Customer-Oriented Product Development

Experiments Involving Users in Service Innovation

STOCKHOLM SCHOOL OF ECONOMICS
EFI, THE ECONOMIC RESEARCH INSTITUTE

EFI Mission
EFI, the Economic Research Institute at the Stockholm School of Economics, is a scientific institution which works independently of economic, political and sectional interests. It conducts theoretical and empirical research in management and economic sciences, including selected related disciplines. The Institute encourages and assists in the publication and distribution of its research findings and is also involved in the doctoral education at the Stockholm School of Economics.
EFI selects its projects based on the need for theoretical or practical development of a research domain, on methodological interests, and on the generality of a problem.

Research Organization
The research activities are organized in twenty Research Centers within eight Research Areas. Center Directors are professors at the Stockholm School of Economics.

ORGANIZATION AND MANAGEMENT	
Management and Organisation; (A)	Prof Sven-Erik Sjöstrand
Center for Ethics and Economics; (CEE)	Adj Prof Hans de Geer
Center for Entrepreneurship and Business Creation; (E)	Prof Carin Holmquist
Public Management; (F)	Prof Nils Brunsson
Information Management; (I)	Prof Mats Lundeberg
Center for People and Organization; (PMO)	Prof Jan Löwstedt
Center for Innovation and Operations Management; (T)	Prof Christer Karlsson
ECONOMIC PSYCHOLOGY	
Center for Risk Research; (CFR)	Prof Lennart Sjöberg
Economic Psychology; (P)	Prof Guje Sevón
MARKETING	
Center for Consumer Marketing; (CCM)	Acting Prof Magnus Söderlund
Center for Information and Communication Research; (CIC)	Adj Prof Bertil Thorngren
Marketing, Distribution and Industrial Dynamics; (D)	Prof Björn Axelsson
ACCOUNTING, CONTROL AND CORPORATE FINANCE	
Accounting and Managerial Finance; (B)	Prof Lars Östman
Managerial Economics; (C)	Prof Peter Jennergren
FINANCE	
Finance; (FI)	Prof Clas Bergström
ECONOMICS	
Center for Health Economics; (CHE)	Prof Bengt Jönsson
International Economics and Geography; (IEG)	Prof Mats Lundahl
Economics; (S)	Prof Lars Bergman
ECONOMICS STATISTICS	
Economic Statistics; (ES)	Prof Anders Westlund
LAW	
Law; (RV)	Prof Erik Nerep

Chairman of the Board: Prof Håkan Lindgren. *Director:* Associate Prof Bo Sellstedt.

Adress
EFI, Box 6501, S-113 83 Stockholm, Sweden • Internet: www.hhs.se/efi/
Telephone: +46(0)8-736 90 00 • Fax: +46(0)8-31 62 70 • E-mail efi@hhs.se

Customer-Oriented Product Development

Experiments Involving Users in Service Innovation

Peter R. Magnusson

STOCKHOLM SCHOOL OF ECONOMICS
EFI, THE ECONOMIC RESEARCH INSTITUTE

Dissertation for the Degree of Doctor of Philosophy, Ph.D.
in Business Administration
Stockholm School of Economics 2003

ISBN 91-7258-618-4

Keywords:
New Product Development
New Service Innovation
User Involvement
Experimental Research
Telecommunications Services.

Cover: Peter Magnusson

Printed by:
Elanders Gotab, Stockholm 2003

Distributed by:
EFI, The Economic Research Institute
Stockholm School of Economics
P O Box 6501, SE1-113 83 Stockholm, Sweden
www.hhs.se/efi

PREFACE

The thesis of Peter Magnusson is part of the Fenix research program at the Institute for Management of Innovation and Technology (IMIT). The Fenix program is carried out by the Stockholm School of Economics and the Chalmers University of Technology in co-operation with AstraZeneca, Ericsson, Telia and Volvo and with financing from the Foundation for Knowledge and Competence Development. The research program aims at creating knowledge of the management and organizing of industrial R&D as a basis for business success.

Fenix would like to express our gratitude to Telia and its employees, and the participating students at the University of Karlstad who provided the empirical material, for their co-operation, openness, and willingness to share their experiences. A warm thanks also to the sponsors of the research program.

Niclas Adler
Director of the Fenix Research Program

Bengt Stymne
Professor, Stockholm School of Economics

FOREWORD AND ACKNOWLEDGEMENT

This paper is a PhD dissertation produced under the Fenix research and leadership program. The format is of the type "compilation thesis", i.e. a number of compiled *articles*, in my case six, and a body text that links the articles together. The body text will hereinafter be referred to as the *cap* of the thesis. There is no norm that prescribes how this type of thesis should look. My intention has been to write a cap that can be read without the reader necessarily having read all the articles beforehand. The cap and the articles make different kinds of contributions; to explain the differences I will tell you a little story.

Some time ago, I participated in a practical creativity-seminar supervised by an art teacher. Our first assignment was to do a pencil drawing of a number of objects that were put in front of us, i.e. a still-life. Among the objects was a guitar, a table, a cloth, and a vase. When the drawing was finished, we had a short lesson in the cubism school headed by Picasso and Braque. The next assignment was to do a new pencil drawing of the same objects, but this time using the cubist style. This entailed drawing a couple of small square segments of the objects in front of us. The result was, thus, a drawing containing three to five fragments of the overall scene. The interesting thing was that each of the small squares was so detailed that it gave a new depth to the drawn objects. However, just looking at the second drawing would not enable the observer to understand how the overall picture looked. After the exercise, it suddenly occurred to me that the two approaches used at the seminar were quite similar to the difference between writing articles and monographs. The article isolates a small piece of a study enabling both the writer and the reader to make discoveries that would otherwise be difficult. At the same time, just writing articles runs the risk of losing the overall view of a study.

Each of the appended papers makes a unique contribution, either by providing direct knowledge to aid the answering of the research questions, or by making a methodological contribution as regards the study of the area. In total, six papers are appended, three journal articles, two book chapters and one conference paper. An isolated paper, at least not in the way the appended papers have been written, cannot give a complete answer to the rather comprehensive research questions posed in the thesis. Thus, the cap provides the overall picture.

I had never realised that the end-product, a PhD dissertation, is actually the tip of an iceberg. There are many people who have in some way contributed to this dissertation. When providing acknowledgements, there is always a risk of forgetting someone, but I will nevertheless give it a try.

First of all, I would like to mention Horst Hart who has been my coach during this journey. Horst has contributed, on an almost daily basis, a lot of valuable ideas and candid criticism. I hope we can keep up our inspiring discussions after my examination as well. Moreover, Horst seems to be one of the few who share my interest in the music of John Fogerty and Creedence Clearwater Revival. If Horst has brought creativity, I would say that Bengt Stymne has brought robustness to my research. Bengt has been my main supervisor and has given me valuable intellectual support. A special thank you goes to the two other members of my supervisory committee; Professor Bo Evdardsson of the University of Karlstad, and Professor Bruce Kogut of INSEAD. Professor Claes-Robert Julander acted as opponent in a pre-seminar and I am grateful to him for contributing constructive suggestions for improving the text.

A special acknowledgement goes to my two co-workers on the CuDIT study, Per Kristensson and Jonas Matthing, both located at the Service Research Centre of the University of Karlstad.

I have also been in frequent contact with Armand Hatchuel's research group at the Ecole des Mines in Paris. In particular with Pascal Le Masson, whom I have had some of my life's most intellectually challenging discussions with.

Of course a big collective thank you goes to the Fenix network. You have all been an enormous asset. The senior researchers, Flemming Norrgren, Niclas Adler, Alexander Styhre, Rami Shani, Andreas Werr, Gunnar Westling, Mats Engwall. My fellow doctoral candidates in the first Fenix PhD group; Cassandra Marshall, Robert Sandberg, Charlotta Svensson, Ulf Malmkvist, Tommy Olin, Jonas Roth, Golaleh Ebrahimpur, Jon Mikaelsson, Jan Wickenberg. The second Fenix PhD group; Hans Björkman, Fredrik Dahlsten, Håkan Linnarsson, Mats Sundgren, Ragnar Kling, Fredrik Nordin, Kamilla Kohn, Cecilia Gustavsson, Tobias Fredberg, Johan Westberg.

There are several others whom I am grateful to for their support, for instance Morten Olsen, Bengt-Göran Bengtner, Matts Norén, and Håkan Larsson. Last but not least to my own family, thank you Mona and Carl for your support during the entire process.

Karlstad, April 2003
Peter Magnusson

TABLE OF CONTENTS

1. INTRODUCTION

Addicted to mobile telephony

"Imagine that I could speak to you *only if* ...", the man just introduced as the head of business development paused and then continued. "… *only if*, I was standing in *this* corner. Wouldn't that be ridiculous?" While squeezing himself into the corner he marked an imaginary borderline in the air with his hand. He was in his mid-fifties and wearing a dark lounge suit, looking very confident about what he was relating. Suddenly, he took a step out of the corner, crossing the imaginary boundary, and started to talk but with no sound coming out, his lips were moving silently. No longer could he withhold a smile as he looked at us in the audience. He stepped back into the corner, "That was my demonstration of the limits of fixed telephony, or POTS as we call it here, Plain Old Telephony System". "Man *is* mobile!" he continued in a loud voice as he started to walk across the room. "Man has always *been* mobile, and man *will* always *be* mobile. That's why mobile telephony is so brilliant. I love it! You can speak to anyone, at anytime regardless of where you are," he sounded like a preacher while walking across the room looking at us with an enthusiastic smile.

The year was 1990; we were all new employees at major mobile telephony company Televerket Radio[1]. After having introduced the NMT-450 system in 1981, the Nordic countries were the world leaders in mobile telephony. Mobile telephony was still something exclusive, available to only a limited group of people. Together with 19 would-be colleagues, I had just started on the company's induction program. There we were, a mix of people from various backgrounds. Most of us were, like me, engineers, others were technicians, some were business economists, and there was even a psychologist among us. We learned that we were about to be the pioneers who would build and shape the next generation of mobile telephony, the GSM[2] system. We felt like we were on a mission from God.

The challenge

My new appointment was at the R&D department, at this time known as the Radio Laboratory[3], headed by the legendary Doctor Östen Mäkitalo, who had been of the driving forces behind the development of the successful NMT system. At this time, Telia Mobile had a *de facto* monopoly on

[1] The name has since changed to Telia Mobile.
[2] GSM was at this time an abbreviation for *Groupe Spécial Mobile,* the French name of the group who had started to specify the upcoming system. Some years later, the meaning of GSM was reinterpreted as *Global System for Mobile telephony.*
[3] Radiolabbet in Swedish

mobile telephony in Sweden, Telia Mobile controlled more than 97% of the market.

Technology ruled in those days. Listening to the voice of the market, the customers or users, was a rather unknown practice at the R&D department. The focus was virtually 100% on developing new service-offerings driven by utilising the available technology to its maximum . If a new product did not become a market success, this was still not a catastrophe, "We can always raise the call rate," as an experienced developer once ironically told me. It was foreseen by Mäkitalo, however, that this situation could not last forever. Very soon, a new generation of mobile telephony would be introduced simultaneously all over Western Europe, namely GSM. All competitors would thereby have access to the same technology, a totally new type of competition would thus arise. Mäkitalo had thus started to explore how "technology-driven" development could be turned around into "market driven" development. He had also noticed that there was a difference between developing services and products. "Architects make drawings, electrical engineers produce circuit diagrams, but what is the result from a service designer … ?", asked Mäkitalo rhetorically and continued. "*We must find methods of how to effectively design services that meet our customers' needs!*"

I was one of the people who would attend to the challenge of designing services that met the customers' needs. This was more than a decade ago, since then I have dedicated myself to the work of understanding how to design and develop better end-user-services for mobile telecommunications; first as an engineer, later on as a project manager, after that as a manager, and for the last four years as a researcher.

The problem with users

The biggest problem when developing telecommunications services has generally not been the technological problems to be solved. Engineers do not normally regard technological problems as problems, rather as thrilling challenges to be mastered. A more complicated and frustrating part has been to understand what the "mysterious users" really want. The frustrating thing is that it does not matter how great the technical solutions are; if they do not provide the users with *value*, they will not be accepted. A developer can thus be considered an expert in mastering technical challenges, but still unable to deliver what the users really want or need. The risk of being blinded by technological opportunities is indeed higher for new emerging technologies. The developers know what the new technology can do, but how do they translate this into something that is valuable to the user? For instance, the GSM standard has lots of specified features that have never been exploited since the mobile telephony companies do not know how to market these vis-à-vis the users.

