall, the concept development work seems to be pretty unpredictable based on my data. Trial and error as well as coincidence and luck seemed to play a significant role as the interviewees saw it. In some cases the organization had formal procedures and practices that the concept developers followed but in most cases the team seemed to come up with ways of working along the way especially when it came to acquiring knowledge about customers. They negotiated what had to be done in order to get the job done. In those cases the work proceeded more intuitively, based on what felt right, reasonable and suitable.

> *" That [developing a concept at first] is kind of shooting in the dark…But the only way to do it is just to try different things, there is no great wisdom to it."*

> *"…it was pure luck. "*

" The sort of method that you just go ahead and do it, you do as much as possible and try different things and then you can also accept that the result is something completely different than what you were aiming for."

" But that [concept, radical idea] was born – let's say, by coincidence."

"...working methods have been random, we've come up with them along the way."

Front end as a context is inherently oriented to the future. The task of concept developers is to "see the future" and determine what kind of concepts (and products) will be experienced as appealing and useful by customers in the future. Many interviewees seemed to consider themselves very future-oriented and visionary. Then again, they seem to deem many others, such as customers or other organizational functions (too) oriented to the present, to day-to-day business. From there a controversy of orientations and interests arises. As the interviewees told, they themselves are enthusiastic, confident and eager about new ideas and concepts whereas some other functions may consider them as a restraint that causes more work, unpleasant changes and discomfort. The interviewees stated that in front end insight and ability to see, feel, and sense something that does not exist yet is central.

"if our R&D project takes for example two years. And at the very beginning, at year zero, we are doing something and in any case we will sell this for a long time ahead. And then at this stage I ask what should be done, what can I do for you? So I would need to know how technology develops at this stage, how the person who begins it at this point, what is his world like. This is one of the challenges, to be able to envision what is going to happen. "

At the same time many interviewees emphasized that nobody can know the future. Thus, in front end there are many open questions to which no right answers are to be found, no facts exist and absolute certainty cannot be reached. Hence, truths about customer needs, requirements and opinions that would apply in the moment when customers are asked about them as well as in the future when they should buy the finished product, do not exist.

"So no one can have the right answer. We understood that this [potential] is big enough, we believed that okay, something is going to come out of it."

"So that [evaluation of market potential] is pulled out of a sleeve. It's sort of... it's sort of very vague that market…"

"Well you do have to take a stand on several. …you try to imagine what such a gadget might cost and imagine what the market is willing to pay for it. Plus you of course take a guess how many could be sold. "

Some interviewees had the opinion that concept developers need to be visionary, sense the right direction and maintain that direction in spite of the changing trends. Other interpretations called for ability to update and specify knowledge and abandon existing ideas when markets change. The interviewees told me stories about how the estimations, presumptions, analysis and calculations done early during front end proved to be wrong and were changed later. Analyses about the most potential segments done in front end were completely changed and the most attractive segments from the viewpoint of business were found somewhere else. Mergers and bankruptcies changed the market in a way that some customers disappeared or changed their business focus. In one case the concept made it possible to create a new market and services that the concept developers had not been able to imagine in the beginning of front end. In one case the concept developers were not able to foresee changes in regulation and the finished product needed some redesign soon after launch.

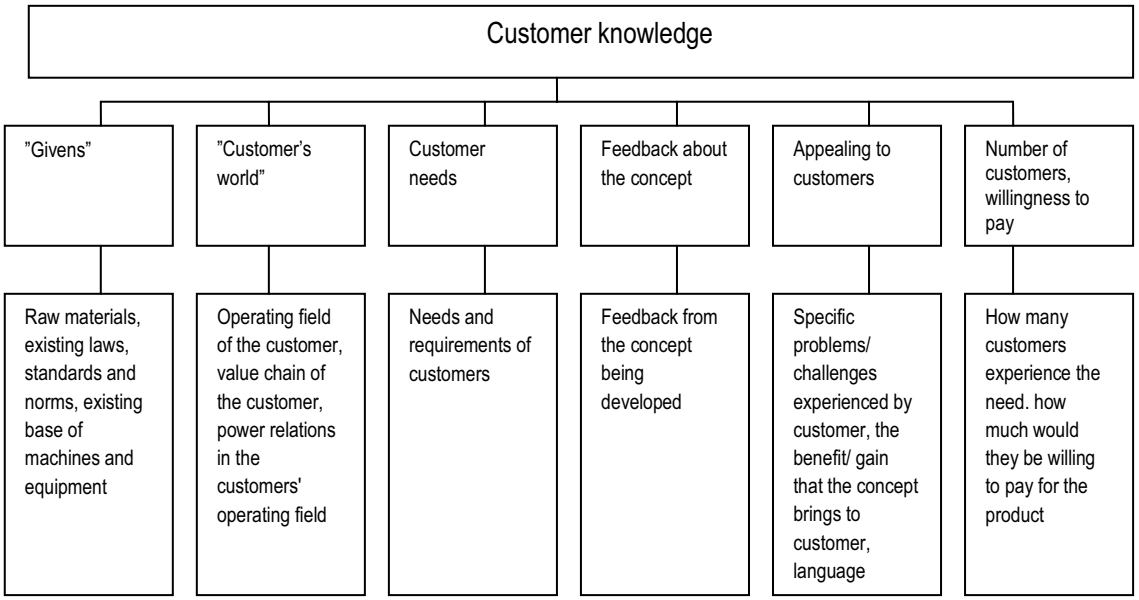
Several interviewees had the experience that when people strive to sense and understand something that takes place in the future, it is clear that not everyone shares the same opinion and understanding. The same information is interpreted differently by different people and based on those interpretations very different constructions of the future may emerge. That is why it is important during front end to persuade and sell a certain view of the future inside the developing organization. Several interviewees stated that it is important to mobilize support and create commitment to the concept inside the organization. Especially commitment of sales function was considered very important because no matter how good the concept is, if the sales persons do not appreciate it, they will never sell it either.

"The enthusiasm that it entails, it's actually almost more important than the product. How well you've succeeded with the product doesn't really matter as much as how we've been able to create ownership to the product. If ownership exists, and people start selling it with enthusiasm..."

4.2 Customer knowledge as the second element of customer understanding

In this sub-chapter I discuss "the other side" of customer understanding, that is the necessary knowledge about customers. I call this simply customer knowledge. The interviews I made revealed that customer needs and requirements present only a friction of what concept developers want to know about customers. In the following I describe their answers. In the interviews (both rounds) I asked the interviewees very directly what concept developers needed to know about customers. In addition to the answers that the interviewees gave to the aforementioned direct question, they also offered more information on things to know about customers in answering other questions I posed. What I am about to present in the following is a constellation of answers from different interviewees and they are summarized in Figure 12.

Figure 12. Elements of customer knowledge



First of all, the interviewees brought up several things to know about customers that I decided to combine under the concept of "givens". The givens consist of different factual information about customers' technical solutions, technological limitations, processes and the way in which the concept being developed integrates into the existing infrastructure of the customer. This information may be hard to find out without direct interaction with customers. This information may be confidential and delicate, and sometimes customers may not be willing to reveal it. Also, information about the standards, norms, regulations and rules that affect customers' business, is part of what I call givens. This information is often available relatively easily but it is dispersed and sometimes customer-specific. In cases where customers are familiar, (and) well known information about givens is often possessed by members of the front end team. They may have very specific information based on a long history of interaction. When it comes to concepts that are targeted to new markets less information about givens exists, which often requires intensive new relationship building.

Givens are something that the concept being developed has to be adjusted to. Often the givens cannot be controlled or even influenced by the developing organization. The interviewees mentioned several examples, such as a certain

machine-base or currently used raw materials that are something that customers are not willing to change easily. Different customers often have different technical solutions, technologies or processes that present controversial requirements from the viewpoint of concept development. Thus, concept development necessarily involves compromises and choices that make some customers more potential than others because their needs and requirements are prioritized. Standards again are examples of givens that can be influenced but only in the long run.

Several interviewees stated that it is important to gain knowledge about the current and future ”world of the customer”. It is an essential background for understanding the needs and requirements of customers because it helps concept developers better understand why customers have the kind of needs, wants and requirements that they have. Understanding the world of the customer includes knowing the chain of customers from direct customers to end users and the logic of different customer segments. Furthermore, it is important to understand the power issues within the chain of customers in order to understand how and where decisions are made and who are the key actors in the chain of customers that can “push” changes through in the chain.

> *"But of course we had to see the whole process through…to who's process do we need to develop our product in a way that it works, and who do we need to influence so that a certain company wants to take it into use."*

It seems that constructing a conception about the customer ”world” is the most challenging in situations where the concept is targeted to new markets or where the concept creates a whole new market that has not existed before. Another challenging situation is when there are so many potential segments, tens or hundreds, where understanding the world of customers aims at choosing the most attractive segments or at least discarding the least potential ones. In case of concepts targeted to familiar markets where customers are known, the data shows how concept developers often think they already know what customers need and want. Different customers may have contradicting requirements however, that have to be compromised in the final concept. Sometimes the concept being developed strongly serves interests of some customers but not others. Still, it has to fit in the processes of all the customers and

concept developers must be able to communicate with the ones that are not so enthusiastic about the concept. Finally, in regard to constructing customer world concept developers need to see and sense how the world of customers is developing. Thus, they also need to see what customers themselves are not yet seeing.

Some interviewees considered it very important to know how they can appeal to customers with the concept. Typically, the concept appeals to customers by resolving a relevant and acute problem or challenge that the customer is experiencing or creating a new opportunity for him/her. The data implies that in market pull enterprises defining the benefit is relatively easy. In technology push enterprises the benefit is not as clear, and gaining knowledge about customers aims at finding ”suitable” problems. However, recognizing the benefit is not enough of an appeal to customers by itself. That benefit needs to be communicated to customers in such a way that customers become convinced. Thus, the interviewees said that they were also looking for ways of communicating and interacting with customers. They wanted to find out the right terms and arguments but also to find out what kind of design and physical forms appeal to customers. The data implies that concept developers often find that customers speak a different language, which means that they do not understand technological details or they use concepts or expressions that concept developers are not able to understand. In incremental innovations, where the new concept builds strongly on the existing products, customers understand the benefits more easily compared to radical innovations. When it comes to radical innovations a latent need may become alive only after a certain concept changes in a way that fits the way customers themselves understand the world.

> *"In what way would the customer like to see it, how would he or she like to talk about it, how does he experience it… "*

In most cases concept developers were also looking for feedback on the concept from customers. They communicated with customers in different stages of front end, thus, some of them looked for feedback already in the ideation stage when customers were told about the idea, the central features of the concept and the benefits of it. In other cases the concept developers invited some customers to use prototypes and asked for feedback based on that.

"[We wanted to find out]…what [the customer] is like, and how he or she envisions and experiences this product."

Understanding the concept's business potential was of primary importance. Concept developers strive to estimate how many customers experience currently or will later experience a certain need, problem or challenge, thus, how many customers are there that can benefit from the concept.

"Then of course you need information about the scope of the problem, so in a sense…you can't really proceed with something that is too specific…How big is the group of people who have this problem and what is the scope of the problem, so that they would actually consider the product so important that they make a positive purchase decision."

Also, the concept developers need to estimate how much customers would be willing to pay for the concept. When it comes to incremental innovations estimating the business potential is easier because the estimations can be built quite directly on existing customers and products and their prices and costs. But in case of more radical innovations it is more challenging as the market is new, maybe just emerging, the technology is new and components are different. Thus, estimation of business potential is more based on tacit knowledge, educated guesses and positive feelings about the concept.