The problem of understanding the users' needs and wants is a general one that is not unique to mobile telephony. History is full of technically brilliant solutions that failed to become market successes because it is not technology that users ask for; they want solutions. Thomas Alva Edison encountered this more than one hundred years ago. Even in his early forties, Edison was considered one of the greatest inventors of all time. In 1877, he patented the phonograph, which never became a commercial success. It was instead the phonographic record, invented by Emile Berliner and marketed by the Victor Talking Machine Company, which was victorious (Norman, 1998). The phonograph was definitely technically superior to the phonographic record. So, in spite of the fact that the phonograph was both first to market and technically superior to the phonographic record, it was still a loser. According to Norman (1998), one plausible explanation for this was that Edison did not understand the users' needs. He was so blinded by technological performance that he did not realize that the *usability* of the flat phonographic record was superior to his cylinder-shaped phonograph. Flat records were both easier to transport and to store. Edison had not bothered to involve the users', or the customers', perspective and had thus failed. Nevertheless, what Edison experienced has been repeated over and over again. Products turn out to be beaten by technologically inferior ones, because the users' perspective is not properly understood. An example of this is Sony's Betamax home video format which was beaten by the late-arriving and technically inferior, but more user-friendly, VHS format from JVC (Tellis and Golder, 1996, p 69). It is therefore, not so surprising, perhaps, to hear development engineers joking that their biggest problem is their customers. Not because they do not understand that the company's revenue originates from satisfied customers, but because of their genuine frustration of not knowing what the *customers really want*.

Trying to understand the customers and users

In order to design services that meet, or even exceed, the users' expectations, one must understand their logic; but how does one gain this knowledge? Many developers consider themselves to be users as well. It can then be tempting to reason as follows; "I am a user, accordingly I am a good representative of users, conclusion: I do not have to ask other users to design a useful service". Unfortunately, this reasoning is seldom correct, professional developers are rarely good representatives of the common user. Veryzer has a vivid illustration of this when a development manager declared, "*Engineers are NOT real people! Don't rely on an engineering test sample – they know too much and often think in a way that differs from the people that will be using the product – you need to test the naive user.*"(Veryzer, 1998a, p 149).

The developer's own conception of what makes a good end-user service is probably not sufficient. Can't you just ask the users what they want? In other words, why not involve them in the product innovation process? A successful example of this comes from Adidas, one of the most successful sports shoe manufacturers of all time. Its founder, Adi Dassler, was also a great innovator, holding more than 700 patents when he died at the age of 87 in 1987. Dassler explained his success by first listening to the athletes, then making the changes, and finally testing the product on the athletes (Mejdevi, 2002). Adidas' success could thus, at least partly, be attributed to the systematic involvement of actual users in the product innovation process.

The concept of user involvement has actually become something of a mantra during recent time. Many companies claim that they utilize their customer base by involving them in the development of new offerings. One industry at the forefront has been software. Companies like Microsoft, Netscape, and Yahoo all claim that they utilise users in order to get design input when developing their products (Iansiti and MacCormack, 1997; Prahalad and Ramaswamy, 2000). At the extreme limit is the so-called open-source movement where, for example, the operating system Linux has been completely designed and implemented by its users (von Hippel, 2001a). In the literature, we can find narratives regarding user involvement originating from many different industries. The car industry involves potential and influential customers early on in the design process, like when Volvo developed the XC 90 (Dahlsten, 2003). Also, in the mobile telecommunication services industry, user involvement has gained popularity during recent years. This will be discussed more in Chapter 2.

Involving users in the new product development process has thus become common practice in many industries today. Nonetheless, the *comparative advantage* of user involvement is, as yet, little investigated by previous research, as discussed in appended paper no 2 (Magnusson, 2003c). In the paper, it is stated that, " … managers wanting to involve users in their product involvement get little practical guidance from the research regarding what to expect from such endeavours". For instance, we do not know whether Adidas would have succeeded even if Adi Dassler had not involved the athletes in the innovation of new shoes. We are left with the unanswered question, *what is the additional contribution made by involving the users?* This is the main topic to be further elaborated on in this thesis.

Practically all cases of user involvement described in the literature are based on successful endeavours, but what about the less successful or even disastrous ones that are never published? We know little about whether user involvement actually can be disadvantageous, since these cases are rarely published. The mere fact that user involvement is frequently used in practice for developing new products does *not* prove its merits. We need to

know more specifically what the contribution is, or can be, before the benefits can be determined. Before this is done, user involvement runs the risk of being classified as contemporary hype with dubious benefits.

Purpose and Tentative Research Questions

The purpose of the thesis is threefold. All three purposes concern user involvement during the early phases of the new product development process and address the issues of 1) understanding, 2) optimising, and 3) implementing. The purposes will now be further elaborated.

The first purpose is to learn more about the actual benefits of involving users in the new product development process, or formulated as a question; what contribution is made by involving users during the early stages of new product development, compared to confining this task to professional developers?

Second, the aim is to produce knowledge that makes a research contribution as well as the ability to be useful to practitioners. Merely knowing what the contribution of user involvement can be is, however, just a first step. We also want to understand how the contribution of user involvement can be achieved and *optimised*; this implies answering questions such as; What types of users are best suited to be involved? Are there differences between different user categories? How do you best involve users?

Third, new product or service ideas are of literally no value to a company if they are not transformed into business offerings; implementation issues are thus important. It is, accordingly, relevant to learn whether, and how, user involvement affects the way a company has to organize its new service development. This can be formulated as the final research question; what are the effects of user involvement on organizing new service development for a company?

The purposes can essentially be divided into two levels. The first level concerns the contribution of user involvement in idea generation and how it can be optimised. The other level is the implications on how to implement user involvement in the organisation. The first two purposes will be treated more in depth in the thesis, whereas the third will be discussed more on a conceptual level.

Scope

The thesis emanates from a practical problem which spans across several theoretical fields. More generally, it makes a contribution to the field of *new product development*. More specifically, the thesis deals with the first stages of new product development, often referred to as *new product innovation*. Since, the subject of the research is the development of end-user services for mobile telephony, one could argue that the correct term should be

service development rather than *product* development. However, in my point of view, there are no distinct boundaries between these fields. In particular for the type of services studied in the thesis – i.e. technically-based services – the affiliation to a specific academic field becomes even more complicated. The services are embedded in some kind of technology, which makes them quite different from very people-intensive services such as legal assistance, or hair-dressing. The thesis will thus make a contribution to several partly overlapping academic fields such as, product development, service development, product innovation, service innovation and innovation management. Nevertheless, the specific contributions are discussed in chapter 9. In my point of view, new service development can be regarded as an instantiation of the broader notion of new product development. Accordingly, in the text, new product development and new service development are used interchangeably.

The aim is to gain a deeper understanding of user involvement. To be able to delve deeply into the subject, the empirical study has been delimited to dealing with *the early stages of end-user services development for mobile telephony.* The concepts *service,* and *early stages* will be defined later on in the theoretical framework. The results can, to a certain degree, be generalized for other contexts as well; this will be discussed in Chapter 9. The choice of context is further motivated in Chapter 2.

The study is limited to the Swedish context. However, as will be shown, Sweden is, and has been, in the forefront of mobile telephony development. The thesis does *not* deal with the profitability of user involvement. The thesis is limited to investigating the contribution of user involvement regarding new service ideas, and how the innovation process is influenced. This is not to imply that profitability is an irrelevant issue; just that it goes beyond the scope of this thesis.

Outline of the Thesis

The outline of the thesis is as follows. In Chapter *2*, I discuss the relevance of studying the development of mobile telephony services, and especially of involving users in the development process. Chapter *3* gives a frame of reference and defines some important concepts used in the thesis. It includes an extensive literature review of user involvement as well as its pros and cons. The chapter also deals with the issue of assessing services, i.e. how to decide whether one service is better than another? The definite research questions are stated in Chapter *4* and a number of research hypotheses are defined. Here, the study is also related to the theory in the area. In Chapter *5,* the two empirical research studies carried out are described with respect to methodological issues. The results and analysis necessary for the coming discussion are presented in Chapter *6*. Chapter *7* contains a discussion about the results in relation to the research questions

as regards the contribution of user involvement and how this can be optimised. In Chapter *8,* the research question concerning the management of user involvement is discussed. In Chapter *9*, I summarize the contributions of this thesis as well as issues for further research. Chapter *10* concludes the cap and contains summaries of the six appended research papers.

2. THE CONTEXT – MOBILE TELEPHONY SERVICES

This chapter describes the practical context of the thesis, namely mobile telephony end-user services. It also discusses the relevance for studying these kind of services, and especially involving users in the development process. We will see that it is an important issue for the industry, but as yet thinly researched.

The case of mobile telephony services

Although, as seen in Chapter 1, Adi Dassler successfully involved users when innovating new athletic shoes, the mobile telecommunications industry has historically not involved users in support of the innovation of new services (Mölleryd, 1999). Nevertheless, users have, at least in the Swedish context, played a vital role in exploring the utilization of and improving the quality of the basic mobile telephony service (plain speech service). In Sweden, different professional users were able to test and explore the possibilities of the mobile phone as early on as the mid 1950s. Among the first to test mobile telephony was a group of physicians in Stockholm (Gerdes, 1991). They explored different situations in which the mobile telephone could be useful. The trials also helped the operator's engineers to detect areas of bad radio coverage, as well as technical deficiencies in the radio system (ibid.). The users were thus helping the operator to improve the technical quality of the services. Ever since, users have been a valuable resource for reporting faults or deficiencies in the *existing* mobile telephony service, but they have *not*, until recently, been used for coming up with ideas for *new* services

During the last few years, we have witnessed a break in this trend. For instance, Takeshi Natsuno, responsible for the content side of the Japanese I-mode system, ascribes its success largely to users having come up with the "killer" ideas for new services (Fujita, 2000). Swedish mobile portal provider Halebop has invited a group of selected people (pilots) to influence and form the company's services (Jonsson, 2001). Finnish mobile operator Sonera has introduced Mspace, an open test environment for new mobile services and applications. They invite users, as well as content and service providers, to explore different aspects such as technical feasibility, usability, behaviour, pricing, etc. (Sonera, 2002). Additionally, contests where users are invited to submit their proposals for new services have been gaining popularity. In Sweden, the MISA awards, directed towards students, took place during the first half of 2002 (MISA, 2002). Another example is Sony Ericsson who has invited users to "create the leanest, coolest and most practical application" for its new mobile phones (Sony-Ericsson, 2002).

Why so little user involvement?

Telephony has been commercially available since about 1880; why has it taken more than 100 years for users to become involved in the innovation of new telecom services? My hypothesis is that it has not, until recently, been feasible to do this. I will discuss four likely reasons why; 1) lack of incentives, 2) how services have been implemented, 3) equipment size, and 4) the introduction of data communications.

Lack of incentives

Telecommunications has been a regulated market dominated by monopolies. Why adapt to the users' needs, if one does not have any competitors? The incentive for listening to what users want has thus been low prior to deregulation and competition coming about. However, even telecom operators who really wanted to explore new service opportunities for their users were restrained, due to the way mobile services were implemented.

Implementation of mobile services

A mobile service is realised by a piece of software, i.e. a computer program. Until the early 90s, telephony operators were dependent on network equipment manufacturers implementing new services, since all services were located in the switches on the network; switches that were outside the operators' control. The problem was that it took the network manufacturers approximately 3-5 years to implement a new service idea, due to long-term planning. However, this situation changed some years into the 90s. Through the introduction of new technology, the logic of the services could be separated from the network. The software was installed on a computer, outside the telecommunications network, but accessible via a network address. These "service computers" are often called service platforms. Since the services are implemented outside the mobile network, the service platforms have made the services independent of the mobile network. The operators are thus no longer dependent on the network manufacturers as regards the implementation of new services. Consequently, virtually anyone can nowadays provide mobile services.

Mobile phone size

For more than 100 years there was only one fundamental telecommunications service, 'the telephone call'. This service enables two persons, independently of distance, to speak with each other via a connection. The limitation of the telephone call is that the two users have to have access to a telephone connected to the wired telecommunications network via a socket. The limitation of being tied to a socket in the wall disappeared when the mobile telephone was introduced. Well, it is not completely true that one could move freely. For the first 60 years, the

mobile phone, or mobile radio as it was called in the beginning, was attached to the user's car. We will now look into the history of the mobile phone in order to understand how its evolution has affected its service design.

The first radio mobile system was introduced in the United States in the 1920s for use in police cars in the Chicago and Detroit areas (Gerdes, 1991). AT&T built the first commercial mobile telephony network in 1946 in St. Louis, Missouri. In Sweden, the first commercial system appeared in 1956 (ibid.). As previously mentioned, the first systems were 'car phones', and rather heavy. In the Swedish system, the telephone weighed 40 kg and took up half the boot of an ordinary car, see Figure 2.1. It was not, however, until the introduction of the NMT system in 1981 that mobile telephone users could buy equipment that was truly portable or at least "dragable". The weight had now decreased to about 6 kg, and the phone could be carried around in a case, see Figure 2.2. However, it would take almost another ten years before the first pocket-sized mobile telephone was introduced. Among the first was the "Mitsubishi pocket", see Figure 2.2, which weighed about half a kilo. If the phone had to fit into your pockets, they would have to be "king sized", so in practice, it was hardly a "pocket phone" at all. At the time of writing, one of the smallest commercially-available phones is the Ericsson T66, see Figure 2.2. One interesting comparison; the weight of the T66 is half that of the antenna on the first portable NMT phones!

Figure 2.1 Testing the first commercial mobile telephony system in Sweden in 1951. Photo: Telemuseum.

Technical Data
Panasonic EF-3380
System: NMT 450
Year of manufacture: 1982
Weight: 6 kg
Dimensions: 320x240x118 mm

Mitsubishi Pocket
System: NMT 900
Year of manufacture: 1990
Weight: 532 g
Dimensions: 185x70x40 mm
Ericsson T66
System: GSM
Year of manufacture: 2002
Weight: 59.5 g
Dimensions: 91.7x41x17.5 mm

Figure 2.2 Three generations of mobile phone. From left to right: the Panasonic EF-3380 (NMT 450), the Mitsubishi Pocket (NMT 900), and the Ericsson T66 (GSM). Note the credit card in the foreground as a size reference.

Actually, a new dimension opened up when pocket-sized phones were introduced. Suddenly, users always had a tool in their pockets which made it possible to communicate with the rest of the world (Mölleryd, 1999). This possibility is consequently, not more than a decade old.

Introduction of data communications

The fourth factor that has changed the circumstances for mobile service design is the introduction of data communications. Until the introduction of GSM (1992), a mobile phone was a device dedicated to voice communication. The possibility to transmit data has opened up a totally new area of usage for the phone. The first GSM specification contained a channel for data (9.6 kbit/s) as well as fax transmission. The most frequently used GSM data service today, 10 years after launch, is the SMS. SMS is an abbreviation for *Short Message Service*, a technology for sending and receiving text messages up to a maximum of 160 characters.

Data communication, and in particular the SMS, has changed the rules for mobile communication completely. Traditional voice communication is synchronous, i.e. both communicating peers must be present and active, whereas SMS communication is asynchronous. Instead of synchronously communicating with each other, the two peers can exchange SMS (text) messages, which can be sent and read whenever convenient. In fact, data-communication does not need to involve *two persons*. One, or both, of the communicating peers can actually be *machines*; so called man-to-machine, or machine-to-machine communication.

Today, recent development in mobile telephony focuses on data communication. In 2001, an additional industry *de facto* standard, WAP (Wireless Application Protocol), was introduced enabling access to Internet pages directly from a mobile phone. One of the most recently introduced technologies for data transmission is the MMS (Multimedia Message Service). MMS enables users to send and receive messages with formatted text, graphics, photographic imagery, and audio and video clips (Ericsson, 2002).

The new technologies for data communication have increased the range of potential services that can be developed for mobile users. Nevertheless, the use of data communication services has not yet met expectations. According to many analysts, this is due to the limited number of useful end-user services made available to the public (Schwartz and Jones, 2001; Walko, 2001). On the other hand, Mölleryd, referring to different surveys, contends that users are not as sophisticated as the mobile telecom industry assumes. Users are only able to utilize a minor part of the value added services provided (Mölleryd, 1999, page 158).

Conclusion – Service development is becoming more important

The four factors just discussed imply an increasing importance of the innovation of mobile telecom services. I will now briefly sum up my arguments. First, deregulation of the telecommunications market has changed it from a non-competitive monopoly market to a highly competitive one. An incentive for adapting to user needs has thus arisen. Second, the shrinking size of electronic equipment has made the mobile phone an object that its owners always carry with them. This, combined with the high level of market penetration, has made the mobile phone an interesting device for accessing different automated services, independently of time and place. Third, the traditional speech service, the telephone call, is an excellent service but hard to diversify. The introduction of data communication technology has opened up completely new opportunities for service developers, including man-to-machine and machine-to-machine communication. Fourth, today it is possible to develop and implement new services in a much more effective way. This has been made possible by the introduction of service platforms., Virtually anybody can now develop and operate telecommunication services. The minimum cycle time from idea to implemented service, which was previously 3 to 5 years, has now been reduced to months or even weeks.

Although the genesis of mobile telephony goes back about 80 years, it was not until the last five to ten years that we witnessed any growth in the number of services for the reasons just explained. How to develop beneficial mobile telephony services is, as yet, an unexplored field. The successful development of new end-user services can be expected to become crucial to mobile telecom operators. This assumption is supported by the fact that most analysts think that the battle of UMTS, the new generation of mobile telephony, will be won by those who come up with the best end-user services.

The previously described Adidas case illustrated that one possible strategy for supporting a company's product development is involving users in the innovation process. We have also witnessed the fact that this approach has been gaining ground among telecom companies during the last couple of years. Nevertheless, in the case of mobile telephony, we still know very little as regards what the contribution of user involvement can be. However, the focus of the thesis is specifically to investigate whether the involvement of ordinary users in innovating new end-user services yields advantages over confining this task to professional developers. To do this, we must first define some important concepts, which will be done in the next chapter.

3. FRAME OF REFERENCE AND PREVIOUS RESEARCH

In this chapter, a frame of reference is discussed that defines some important concepts used in the thesis. Issues discussed are; What is a user? What is a mobile telecom service? What is innovation? What is user involvement? How is innovation organised? I will mainly use the existing research literature – chiefly in new product development, new service development, and innovation management – to derive the definitions used. The outline is as follows. First the concept of the user will be discussed, by relating it to customers and consumers. Next, the notion of mobile telecommunications services is discussed. This discussion includes dealing with the differences between products and services. In the next paragraph, the assessment of, in particular mobile end-user services, is discussed and related to the literature. Innovation is central to the thesis; accordingly the innovation concept is discussed in the next paragraph. Following this, is a survey of the literature on user involvement. First, the concept of user involvement is defined. Second, based on previous research, the benefit of user involvement is summarised, and third its drawbacks are exposed. In the concluding paragraph, the organising of innovation is discussed. The problem of managing innovation in parallel with routine work is dealt with. User involvement is introduced as a means of easing the tension between the two management practices.

What is a user?

The terms customer, consumer and user are often mixed in the literature. In this paper, *users* are considered to be the ones that actually use the product, or service, i.e. the end-users. *Customers*, on the other hand, are the ones paying for the product, or the usage of a service. In some cases, but not always, the customers are also the users. When the customer and the user is the same individual, he or she can be referred to as a *consumer*. For mobile telephony services, all three categories (customers, consumers, and users) exist. There are two main types of customers, private individuals and companies. Private individuals are both customers and users; consequently they can be called consumers. When a company subscribes to mobile telephone services, it is the company that is the customer, whereas the employees who use the services are the users.

What is a mobile telecom service?

Since the scope of this thesis is mobile telephony services, we will look into how a mobile service is constituted; but first we need to clarify the service concept and how it relates to the product concept.

Services as a means of creating user value

"Services are something which can be bought and sold but which you cannot drop on your foot", (Gummesson, 1987). Services are, thus, intangible yet something we are willing to pay for; the willingness to pay indicates that services bring some value to the user. Cost and time reduction are two examples of values that services can bring. However, the value might also be outside of traditional utilitarian principles. Take, for example, a visit to the cinema; this neither saves time nor money, but people are still willing to pay for it because it provides them with some kind of experience. The value of a service depends on the user's individual experience of it, thus making it something individual, but also dependent on the substitutes available. For example, if your car is dirty, you will have at least three options for getting it cleaned. First, you can do it yourself; or second, you can pay someone else to clean it for you; or third, you can drive the car through an automatic carwash. All three options have their advantages and disadvantages concerning cost, time taken, quality of work, etc. Which is the best choice is determined by the car owner's preferences. The intention is not to elaborate further on user value, just to illustrate that the value of a service is highly linked to the individual user. However, the discussion indicates that a thorough understanding of user value implicates a deep understanding of the individual user's preferences. For comprehensive discussions on user value, see Ramirez (1999) and Holbrook (1998).

Product or service?

The terms product and service are often confused in both the literature and in every day speech. The lack of any precise definition of the term services is supported by Edvardsson et al. (2000). However, they are of the opinion that services should be seen as a subset of the product concept (ibid., page 31); a similar definition is stated by the International Standards Organisation (ISO). The ISO has defined the product concept in the ISO-8402 standard *'Quality management and quality assurance – Vocabulary'* (ISO, 1994). It is established that, a *product* may include a *service*, hardware, processed materials, software or a combination thereof. It is further stated that, a *product* can be tangible (e.g. assemblies or processed materials) or intangible (e.g. knowledge or concepts), or a combination thereof.

From the above, we can conclude that a product can be defined as a combination of goods and services, the relationship between them differs between products. Figure 3.1 illustrates how the relative service content varies across a range of different products.

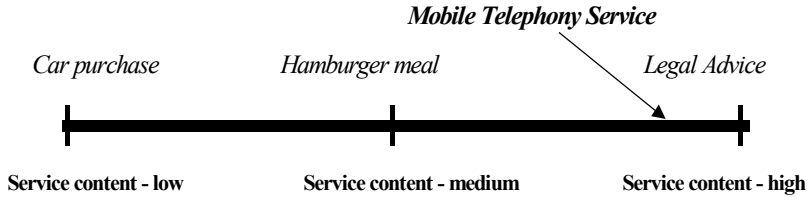

Figure 3.1 The relationship between goods and service content for a range of products.

A car has a low service content compared to its goods content; whereas legal advice has an inverse relationship. The hamburger meal is often referred to as a product with almost equal goods and service contents. As can be seen in the figure, mobile telephony services are products of *high service and low goods* contents.

There are numerous suggestions for dimensions to classify different kind of services; for example the degree of labour intensity, technology infusion, user participation, etc. For reviews, see Lovelock (1983) and Edvardsson et al. (2000), for example. There are several attributes characterising mobile telephony services which we will now look into.

Characteristics of mobile telephony services

Mobile telephony services can be classified as *technology-based self-services* (Dabholkar, 1996). Traditional service research started off with the study of man-intensive services, i.e. services that demand an extensive interplay between the user and the service provider. For mobile telecommunications services, users interact with some "service access equipment", normally a mobile phone.

Using technology to implement services also has other implications for the nature of the services. Normally, services cannot draw any benefits from *economies of scale* (Edvardsson et al., 2000), this is not, however, valid for telephony services. On the contrary, economies of scale are often a requirement for covering the huge investments in infrastructure.

Another attribute normally assigned to services is that they cannot be *stored*. A service is produced and consumed at the same time, and thus defined as impossible to store. This is not true for telephony services, since these are implemented by computer programs. A telephony service can thus be stored as long as the lifetime of the storage medium. Related to storing is the feature that services cannot be *repeated*. Neither this is true for mobile telephony services; the repeatability of telephone services comes from their software implementation. Finally, telephony is largely adapted to standards. There has to be a standardised way of connecting different equipment and systems with each other. Standardisation within telecommunications has a

long tradition going back to May 1865 when 20 countries founded the ITU (International Telecommunications Union) in Paris. The aim was to come to an agreement enabling the international interconnection of telegraph signals (ITU, 2003). Ever since, telecommunications and radio communications have been governed by internationally agreed standards.

Illustration of a mobile service

To illustrate a mobile service, I will use a real example, namely Unified Services (US), an application platform used to design SMS-based services. This is a prototype developed at the Mobile Internet Lab at Telia Mobile by Håkan Blomkvist. The reason for using the US platform as an illustration is that we will return to it, as it was used in the experimental study to be described later on.

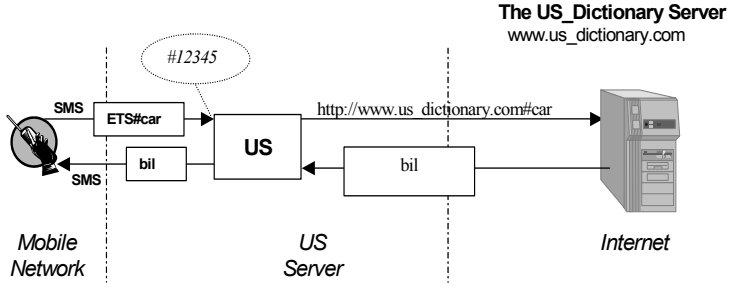

Figure 3.2 Unified Services, a platform developing mobile Internet services based on SMS

US is essentially a converter between SMS[4] messages in GSM and http calls on the Internet, as illustrated in Figure 3.2. From the user's point of view, US enables access to information on the Internet by means of sending and receiving SMS-messages. An example of a service is the ability to translate English words into Swedish, i.e. a mobile dictionary service[5]. The actual dictionary used in the service is available on the Internet on a specific web page. The service designer first decides a name for the service, for example "ETS" (English-To-Swedish). The service will have just one parameter, the English word to be translated. The US server has a predefined number in the network, for example "12345". If a user wants to translate the word "car", the message "ETS#car" is sent to number "12345". US analyses the message using a computer program, the 'interpreter'. "ETS" informs the interpreter that this is a request to translate an English

[4] SMS is an abbreviation of *Short Message Service*, a technology for sending and receiving text messages using mobile phones. SMS is defined within the GSM specification. GSM is a pan-European standard for mobile telephony. The system was introduced in Europe in 1992, but is today to be found all over the world.

[5] This description is somewhat simplified in order to facilitate understanding.

word into Swedish. The parameter, in this case the word "car", is then passed on to the 'ETS-service program'. The latter is also a computer program, the actual service, written by the service designer. The program makes a translation request across the Internet to the Dictionary server (www.us_dictionary.com). After a few moments, US receives an answer, a web page in which the translated word ("bil") is included. The ETS service program extracts the word "bil" and sends this by SMS to the user of the service. Finally, a few seconds after sending the SMS, the user will receive the answer and the service has completed. This is only one example of how a mobile telecom service can be designed. Nevertheless, it illustrates how the user interacts with service access equipment to get access to a technology-based service.