"The potential…this is a difficult or an interesting product in a sense that when it was… a new product for a new market, so what is the market potential since it is new. How do you define that? You can't define it. You can check what the existing potential is at the moment in the segments you have and then you can calculate that we could get some share of the market like we're probably going to at some point. The funny thing is... you can do that... it gives you a conservative curve, but the funny thing is that this sort of product possesses so called "upcider" and when it changes the field and when it creates new segments, new needs, new applications, so what is their potential."

4.3 Actors involved in constructing customer understanding

In the cases I studied the whole front end team consisted of 8-50 people and organization-specific processes and division of responsibility defined who was responsible for managing the enterprise in an organization. In some organizations R&D always has the lead in innovation projects while in other organizations the lead is given to R&D or marketing depending, for example, on the type of enterprise and knowledge required. In the cases studied in this research the team combined expertise from areas of R&D (such as mechanics, electronics, and hydraulics), sales, marketing, productions, logistics, maintenance, installation, after sales, and purchase, depending on the enterprises and the end product developed. In addition to internal actors various external actors played an important part according to my interviewees. External actors included universities and research organizations that had a central role in terms of technology development and testing specifically; professional design organizations, individual designers, subcontractors, and external experts in different fields. An important group of external actors were customers whose role naturally relates integrally to constructing customer understanding. Thus, based on my data front end is characterized by a diversity of different participants in terms of background and knowledge as well as in terms of how they participate.

In my data constructing customer understanding was a responsibility of one person who then had a team of 1-4 persons to support him/her. This group belonged to the front end team. Typically, the group stayed the same throughout the process. They acquired customer knowledge by involving different internal and external actors and then shared that knowledge with the whole front end team.

In addition to the official front end team various other people were more loosely connected to constructing customer understanding. First of all, there were other organizational members that were considered to have relevant knowledge and expertise from the viewpoint of the ongoing task. The team resorted to their knowledge and expertise when needed. There were also various external actors involved as shown in Table 8. The way these different actors participated in

constructing customer understanding was very versatile, thus, it varied greatly in terms of intensity and commitment.

Table 8. People involved in constructing customer understanding

	Main responsibility	Others involved
Case 1	Ventures organization, 1 person	Project manager, Business Intelligence unit, internal experts in the organization, customers
Case 2	Product line, sales, 2 persons	International business unit, sales persons around the globe, Internal experts in the company, customers.
Case 3	Project manager and later on marketing 2 persons	The whole management of marketing unit, R&D management, customers.
Case 4	R&D, 1 person	R&D, sales, internal experts in the organization, customers.
Case 5	Product line, 1 person	Persons from product line organization, internal experts in the organization, management of the company, customers.
Case 6	Marketing, 1 person	Upper management of the organization, experts of customer environment, internal experts in the company, sales persons, customers.
Case 7	R&D, one person	R&D, sales, customers
Case 8	Sales, 1 person	Sales, diploma worker, customers
Case 9	No actual responsibility	Sales, R&D

Many interviewees considered combining different expertise important in front end and that success dependent on people. My interviewees considered collective ”doing together” important. The interviewees typically stated that they cannot name one source or person who came up with the crucial ideas. Instead, the final ideas as well as the concept were born in a collective process where ideas from different members were combined and refined together using their diverse knowledge and expertise.

"And that [information necessary to develop a concept] is not something only one or two people have, instead it's quite, in a way… distributed here internally but it's not in any books and covers. I think that has been the basis sort of, on which we have... kind of a success factor in…"

"Yes, that [combining different expertise] was a prerequisite of success. We wouldn't have succeeded if that hadn't been the case."

"Now I can't remember exactly where the [original idea came from], at best ideas are tossed in idea meetings… Somebody scribbles something and someone else takes it from there. A third person adds his comments like hey, this is how it works and it sort of goes from one person to the next."

The interviewees strongly indicated that successful concept development is strongly connected to people. Knowledge and expertise are crucial but commitment and persistence matter as well.

"No matter what the front end –processes are like and no matter how many people you have working for you, still if the people are wrong ones, it's like people are everything …otherwise it just won't work."

"And why we succeeded, mainly because we had a couple of damn good people [involved]."

Based on this chapter my reader should know how customer understanding is defined in this study and who are the ones constructing it. Thus, I am ready to present how customer understanding is constructed in front end.

5. Three spaces for constructing customer understanding

In this chapter I am looking for an answer to my main research question about how and why concept developers construct customer understanding in front end. Based on my findings I suggest that they do it by creating spaces. More specifically, I have found three different spaces that are used for knowledge construction and for strategic purposes. The spaces I am about present here are my constructs; they present my interpretations of the research data. This means that the interviewees did not tell me that they were creating spaces; it is my understanding of what was going on in the data.

Literature offers dimensions based on which spaces can be examined such as physical, mental and social aspects of space. (Hernes 2004; Nonaka et al 2001; Heiskanen 2007; Hislop 2005) I acknowledge these dimensions yet I have chosen to proceed differently. I describe differences between spaces based on five dimensions that emerged as emic issues from data. (see Eriksson & Kovalainen 2008; Stake 1995)

In analyzing the interviews I noticed first that customers were very differently conscious of the concept development enterprise. In some cases it was kept from customers completely, in other cases customers were conscious of it but they only received limited information about it, while in some cases customers were very openly told about the concept development enterprise, its objectives and phases.

A second issue that caught my attention was that in some cases customers did not seem to care about the concept development at all, they were not committed to it and did not show much interest in it. Some interviewees mentioned that customer commitment did emerge and it could be strengthened by involving customers in

concept development by asking feedback, asking them to try out prototypes and making them aware that their feedback affected the end result. Two cases were very different in this respect. In those cases customers were strongly committed to the concept development enterprise and they seemed to have a common goal with concept developers.

The third distinguishing aspect between cases was the role of customer. In analyzing the empirical data I started to pay attention to how the interviewees were talking about customers. For me it seemed like they were talking about customers as insiders or outsiders regarding the concept development. In some cases the interviewees described that they were not able or they did not find it necessary to involve customers at all. It seemed as if they were "doing all the knowing" themselves, independent of customers; customers seemed to be total outsiders. In other cases it seemed to me that customers were considered important participants having knowledge and insight that were considered valuable by concept developers. However, at the same time many interviewees wanted to give (very) limited information to customers regarding the concept. The information or knowledge asymmetry was obvious and the interviewees emphasized the need to evaluate the future-orientation, competence and knowledge of customers thus putting themselves in a kind of a different position. Customers seemed to be involved and have a recognized role in the front end community but they were still outsiders to the core team. In two cases the customers were part of the development team and the interviewees described that customers really had "a say" in the team. They were developing the concept together and seemed to be going towards a mutual goal that was important for both parties.

As the literature states, boundaries act as distinction drawers that make a difference between insiders and outsiders. When analyzing the data I had a picture in my mind about the space being the "nerve center" of the concept development and the base where the team worked. Only in the cases where customers were members of the team the boundaries of the space seemed to be open for customers. Otherwise it seemed to me that concept developers left the base and went to customers but they still wanted to keep customers out of the space or expose just

parts of it to them. Thus, concept developers stepped out of the space but did not let customers in. And sometimes the boundaries seemed to be completely closed.

Based on these ideas that I just described, I constructed three spaces that I call closed, conditionally open, and open space. They are summarized in Table 9.

Table 9. Dimensions of spaces

Dimension	Closed space	Conditionally open space	Open space
Customer consciousness about the concept development	Not conscious	Conscious but limited knowledge given	Conscious
Customer commitment to the concept	Non-existent	Possibly emerging	Committed
Role of the customer	Outsider	Involved outsider	Insider
Boundaries	Closed	One sided crossing of boundaries	Mutually crossed
Knowledge processes between concept developers and customers	Independent	Dependent	Collective

In the closed space the customer is not conscious of the concept development enterprise and that way the customer is not committed to the concept either. The customer is an outsider in relation to the space and the boundaries of the space are closed. Knowledge processes between concept developers and customers are largely independent of each other.

In the conditionally open space customers are conscious of the concept development but their participation is based on limited knowledge. The customer is not committed to the concept to start with but commitment may emerge in the course of the project along with, or as a by-product of, participation. The customer is still an outsider in relation to the space in a sense that s/he does not become a member of the development team but s/he belongs to the front end community at least in a peripheral role. However, the customer is an involved participant and knowledge processes between customers and knowledge developers are dependent of each other: concept developers need the knowledge of customers but at the same

time customers' contribution is dependent on the information given by concept developers. Boundary crossings between concept developers and customers are one-sided: concept developers are willing to "step out" to learn about customers but they are not willing to let customers in the space.

In open space the customer is conscious and committed to the concept development enterprise. The concept development enterprise is a shared objective and a mutual enterprise that binds the two parties together. The customer becomes a member of the front end team, thus s/he becomes an insider in open space who participates in defining the boundaries and practices of the space. Boundaries of the space are mutually crossed. Knowledge processes between concept developers and customers are collective in nature.

In the following I describe the spaces in more detail and show how the spaces were manifested in my data.

5.1 Closed space

As the name manifests, what I mean by a closed space refers to a space that is closed from customers. When the interviewees described situations or practices that in my mind refer to closed space they were saying how customers were outsiders in relation to the space and unconscious of the whole concept development enterprise. Thus, they do not become members of front end community even in the most peripheral roles.

"we kept [developing the concept] completely in secret up until the very end"

Instead of seeking direct interaction with customers, concept developers described how they tried to put themselves in the shoes of the customer, to see the world with their eyes and think like they do.

The interviewees described various means of acquiring knowledge about customers without revealing the concept development enterprise to customers. Many interviewees emphasized that they lean on their existing internal knowledge about customers but they also engage in new knowledge creation processes. The former, leaning on existing knowledge, tacit and explicit, and expertise, seems to be really important in a closed space. My data shows that a lot of trust is placed on insight, experience and tacit knowledge because right answers as such are rarely to be found. The existing knowledge and expertise is integrated into concept development by mobilizing organizational members and asking them to participate in the concept development work. This participation can refer to becoming an actual or peripheral member in the front end community but also to just informal discussions where individuals give their insight and opinions to concept developers. Some interviewees mentioned that internal expert groups were used. Often, knowledge is scattered between many different people in the organization and they also have different viewpoints to the subject. Consequently, sometimes knowledge of different individuals might be controversial.

> *”We have know-how connected to [a concept under development] spread around in different parts of the house. We have, in a way, we sort of compiled it all together."*

> *"And also the fact, that when we have like, we have had co-operation with them for years, so we do in a way know them and what their demands are.”*

> *"In the end it all relies quite heavily on your own experience on developing these products and so forth."*

> *"Yes, we have searched information, but perhaps the most important source of information has been these people, who have long experience and a good vision."*

Some functions of the organization are naturally closely linked to customers in the everyday work. Insights from representatives of sales and marketing functions were often highly regarded in my data since they are trusted to have an ongoing, far-sighted, close connection to customers. Many interviewees found that they had the closest connection to customers. Also, sales persons and international sales offices

were asked to participate in idea generation, concept development and -commenting.

> *”We aim to develop our own production and machines according to the messages we get from the market and our customers. The sales organization is in an important position in that way, that they have the best contact surface to the customers.”*

> *"[sales offices]were presented with this question, that if a new product had these features and these characteristics and this sort of price, how much can you increase the sales. "*

> *"I talk to our sales people, who are there in a way in the front line and at the customer interface. I’m in contact with them practically on a daily basis."*

> *"We got the current customer view point mainly from sales."*

However, these individuals were also described having a different focus and temporal perspective in their work compared to the concept developers. Whereas concept developers are oriented towards the future, sales and marketing functions are more oriented towards the present. This controversy in orientation and focus was also brought up by some interviewees.