Assessment of mobile end-user services

To evaluate the contribution of user involvement, we must decide which aspects, conditions, factors, or criteria determine whether one service is better than another. Evaluating something as being the *best* is not a trivial task. "Best" can, regarding a service, be determined on the basis of many different aspects. For example, a service can be perceived as being "the most innovative", "the easiest to use", or "the cheapest to produce", etc.

In practice, far from all companies seem to use a formal methodology for evaluating ideas. In an explorative study, Kelly and Storey (2000) found that only about 50% of 43 investigated service firms used some kind of formal idea screening methodology. Criteria used by companies could be divided into five categories; financial implications (35%), market considerations (24%), specific management input (18%), strategic plans (12%), and resource availability (11%). Neither does there seem to be any generic best way of evaluating ideas. Hauser and Zettelmeyer (1997) recommend that different metrics be used throughout the development process. Evaluation criteria should be aligned with the phase of the development process where evaluation takes place. Evaluating a product idea is thus different to evaluating an almost finished product. In an extensive study of Dutch and UK companies which were developing and manufacturing industrial goods, Hart et al. (2003) investigated the different criteria used in different NPD gates. For idea screening, the following evaluation criteria were most frequently used; Technical Feasibility, Product Uniqueness, Market Potential, Customer Acceptance and Intuition. Previous research thus indicates that the appropriate evaluation criteria are situation-dependent.

I will now suggest a framework for evaluating results from the idea generation process. By comparing ideas about new services produced by users with those of professionals, the contribution made by the users can be established. One guideline used when assessing the ideas (service

proposals), in the thesis, has been a *business perspective*. By this, it is understood that the evaluation criteria must reflect important aspects of the business potential of the service. What is best from the business perspective is, however, dependent on the current market situation. Different factors are likely to be important if the product is intended for an emerging market rather than for a mature one (Hart et al., 2003). Many companies operate in more than one business context simultaneously. It would be desirable to perform the evaluation without the need to take the business context into account. Therefore, I propose a framework wherein the *business contextual factors are separated from the product intrinsic factors*. The product intrinsic factors are those which the service designer can control in some way. In contrast, the business context factors are not possible to influence, being provided by the environment. As illustrated in Figure 3.3, the business potential of a product can be seen as being constituted by a number of *product intrinsic factors* (PIF_1 … PIF_n) and a number of *business context factors* (BC_1…BC_n). The product intrinsic factors are those which can be evaluated without knowing the business context.

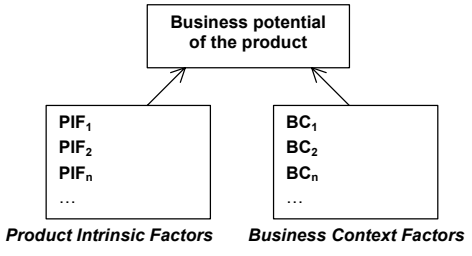

Figure 3.3 Factors constituting the business potential of a product

The product intrinsic factors are differing from company to company (Hart et al., 2003). As will be shown later on, in the methodology chapter, the relevant product intrinsic factors for the studied context were established, by a focus group, to be *originality*, *producibility* and *user-value* (see page 61), thus conforming well with at least two of the idea screening criteria found by Hart et al (2003), namely Technical Feasibility, and Product Uniqueness. But, user-value also corresponds rather well with the criteria Customer Acceptance and Customer Satisfaction.

A product that scores high on producibility but low on originality could be considered as having a high business potential in one business context, but at the same time it could be estimated to have a low business potential in another business context. This can be formally expressed as:

$$(\alpha * O, \beta * P, \gamma * U) \rightarrow \text{Product intrinsic business potential}$$

O, P and U are the originality and producibility of the product. The coefficients α, β and γ are decided by the business context. For instance, in

a new emerging market, originality is probably very important to business success, giving α a relatively high value. In a mature market, producibility is more important, giving β a relatively high value.

The second category, the business context factors, is, as previously discussed, more problematic. The problem of assessing ideas in respect of business contextual criteria is that idea *A* can be ranked higher than *B* in one context, while the opposite ranking could apply in another. Assessing the market factors thus implies that the business context has to be specified, which would make assessment rather complex and tedious. During the idea stage, it can indeed be difficult to take the contextual factors into account, especially if the idea is "new to the world"; in this case the market has to be estimated.

In order to evade the complexity of defining the market context prior to evaluation, another approach can be chosen, i.e. dividing the evaluation into two steps. In the first, *only the product intrinsic factors* are evaluated. The second, evaluation relates to the business context factors. This two-step approach is shown in Figure 3.4. Some ideas are blocked, i.e. put in the "dustbin" following the first evaluation. This model corresponds well with the findings of Goldenberg et al. (1999), who found that inspecting the idea itself can be used to predict the success of product ideas.

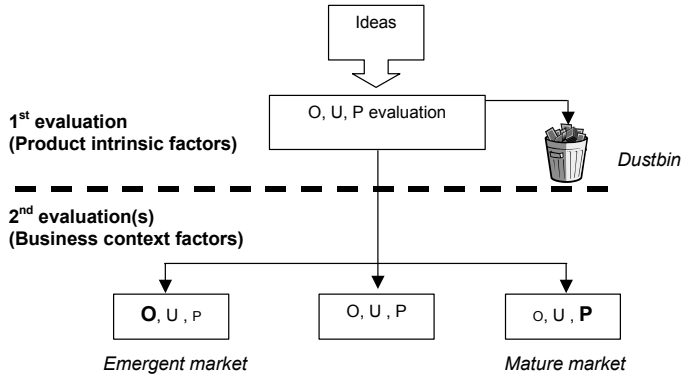

Figure 3.4 Two-step evaluation of ideas

To summarise, the dependent variable to be assessed, "quality of service idea", can be divided, in the context of end-user services for mobile telephony, into three dimensions; *originality, user-value* and *producibility*. How the dimensions were assessed is described in appendices D – F.

What is innovation?

Most companies need to be innovative to achieve long-term prosperity. This basic assumption originates from Schumpeter and his theory of economic growth (Schumpeter, 1934). Schumpeter defined economic growth in terms

of five different innovations, two of which being product and process innovation. It can, however, be presumed that there are certain industries where the need for innovation is so low that it can be virtually neglected. As described in the second chapter, mobile telecommunications is in the midst of rapid growth as regards service development; innovation can hence be expected to play a crucial role.

Schumpeter (ibid.) stated that the important issue for innovation was to *realise* inventions. While an invention remains unrealised, it is of no economic value. Schumpeter differentiated between inventing and the process of putting the invention to commercial use. According to Schumpeter, it is, thus, only after commercialisation that an innovation occurs. Roberts (1988) follows the same line of reasoning when he states that an innovation requires both the generation of a new idea followed by its implementation, into a new or improved solution. "*Innovation is composed of two parts: (1) the generation of an idea or invention, and (2) the conversion of that invention into a business or other useful application …"* (Roberts, 1988, page 12).

We can conclude that an established way of describing innovation is that it is composed of at least two parts, first *creation* and then *implementation* of the idea. Other scholarly writings supporting this view are, for example, Gurteen (1998), Zhuang et al (1999), and McAdam & McClelland (2002).

Creativity and Innovation

Individual creativity is a concept linked to innovation. To come up with innovative ideas, a person must be creative. There is an ongoing debate as to whether creativity can be learnt or whether it is a purely hereditary talent (Fesist, 1999). There are also theories that other factors than individual creativity influence the innovativeness of the outcome, such as the process and the environment. Advocates of creative processes are of the opinion that most people can be creative if they adopt a certain way of thinking which can be learnt, examples of such methods are *Brainstorming* (Clark, 1989), *Six Thinking Hats* (de Bono, 2000), and *TRIZ* (Altshuller et al., 1997). The importance of the environment is often emphasised in writings dealing with innovation in organisations (Amabile et al., 1996). Today, most researchers have concluded that several factors affect one's ability to be creative, e.g. expertise, hereditary talent, intrinsic motivation, techniques and environment (Amabile, 1988; Amabile, 1997).

The service development process

The objective of the type of innovation studied in this thesis is to create new products, i.e. innovation in the context of new product development (NPD). The NPD process is usually described as a sequential process with well-defined and separated steps. Although, some scholars would prefer to use

non-linear models (e.g. Nonaka and Takeuchi, 1995). Since those better reflect the true nature of development work, one can argue that the sequential models are sufficient representations (Crawford and Di Benedetto, 2000).

Typically, the NPD process is described as a type of filtering process, which aims to select the 'best' ideas and then develop these into new commercial products. Ideas are put into a funnel, and then filtered out step by step until the 'best' ones are left (Wheelwright and Clark, 1992).

Although, new product development is abundantly dealt with in the literature, the special case of new service development (NSD) has been much more sparsely investigated. In an extensive review, Alam and Perry (2002) only found two examples describing NSD models, i.e. Scheuing and Johnson (1989), and Bowers (1989). Both the proposed models are sequential, the first using fifteen and the second eight stages. In their article, Alam and Perry propose two new service development process models, both using the following ten stages 1) *Strategic planning*, 2) *Idea Generation*, 3) *Idea Screening*, 4) *Business Analysis*, 5) *Formation of the functional team*, 6) *Service and process design*, 7) *Personnel training*, 8) *Service testing and pilot run*, 9) *Test marketing*, and 10) *Commercialisation*. Based on empirical data from the development of business-to-business financial services, they concluded that the new service development process could be both linear and partly parallel. The stages found to be performed in parallel were 1&2, 3&4, and 7&8. Alam and Perry also investigated during which stages customers are involved and what activities they can carry out. In particular, the three stages of idea generation (2), service and process design (6), and service testing and the pilot run (8) were the most important stages for involving customers (Alam, 2002, p. 255).

The scope of this thesis, as previously defined, is user involvement during the early stages of end-user services development for mobile telephony. According to Cooper (1993, page 121), the early stages of product development have been rather sparsely described in the literature. However, during recent years, more and more attention has been focused on this pre-stage of the traditional new product development process. A new term has also been assigned to it, namely '*the fuzzy front-end'*, or simply FFE (Smith and Reinertsen, 1991). The term FFE has been used widely among scholars, as well as practitioners. The word 'fuzzy' is meant to illustrate the fact that front-end activities often are ill-defined and of an *ad hoc* nature. There are several scholarly writings which aim to structure and define front-end activities. The vast majority of these use a *sequential approach* where the front-end is defined as a process with different phases, (see for instance Burkart, 1994; Reinertsen, 1994; Cooper, 1997; Khurana and Rosenthal, 1997; Khurana and Rosenthal, 1998; Reinertsen, 1999).

There are also some writings which describe the front-end activities as non-sequential (e.g. Koen et al., 2001). However, a common theme in all the writings is that they regard the front-end as a zone for reducing the uncertainties of a new product idea or concept. After the front-end activities, whether sequential or not, have been accomplished, the result should be an initial conceptualisation or specification to be put forward for implementation.

I maintain that, at least on some level of abstraction, innovation can be described as a sequential process, see Figure 3.5. It must, however, be noted that, on other levels of abstraction, innovation can be regarded as a circular, non- sequential, process.

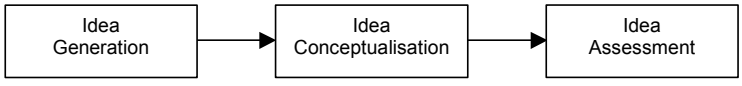

Figure 3.5 The scope of innovation for the thesis

A description of the innovation process studied in this thesis starts with *idea generation*. This is a creative process where the participants come up with ideas for new services. In the next step of the innovation process, the idea is conceptualised (*idea conceptualisation*) into a written *service idea description*. The purpose of the service idea description is to describe the ideas in a format that makes them possible to evaluate; the format can, for example, include the following:

- Target group for the service
- Functional description of the service
- Expected user-value when using the service, e.g. timesaving, cost saving, or entertainment.

Once the ideas have been translated into concepts, they can be evaluated during the third stage of idea assessment.

To summarise, the steps of *idea generation, idea conceptualisation,* and *idea assessment* constitute the scope for this thesis. We want to investigate whether user involvement during these three stages makes any difference to the quality of the generated ideas.

What is user involvement?

A review of the research literature on customer involvement provides many different concepts for describing collaboration between customers (users) and suppliers. This is just a small selection; *Customer-focused product development, Customer-oriented product development, Customer-centred product development* (Kaulio, 1997); *Co-opting customer competence* (Prahalad and Ramaswamy, 2000); *Participatory Design* (PD) (Muller et al., 1993); *Joint Application Design* (Anderson and Crocca, 1993); *Co-*

development (Anderson and Crocca, 1993; Neale and Corkindale, 1998); *Consumer Idealized Design* (Ciccantelli and Madgison, 1993). For a review of different concepts and methods, (see for example Ives and Olson, 1984; Muller et al., 1993; Kaulio, 1997; Kaulio, 1998).