> *”But unfortunately, quite often, the closer you are to the actual sales point or customer interface, the worse is the information you seem to get. You find out about the current competition situation, and usually those demands, that have caused [a company] lately to loose deals in which the competitor is good at. But that’s the sort of information, that you can’t build a future on, they can help you to stay in the competition.”*

One interviewee described how they wanted to gain in-depth expertise about the customers’ context in the front end team and they consciously recruited people with a certain background into their team. This also related to the organization’s long-term strategy to create a whole product line to a certain market. This way the developing organization seemed to aim at getting a closer view of customer practices and have the expertise available in the front end team constantly. Thus, they recruited people from “the other side of the table”.

"*...and then we have a specialist in the organization with whom we have analyzed this whole business through…I cannot say that it is based on scientifically studied knowledge, maybe more on experiential knowledge in our organization."*

My data shows that when a closed space is created concept developers do not resort to internal knowledge only. External sources of knowledge and expertise were widely used in closed space as well. First, tailored studies and analysis were bought from external research institutes or consultants. Some interviewees said that studies and analysis are made on a regular basis while others bought them on one-time bases regarding a strictly defined viewpoint. In regard to the latter, the data shows that assigning such studies may be difficult especially in early phases of front end because the concept developers themselves do not necessarily know what knowledge is missing and where it should be looked for. Public research such as articles and journals were utilized in making sense about the trends, changes and needs among customers. One interviewee stated that academic research always goes a bit ahead and for example new technologies are regularly examined by participating in scientific conferences. Furthermore, the interviewees described how knowledge was looked for by examining changes in norms and standards that are prepared by authorities. Norms and standards essentially affect the "givens" since customers can not compromise requirements that are related to standards and norms. In several cases the interviewees also said that they participated in different groups and working parties that prepared norms and standards together with the authorities.

"A consultant carries out a fairly wide study every two years and we are quite well familiar with the overall market"

"*There is a lot of research available about the US markets…we find a lot of research reports about consumer behavior, -habits and trends…from Europe there is not much information available."*

"We have made use of that information, existing data also in previous projects. It's not all new as such. Always if there's an interesting article or a study, we subscribe to it and read through it and evaluate it, but one could say that the information based on experience is already in the house. "

"...organization has people who take part in these standard working groups which maintain these international norms. We have a quite a good feel for what...we have a good opportunity to comment and we also know what is going to come in effect in five years."

In some cases the interviewees described how they tried to understand customers by carrying out studies internally by themselves, in other cases the concept developers were supported by business intelligence –function, for example. Internet was often used as a source of information.

The interviewees also told that data gathered in organizations constantly, such as statistical data or CRM data, are useful in concept development in constructing customer understanding. Based on such information the sales potential and potential market shares can be estimated, for example. The interviewees also claimed that by paying careful attention to reclamation data concept developers can learn about customers' current conceptions of existing products and the improvement needs. This can then be used in concept development.

Some interviewees had put themselves or other members of their organization very concretely in the position of customers and consciously gained user experience of the concept by using prototypes. Naturally, this is not possible in all kinds of concept development enterprises because some products are so expensive to build that prototypes would be too costly. By using prototypes concept developers test the products on behalf of the customers. By giving the prototype to be tested by a number of organizational members from product development to financial department different kinds of users can be reached. In other cases concept developers dwell in the customers' natural environment in order to better understand customers' needs, wants and requirements. In a closed space this took place "in secret" without customers noticing it. The important thing is to be able to approach the experiences of customers.

Sometimes direct communication with customers was used in a closed space as well. Since a central defining factor in a closed space is to keep the concept development enterprise from customers, questions were asked in subordinate sentences, in passing during other conversations, in wondering about the shortages

of the existing products and so on. In other words, questions relating to the concept development were asked but in contexts and conversations where customers could not connect them to new concept development but understood them as "normal" visionary talking and planning.

> *"Well, we were in touch with the customer and just by the way, if we had this, what would it be worth. Just in a discussion… So in a way they provided us with information without being aware of it."*

Knowledge about customers was also sought from fairs. Fairs were considered particularly useful by the interviewees when searching for information and knowledge about the broader changes taking place in the customers' business environment. Also, when organizations were moving to new segments or to whole new businesses, fairs were considered to give a holistic picture about the relevant players and current issues in the market.

The interviewees described the challenges of closed space vividly. First, since the space is closed from customers many interviewees saw that a lot of weight is put on their interpretation about the customer and it is difficult for concept developers to make sure if their own interpretations of customers corresponds with what customers themselves think. On the other hand other interviewees were really confident about their own expertise in relation to customers and argued that they know exactly what customers want and require.

> *"… it's always about making interpretations. Interpreting something so that you can be sure that it is realized the way customer wants it… you don't necessarily know the person directly who has made the requirement ...so that could ask and specify it"*

As the earlier text described a lot of indirect sources such as public studies, articles, and statistics are used in constructing customer understanding. These are sources that are planned for another purpose than the very concept development enterprise that is being carried out. Thus, concept developers need to put together the knowledge they need themselves, based on pieces of knowledge and hints of facts that they find. Hence, it is up to the front end team and community how they contextualize the knowledge and how they pay attention to the underlying

assumptions of that information and knowledge, to how the knowledge has been produced and how the knowledge should be utilized in concept development. Thus, the concept developers need to translate the knowledge to another context and analyze what kind of an effect it has.

> *”We did search all the existing information [connected to the concept under development] …Of course nothing about, like about technical matters you can’t find almost anything…”*

> *”Well, a couple of times [we ordered a study from an outside party] with bad results. I don’t even want to say who we used …Of course it’s our own fault, if we’re not able to provide the specifications for what is studied, but if you order such a market research study, it's quite difficult to say then that this is what we [want to find out]…”*

> *"…you can evaluate it in your mind and push it across the table and think how would you yourself demand something like this but are you able to consider it in the right environment that's always the question.”*

The interviewees presented several interpretations about the reasons for creating closed spaces in constructing customer understanding. An important reason mentioned by several interviewees is confidentiality: closed space is created because the concept development is kept secret from external actors and sometimes from other organizational members. In the most strict cases the concept development enterprise was kept even from other employees in the company, only the ones that were closest linked to the enterprise were allowed to know about it. Annual product development plans and schedules were even manipulated with imaginary projects in order to secure needed resources without revealing the enterprise. The need to keep the enterprise secret seems to relate either to a will to protect the concept from the competitive viewpoint or to attempts to secure working peace for the concept development team and to avoid too high expectations emerging for the team too early.

> *"And at this stage we don’t even want to tell about these things, because we are really trying to make sure that our competitors don’t receive any extra information about the product. It changes their product development; we know that they will do the same thing then."*

”Confidentiality is one problem; we are sitting in a space separated from others completely. That’s how we aim to minimize the risk of a leak. And then with these new concepts, whoever is involved, they have to sign a paper that they’re going to keep their mouths shut except with other people in the group and so forth.”

Another reason for creating a closed space that was brought up by the interviewees is that the concept developers may consider customer participation as unnecessary or even useless. In other words, concept developers may consider their own knowledge and expertise so strong that no outside insight is needed.

"...to trust the fact that with this long term experience and by knowing the market we trust that we [done] the right things."

5.2 Conditionally open space

What I call conditionally open space refers to a space that is more open in relation to customers compared to a closed space but, as the name states; it is opened only partly and on certain conditions. Conditionally open space is more open in a sense that customers are conscious of concept development enterprise but the main responsibility and control of the enterprise remain with concept developers. When moving from closed to conditionally open space the dynamics between customers and concept developers as well as the challenges of constructing customer understanding become very different.

When talking about conditionally open space interviewees characterized customers as important sources of information and knowledge and they seemed to value the knowledge and expertise of customers. Many interviewees found that customers complemented the knowledge and expertise of front end team and that the involvement of customers was necessary.

"Plus some of these applications that we are aiming for, they were a bit unfamiliar to us and then we were in a situation that we had no other choice but to get as many customers into this as possible..."

On the other hand, some interviewees were of the opinion that customers are too tightly oriented towards their day-to-day business and it was difficult to evoke their interest in future-oriented new concept development enterprises. In addition, some interviewees said that they had been disappointed in what customers had to give to the concept development enterprise.

> *"It is very difficult….acquiring knowledge [about customers]…Of course it brought us to new discussion. I see the value of it relatively insignificant. Some customers gave us honest opinions but others just said something for the sake of saying something without really thinking…They answered just yes or no…We did not get as many as we would have wanted or needed. That way it did not give as much as it could have. It was not because of who did the work, it was because customers did not want to give the information, for some reason. I feel that we did not get as much input from customers as we asked or would have wanted or hoped for"*

Based on the data it seems to me that concept developers want to keep the control of the enterprise to themselves in a conditionally open space. Customer participation most often takes place on conditions stated by concept developers. They choose, more or less purposefully, the customers that are invited to participate. Also, in the cases included in this study, customers participated "when asked"; none of the interviewees described a situation where customers themselves had offered to participate. The interviewees said that most often they asked customers with whom they had existing good and long-standing relationships, to participate. Based on my data the competence and expertise of customers as such did not seem to have intrinsic value as criteria but we can assume that they have a significant role in the long-term relations.

Concept developers decide how customers are invited to participate and what kind of role is offered to them. The interviewees described various ways in which customers had participated. In some cases customers had a very peripheral role and their participation was very occasional while in other cases their participation was intensive and repetitive, which makes it possible to refine information and knowledge together with customers. Customers were asked about their current and future operating environment and their practices and routines. With the help of this

information concept developers strive to understand the customers. In many cases customers were asked to provide feedback about the concept based on oral, written, visual or physical descriptions of the concept. In several cases concept developers did interviews among customers. In some cases they had a formal interview protocol while in other cases the interviews resembled free discussions. One interviewee told that they asked customers to send samples of their raw materials. These were used by concept developers to test the prototype of the machine they were developing.

> *"... in different countries our key people, there are five countries altogether, they've approached customers with questions like: "We have this kind of technology, this kind of product characteristics, this kind of benefits. We would like to discuss and see how they fit your needs."*

> *"They were presented a product, they were shown the applications, they were asked if they are interested, and when they were, they were asked if they have targets were this could be applicable, and when targets were searched and found, in a way a more extensive sales talk, including product characteristics, delivery times, prices, was carried out. Kind of down-to-earth feedback."*

> *"we had prepared those specifications, so we went with the technical specifications, like how does this look, is this what you're looking for, so this is our QFD's final outcome, this product would have such and such technical specifications and then we went through it once again."*

The interviewees told many stories about difficulties in communicating with customers in conditionally open space. Several interviewees talked about the inability of customers to understand "what the concept is really about", thus they were not able to transmit to customers the essentials of the concept. The interviewees stated that customers "talk a different language", which according to my interpretation, refers to a lack of common words, concepts and practices. This naturally relates to different organizational practices, backgrounds and expertise that need to be combined and "fit together" in concept development. The interviewees also said that a customer may understand the concept very differently from what the concept developer intended to convey. Thus, customer's idea of the benefits and advantages of the concept may be very different from that of concept developers'. Consequently, several interviewees seemed to find it necessary to constantly

evaluate if the customers had understood the concept "correctly", to assess the "validity" of the feedback from customers and to see "beyond" their comments. The interactive communication between customers and concept developers in conditionally open space makes this possible, however.

> *"You have to filter it a little bit [customer feedback]"*

> *"..then you should be able to objectively evaluate what is the quality of the information we receive..."*

> *"Well, that can be…, that customers, if there is a completely new concept, they don't know it…, they may say things that in the end when they understand the concept, they think differently. It can be difficult to receive that kind of objective feedback. If we listen to the customer too much, it may be a negative thing, because in that case we are sort of fooling ourselves with it."*

> *"It's always a person, who gives [the feedback and information]. It's that person's street credibility. If he or she has been in the business for a long time and is generally considered competent. And if he has given the kind of impression that he represents big potential and knows what he is talking about and follows his time and is a visionary, then it matters."*

Due to the difficulties in communicating with customers my data shows that the concept developers experience a need to support customers' ability to understand the concept. This is why prototypes where often used when customers were invited to participate in conditionally open space. Prototypes concretize the abstract concept to customers and allow a physical contact with it. At the same time customers are allowed to use all their senses to construct understanding about the concept.

> "*so we had seen that this is needed, so with these specifications we would do it, so in a way, we probably a bit too early even, but we did give them the prototypes quite early and our technical specifications and we told them that this is what we are doing now, how does this work..."*

> *"Then finally with this prototype, user experience with this prototype model, which is very, you don't even recognize it as a prototype, it's so industrially manufactured and so functional. So finally, we've used it to get feedback from the customer."*

"Here we had the opportunity to produce a prototype…That's the basis for everything. That you have something concrete to show and you get feedback on it…"

"Of course it's difficult, because at least after this project I'm of the opinion that with Power Point I can show almost anything, and people usually agree with me. Like: "Yes, this is good, go ahead with it", but only after there's something concrete, you get the feedback, like: "Yes, but this is not exactly, you have to change that and that."

"usually power point is the way we communicate in this field, like...the technical specifications are included and the cold numbers…If you have something to hold in your hands it's always better. Some of the customers don't even want to see a power point. They are so completely bored with it, they ask for something concrete instead…"

On the other hand prototypes also allow concept developers to understand customers in a more versatile way. As one interviewee described, concept developers get a chance to see and listen and that way they can create new interpretations about how customers actually understand and evaluate the concept. Concept developers can either "just" observe how customers work with the concept or do participant observation where they ask more specific questions and communicate intensively with customers.

"One thing that's [when the customer uses the prototype] essential is, that [the customer] doesn't even necessarily have to say anything… how he or she uses the equipment…, how they understand, how they feel about it without guiding them too much, so that's really important feedback…"

"it's actually better to see it, instead of asking."

"I talked with the customer's own, like the [floor level employees doing concrete work]… what were their experiences with it. I was there myself [working in the customer's premises]… so our understanding of the [customer's] process was extremely versatile. We understood immediately that okay, these are the basic requirements for our product and I think understanding what the customer's operational environment is, is as important as the customer's… or is a part of the customer's need, because in the end your product can't cause any problems for the customer. "

The challenges in communicating with customers and building a shared understanding about the concept is not due to customers only. The interviewees

stated that confidentiality sets limitations to communication. The need emerges, first, from the need to protect the concept from knowledge leaks to competitors. Customers are communicating with the concept developing company's competitors and the interviewees stated that knowledge leaks can be either accidental or purposeful. In front end the lead is not that strong compared to competitors and the risk of competitors finding out about the concept is taken seriously.

> *".. for that reason, that the information doesn't leak to the competitor, to their knowledge, we've had to invest in it [confidentiality] and of course it's a bit difficult that you can't discuss freely. "*

> *"And at this stage we don't even want to tell about these things, because we are really trying to make sure that our competitors don't receive any extra information about the product. It changes their product development; we know that they will do the same thing then."*

Sometimes the concept development is kept from others to secure working peace to concept developers. Some interviewees had the opinion that disclosing the concept development activities in the organization may lead to extra pressure towards the concept development team which again hinders their job. Also, some interviewees described how telling about the concept too early leads to making premature promises to customers about the features and especially about the schedule. As concept development enterprises may be delayed due to many unexpected reasons these premature promises cause disappointments, broken promises and consequently friction among different functions.

> *"...so this caused that at some point they start telling their customers that now it's coming and there might be important people who are saying that now it's coming and big customers who hear that now it's going to come and then when that doesn't happen the people who give these promises, they lose face, which makes the matter very delicate... when he [sales person] looses face time after time he loses trust in our R&D project so a delay in the timetable creates many problems and embitters a lot of people during a product development project."*

Consequently, due to confidentiality only some aspects of a concept can be opened up to customers while a lot of information must be kept from them. My data shows that the issues relating to confidentiality concerned concept developers in

every case included in the data of this study, but the decisions relating to confidentiality were significantly different. Some interviewees felt that confidentiality is somewhat problematic and restricts communication since everything cannot be shared with customers. Others again considered that confidentiality has to be considered but concept developers are able to communicate with customers without revealing too much.

> *"…there is always the risk of how much you dare to tell to a customer…how much you dare to tell without being copied. We discussed in the team what we can tell and what is not told, and we decided. We had quite clear instructions about what we tell to customers. We did not think that it caused any problems. But you have be sure you can go pretty long with the discussions so that you don't have to tell the customer things that actually is not any of their business…you do not have to put all your cards on the table."*

One organization had turned the set-up upside down in a sense that they considered that revealing the new concepts early only increases interest towards their company and strengthens their reputation as an innovative organization.

Several interviewees said that it is challenging that customers construct their understanding about the concept based on different, and essentially, more restricted information than the concept developers themselves.

> *"…customers are not familiar with the concept and the background they can say things…but in the end when they really learn to know the concept they may think completely differently…"*

> *"…when we give only limited information, and they [customers] naturally do not have the expertise we have, the insight we get may be really subjective…"*

Some interviewees pointed out that customers may have different understanding of what is expected from his/her participation compared to what the concept developers expect. This may lead to concept developers being disappointed with a certain customer's input to concept development. Customer may bring forth aspects or issues that are not considered useful or interesting by concept developers. At the same time something truly interesting and relevant may be left unsaid because customers might consider something so self-evident that it is not worth mentioning.

Consequently, it is important for concept developers to carefully consider how they talk and discuss with customers. Many interviewees stressed the importance of an ability to “ask the right questions” in a “right way”.

> *”Well, it depends on the person asking the questions, and depends on the competence how well you get [from customers]…The [information] you get is just as good as the questions you ask.”*

Knowing the right questions is not always that simple. Especially during the early phases of front end the task might be unclear to concept developers themselves as they are themselves making sense of task definition, forming the common practices and building a common ground inside the team for concept development.

The interviewees described how customers may refuse to participate or they may define their participation differently than the concept developers have thought. More than one interviewee described that they felt that customers had given cursory feedback without thinking or without willingness to sacrifice too much of their time for the concept development. Many customers seem to be strongly focused on their day-to-day business and do not want or cannot invest much time in future-oriented, uncertain enterprises.

> *”Often people [customers] are busy and they don’t have the energy to concentrate on the future.”*

Some interviewees also had the impression that customers often felt pressured to say or comment on something even though they did not really understand the concept or did not have any arguments in their minds. Consequently, they felt that they had received hasty and inconsiderate feedback that could not be considered valid in concept development. Moreover, some interviewees stressed that customers only participate when they see participation as meaningful and beneficial for themselves. In my mind this manifests that the concept development task is not a common and shared enterprise for customers and concept developers in a conditionally open space.

” [customers want] to appear competent and have an effect on issues so then they may say something very strongly just in order to say something. So what is an attempt to appear competent and what is a real comment and a wish.”

”But in my opinion this is the kind of activity that if you’re not involved in something like development work out of free will, you can't force anybody. You can’t teach anybody to learn anything unless they want to learn and when they are not in a way... The ones who understood, in other words, believe that if [the company developing a concept] does something like that, it benefits us, so we didn’t have a strategy, no strategy interest conflicts, so they typically agreed with it, but if there was something, like now I’m not completely sure if this is good for me or not, then you of course don’t commit to it one hundred percent. You’re sort of there, because you want to know what people are doing, but you don’t invest more than that in it. Just like all of us act in some other situations.”

This makes it important to examine the whole construction of customer understanding as well as customer participation from the viewpoint of customers. They have to be motivated to participate. Several interviewees pointed out that a customer may participate one or two times because of long-standing relations but generally they need to get something out of it as well. As one interviewee stated, no one does charity in business. Furthermore, confidentiality works in both directions and the customer has to feel confident about the participation also, otherwise s/he will not provide the information or input that concept developers are asking for especially if confidential information about technological details is requested for example.

”We should’ve found a way to engage our customer in the project so that they would have recognized their own benefit in it. Now just a bunch of questions was asked, even though it's a familiar person asking the questions, with whom they can talk to, it’s still difficult to understand why you need to answer all those questions. It requires some trust, when questions were asked even about technological matters, how do you do this. So getting the customer to commit to the project. That they would understand better that they are gaining something. If I remember correctly, we did try to do it, but maybe we didn't do it well enough.”

Although customers are not committed to start with, commitment may emerge during concept development along with customer participation. The data implies that through participation, or as a ”by-product” of it, commitment to concept may

arise especially if concept developers and customers manage to create a shared understanding of the future and the concept being developed either creates new needs for the customer or the concept strengthens the customer's conception of his/her needs.

> *"They were some of the most important… customers, because we wanted to be sure that... There are two ways we want to make sure that the product turns out the way they want… the best thing and the most essential thing is of course that we involve them. When they have been involved in making this product, before they even notice it they are married to it, so there's a kind of a courtship period..."*

5.3 Open space

As the name manifests what I call open space is a space that is open to customer(s). Customer becomes a full member of front end team, thus, s/he becomes an insider of the space. The feature that most clearly distinguishes open space from the other two spaces presented previously is that concept developers and customer share a mutual goal; the concept development task is their common enterprise. This means that the customer is committed to the concept right from the start.

As customer becomes a full member of front end team and an insider of the space it means that it is not only the concept developers who define the space, its boundaries and practices. Customer as an insider has a central role in those activities as well. A good example is that in the cases where customer understanding was constructed in open space only one customer participated in the open space. There were at least two obvious reasons for this. First, the interviewees described that managing the partner relationship takes much time and effort. Also, they told that different legal agreements such as exclusivity agreements often belong to the open space, which means that the customer may want to control who the other customers invited to participate are. However, the interviewees described that they did feel a

need to benchmark the ideas and needs of the partner customer with other customers to assure that there is a broader demand for the product being developed.

In an open space a customer is an insider and a partner that participates in concept development as a member of the team with decision making power. Thus the customer has power in relation to the space and the practices. The interviewees described how they negotiated the final form and features of the concept with the customer. They needed customer acceptance for the concept. Thus, they could not independently decide on the contents, priorities and compromises of the concept. And unlike in other spaces, concept developers may no longer independently decide whether they take the needs, wants and requirements of the customers into account. Consequently, in open space –if compared to closed and conditionally open space- concept developers loose a bit of control over the space, the concept and the practices.

In an open space customer is consciously involved in creating a shared understanding of the concept together with concept developers. In one case the customer was the originator of the concept development enterprise while in another case the customer joined the process later. The issue of commitment is not problematic in the same way than in conditionally open space because customer and concept developers share a mutual engagement in concept development and they want to do it so that both the parties succeed financially.

In the cases that I studied in this research it seemed that it was characteristic to open space to build a common understanding and negotiating between concept developers and customers by bringing together the needs of customers and possibilities of the developing company. In both cases a radically new product concept emerged that was new to both parties. The data also implies that in an open space concept developers get in-depth information and knowledge about the needs but also about the processes of the customer while customers have the opportunity to create a very deep understanding about the concept being created as well as the technological and other possibilities offered by the developing company for their specific needs. Such relations last for a long time, which makes it possible to create

common competencies, collective knowledge and develop a common language, which improves communication. Thus, as an insider the customer participates in creation of practices, shared repertoires, shared a history with the concept developers and adopts the perspective of the team.

> *"Right, in my opinion the main idea is a need. We wouldn't have recognized it ourselves. It came from our [partner customer]".*

> *"... the customer came up with surprising things that we hadn't thought of earlier at all."*

On the other side of the partner customer's specific needs and requirements there is a need to examine and benchmark that viewpoint to other customers as well, in order to determine if there is a wider business potential for the concept being developed. Often one customer is not enough.