Although, there a lot has been written on the subject of user involvement, very few of these have actually tried to define the concept of user involvement as linked to product development. One exception is Alam who has developed a framework containing four key elements defining different types of user involvement (Alam, 2002, page 252); 1) objective/purpose of involvement, 2) stages of involvement, 3) intensity of involvement, and 4) modes of involvement. The framework has been deducted from a literature review, and tested in a survey using 12 service firms. I will now further elaborate on Alam's framework for differentiating user involvement.

Objective/purpose of involvement

First in Alam's framework is the *objective/purpose of involvement*, i.e. why are users involved in new service development? It can, for instance, be to obtain new service ideas, to reduce cycle time, or to improve customer relations. User involvement can, of course, serve more than one purpose. In his study, Alam (ibid., p 254) found that developing a superior service was considered the most important objective for user involvement. Other objectives found were; reduced cycle time, user education, rapid diffusion, improved public relations, and long-term relationships. Closely related to the purpose of user involvement is the stage of involvement.

Stage of involvement

Where in the new service development process are users involved? As previously mentioned in the thesis, Alam and Perry (2002) derived 10 stages where users can be involved and these were; 1) Strategic planning, 2) Idea Generation, 3) Idea Screening, 4) Business Analysis, 5) Formation of the functional team, 6) Service and process design, 7) Personnel training, 8) Service testing and pilot run, 9) Test marketing, and 10) Commercialization. Users can be involved during all these phases, but their contributions differ.

User involvement is more common nearer commercialisation, and increases vis-à-vis project uncertainty (Gales and Mansour-Cole, 1991). Moreover, users are also involved after commercialisation, for example to evaluate and suggest improvements that will facilitate, or increase, the usage of a product. User involvement can also be useful during the very first phases of innovation, e.g. exploring the usage of new technologies from a user perspective (Neale and Corkindale, 1998). Users can be seen here as a resource for innovation (von Hippel, 1988). Nevertheless, users are *normally not trusted* with playing a part in the *initial generation* of new

product ideas. This endeavour is usually reserved for the company's professional designers. It is more common that users are contacted *after* the company has developed a new concept for a product, or service, in order to evaluate these, e.g. focus groups (McQuarrie and McIntyre, 1986). Nambisan (2002, p 394) contends that customers rarely offer new ideas without being prompted by firms. For input, structured inquiry mechanisms are normally used, thereby severely limiting the richness and frequency of customer contributions.

Intensity of involvement

How intense is user involvement? Alam (2002) describes this as a continuum, from passive listening to extremely intense when the user is part of a development team. This spans from using traditional questionnaires where users are asked for their opinion about an existing product or service, thereby influencing development of the next product generation. On the other side of the spectrum, there is "deep involvement" whereby users actually play an active part in the innovation and development of a new product. Examples of the latter are: the lead-user concept described by von Hippel (1986; 1988; 1999), and 'the customer as co-producer' (e.g. Grönroos, 1990; Gummesson, 1991; Wikström, 1995). Between the two end-points, Alam defines two other levels, "information and feedback on specific issues", and "extensive consultation with users"; these two were also found to be the most preferred among the investigated companies (ibid., p 255).

Kaulio (1998) has presented a taxonomy for structuring the *level* of involvement; Kaulio's level can be regarded as a measurement of user-involvement intensity. He uses three levels: 1) *Design for*; 2) *Design with,* and 3) *Design by the customer*. It is, however, debatable whether the first level (design for) should be defined as a type of customer involvement since the customer, or user, is not actively involved in the design. Kaulio's level 2, "Design with the customer" conforms to the definition of *co-development*, of Neale and Corkindale (1998) who write; "Co-development is where the customer takes a very active role as a team member in a joint development process, where their involvement starts at the earliest stages of the project" (Neale and Corkindale, 1998, p 419). Anderson and Crocca (1993) stated that, in co-development, a company, together with its users or customers, evaluates a new technology and work practice, exploring market and product requirements. Co-development is a *collaboration* which is a new work experience for both parties.

'Design by the customer' (Kaulio's level 3) can be classified as *Customers-as-Innovators* (Thomke and Von Hippel, 2002); in this case the customer, or user, makes the actual invention. Von Hippel has illustrated that certain types of users, so-called lead users, have invented the majority

of products in certain industries (von Hippel, 1977; von Hippel, 1978; von Hippel, 1982; von Hippel, 1986; von Hippel, 1988). Lead users have unique features, which von Hippel (1988, page 107) defines thus: "Lead users face needs that will be general in a marketplace, but they face them months or years before the bulk of that marketplace encounters them, *and* Lead users are positioned to benefit significantly by obtaining a solution to those needs." The company's role, according to von Hippel, is to identify the lead-users' inventions and to try to commercialise them.

Developing a user's invention into a profitable product requires a supplier to get involved in co-development with the inventing user. Level 3 of Kulio's taxonomy can thus be seen as a special case of level 2, where the original idea or invention comes from the users (customers). There could, however, be an alternative way to transform the users' ideas into products, i.e. to provide them with a "toolkit for innovation", as described by Thomke and von Hippel (von Hippel, 2001b; Thomke and Von Hippel, 2002). As indicated by their name, these toolkits are meant to aid the customers, or users, in their efforts to transform their needs into usable products. Thomke and von Hippel, however, indicate that there are limitations regarding the sophistication of products that can be developed using user-toolkits. This will also require a completely altered mindset, both for management and customers (Thomke and Von Hippel, 2002). Examples of existing toolkits are only found in industrial product development, e.g. CAD/CAM, flavour making. According to Thomke and von Hippel (ibid.), there are, however, indications that the toolkit concept is spreading to consumer markets as well. A first step in this direction is the product configurators which are becoming common for cars, computers, spectacles, and so on. Many car manufacturers have, for instance, Internet-based systems that enable potential buyers to configure different variables for a new car, such as colour, type of wheels, type of audio equipment, etc. Workable prototypes can serve as a means of exploring and learning the capabilities of new technologies, as the previously-mentioned prototype testing of the first Swedish mobile telephony system by physicians (p 18) showed. Today, the use of prototypes as tools for stimulating the innovation of new products and services is becoming widespread in many companies (Thomke et al., 1998; Schrage, 1999; von Hippel, 1999). This makes the involvement of users, in combination with toolkits, an interesting approach to investigate.

Modes of involvement

How are input and information obtained from the users? In his study, Alam (2002) identified six different modes; 1) face-to-face interviews, 2) user visits and meetings, 3) brainstorming, 4) users' observations and feedback, 5) phone calls, faxes and e-mails, and 6) focus group discussions. These can be combined in different ways. There are certainly more modes for

providing user input than the six ones identified by Alam, for instance providing users with toolkits for innovation as previously described. Also, when users are engaged in co-development, more modes can appear than those mentioned above.

Type of user

The element "type of user" is not included in Alam's framework. Nonetheless, I consider it to be an important one. Users involved in product development can be of two basic types, either industrial users or consumers. Industrial users are those who act on behalf of a company, whereas consumers act on behalf of themselves as private individuals. The former is often referred to as a business-to-business relationship, while the latter is referred to as a business-to-consumer relationship. In both cases, the users are supposed to be the actual end-users of the resulting product or service. Both types of users are indeed "experts" in the context where the product to be developed will be used. Nevertheless, there are normally important differences between those two categories of end-users. Trott (2001) pinpoints the level of information symmetry as usually being very high on industrial markets. Industrial users are those who use as a part of their daily professional lives, thereby developing a high level of competence in the area. It has previously been mentioned that von Hippel, in many of his studies, found that the users (lead-users) did not only come up with ideas, they also transformed them into working prototypes. It is, however, not very likely that consumers will come up with working prototypes of their ideas, since they usually have a limited understanding of the underlying technology. Also (ibid.), in industrial markets, the buyers are relatively few who make it possible to hold negotiations regarding specifications for customising products. Furthermore, the economic incentive for industrial users is normally higher, since their ideas are supposed to bring benefit to their companies in some way.

It is thus an assumption that there are significant differences between the involvement of industrial users and that of consumers. The main differences between the groups are that consumers are more heterogeneous as regards competence; that they have an inferior understanding of the design of products; and finally that they have a lower economic incentive for participating in the development of new products.

User involvement studied in this thesis

To summarize, five different factors have been identified which can distinguish various forms of user involvement; 1) purpose, 2) stage, 3) intensity, 4) mode, and 5) type of user. The kind of user involvement dealt with in this thesis can be positioned with respect to the five factors just described. The *purpose* of the user involvement studied is to have users

generate new ideas. Accordingly, the focused *stages* are, idea generation, idea conceptualisation, and idea assessment, all belonging to the so-called "Front End of innovation". The *intensity* of involvement is rather deep. Users are invited to come up with new ideas, either themselves or in some kind of collaboration with the company, corresponding to levels 2 and 3 in Kaulio's framework Kaulio (1998). Several different *modes* are used to involve the users; the intensity and the modes will be described in more detail later on in the method section. Finally, the users are of the *type* consumers.

The contribution of user involvement in innovation

The importance of involving customers or users in product innovation is stressed in the literature (see for example Prahalad and Ramaswamy, 2000). Nevertheless, we can find two opposing views as to whether the involvement of users is good or bad, and I will account for both those views. In this paragraph, we will first look into what is emphasized as positive as regards user involvement. In the subsequent paragraph, I will account for the perils of user involvement.

New ideas and inventions

There are many findings which report that users, or customers, can be a valuable source of new product ideas or inventions. This is, thus, a kind of level 3 involvement (Kaulio, 1998), i.e. design by the customer. The best-known research in the area of customer innovation is probably that of Eric von Hippel. As previously mentioned in this thesis, von Hippel has shown that certain types of users, so-called lead users, have invented the majority of products in certain industries (von Hippel, 1977; von Hippel, 1978; von Hippel, 1982; von Hippel, 1986; von Hippel, 1988). The vast majority of von Hippel's studies of lead users are, however, from *industrial markets*.

Other scholars have come up with similar findings. In a study from medical equipment innovation, Shaw (1985) concluded that leading-edge users had been of substantial importance to innovations in that area. Shaw reported that users had been the ones who had identified the actual need for new innovations in 76% of 34 cases.

Although the vast majority of studies from involving users come from industrial market contexts, there are some studies from consumer markets as well. Morrison, Roberts and von Hippel (2000) have investigated the occurrence of user innovations among library users of OPAC (Online Public Access Catalogue) information search systems in Australia. They found that 26% of the users had made some major or minor modifications for their own needs. The study also distinguished modifying users from non-modifying users, one important user characteristic being their *technical capability*. The authors' conclusion was that the findings supported the

systematic inclusion of user ideas in the manufacturers' idea generation process.

In the first chapter, several other examples of consumer involvement were mentioned. One was the software industry where companies like Microsoft, Netscape and Yahoo all utilise their consumers during the development of new products. Another was the extreme of Linux, where the consumers were both designers and implementers. Volvo was mentioned as an example of involving users in the car industry. Numerous additional examples of consumer involvement in the development process certainly exist.

A catalyst for new ideas

We have just discussed how users, or customers, produce ideas or even inventions on their own; the users were involved *after* they had come up with a promising idea. Closely related to this is when users are involved *before* idea generation has started. In Kaulio's (1998) framework, this can be regarded as level 2 involvement (Design with the customer).

Wikström (1995) concludes that intensive interaction with potential customers is a likely source of generating new ideas and new ways of doing business. When involving customers in front-end activities, the company can learn about the customers' actual needs. Conversely, the customers get an understanding of the opportunities provided by new technologies. This taken together has the potential to bring up ideas for new products; thus customer involvement can function as a catalyst for generating new ideas.

In a study in the telecommunications industry, Mullins and Sutherland (1998) investigated best practices for new product and service development. One of the "best practices" included user involvement for idea generation, and the use of mock-ups and prototypes to understand customer usage and benefits. The products had a rather high degree of service content and targeted both consumers and business markets. This indicates that consumers, or ordinary users, could also be utilised as innovators of services.

Enhanced understanding of user value

The ultimate objective of a consumer product is to bring value to its user. The user value of services is generated when they are consumed; users thus take an active part in the value creation process themselves (Wikström, 1995). This implies a deep understanding of how customers gain value from the service, including understanding of the users' needs and wants. User involvement can support this. Involving users in the innovation process can serve as a means of gaining important understanding of them, as shown by Hennestad (1999). He found that companies can have a completely wrong understanding of what their customers perceive as important in their

products. Employees think that they understand how their customers think, but this might turn out to be completely wrong. In the case study presented by Hennestad (ibid.), knowledge of customers was acquired by interacting with them.

It can be hard for users to express their wants and needs if they do not interact with the supplying company (von Hippel, 1994; von Hippel, 1998). Von Hippel calls this *sticky information,* because it is hard to extract from the users. The users' needs and wants can be regarded as a kind of *tacit knowledge* (Polyani, 1966), i.e. knowledge that cannot easily be expressed explicitly[6]. Users are assumed to possess a lot of tacit knowledge. Nonaka and Takeuchi (1995, p 62) suggest that tacit knowledge is transferred between individuals through socialization, i.e. by the sharing of experiences. Tacit knowledge can be acquired directly from others without using language, as when apprentices work with a master and learn by observation and imitation. In this way, user involvement could be seen as a socialization process wherein tacit knowledge is exchanged.

Anderson and Crocca (1993) reported that co-development, during an IT-development project, had made it easier for the customers to express their needs so that the engineers could transform them into technical specifications. The same observation was made by Johne and Storey (1998); customers involved in the development process are helped to articulate their needs. In a study of seven NPD projects, Veryzer (1998b) concluded that customers ought to be involved early on in order to reveal their latent needs. Following the same line of reasoning, Bitner et al. (2000) recommend closely involving customers in the design process of technology-based services, since this is an as yet unexplored area.

Mutual learning

User involvement can work as a mutual learning process where the developing company, together with the prospective users, explores a new technology, for instance. Neale & Corkindale (1998, page 420) contend that co-development supports the experimental learning that is important when exploring new technologies. The process of experimentation allows the customer to discover different aspects of the technology, while the company learns about the customer's needs. Co-development can thus play an important role in assisting the early identification of applications and benefits provided by new technology.

Sinkula (1994), too, argues that collaboration with customers contributes to mutual and iterative learning about applications for new technologies. The knowledge achieved from customer interaction is not only used for decision-making, but also plays an important role in the sense making process (ibid, p 43).

[6] For instance, knowing how to ride a bicycle is almost impossible to express in a written manual.

Enhancing the user's competence
Advocates of technology push are of the opinion that the company, instead of reacting to customer needs, should "lead its customers using new products that are likely to fulfil latent or unexpressed needs" (Balakrishnan, 1996, p 259). Customer interaction can thereby be seen as a *teaching process*, where the company guides its customers towards exploring their hidden needs and supplies them with products which fulfil these. This is especially important in areas where new technology is the driver of development. In order to achieve a fit between technological opportunities and the fulfilment of customer needs, companies need to develop their customers' competence (Prahalad and Ramaswamy, 2000).

Reducing development time
User involvement can also result in shorter development times. In a study of product development projects, Gupta and Wilemon (1990) found that in 71% of cases the "poor definition of product requirements" was the cause of delays. According to their interviewees, this was due to insufficient understanding of customer requirements. The problem could have been avoided or reduced by involving the customers early on in the new product development process. The product concept ought to be tested by active customers early on and all the way through the development cycle on an "as-you-go" basis.

The rapid capture of a rich understanding of customer needs is a key to shortening development times in the software industry. Continuous user feedback during the development of different beta versions (prototypes) is a strategy used in, for example, the development of Netscape Navigator (Iansiti and MacCormack, 1997).

The downside of user involvement
As previously indicated, there are scholars who challenge the benefit of user involvement, even claiming it to be destructive. We will now look in to the arguments against involving users.

Trapped by the current users' manifested needs and wants
Bennett and Cooper (1981) question the usefulness of users as a source of input for new product development. They contend that trying to satisfy the consumers' articulated wishes will lead to a stalemate, since innovative ideas rarely arise from customers. They give three reasons for this (ibid., p 54). First, perception is limited to what consumers can currently relate to. Second, the consumers' ability to express and verbalise their needs is limited, since they do not know what is technically feasible. Third, the needs expressed by consumers may well have changed by the time the new product is developed and ready. Christensen and Bower (1996) come to a similar conclusion. They argue that the strategy "Stay close to your

customers" might mislead suppliers into *avoiding exploration* of the opportunities provided by new disruptive technologies. In time, the lead will be taken by those who have learnt to exploit the emergent opportunities. Their arguments are based on empirical findings from the computer disk industry (see also Christensen, 1997). More support for the inadequacy of users as a source of innovation comes from Leonard and Rayport (1997); who are of the opinion that users neither have sufficient technical knowledge to produce innovations nor are able to articulate their needs, if inquired.

Most scholars and practitioners agree that there are mainly positive effects from user involvement in the short run. The problem addressed by the sceptics is that the long-term innovativeness of the company might deteriorate when it listens to its current customers. It is evidently no trifling matter to have product development that adapts to the current customers' needs while at the same time being innovative. Miller (1993) also discusses the risk of adapting, unreflectively, to current customers. He contends that organizations tend, over time, to adapt to the environment that once created success, thereby becoming more and more "simple". For instance, management tends to think that adapting to the users' manifested needs and wants is the key to success. Paradoxically, the relentless eagerness to efficiently fulfil the customers explicit needs is usually successful in the short run; nonetheless, it is likely to cause failure in the long run since the company's flexibility decreases and with it the ability to adapt to newly emerging needs and wants.

How to choose the right users to involve?

Which users should be involved in the innovation process? As previously described, von Hippel has identified the desirable characteristics of a lead-user. Rothwell (1992, page 226) also presents a list of customer characteristics suited to new product innovation. He calls them *leading-edge customers*:

- they are early adopters on the diffusion curve:
- they have a proven track record in the successful use of innovative products;
- they establish forward-looking, innovation-demanding specifications for new product purchases;
- where appropriate, they become actively involved in suppliers' developments, e.g. through prototype testing; and
- they are a primary source of post-launch improvements.

There is a problem, however, *finding* these users. Von Hippel and colleagues have described a method for identifying lead-users (von Hippel et al., 1999). However, the problem of inviting them to take part in the

development process remains, especially since von Hippel's lead-users method requires that the participants do not claim property rights regarding any ideas they might contribute, the reward being purely intellectual (ibid., p 54).

It is arguable whether lead-users for consumer products can be identified and recruited in the same manner as for industrial products. A point of conjecture is that it might be even harder to find lead users on consumer markets, since consumers can be expected to be a much less homogenous group. According to Rogers' theory of innovation diffusion, the market can be divided into five different types of adopters (Rogers, 1995), the five types being normally distributed, see Figure 3.6. He calls the first ones to adopt a new technology the *Innovators,* these constitute 2.5% of all adopters. The next ones to adopt are the *Early Adopters* (13.5%)*, Early Majority* (34%)*, Late Majority* (34%)*,* and *Laggards* (16%).

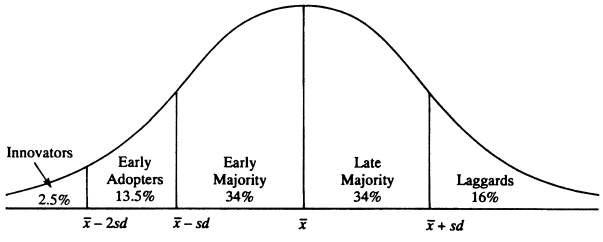

Figure 3.6 Adoption of new technology, from Rogers (1995, p 262).

Von Hippel's lead users "create solutions" (von Hippel et al., 1999, p 49) and are thereby consistent with Rogers' "innovators"; lead users would thus only represent approximately 2.5% of the total number of customers. These figures imply that lead users might not be a good representation of the remaining 97.5% of the market. It is not certain that lead users have the same frame of reference as "ordinary" users, possibly leading to the design of superfluous products and services.

Although Rogers' diffusion model of technology adoption is one of the best known, there are also many others; for a comprehensive review see Mahajan and Peterson (1985). A common theme for the diffusion models is that they divide the market into different categories. Martinez, Polo, & Flavián (1998) state that all the investigated models mention the so-called innovator, or early adopter, category. In their empirical study of 6 different consumer durables, they reported that the Innovator category varied from 0.4% to 1.7% percent, i.e. even less than Rogers' assumption of 2.5%. The figures for the Early Adopters varied from 7.2% to 20%. Consequently, this confirms the assumption that "Innovators" represent only a minority of all potential users.

Positive contribution?

The cost issue relating to user involvement seems to be thinly researched. It is hard to find studies that have investigated whether or not the costs of involving users are balanced by increased revenues. One plausible reason for this is that much of the claimed benefit of user involvement is hard to translate into monetary value. For example, it is difficult to estimate the value of obtaining a certain user need. Gales and Mansour-Cole argue (1995), based on findings from a study of toxic waste treatment projects, that user involvement might not provide any positive effects justifying the extra cost. However, the higher the uncertainty - the more likely that user involvement might make a positive contribution.

In a recent review, Nambisan (2002) lists a number of drawbacks that might be caused by user-involvement. Although some researchers have concluded that user-involvement might shorten development times, Nambisian contends that the opposite is also possible. Delays might result, if the company cannot manage the additional information gained form users. Furthermore, involving outside staff, i.e. users or customers, introduces the risk that competitors will be forewarned of the company's plans for new products or services. Finally, there is a risk that only the most vocal users will be the ones that a company pays attention to. These are not, however, necessarily the ones most representative of the vast majority of users.

Summary - Pros and cons of user involvement

As previously discussed, there are arguments both for and against user involvement. I will now summarise these.

For user involvement on level 3 (design by the customers), it has been demonstrated that customers, or so-called lead-users, can serve as the contributors of novel product ideas and innovations, at least for industrial products. The field of consumer innovations, however, is as yet thinly researched.

Involving users in collaboration to explore new ideas and technologies (level 2 involvement) can work as a catalyst for novel product ideas. Joint exploration also deepens understanding of the users' needs and wants; this information is often what von Hippel calls *sticky* and hard to transfer without user interaction. The involvement process can also be regarded as a teaching process where users are helped to unveil their hidden, or latent, needs. The result of this is products that are better designed to create value for their users.

At the same time, companies that listen unreflectively to their users run the risk of missing out on exploring new technological opportunities because there is no demand for these from current users. Adapting "too much" to current users' needs might thus cause a setback in the future. The

risk seems to be especially great for industries using rapidly evolving technology, e.g. computer disks and telecommunications. The problem can also be assumed to be larger for consumer products since ordinary consumers, in all probability, do not have the necessary competence to understand the opportunities of new emerging technologies.

Another problem is identifying and recruiting the right users to involve. The perfect user must be both innovative and representative of the vast majority of other users. The problem is especially difficult for consumer products, since consumers normally form a rather heterogeneous group. Doubts are also raised as to whether user involvement can create payback. Furthermore, the potential drawbacks of user-involvement could be; extended development times, competitors being forewarned of upcoming products, and the risk of listening to unrepresentative users.

Organising Innovation

In accordance with one of the purposes of this thesis, it also aims to discuss the implications of involving users in organising the early stages of the new product development process for a company; the issue is discussed in this paragraph.

An established view of the organisation of innovation is that it needs another type of management than that of routine work. Schumpeter (1934) stated in his classic work, '*The theory of economic development*', that the management of innovation needs another theory (dynamic) compared to routine work (static). The organising of innovation activities (innovation management) has been a research subject for several decades, wherein the problem of simultaneously trying to apply two fundamentally different ways of organising has been identified as a central one (Van de Ven, 1986). While being innovative, companies must also exploit their current businesses in order to achieve short-term survival. This situation produces a dilemma for companies since they have to allocate resources for two very different kinds of operations, namely *exploration* and *exploitation* (March, 1991). Burns and Stalker (1961), identified two main organisational types that they called *organic* and *mechanistic*. Many researchers have elaborated on the dilemma of handling two conflicting types of management (e.g. Thompson, 1967; Normann, 1977; Spender and Kessler, 1995; Tushman and O´Reilly III, 1996; Katz and Allen, 1997). These writings advocate an approach wherein innovation and production are separated. This ends up with one part of the company being the idea generator while the other part handles the current business, resulting in an interface-management problem between the two parts.

Based upon previous work carried out with my research colleague Cassandra Marshall (Magnusson and Marshall, 1999), I propose a

framework that elucidates the duality problem when managing innovation, as illustrated in Figure 3.7.

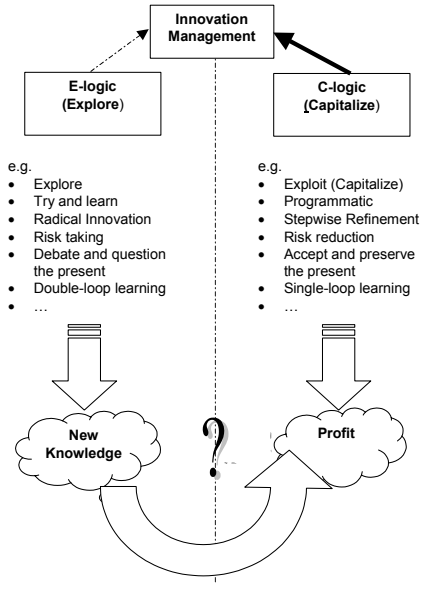

Figure 3.7 The EC framework of two contradictory types of logic to be handled by innovation management

To successfully manage innovation, the company will need, on a conceptual level, two contradicting types of logic named E-logic and C-logic; these must be handled concurrently. The letter 'E' stands for explore, and the 'C' for capitalise. The aim of the C logic is to generate *short-term profit*, by capitalising, or exploiting, the currently established businesses. On the C-side, some dominant designs have normally been established (Abernathy and Utterback, 1978) or technological paradigms (Dosi, 1982). These work as entry barriers to new innovation. The 'E' logic aims to create *new knowledge* to support the company's future businesses. This knowledge can, for instance, include information about competitors, the market, new technologies, etc. These activities are a form of exploration, with the vaguely defined objective of generating knowledge that can later be capitalized on.