In the two cases where an open space was created the interviewees stated that such a collaborative relationship and open space require competencies related to collaborative working, joint projects and legal aspects of collaboration. As the interviewees pointed out creation and maintaining the relationship takes resources, at least one contact person that is dedicated to the project. The data shows that sometimes the relationship is originated on a totally different hierarchical level in the organization than on which the work is actually carried out. Thus, despite long negotiations (on some other organizational level) it takes time to build the joint practice, trust and commitment. The interviewees said that both customers and concept developers are often engaged in several projects at the same time and prioritization of the very concept development enterprise is not a self-clarity. Confidentiality and immaterial rights also came out as important issues in open space.

One interviewee said that collaboration with a committed customer significantly decreased the risk of the enterprise.

> *"we had a customer who said that when it's finished he will pay for it"*

Uncertainty may fade away faster in front end if the customer is willing to provide clear guidelines for development work. In-depth knowledge about the customer's working environment and understanding about their processes help to connect the concept to customers' actual practices.

5.4 Summary: Different spaces in individual cases

In this sub-chapter I briefly go back to individual cases and present what spaces were created in each individual case. Different spaces in individual cases are summarized in the following and illustrated in Table 10. The table reveals that in one case (number 9) only concept developers trusted one space and this was mainly due to the willingness to keep the concept development enterprise from all the outsiders. The concept development was also done mostly in secret from other organizational actors. Only the core team and the steering group knew about it.

In other cases at least closed and conditionally open spaces were created. In six cases (2,4,5,6,7,8) two different spaces were created. In three (2,4,8) out of those six cases the role of closed space was very strong. In cases 2 and 4 closed space dominated in constructing customer understanding. In both the cases concept developers relied strongly on their existing knowledge and expertise on customers and the larger development trends in the market. In both of the cases a conditionally open space was created as well, but its role was not that significant. In case 4 prototypes were also tested by concept developers as well as other organizational members. In case 8 efforts to interact with customers in a conditionally open space somewhat failed but still the samples of raw materials that were used to test the prototype machine were significant. However, in that case the role of closed space was significant as well. In case 5 closed space was used to create background knowledge because the concept was targeted to an unfamiliar market. However, in conditionally open space there were only a few customers who participated but the interviewees felt that they contributed significantly to concept development. Talking directly with customers was important because the concept developers did not know

the markets well. In case 6 the role of closed space was strong again. First of all, the company had recruited people with strong experience from the customer side and their internal knowledge was used in concept development. The interviewees also told that there were a wide variety of research publicly available about the target customers that was used systematically in concept development. Furthermore, they tested prototypes themselves and asked a number of company employees to do the same. However, the company also tested prototypes in two rounds with customers so a conditionally open space was used intensively as well. In case 7 the role of closed space was strong once again. There were some visionary, experienced experts in the organization whose knowledge was used. Overall, insights of these visionary people were highly appreciated. In addition, the organization had created a structure in which understanding in relation to customers was built in the long term inside R&D organization. However, a prototype was brought to customer tests very early, and consequently a conditionally open space was used as well.

In two cases all three types of spaces were built. The cases were somewhat different but the common feature to both cases was that an open space was extremely strong and affected the concept development greatly. Other spaces were supportive in nature. In case 1 constructing customer understanding was in a very strong role from the beginning because it was the customer who came to ask for a certain product concept. In case 3 constructing customer understanding came later during front end, in the beginning the whole enterprise was very focused on technology.

Table 10. Spaces in individual cases of the data

Space	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Closed space	X	X (very significant)	X	X (very significant)	X	X	X (very significant)	X	X
Conditionally open space	X	X (not very significant)	X	X	X	X	X	X (not very significant)	
Open space	X		X						

5.5 Knowledge creation and strategic aspects of constructing customer understanding

In this study I have approached constructing customer understanding from the viewpoint of knowledge processes where existing knowledge is utilized and recombined as well as where new knowledge is being created. However, in analyzing my data I kept noticing that something else was also going on in the knowledge processes and knowledge creation alone was not enough to express that. More specifically, I kept seeing that there were more strategic purposes involved. Consequently, we can –and we need to- examine construction of customer understanding as a much more complex and versatile activity that involves both strategic and knowledge creation aspects. Thus, we need to understand the political aspects of it as well. I found that in addition to knowledge creation, concept developers engage in these knowledge processes in order to influence customers and in order to legitimize their own knowledge.

When a space is used for knowledge creation it is characterized by openness to new knowledge and understanding as well as commitment for knowledge creation. The interviewees indicated a strong willingness to understand customers better and willingness to learn. When the interviewees described such spaces they implied readiness to change or at least readiness to shape the current understanding and perspective they were holding. They were truly interested in the ideas, opinions, knowledge, experience and expertise of customers. Thus, they considered that they had something to learn from customers. Importantly, concept developers were willing to recognize the shortcomings and imperfections of their own knowledge and understanding, which can be complemented by listening to customers.

> *"we knew right away that we didn't know much about the [customer's] business and we have to go and ask about it and for that reason it was essential for us to create those contacts with [customers]. Perhaps exactly figuring out the potential and in a way defining the size of the risk also that is contradictory to if they say that this will never go through, you have taken a significant risk."*

> *"I think there's also maybe the fact that, what you have to remind yourself of, that you have to be quite humble in admitting that I'm developing a product and I don't ... many things and then you go and ask about it. Many probably think that I'm crazy if I go and present a product and then I ask all these questions. It's quite difficult and I think that in many R&D projects exactly not asking enough, not asking the right questions and not in a way... lack of information for sure, because these are not that sophisticated things, these are really every day things."*

Sometimes the interviewees described situations where the knowledge processes did not seem to be open for new knowledge. Instead, they seemed to have another agenda, more or less hidden. The interviewees described situations where they were more oriented towards "pushing" and "selling" a certain idea or concept to customers. In other words, they wanted to influence customers. Some interviewees claimed that they need to educate and train customers, suggesting that they are more visionary than the customers. By training customers they aimed at improving the readiness and ability of customers to accept a new concept. Influencing was also used to increase customer commitment to the concept being developed. Influencing oriented knowledge processes are not totally closed from new knowledge creation

but the data implies that knowledge creation is more oriented towards finding ways and arguments with which the concept can be best sold to customers. Thus, the focus is not in the concept as such.

> *"you could say that in a certain way it's also about training this clientele and preparing them for this product. They learn to understand what [the company developing the concept] is delivering and understand what [the company developing the concept] has to do [in the market in question] in the first place."*

> *"..after that those [concepts] awaken questions also for them [customers] about how they change their business model, like it happened to some of them already at that stage they started to tell that well, actually this is not really suitable for what we are selling today, or it's okay, but not quite good enough, but if such a product comes, after that we will start to… for example to [a new segment] that this would fit very well. That way they wake up, also the customers, to think about their own operations and in that way it's important that, that it takes place here early enough, so that they can also prepare their own interface, their own product concept, of which this product is only a part of."*

> *"...we are the snow plough that tries to push something to them [to the customers]."*

Some interviewees seemed to imply that they use knowledge about customers to further their own cause in the organization where understanding of customers was highly appreciated. Concept developers seemed to have a strong confidence in existing knowledge, experience and understanding of the customers. Concept developers may believe that interacting with customers would not bring anything new but due to requirements in organizational processes or the criteria in gate evaluations, the spaces are created and used. Construction of customer understanding is thought to strengthen the existing knowledge and make it more believable and reliable in the eyes of other organizational members. Also, in addition to strengthening the credibility of the concept in the eyes of other organizational members, concept developers may seek protection for themselves to assure others that they have not made up certain figures or needs themselves, for example.

"We did only want ascertain things that we already knew in practice. As I said we have operated on this field of business for a long time, so we know approximately what kind of demands there are for a product and what customers look for."

"We did mainly use this sort of writing desk method mainly because we knew very well what we were doing, if you can put it that way. And then we just wanted support for our plans…"

In this chapter I have presented the three spaces that I have constructed based on my data and they are closed, conditionally open and open space. Moreover, I have discussed three different purposes for furthering of which the spaces are used and shown how the three space were present in each individual case. In the following chapter I discuss my results in relation to existing literature.

6. Discussion

The main research question that I have posed in this study is "How and why concept developers construct customer understanding in front end of innovation?" I have studied the subject in a specific context that is relatively little known and the least understood phase of innovation process and is understood to present the best potential to improve the whole innovation process. (Koen et al 2001; Zhang & Doll 2001; Kim & Wilemon 2002). My study contributes to front end literature by bringing up aspects of front end that are not addressed in the literature and on the other hand by supporting the findings of earlier literature. First of all, there seems to be a fundamental controversy between confidentiality and knowledge creation in constructing customer understanding that significantly affects how it is constructed in front end. Secondly, as the literature states in front end there are a lot of things that are not known (Kim & Wilemon 2002) and my results state the same. This means that concept developers themselves often need some time to make sense of the task and come up with ideas how to proceed with the work. Consequently, it may be difficult for them to communicate with outsiders because they are unsure themselves. In addition, it is difficult for customers to contribute if they do not know what they are contributing to.

Front end is inherently oriented towards the future. Existing literature states that front end is characterized by uncertainty and unpredictability (Koen et al 2001; Zien & Buckler 1997) and work is often experimental and chaotic (Koen et al 2001) and my findings support these characterizations. This means that there are often no right answers or hard facts available based on which decisions could be made. Information available for decision making during front end is typically qualitative, informal and approximate (Kim and Wilemon 2002), my interviewees talked about some decisions being "pulled out of the sleeve". All of this seems to make room for power and politics in front end, an aspect of front end that has not been touched much in front end literature.

Based on my results I propose that concept developers construct customer understanding by creating closed, conditionally open and open spaces. Furthermore, concept developers construct customer understanding for knowledge creation and for strategic purposes. By creating spaces of three kinds concept developers affect the preconditions of customers to understand the concept and to participate as well as to contribute to concept development. Based on these findings I claim that instead of questioning the ability of customers to participate we should look more carefully at the ability of concept developers and their organizations to create spaces and examine the purposes for which they engage in knowledge processes.

6.1 Concept developers construct customer understanding in closed, conditionally open and open spaces

The concept of customer understanding plays a very central role in this study. It is not, however, a concept I started with, rather it emerged as an emic issue (Eriksson & Kovalainen 2008; Stake 1995) from the data. The concepts used in the literature, such as customer knowledge (see e.g. Salomo et al 2003), customer input (see e.g. Callahan & Lasry 2004) and customer needs (see e.g. Leonard & Rayport 1997) did not seem to describe the interpretations of my interviewees because those definitions concern themselves mainly with needs and wants of customers forgetting the other side of the story, that of the concept developers. Based on my results I define customer understanding as follows:

> ***Customer understanding captures what can be offered to customers, thus it emerges as customer knowledge and possibilities as well as objectives of concept developers meet.***

I see that these two aspects of customer understanding are inseparable because the objectives set for concept development as well as concept developers' understanding about technological and other possibilities are an essential part of

their perspective from which they interpret all knowledge about customers and based on which they interpret what is important, relevant and interesting from the viewpoint of concept development. Practice-based view to knowledge helps us to understand that customer understanding in an organization consists of distributed, multiple interpretations and it is constantly subject to dispute, change and evolvement caused by ongoing perspective making and perspective taking processes. It is not objective or unbiased rather it is highly subjective. (Tsoukas & Mylonopoulos 2004; Hislop 2005; Boland & Tenkasi 1995) This means that one single understanding or truth about customers is not to be found in an organization. Customer understanding is always tied to who is participating in knowledge processes. As Tsoukas and Mylonopoulos (2004) remind, it emerges out of attempts to answer particular questions for particular reasons. And this is what makes participation and intentions of participants important. However, this is something that is not much addressed in the literature in front end context specifically and consequently, this is where an important contribution of my study lies.