Innovation can take place on both sides. The C side innovations can be characterized as 'stepwise refinements', whereas the E side innovations are more 'radical'. "Traditional R&D activities" belong to the E side. There is, thus, tension between the two sides, especially when it comes to resource allocation, when the C side has an advantage since its activities focus on the company's short-term survival. It is more problematic to justify the E side because its results do not directly generate short-term profit. Nevertheless, the E side activities are vital for ensuring the company's future wealth. To

achieve long-term prosperity, the firm should thus achieve a balance between both types of logic. One difficulty is how to effectively transform the knowledge created by the E side activities into profit. The dilemma can be illustrated by describing the origin of a new product or service.

An innovation starts with an idea. If the idea can be realised through small modifications to any of the existing products, (or services or processes), the idea will be of type C. This means that the idea is possible to implement within the current business context, i.e. no transformation between the E and C sides will be necessary. If, on the other hand, the idea does not fit into the current business context, it will be of type E. The idea can originate from, for instance, a new technological opportunity, so-called technology-push[7]. If so, it needs to be further explored in order to fit customer requirements. On the other hand, the idea can be the fruit of a detected customer demand, so-called demand-pull, which must be explored to be realised by a new product. In either case, the company must take a decision as to whether it should stop, or go on with, the exploration of the idea towards a new product offering. The decision is dependent on the estimated risk that the exploration might result in a dead-end, in other words failure to transform the idea into a profitable product.

A reasonable assumption is that if users are involved in the idea generation process, the risk of ending up with a product that lacks purchasers will be significantly reduced. It should be noted that there is a difference between detecting a user need and getting a product idea proposal from the user. When a user need is detected, this must first be interpreted and then translated into a product concept. If a user proposes an idea, the initial need has already been translated into a product concept that satisfies it. Proposals coming directly from users thus do eliminate the risk of erroneously interpreting the needs, as well as the risk of translating the needs into an unwanted concept. Innovating users have the potential to be a mechanism for bridging the E logic and C logic of the firm. When users innovate, market uncertainty is reduced. User involvement can, from a knowledge-based perspective (Grant, 1991; Grant, 1996), be seen as an extension of the firm's available resources. The users become "partial employees[8]" of the company. The firm's knowledge base will be extended by the knowledge of the users.

[7] For a discussion regarding the pros and cons of the push and pull approaches, see for example Souder (1989) and Bennet & Cooper (1981).
[8] The term *partial employee* is adopted from Mills and Morris (1986).

4. RESEARCH QUESTIONS AND HYPOTHESES

To recapitulate, in Chapter 1, three purposes of the thesis were formulated, namely to understand 1) the contribution of user involvement, 2) how the contribution can be controlled and optimised, and 3) how to implement it in the product development process. Based on the previous chapter, I will now elaborate on the purposes to define the definite research questions for the thesis. In the chapter, I will also define a number of hypotheses. These can be seen as pedagogical tools for investigating the research questions.

From the review, we have witnessed a growing interest in involving users in new product development. Nevertheless, it has become evident that it is difficult to either confirm or refute the benefits of user involvement during the early stages of new product development. From the previous research literature, two opposing views emerge regarding the general contribution of user involvement in the new product development process. A vast majority of writings claim that user involvement yields positive results (e.g. von Hippel, 1988; Wikström, 1995; Morrison et al., 2000; Thomke and Von Hippel, 2002). Nevertheless, there are also a number of writings that contend that user involvement for developing new products makes either no or a very limited contribution; there are even some writings that are of the opinion that user input can be harmful (e.g. Bennett and Cooper, 1981; Christensen and Bower, 1996; Christensen, 1997). More specifically, for the investigation into how users can contribute when innovating new end-user services, the review shows that very little research has been carried out. A more detailed discussion on this can be found in appended paper no. 5 (Magnusson et al., 2003, pp. V-1 to V-3). There is, thus, a knowledge gap in the previous literature that justifies further investigation of the contribution of user involvement in new product development.

The issue of optimising user involvement in product development has also been dealt with thinly in the existing literature. This is partly a consequence of the low number of empirical studies. But it is also due to the research methods used in most of the previous research not enabling a detailed understanding of the factors that might influence user involvement, either positively or negatively; this problem is discussed in appended paper no. 2 (Magnusson, 2003c). The review thus justifies further investigation of how to optimise user involvement in new product development.

The third research issue of the thesis is the effects that user involvement will have on the new product development process. The issue of how the product development process should be adapted to utilise user involvement during the early phases has not received much attention in the previous research literature (Alam and Perry, 2002). Nevertheless, it is a most

relevant issue for implementing and managing user involvement. It is not so surprising that the management of user involvement is thinly dealt with in the literature since it requires a thorough understanding of how users can contribute and how their contribution can be obtained. As previously discussed, these detailed investigations of user involvement are almost absent in past research; consequently, there are few writings that deal with how user involvement should be integrated into the product, or service, development process. Accordingly, the review gives cause for further research regarding how the product development process should be adapted to handle user involvement.

Understanding the Contribution

The first purpose of the thesis is to learn more about the actual benefits of involving users in the idea generation process. This can be formulated in the following research question:

> Q_1 What are the contributions of involving ordinary users in innovating new end-user services for mobile telephony, as opposed to confining this task to professional developers?

As previously stated, the thesis does not intend to draw any financial conclusions regarding the profitability of user involvement. Nevertheless, it aims to clarify how users can contribute when invited to take an active part in service innovation; it also aspires towards the opposite of this, namely to clarify what cannot be expected from user involvement. This knowledge is the foundation for further judgements regarding profitability. Accordingly, learning more about the specific benefits of user involvement is a relevant issue for both scholars and practitioners.

Optimising user involvement

The first research question concerns the *contribution* made by user involvement. However, we also want to understand how the users' contributions can be optimised. In Chapter one, it was concluded that there are essentially two issues that can be controlled in order to optimise user involvement, i.e. the *subject* and the *process*. This can be formulated in the following two research questions.

> Q_2: What are the personal characteristics that make users useful to be involved?
>
> Q_3: How does the process of involvement affect the results of user involvement?

The dependent variables that are supposed to be affected by user involvement are; the created user ideas' 1) originality, 2) user-value, and 3) producibility. On the basis of the previous review, the open-ended research

questions can be further elaborated into some hypotheses regarding how the dependent variables are affected by user involvement. First, a note concerning the notation used in numbering the hypotheses. Each hypothesis is related to a research question in the form H_{qn}, where q = the number of the research question, and n = the sequence letter of the hypothesis designated A, B, C, … etc. For example, the first hypothesis related to research question one is referred to as H_{1A}.

Originality

The review demonstrated that it is being debated among researchers whether or not user involvement brings benefits. The users' lack of technological knowledge has been put forward as one argument as to why users would not be able to come up with innovative ideas (see for example, Bennett and Cooper, 1981; Christensen and Bower, 1996); users are simply unaware of the technological opportunities and thus incapable of utilising them. It could, accordingly, be assumed that the technical skill of the involved users would affect their ability to produce the innovative ideas; a higher *technical capability* would yield more innovative ideas. This is consistent with the findings of Morrison, Roberts and von Hippel (2000); who found that technical capability was a characteristic that distinguished innovating users. It would thus be relevant to investigate whether or not the technical capability of the users involved influences the innovativeness of the created idea. We can therefore formulate the following hypotheses:

H_{1A}: Professional developers produce more original ideas than users.

H_{2A}: Technically capable users produce more original ideas than less technically skilled.

Can the original contributions of users be enhanced by actions performed in the involvement process, e.g. if users learn more about the technology that realises the service? It is at least reasonable to hypothesize this.

H_{3A}: Ordinary users, when taught more about the underlying technology that realises the services, will produce more original ideas.

The originality dimension reflects the innovativeness or creativeness of the proposed idea. As seen from the review, there is a debate as to whether creativity can be learnt or if it is a hereditary talent. The present study is convenient for testing which of the two opinions is valid for the investigated context. Until proven otherwise, we therefore hypothesize:

H_{2B}: A person's assessed creativity is positively related to his/her ability to produce original ideas.

H_{3B}: People who are trained in creative methods will produce more original ideas than those who are not trained.

As previously mentioned, originality is only one of three factor of interest to this study. The second one, the perceived *user-value* of the proposal, is the one that could be expected to obtain the most favourable contribution from user involvement.

Perceived user-value

From the review, one of the incentives for involving users is to get a better understanding of what brings value to the user. User involvement particularly enables the company to gain so-called tacit knowledge from the users. If users come up with their own suggestions for new services, it can be assumed that these will generally hold a higher value for the user than services proposed by others. It could thus be hypothesized:

H_{1B}: Users produce ideas which have a higher perceived user-value than the ideas of professional developers.

Producibility

The third factor, producibility, is more seldom dealt with in the literature. Nevertheless, it is reasonable to expect that the ideas of ordinary users will be harder to realise, since users have an inferior knowledge of the systems that realise a service. The hypothesis is thus:

H_{1C}: Users produce ideas which have a lower level of producibility than the ideas of professional developers.

One can speculate that learning more about the technology used to implement the services would cause users to create more feasible ideas. The hypothesis is thus:

H_{3C}: Users, when taught more about the technology that realises the services, will produce ideas with a higher level of producibility.

Toolkits for innovation

A thought-provoking method of stimulating user innovation, namely *toolkits for innovation*, was introduced in the review (von Hippel, 2001b; Thomke and Von Hippel, 2002). This is equipment that users can utilise to realise their new product ideas. The review revealed that the toolkits have almost exclusively been used for innovating industrial products. It would, therefore, be relevant to investigate whether toolkits could have any effect

on the development of end-user services. We accordingly formulate the following hypothesis:

H_{3D}: Enabling user toolkits for innovation will have an effect on the quality of the ideas created.

Organizing user involvement in new service development

The third purpose of the thesis concerns how user involvement can be implemented in the new product, or service, development process. The review showed that there has been very limited research as regards how the new service development (NSD) process should be designed. Even fewer researchers have delved into how the NSD process is affected by user involvement. However, the writings of Alam (2002) and Alam and Perry (2002) are an exception. They have presented a ten-stage NSD process, and investigated how users can be involved during the ten stages. The limitation is that their findings come from business-to-business services in the financial sector; there is, thus, a need for further research. The purpose can be translated into a research question:

Q_4: What are the effects of user involvement on organizing the new product, or service, development of a company?

Q_4 will not be answered by any direct empirical research study in the thesis. Instead, its answer will be discussed and deduced on the basis of the findings regarding the contribution and optimisation of user involvement. Q_4 will thus be more speculatively dealt with than the three other research questions.

Conclusion

We have identified a need for both practitioners and academics to gain further knowledge of user involvement in new product and service development; this thesis focuses on the early stages of the development process, here defined by the three steps of idea generation, idea conceptualisation, and idea assessment. The knowledge gap from the literature review has been translated into four research questions and nine hypotheses. Thus, answering the research questions, and testing the hypotheses, would make a contribution to both academics and practitioners.

5. METHODOLOGY AND RESEARCH DESIGN

Two major studies have been conducted in order to answer the research questions and test the hypotheses. The first study was a retrospective case study, henceforth referred to as the DOF study. The initial purpose was to study how user involvement could be carried out in practice. It especially elucidated how user involvement could affect the organising of the product development of a large mature company. The other study was a quasi-experimental study investigating the contribution and optimisation of user involvement, henceforth referred to as the CuDIT[9] study. The two studies will now be described in more detail as regards methodological aspects.

The DOF study

This study formed part of the Genesis project, whose purpose was to illustrate alternatives to the traditional sequential stage-gate development models for new product development. Genesis was built around four in-depth case studies at four different companies. Three of the studied cases used some kind of customer involvement in the development of new products.

The DOF study illustrates Telia Mobile's endeavour towards involving users in the development of a new concept called DOF. The time span of the case is approximately one year, starting from spring 1997. The survey was carried out retrospectively, using in-depth interviews with 11 people who in one way or another were involved in the creation of the DOF. Additionally, I had access to internal material in the form of supportive documentation for marketing, service specifications, development model descriptions, etc. As a co-worker at Telia Mobile's development department, I also had the opportunity to monitor the DOF's development work in a 'semi-detached' manner. I was also one of the DOF pilots during the autumn of 1997 in the run up to the market launch in February 1998.

The data collection was carried out during a period of 3 months at the end of 1999. Eight of the interviews were telephone-interviews and the remaining three face-to-face. Each interview was semi structured and lasted for approximately one to two hours. In some cases, supplementary contact was briefly made to clarify any obscurities. Written notes were taken during the interviews. The notes were printed out and sent back to the interviewees for comments. When applicable, corrections were made in accordance with the feedback from the interviewees. Based on the interviews, the printed material, and my own experiences, the case was written up, resulting in appended paper no. 1 (Magnusson, 2003a).

[9] CuDIT is an abbreviation of Customer Driven IT development.

The DOF study can be characterised as *explorative* with the aim of understanding how user involvement can be carried out in practice. I had also hoped to obtain some data regarding the actual contribution of user involvement. However, it was almost impossible to draw any distinct conclusions regarding the contribution of user involvement. It could not be established in which way the developed services differed in comparison to users not having been involved; the contribution to the main question was thus trifling. Anyhow, the DOF case study was a trigger to go on and design the CuDIT study, which would enable a comparative in-depth investigation of user involvement.