The results of my study show the same point made in literature that spaces are central in knowledge processes. (Nonaka et al 2001; Heiskanen 2004, 2006) In fact, I claim that concept developers construct customer understanding by creating closed, conditionally open and open spaces. The concept of space can be understood in various ways and the conception I adopt here is very different from the approaches taken in geography or architecture for example (see Heiskanen 2004). I adopt the approach of Nonaka et al (2001) as well as Hernes (2004) and Heiskanen (2004, 2006) who see space as a shared context for action and interaction and as a platform for knowledge processes. Spaces can be examined from physical, mental and social viewpoints. Spaces bring together people and practices. Whereas physical space is often seen, mental and social spaces are “felt”. (Hernes 2004). First and foremost I see the concept of space as a tool for of thought and action (Heiskanen 2004) that can help us to better understand the phenomenon we are studying here. The spaces I present are archetypes or ideal models that may not always exist as clear-cut in practice. Rather, boundaries between different spaces are blurred. However, they help us to understand and describe the phenomenon that has been the most important objective of my study.

The three spaces that I have constructed based on my data differ in relation to customer consciousness of the concept development, customer commitment to the concept, the role of customer in the space, boundary crossings and knowledge processes between concept developers and customers. Although literature offers dimensions for examining spaces (see Hernes 2004; Nonaka et al 2001) I have chosen to use dimensions that seemed to emerge from my data instead of using pre-determined categories (see Eriksson & Kovalainen 2008; Stake 1995). An important aspect of the contribution of my study is to examine advantages and challenges of these spaces and how the different spaces relate to each other as these are not much discussed in the existing models of customer participation (see Lagrosen 2005; Alam 2002; Kaulio 1998; Ives & Olson 1984; Gales & Mansour-Cole 1995).

The categories presented by Kaulio (1998); Lagrosen (2005); Alam (2002) and Pals et al (2008) correspond partly to the spaces that I have presented here. “Design for” and “design with” –categories used by Kaulio and Lagrosen have similar elements with the conditionally open space while design by has a lot in common with the open space. However, a closed space as a separate category is not recognized since these models concentrate on customer involvement only. By looking at these models there is a risk that we forget that customer understanding can be constructed by other means as well. Ives and Olson (1984) bring up “no involvement” and “symbolic involvement” categories and Pals et al (2008) discuss indirect involvement of customers. In a way the closed space is present in their models but the way I see it is that the customer can participate directly in a closed space as well. The challenge in comparing or fitting together the spaces I have constructed and the existing models is that the dimensions we have used are so different. However, my study offers alternative dimensions of examining the participation of customers. As Hislop (2005) states, innovation literature mainly concerns itself with integration of new external knowledge to existing internal knowledge. My study brings forth the significance of internal knowledge and new combinations of it.

In a closed space customers are outsiders to the space. A central defining characteristic of closed space is that customers are not conscious of concept development enterprise. Customer understanding is constructed in knowledge processes that are largely independent of customers. Concept developers depend heavily on their existing explicit and tacit knowledge and experience about customers as well as use external sources such as research, publications, and the internet. Closed spaces are created for many reasons. One is that the concept developers feel that the space cannot be opened for confidentiality or resource-related reasons, for example. Concept developers may also feel that opening the space is of no use since they know all they need to know, there is nothing new to gain from interacting with customers. In a closed space control of concept development is strictly in the hands of concept developers but at the same time distance to customers is great. A lot of faith is placed on interpretations of concept developers and it is hard to know if their interpretations at least approximate those of customers', in other words, to see if shared understandings with customers exist. The same way as customers are outsiders to the closed space concept developers may be outsiders to customers' communities, practices and routines. Even though they may have developed a deep pre-understanding of customers, what outsiders see (and the significance they attach to what they see) is different from what insiders see (and the significance they attach to what they experience). (see Tsoukas 2006). Consequently, the needs considered important by concept developers or the routines they wish to liberate customers from may not be seen the same way by customers. There is a risk that concept developers trust their knowledge so much that they are unwilling to engage in perspective taking (see Boland & Tenkasi 1995; Hislop 2005). Lindman (2002) suggests that although internal knowledge is easier to access, relying on in-house knowledge base only, reflects a closed strategy for new product development that poses a risk for the organization's ability to renew. External sources may provide an organization with new knowledge and ideas. Furthermore, using external sources of knowledge can make the knowledge more believable to other organizational members (Hislop et al 2000).

In a conditionally open space customer is conscious of concept development enterprise but is not committed to it, at least not in the beginning. Customer is "an

involved outsider" whose input is considered important. Thus, the knowledge processes of concept developers are dependent on customers. In order to understand and appreciate new concepts (and to contribute) customers need to learn about those concepts (Heiskanen et al 2007) and build shared understandings about them with concept developers. Often there prevails a considerable knowledge asymmetry about the concept between concept developers and customers, which creates a very different starting point for customers in understanding the concept. The fundamental controversy between confidentiality and knowledge construction seems to be one major reason for this knowledge asymmetry. On the other hand, the concept developers may not even know themselves what they are looking for, which makes it difficult for customers to contribute as well. The more customers know about the concept the better they are able to understand and contribute. However, the risks relating to confidentiality escalate as the concept is opened up.

The main challenge of a conditionally open space is the lack of commitment to the concept development enterprise on the part of customers. It is a typical situation where one party is more committed to a community than the other and full commitment can only emerge if both parties experience participation meaningful and useful. (Corso et al 2009) However, at the same time it means that commitment may emerge along with participation (Joshi & Sharma 2004). In my data the lack of commitment was apparent in customer refusing to participate or not participating as "properly" as expected by concept developers. My results imply that innovation literature, when talking about choosing the right customers, sees the dynamics of customer participation in a very simplistic way and often ignoring the aspects relating to commitment. Choosing customers is presented as a rational selection process while motivational aspects of participating in knowledge processes emphasized in knowledge literature (Von Krogh et al 1998; Ives et al 2002) are often ignored. This means that in creating spaces concept developers should pay considerable attention to how customers benefit from participating in concept development and how it is presented to customers themselves. This challenge of commitment and motivation on the part of customers is tied to and multiplied by customers tending to be more oriented towards the day-to-day business and gives all

the more stronger reason for concept developers to carefully consider this aspect of participation.

In an open space customer becomes an insider of the space. Importantly, in an open space customers and concept developers have a shared enterprise (Wenger 1998) to which they are committed. Customers and concept developers create the space together and they also define the boundaries of the space together. In time they negotiate a shared perspective and knowledge processes between them become intra-community knowledge processes (Hislop 2005) in which the participants share a similar view of the world, practices, cultural tools and the perspective. Truly collective knowledge processes become possible in an open space because they precondition a shared enterprise, mutual goal and a strong intention to solve a problem or a task together. (Parviainen 2006) The current emphasis in the literature on methods that allow concept developers to get really close to customers such as participatory design (see e.g. Stappers et al 2008; Buur &Matthews 2008; Pals et al 2008), collaborative product development (Andersen 2009) and co-creation (Normann 2001) almost seem to picture open space as an ideal type. However, as my data shows, typically only one or just a few customers can participate in open space during one concept development enterprise. This is due to the resource intensity, competition between customers and legal aspects where exclusivity and property rights have to be considered. This way the risk of customness (Ernst 2002) and customer-led philosophy (Atuahene-Gima et al 2005; Narver, Slater & MacLachlan 2004; Slater & Narver 1998) taking over escalate as the insight to the market narrows. Thus, too tight relationships with a few customers only can start to direct the long-term development of the whole organization and may lead to failure. (Christensen & Bower 1996; Hamel & Prahalad 1994)

Normann (2001) along with Prahalad and Ramaswamy (2000) echo the emphasis on closeness to customer. They claim that a permanent change in the role of customers has taken place. Customers have transformed from passive audience to active participants and co-creators of value. Based on my research results I would argue that the matter is not that simple: I see that customers still have various roles, but in time, the options have become broader. However, the more passive and

traditional roles seem to be well and alive. Consequently, I suggest that we should examine construction of customer understanding more holistically instead of looking at one tool or category as majority of the literature does (see e.g. Pals et al 2008; Buur & Matthews 2008; Stappers et al 2008; Franke et al 2006; Lilien et al 2002; Ulwick 2002; Von Hippel 1986, 1988).

Everyone cannot participate as co-creators and partners of development in a participatory way. For one, the nature of front end as a context for activity and specifically the prevailing controversy between knowledge creation and confidentiality means that creating an open space or even a conditionally open space is not always possible. Furthermore, the need to speed up processes on one hand and lack of commitment from customers as well as a need to build common ground on the other, sometimes make it impossible to build open spaces, not to even mention the need for resources that an open space requires. Finally, sometimes concept developers see that it is not necessary or appropriate to build open spaces. As Neale and Corkindale (1998) suggest, organizations should determine the right amount of customer participation considering the expected costs and benefits of it. More is not always better. Consequently, I suggest that we need to remain sensitive to these "old" ways of constructing customer understanding while simultaneously being open to new spaces and opportunities.

A key aspect of holistic understanding of how customer understanding is constructed in front end of innovation is to understand how the spaces can be combined and used to complement each other. This argument can be understood with the help of tight and loose coupling systems described by Danneels (2003). In a loose coupled system elements or actors are connected but they are not fully determined by each other. In a tightly coupled system again elements or actors are mutually strongly dependent, constrained and determined. Danneels (ibid.) states that tight coupling leads to a better understanding of customers and their needs, close tailoring of products and services, easier forecasting of demand and closer relationships. Loose coupling with customer again is necessary to remain flexible in a dynamic environment and to keep an eye on opportunities and threats. In other words, the same process that makes organizations more responsive to the needs of

markets constrains its external inquiry and limits available options. Thus, organizations need to supplement tight coupling with loose coupling. Analogically, I suggest concept developers need to combine different spaces in constructing customer understanding. They need to complement the distance to customers inherent in closed space by reaching out to customers in open or conditionally open spaces. They need to manage the risks of customness and customer-led insight in open space by creating conditionally open and closed spaces where a wider range of customers can be invited to participate. The issues relating to confidentiality inherent to conditionally open space sometimes need to be resolved by creating open or closed spaces. Also, closed space can be used to develop concept developers' own understanding before they can go and discuss with customers in conditionally open or open space. However, creating multiple spaces preconditions practices and competence that make it possible. It is not only a question of competence among concept developers but also organizational appreciation, support and enabling structures (Corso et al 2009). It is important to see that involving customers or gathering customer-related knowledge is not enough, it must be utilized as well in a way that becomes apparent in the final products that are developed.

6.2 Concept developers construct customer understanding for knowledge creation and for strategic purposes

As suggested by knowledge literature, power and politics intertwine with knowledge processes (Hislop 2005; Tsoukas & Mylonopoulos 2004; Hislop et al 2002) but this aspect is often ignored both in theories of knowledge (Tsoukas & Mylonopoulos 2004) and in studying innovation activity (Hislop 2005). My study contributes to existing innovation and front end literature by shedding new light on this issue in innovation context. I suggest that concept developers engage in knowledge processes that aim to construct customer understanding for knowledge creation and for strategic purposes. This shows how knowledge can be used as a source of power as stated by Hislop (2005). Innovation literature does not pay much attention to

strategic purposes; openness to new knowledge is often taken for granted as the primary purpose (Dahlsten 2004). Alam (2002) has touched the issue of purposes for customer involvement and found indication towards what I call strategic purposes but he only recognizes strategic purposes that aim to influence actors outside the organization, such as educating users and improving public relations. In innovation literature the dynamic and evolving nature of customer needs is acknowledged (Joshi & Sharma 2004; Vicari & Troilo 1998), which should make the inevitable presence and significance of power and politics very visible. Thus, I suggest that in order to understand how customer understanding is constructed in front end we must widen our scope of examining it.

In constructing customer understanding concept developers subjectively assess what is important, relevant and interesting or unimportant, irrelevant or uninteresting. They do this based on personal aspects of their existing knowledge (Tsoukas & Vladimirou 2006; Hislop 2002, 2005; Brown & Duguid 2001) and the perspective of the community or communities they have membership in. (Boland & Tenkasi 1995; Tsoukas & Mylonopoulos 2004) In the quickly passing moments of interaction and interpretation individuals choose to direct their attention to something and ignore something else, and it is their interpretation that remains. This interpretation becomes their "truth about how things are". Through these interpretations of different organizational members the organization comes to know and understand its customers.

Koivunen (2003) writes that we sometimes enter situations of encountering people openly, willing to listen, and sometimes we do this with deaf ears and closed minds. We sometimes have our mind already set, our actions already planned and experience already determined. We begin an encounter with absolutely certain of our knowledge and understanding; absolutely certain that we have nothing to learn. "We can hear only what we want to hear, or what we already know and believe; we can hear nothing different, nothing new". The text above describes the scope of different purposes regarding knowledge processes where customer understanding is constructed. Sometimes the obvious purpose of creating new knowledge covers other more strategic purposes of influencing customers or just legitimating existing

knowledge. I believe that sometimes this is intentional but at other times unintentional. We can become so emotionally committed or enthusiastic about our knowledge, ideas and "grand visions" that we sometimes forget to listen; sometimes we are too busy to listen and sometimes we think that we gain nothing by listening.

Perspective taking that again requires openness as well as appreciation of knowledge and worldview of others is a precondition for knowledge creation. (Hislop 2005; Boland & Tenkasi 1995) Knowledge creation involves *questioning and revising* routines and creation of new processes and relationships (Boland & Tenkasi 1995). Openness to new knowledge also means that concept developers need to listen to things that they do not expect or want to hear. (Heiskanen et al 2007) Thus, as suggested by Boland and Tenkasi (1995) concept developers need to give their own perspective "up for grabs".

As suggested in the literature and found in this study too, front end as a context for constructing customer understanding involves a lot of uncertainty, a need to build new knowledge and using hunches and intuitions as basis for decision making (Kim & Wilemon 2002; Zhang & Doll 2001; Koen et al 2001; Zien & Buckler 1997). In other words, it means that often there are no right answers or hard facts to prove one viewpoint right and another one wrong. Thus, innovation activity as well as constructing customer understanding is about trying to see and shape an uncertain, not-yet-determined future in an environment of multiple, competing images of the future. Generating support becomes an important activity and competence. From this viewpoint the role of power and politics fit very naturally within the discussion. Strategic and political activities include seeking support and acceptance, bargaining with others, selling the idea to others and protecting something from criticism. (Markham & Holahan 1996; Hislop et al 2000) When concept developers construct customer understanding for strategic purposes they aim to influence the way customers see their future or to justify their own knowledge and vision, thus, legitimizing their knowledge and activity. These findings are in line with what Parviainen (2006) notes about experts sometimes using networks for self-serving purposes.

Constructing customer understanding for strategic purposes means that concept developers are not willing to engage in perspective taking, rather they only aim to strengthen their own perspective and "sell" it to others. If the strategic purposes are very strong, there is a risk that concept developers become very inward-looking and unreceptive to knowledge and ideas of customers. (Hislop 2005; Hardy et al 2003) This is closely linked to discussion about customers' inability to contribute to innovation development (see e.g. Pals et al 2008; Salomo et al 2003; Leonard 2002; Vicari & Troilo 1998; Hamel & Prahalad 1994) that I discussed in theoretical overview. Reasons for lack of interest and enthusiasm on the part of customers are often searched in customers' inability to understand new concepts, especially if they are radically new. Heiskanen et al (2007) suggest that this may also be due to concept developers' failure to understand the fundamental aspects of customers' life and context. Thus, we should also consider if it is a question of concept developers failure or reluctance to create spaces where in-depth understanding of customers can be constructed. These ideas reflect a fundamental shift from seeing customers as technologically (and otherwise) inferior to considering them as skilled users. (Buur & Matthews 2008) This may also mean a shift from searching for "extraordinarily skilled" and advanced customers to appreciating ordinary customers and users as participants in innovation process, which would be one step towards a more open and democratic (Von Hippel 2005) innovation. Taking such a step preconditions a cultural change however. A more open and democratic innovation also raises the controversy between knowledge creation and confidentiality to the centre of attention because the "ideology" of open innovation emphasizes revealing and sharing instead of hiding, inclusion and participation instead of exclusion and choosing as well as support instead of criticism. I hope we take up the challenge.

6.3 Assessing the study

> *"The issue becomes how to differentiate good stories from poor stories. Interest, plausibility and believability are as important as logicality, coherency and consistency." (Blackler, Crump & McDonald 1998)*

The quotation above indicates that there are many criteria based on which research can be assessed. As the alternative paradigms to positivism have established a solid position in the field of qualitative research, the criteria based on which the quality of research is examined, are changing as well. The new criteria have been influenced by the traditional ones, which is why I consider it important to discuss the traditional criteria first briefly. The idea of positivism requires the researcher to be precise, unbiased, open, honest, and receptive to criticism among other things. (Smith 1990) Evaluation of positivist inquiry relies on four criteria: internal validity, external validity, reliability and objectivity. (Guba & Lincoln 1994) Internal validity refers to logicality and internal consistency of the interpretation. External validity again refers to the generalizability of the findings into a wider population. Reliability refers to how well the method describes the phenomenon studied and would another inquirer end up with the same results if the study was repeated. Finally, objectivity refers to distanced, neutral and unbiased role of the researcher. Needless to say, these criteria lose their significance when we have a position that reality is not out there but in here, constructed by the researcher in interaction with the researched, interpreted by the unique capabilities and perspective of the researcher. Thus, criteria that depart from realist ontology cannot be applied to research that leans on to relativist assumptions (Guba & Lincoln ibid.).

As an attempt to resolve the dilemma of judging constructivist research, the trustworthiness of research became the object of evaluation. The suggested criteria are credibility, transferability, dependability, confirmability. Credibility parallels to internal validity of the positivist criteria, transferability to external validity, dependability to reliability and confirmability to objectivity. (Guba & Lincoln 1994; Guba & Lincoln 1989) However, these criteria have been criticized for the apparent analogy to the traditional positivist criteria. Koskinen et al (2005) suggest that

instead, we should evaluate quality of research. They talk about repeatability of research as an overall guideline to all research, which draws from the basic ideas of validity and reliability.

The requirement for repeatability means that the researcher needs to give her/his readers enough information to evaluate how the data was gained and how s/he arrived at the interpretation s/he presents. Hence, the researcher must make explicit 1) how the research was carried out; 2) how the material is verified; 3) how the researcher has influenced the results.

In simultaneously describing and reflecting the methodology and research process, I already described on a detailed level how this research has been carried out and what kind of cases were included. I have already critically examined my choices there and will not repeat those issues here. Instead I concentrate more on the second and the third aspects brought up by Koskinen et al (2005).

Although finding truth is not a relevant objective in my study, verifying that the second order reality I have created "at least approximates" the first order reality is. (Scherer 2003) A researcher has an ethical obligation to minimize misunderstanding (Stake 1995). In the literature several techniques for verification are suggested. Triangulation refers to protocols with which we can assure that we have "gotten it right". We can triangulate data sources, investigators or theory from which we approach the interpretations. As Stake (1995) states, if we see reality as constructed we also believe that our interpretations cannot be triangulated and I do not consider triangulation as the main criteria for assessing the verification of this data. However, both data and investigator triangulation have taken place in my study. Member checks (Stake 1995), another technique for verification, has not been used here. As Koskinen et al (2005) state, perspectives of the respondents and the researcher are different, thus, it would be unreasonable to assume that the respondents would be able to adopt my perspective, research goals, theoretical background and interest in the subject and evaluate my study accordingly. I have tried to verify my interpretations by presenting quite many authentic quotations from the transcribed interviews that illustrate how I have interpreted the data. However, it is clear that

those quotations can never transmit the feelings or meanings that derive from physical presence in the interview situation.

I as the researcher have influenced the results a great deal and I have tried to write myself in the text. The background and starting points of this research that I have openly described earlier certainly affect the way I see and understand this phenomenon. Another person with a different background would have come to different interpretations. I have tried to stay true to the meanings that I believe my interviewees have wanted to transmit, yet it is always the researcher who decides what the story of the case is. Thus, it is the researcher who decides what parts of the case will be included and reported and what parts of it will be excluded. (Stake 1995). This means that at best we can provide partial descriptions of the phenomena we study.

In reading the literature I have found additional ideas based on which the quality of this study could be assessed. Tsoukas (2006) calls researchers to think how the chosen forms of understanding do justice to the object of study. How can organizational researchers avoid oversimplifying the phenomena they wish to study? I see that the sole act of stabilizing a dynamic phenomenon such as constructing customer understanding in front end to be studied, simplifies it. At the same time it makes it possible for us to understand it better. I feel that the description I have provided does not present the dynamic and iterative aspects of the phenomenon very well, a temporal description or detailed single case analysis would achieve that better.

Another viewpoint I wish to bring forth relates to inductive research and giving room for emic issues (Eriksson & Kovalainen 2008; Stake 1995). I feel that I have let the data surprise me numerous times as suggested by Alvesson and Kärreman (2007). I found many things that I did not expect and on the other hand some things that I expected to find did not come out. Although assumptionless science is not possible (Altheide & Johnson 1998) I feel that finding and giving room to emic issues is one sign of success in inductive analysis. Still I feel that being inductive in my analysis was quite challenging and the theoretical frames in my mind directed

my analysis a lot in the beginning. Yet the theoretical basis I have given my reader in this thesis is totally different from the one I started with in the beginning of this analysis. I had to look for new sensitizing concepts (Eriksson & Kovalainen 2008) in order to make sense of what was going on in the data.

Finally, Stake (2005) states that the main objective of case study is to provide readers with opportunities for learning. Only my readers can judge that. I expect to provide those opportunities by having chosen a topic that is not very well understood and where not much earlier research exists. Additionally, I have approached the phenomenon I study from a viewpoint that is new and gives opportunities to examine aspects of the phenomenon that are not much discussed or very well understood. As Stake (1995) states, I am conscious that I will be able to pass on to readers some meanings and provide them an opportunity to learn and reformulate their current constructs. And some others I fail to pass. My readers will add and subtract, invent and shape reconstructing the knowledge in ways that is useful and meaningful for them. (Stake 1995)

6.4 Managerial implications

The results of my study have several managerial implications. First of all, this study highlights the importance as well as the complexity of constructing customer understanding in front end of innovation. The concept of customer understanding encourages organizations to go beyond the needs, wants and requirements of customers to consider what can be offered to customers within the limits set by their objectives and possibilities. From managerial viewpoint this means that paying attention to the way concept developers make sense and negotiate the development task (understand their objectives) and the way they understand the possibilities of the organization, is of primary importance.

Another managerial implication is that if customer understanding is understood as interpretations about what can be offered to customers, it means that definitive truths or uncontestable facts about customers rarely exist. Instead, customer

understanding emerges as shared understandings, emergence of which managers should support. Managers must also make sure that prevailing understandings are updated and new insights that may challenge the existing ones are allowed to come up. In the absence of right answers and absolute truths, developing new concepts can be understood as a collective commitment to making a desired future happen. Consequently, an important managerial competence is to encourage inter-community knowledge processes and ability to inspire and infuse faith and commitment to people. Thus, managing front end seems to be more about leadership than management. Leadership is concerned with establishing direction, aligning people and motivating and inspiring people, while management emphasizes planning, organizing and controlling. (Kotter 1990) Eriksson (2006) also notes that innovativeness and new knowledge creation do not fit well in controlling management style that is closely attached to quartal economy. Instead, she claims that innovativeness and new knowledge creation require enforcing commitment, time and patience as well as sensitivity to listen and ability to understand.

Another managerial implication comes from challenging the idea of customers' inability to participate in innovation development. Different spaces have different benefits and challenges and they make constructing customer understanding possible in different ways. This challenges managers to see that what kind of practices exist in their companies and what kind of spaces they support. Do the practices and the competencies of organizational members support forming of multiple spaces or just one? Thus, what kind of preconditions are given for customer participation and contribution?

My results show that concept developers engage in knowledge processes that aim at constructing customer understanding for knowledge creation and for strategic purposes. I do not suggest that knowledge creation is automatically a better or nobler purpose. What I suggest is that organizations and concept developers should acknowledge their starting points. This is important because knowledge and understanding is always an outcome of practices that have sought to answer particular questions in certain ways. Thus, knowledge depends on the questions we ask and the way we ask them. (Tsoukas & Mylonopoulos 2004) It is also important

to be conscious of the possibilities to use knowledge processes strategically, yet it is important to make sure that concept developers do not become overconfident or reluctant to listen to customers. Managers should see if the organization is willing to engage in perspective taking, building common ground and accepting to hear something they do not expect or want to hear. And how do organizational processes, such as front end decision making, react to such impulses, how much is customer understanding appreciated in decision making? And how much space is given to legitimation? It is important to note that all the effort and resources invested in constructing customer understanding only pays off if it is used in developing new product concepts and the understanding becomes visible in final products.

6.5 Future research directions

I see many interesting future research directions emerging from the findings of this study and I hope they will inspire other researchers as well.

The idea of spaces as well as the concept of customer understanding could be further elaborated in several ways. I would find a more deductive study with a larger number of cases that would examine how the spaces are related to different types of innovations a very interesting track of future research.

In my opinion the power- and politics-related findings of my study deserve attention in considering future research, since we understand so little about them in innovation context. How is customer understanding used as a source of power? Or is it? If so, is it used consciously? Ability to build support in an organization also relates to what kind of knowledge is generally highly regarded in the organization (Hislop et al 2000). Do people learn to "use" the front end practices and how do they do that? These are all questions that I consider important and worth further research. In there, action research, participatory observation and ethnography could be methods that would give a deep insight into the subject. Particularly, the role of

customer as an insider is interesting, though it has been studied in collaborative new product development studies.

Stemming from finding of this study, I feel that we cannot escape "soft" concepts such as emotions, listening and empathy, and I believe they could further increase our understanding about how customer understanding is constructed. Empathy, interest and ability to put oneself in the position of another are necessary in order to perceive the knowledge and expertise of that other, which again, is necessary in knowledge processes. (Parviainen 2006) As we emphasize more and more today how we need techniques and ways of understanding customers in ever more in-depth, sophisticated and proactive ways, it is inevitable that we need new concepts to work with in order to achieve that.

Finally, my claim that we should pay more attention to the ability of concept developers to form different spaces and the need for organizational support and practices to support that, imply towards a more democratic innovation where customers are not considered inferior in their technological or other capabilities. Considering this and looking at the newest ideas in the literature an interesting future research direction is to find out if there is a new space emerging along with open innovation (Chesbrough 2006; Von Hippel 2005). At least we are getting new ideas for customer participation in open space. The idea of outsourcing innovation or parts of the innovation process to customers; web 2.0 enabled new ways of involving customer; and significance of users generally, has gained a lot of attention lately (see e.g. Prügl & Schreier 2006; Kristensson et al 2004; Füller & Matzler 2007; Lettl et al 2006; Franke & Shah 2003; Von Hippel 2006; Von Hippel & Katz 2002) So far, the discussion has been more concerned with consumer markets and many organizations seem to be quite skeptical still about the idea of outsourcing innovation activities to customers and users. However, I believe that such outsourcing is something that will strengthen in the future and gain attention in business-to-business context as well. In business-to-business context motivational issues and the significance of user communities are something that we need to study carefully.

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APPENDIX 1: Interview outline for the first interview round

A) Background information of the company:

1. How many people are working in R&D?
2. How many % of turnover is invested in R&D?
3. What is the business area of the company/BU?
    a. B2B or B2C?
4. Describe the dynamics of the business from the point of view of the developed product concept?

B) Background information of the development case

5. What was actually developed in this case?
    a. Component or stand-alone innovation
    b. Technology push or market pull
6. Who was the target customer group of this case?
    a. Customer, customer's customer, user
    b. Was the target group somehow classified (key customers, lead users etc.)?
7. What was your role in this development case?
8. Evaluate the radicalness of the product concept
    a. From the point of view of technology (new to the company, new to the markets)
    b. From the point of view of markets (new to the existing markets of the company, if yes: new to the world-wide markets)
9. Evaluate the success of front-end phase with a scale of 1-5
    a. The success of end result
    b. The success of front-end phase
    c. Justify the scores you gave, why?

C) Case description

10. What phases, activities and critical incidents were included in the front-end phase in this case? Who were the main actors? Illustrate and explain, please.

D) Task definition

11. How was the task defined in this case? Where did it come from?
    a. Was this enough to support successful task execution?
12. Was the strategic vision clear for the people participating in developing the concept?
    a. How this vision concretely guided activities during the front-end?
13. How was the linkage between strategies and the product concept defined in this case?
    a. Product strategy, product platform strategy, product line strategy
    b. R&D strategy, technology strategy
    c. Product portfolio, R&D portfolio
    d. Production, organizational competences
    e. Was this integration enough to support successful task execution?

14. What were the concrete tools to illustrate strategies and strategic vision for the people participating in the case? (Roadmaps, Portfolios, Balanced Scorecard)?
    a. How did these concretely guide activities during the front-end?
15. How was top management support confirmed for this case and for the front-end team?
    a. How was this seen during the front-end?

E) Cross-functional teams

16. In which stage the person, who was responsible of executing this case, was appointed to this front-end case?
17. How was this front-end case resourced (human resources)?
    a. Was there a team and who belonged to the team (inside the organization, outside the organization) and who led the team?
    b. Who guided the work of the team (potential steering group), and how?
    c. Which internal and external parties were integrated in the case?
    d. If a cross-functional team: What advantages did the cross-functional team bring from the point of view of this case?
    e. If a cross-functional team: What disadvantages did the cross-functional team bring from the point of view of this case?
    f. Was this a typical resource allocation in the front-end?

F) Idea generation

18. How mature and well prepared were the ideas already in a task definition phase?
19. How was the idea generation phase organized in this case?
    a. Who participated in ideating (and why) and who led this (internal and external parties)?
    b. How was customer focus considered in the idea generation phase?
    c. What was the role of business intelligence in the idea generation phase?
20. Did you use any tools in the idea generation phase?
21. Where did the final idea(s) come from?
22. How was the end result documented?

G) Idea screening and evaluation

23. How were the most potential ideas selected for the further development?
    a. Who participated in this selection? (internal and external parties)
        i. How did this participation differ from the idea generation phase?
    b. Were there any selection criteria or tools?
        i. If criteria were used: Where did these criteria come from and how were they defined?
        ii. Were these criteria prioritized beforehand in this case?
        iii. How was the customer focus considered?
    c. Who made finally the decision to develop this idea into a final product concept?
        i. Did you prioritize other potential ideas, and if yes, based on what?
24. How was the end result documented?

H) Concept definition

25. How was the product concept defined?
    a. Who participated in concept definition (and why) and who led this work (internal and external parties)?
    b. What issues were included in the product concept in this case?
    c. Were there any limitations set for the product concept and how were these considered in conceptualization?
    d. How were customer and end user considered and how were customer needs transferred to product requirements?
        i. How were the latent needs of customer taken into consideration?
    e. Were there any tools used in concept definition?
    f. How iterative was the process in this case?
    g. How formal was the process in this case?
26. What was the end result of conceptualization and how was it documented?
27. How was the product concept tested?
    a. With whom was it tested (customer)?
    b. Were there any tools used?

I) Business analysis

28. How was the business potential of the product concept defined?
    a. Who participated in business analysis phase (and why) and who led this work (internal and external parties)?
    b. What different issues were considered (technical reliability, market potential, customer satisfaction, risks, strategic fit, competences)?
    c. Were there any criteria used?
        i. How were these criteria defined?
        ii. Were these criteria prioritized?
        iii. Were there any tools used?
29. What was the end result of business analysis and how was it documented?
30. Who made the decision to commercialize a product concept and based on what? (to start a new product development project based on the concept)

J) Front-end

31. How formal and clearly defined "process" was the front-end phase? (SOP, quality manual)?
32. How iterative was the process and how much different phases overlapped?
33. What was the end result of the front-end phase?
    a. Evaluate the business potential of the product concept for your company?
    b. Was the end result aligned with the company's strategies?
    c. Was the end result strategically important for the company?
    d. Did this development enterprise or the end result have any influence on renewing any strategies of the company (product, market, R&D)?
    e. Was product development project planning a part of front-end phase?
    f. To which party, the responsibility regarding this enterprise was transferred?
34. If a customer was an active party in this enterprise: What advantages or disadvantages related to customer participation?

APPENDIX 2: Interview outline for the second interview round

A) Background information of the company:

1. How many people are working in R&D?
2. How many % of turnover is invested in R&D?
3. What is the business area of the company/BU?
    a. B2B or B2C?
4. Describe the dynamics of the business from the point of view of the developed product concept?

B) Background information of the development case

5. What was actually developed in this case?
    a. Component or stand-alone innovation
    b. Technology push or market pull
6. Who was the target customer group of this case?
    a. Customer, customer's customer, user
    b. Was the target group somehow classified (key customers, lead users etc.)?
7. What was your role in this development case?
    a. In which unit did you work at the time of the project (marketing, R&D, sales, other)
    b. At which stage of the project did you join the project?
    c. Where there other people involved how provided information and knowledge about customers?
8. Evaluate the radicalness of the product concept
    a. From the point of view of technology (new to the company, new to the markets)
    b. From the point of view of markets (new to the existing markets of the company, if yes: new to the world-wide markets)
9. Evaluate the success of front-end phase with a scale of 1-5
    a. The success of end result from the viewpoint of customers
    b. The success of front-end phase in regard to how well the input gotten from customers was taken into account in the concept development?
    c. How would you estimate the business potential of the concept in the long run?
    How was business potential evaluated during the project and what criteria where used?
10. Evaluate the significance of the input you got from customers?

C) Interview questions

11. What does customer orientation mean in your company?
    a. What kind of advantages and disadvantages are related to customer orientation during front end?
12. Were customers categorized somehow during front end –process?
    a. What criteria were used in categorizing customers?
    b. Were lead users identified?
13. How were customers involved in the front end –phase?
    a. How did customers contribute?

    b. What was achieved by involving customers?
    c. What are the most important factors that affect a customer's ability to contribute?
14. What did you have to know about customers?
15. How was knowledge about customers searched for?
    a. Who was responsible for constructing knowledge about customers?
    b. What were the most important sources for knowledge and information?
    c. What was the role of R&D in knowledge construction?
    d. What were the concrete means used for searching for information and knowledge about customers?
    e. What were the most useful means?

16. How was information and knowledge about customers further refined?
    a. Who was involved?
    b. Are there instances when you should not listen to customers or ignore what they have to say?
    c. Was the information and knowledge utilized in concept development?
    d. How did this show in the final concept?
17. Did you search for knowledge about customer's customers or users?
18. What were the most important challenges in integrating information and knowledge about customers in the front end?
19. What were the most important success factors in integrating information and knowledge about customers in the front end?
20. What were the most important benefits from integrating information and knowledge about customers in the front end?
    a. Did it cause changes in the process or in the concept compared to what was originally planned?
21. What were the most important disadvantages from integrating information and knowledge about customers in the front end?