The CuDIT study

The CuDIT study has been the main study of the thesis; it was carried out in collaboration with two researchers – Per Kristensson and Jonas Matthing[10]. CuDIT was a quasi-experimental study emulating user involvement in innovating new mobile end-user services. Embedded in the CuDIT-study was also the development of an experimentally based research design which, in itself, can be considered a research contribution.

The CuDIT research design enables action research that produces academic knowledge as regards user involvement, while at the same time producing valuable idea proposals for the participating company. The design makes it possible to provide answers for the previously defined research questions numbers one to three (Q_1, Q_2, and Q_3); i.e. understanding the contributions of user involvement and learning how it can be optimised. In CuDIT, different settings of user involvement were compared in order to distinguish the contribution of different types of user involvement, in comparison with professional developers. Also, process data was captured for further qualitative analysis in order to explain the underlying mechanisms of user involvement. A thorough description of the method is made in appended paper no. 2 (Magnusson, 2003c). In the following text, I will describe the actual research process for the CuDIT study. Although some parts of the description overlap paper no. 2, it provides details not described in the paper. The CuDIT study can be divided into four parts (I-IV), *Planning, Data collection, Assessment,* and *Analysis*.

I. Planning and pilot testing of the design

This part was carried out during the period October 1999 – October 2000. The main purpose was to develop a robust research design, including the decision about the research method, and the detailed planning of data collection and assessment. A critical literature review provided some input

[10] At the time of the study, Per Kristensson was a doctoral candidate in psychology, and Jonas Matthing a doctoral candidate in business administration, both located at the Service Research Center of the University of Karlstad.

for the design, but also showed that there were no "off the shelf" methods available for investigating the research purposes. Thus, a new research design had to be developed. After discussing several alternatives, an experimental approach was decided upon. The experiments were supplemented with the diary-method, and interviews of the participants. A more detailed description of the design will be described further on in the thesis.

To test the preliminary design, a pilot test using a group of three people was carried out in April 2000. This provided valuable input and resulted in some changes to the design. For instance, it was decided to prolong the experiment by about two weeks. It also resulted in some clarifications being made in the instructions given to the participants.

In May 2000, the first "real" experiment was carried out. In October the same year, a meeting was held with our research supervisors and examiners to validate the method used; the research design passed their critical evaluation.

II. Data Collection

This part was carried out during the period April 2000 – April 2001. As described above, this was partly in overlap with the "planning" phase, since the method had to be tested before it could be validated.

The research design was attempted in order to constitute a realistic way of realising user involvement during the innovation process. The basic design was made up of experimental trials, where different user involvement trials could be compared; it can be described as a *Multiple-Group Posttest Design* (Spector, 1993, page 38). Five experimental trials were held; one with a group of professional service developers, thus forming a control (reference) group for non-user-involvement. The participants were instructed to create one or more service ideas on the basis of a given assignment. Since the resulting ideas were solutions to a common assignment, they could be compared and ranked against each other, thus enabling the determination of the users' contributions when involving them in the idea creation process. The dependent variable was thus the quality of the generated ideas, which in turn could be divided into the originality, user-value, and producibility of the ideas. During the trials, data was also captured from the process to enable a deeper understanding of how and why different factors influence user involvement.

Sample

The professional service developers were randomly recruited from Swedish mobile telephony operator Telia Mobile. The participating users consisted of university students from mainly two different categories, *technically skilled users* and *ordinary users* (non-technically skilled). The Technically Skilled Users were computer science students at the University of Karlstad,

whereas the Ordinary Users were students in non-technical study programmes, e.g. social science, teacher training, business administration, etc, from the same university. All students volunteered to participate. The main reason for choosing students was that they represent one of the most frequent SMS user-groups, thus being well representative of users. They also form a homogenous group of people.

Outline

The actual experiments consisted of four stages, *initiation, idea creation, delivery,* and *evaluation*. The outline is illustrated in Figure 1.

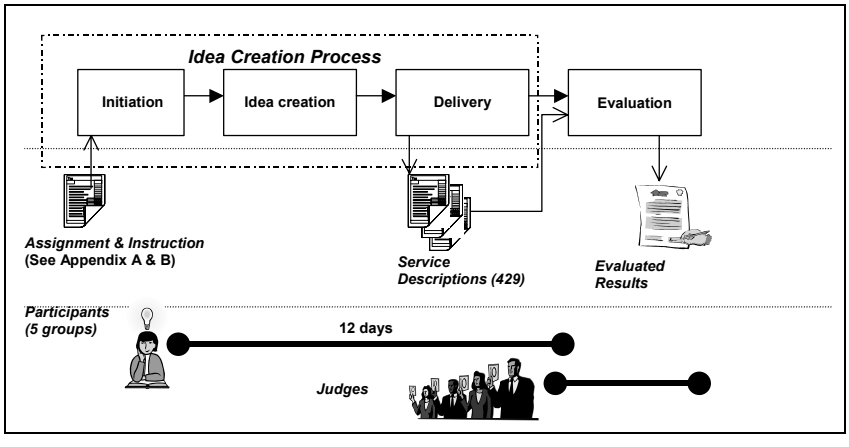

Figure 5.1 Outline of the experiments.

Initiation

At the initiation meeting, each trial group was gathered and the study introduced. A common, yet individual, assignment was given to each participant. The assignment for the user-group was to create service ideas that would provide itself with value. The professionals, on the other hand, were instructed to come up with ideas for services that they thought would add value to the "user-group". Through these different formulations, both professionals and users would actually be trying to satisfy the same target group; the service ideas could thus be compared. The services were intended to utilise an application platform, Unified Services (US). US is essentially a converter between SMS[11] messages in GSM and http-calls on the Internet; the platform has previously been described with an illustrating example on page 26.

Giving out instructions for experiments featuring humans is a vital yet difficult part. Holt (1995) argues that many experimental results lack

[11] SMS is an abbreviation for *Short Message Service*, a technology for sending and receiving text messages using mobile phones. SMS is defined within the GSM specification. GSM is a pan-European standard for mobile telephony. The system was introduced in Europe in 1992, but is today to be found all over the world.

validity due to poor instructions. He emphasises that much care needs to be taken when formulating the instructions for an experiment. Therefore, the instructions and assignment for the experiment were given in both verbal and written form. A diary was handed out to the participants in which they were instructed to document the ideas that came up, as well as the activities that triggered the idea creation. The diary (process) data could be used for gaining a deeper understanding of the individual idea creation process, but could also be used for *triangulation*, i.e. making explicit the factors that influenced the creation of the ideas and solutions. Below is an excerpt from the assignment given to the users (translated from Swedish); the complete assignment can be found in Appendix A:

> Your assignment is to create – using the knowledge you have attained of Unified Services, along with a mobile phone – services that produce an added value for you.
>
> Put simply, you are going to create one or more services that you perceive as important. It is important that you are able describe how your solution creates an added value for you. The solution can, for instance, facilitate information retrieval, or create a beneficial experience of some kind. The one who decides the value adding is you yourself, accordingly, there is no right or wrong here.

The written assignment and instructions were put in a blank diary. The participants were instructed to document the idea creation process; an excerpt is shown below (translated from Swedish); the complete instruction can be found in Appendix B:

> It is important that you make notes in the diary of how your ideas emerged. That is, where did you get the idea? Was it from someone you have worked or been in discussion with? Did the idea arise from an association path when you saw or heard something? The purpose of the narratives is to enable us to understand the originating process of your ideas.

The participants used the diaries in rather diverse ways. Some used them more as a notebook when an idea came up, i.e. not much of the process was captured. These notes were, however, often richer than the resulting service description. Others used the diary to write small narratives around their idea creation. The following example illustrates how one of the participants came up with the idea that an alarm function would be convenient. She wrote: *"I'm on my way home from the city, walking into the subway that leads to my home. It's dark ... a personal alarm would be a function appreciated by all, but by girls in particular"*.

To provide the participants with a sense of how these services might work and inspiration, they were given access to a *service portfolio* consisting of about ten implemented services. To use and test these, the participants were equipped with a mobile telephone (Ericsson 1018S) and a prepaid card (Telia GSM Refill) topped up to a value of approximately 25 euros[12] plus a chatboard, se Figure 5.2.

[12] The cost of sending an SMS was 0.15 euro.

Figure 5.2 Ericsson's chatboard and telephone, model 1018S

The chatboard is a small keyboard that can be plugged into the mobile phone to ease the input of text messages. All participants received hands-on training on how to use the phone and chatboard by means of testing some of the services. To encourage the submission of ideas, it was also stated that an idea would remain the intellectual property of the *creator of the idea*. In order to make the experimental setting more stimulating, the participants were informed that an award of 80 euros would be given for the best service idea. It was also stated that one could choose to work alone or collaborate with others. If one collaborated with other participants, this was to be noted in the diary. Each individual was expected to produce at least one service idea of his or her own.

The professionals all underwent the same initiation procedure, with the exception that their ideas would become the intellectual property of the company and that they would not receive any best service reward. This conformed with standard policy for job-related ideas created by the employees of the company. It should, however, be noted that the company had a regulated payment system for ideas falling under the protection of patent laws. If an idea was patented by the company, the employee would be rewarded with a sum of around 2 400 euros and upwards. There was, thus, an incentive for the professionals to come up with valuable ideas as well.

To obtain individual background data, the participants filled in a form asking for personal data such as age, experience of mobile telephony and SMS usage. Upon entering the trial, each participant also underwent three different personality tests to determine more specific personality characteristics. The rationale for using the test was to support the answering of research question number two, i.e. what are the personal characteristics that make users useful for involvement?

The first test was the **FS test**, a Swedish test correlating with a person's creativity (Holmquist and Ekvall, 1986). The measures were standardized against the normally distributed stanine scale from 1 to 9, where 1 is least creative and 9 is most creative. Since this test is aimed at assessing a

person's creative capability, it can more specifically be used to investigate the hypothesis that a person's assessed creativity is positively related to his/her ability to produce original ideas, i.e. hypothesis H_{2B}.

The second test was the Life Orientation Test (**LOT**), a test for measuring dispositional optimism (Scheier and Carver, 1985). The test consists of 12 items, 4 of them being filler items, ranging from 8 (most pessimistic) to 32 (most optimistic). The theory is that optimistic people are better able to cope with problems arising during goal-driven activities than those who are pessimistically disposed.

The third test was Technology Readiness (**TR)**, indicating a person's willingness to adopt new technology (Parasuraman, 2000), ranging from –20 to +20. The interpretation is that scores of approximately 11 to 20 are "highly technology ready", 0 to 10 "somewhat ready", -10 to –1 "somewhat resistant", and –20 to –11 "highly resistant". Since the studied services are technology-based, it should be relevant to investigate whether the creator's technology readiness influences the characteristics of the resulting idea.

Idea Creation

The *idea creation period* of the study lasted for 12 days; this was anticipated to be long enough for the participants to become saturated in idea creation, i.e. even if the period had been longer, not so many more ideas would have come up. The pilot test had a shorter creation period. However, the feedback from the pilots resulted in a longer period.

During the idea creation period, communication between trial management and the participants was kept to a minimum. However, a notification was sent, in the form of an SMS, to all participants on day two to remind them to be active during the trial. Technical support was available by e-mail or phone. Only questions regarding technical problems, as well as practical usage of the telephones and services, were attended to. Approximately 20 support questions were received during the five trials.

Each of the trials represented a unique "set-up" of user involvement. One of the trials, Trial A, consisted solely of professionals, hereby forming a reference, or control, group for non-user involvement. The user groups were composed so as to match the posed research questions and to enable hypotheses testing. The five trials will now be described in more detail. In the descriptions, linkages to the different research hypotheses are also marked.

Trial A (12 persons), *"Professionals",* consisted of 12 professional service developers; randomly recruited from Telia Mobile, a Swedish mobile telephony operator. All of them came from an R&D unit responsible for developing new non-voice mobile services, i.e. services based on SMS, WAP, GPRS and suchlike. Their professional experience in the field varied from 1 up to 10 years. The participants had slightly different knowledge of the specific US platform; but all had the technical competence to understand

its technical limitations and opportunities. The participants were asked not to interact with any of the students in the target group, thus emulating a setting where experts try to envision the users' wants and needs.

Trial B (16 persons), henceforth called *"Technically Skilled Users"*, was composed of students in grades 2-4 on the computer science program. Since this group was familiar with computer programming, it was possible to emulate the previously-mentioned ideas of von Hippel to offer users a "toolkit for innovation". This was realised by making a "developer's toolkit" available to the participating users, thereby enabling them to act as developers as well. The toolkit was the same as the one used by professional developers at the company; it consisted of a CD-ROM with the necessary software and programming examples. Since the toolkit required knowledge of JAVA programming, it was a prerequisite that the participants possessed this skill before entering the trial. A professional service developer gave a practical introduction to the toolkit (about 2 hours). Following the introduction, six computers were available for testing and consulting the service developer. The training also included a basic refresher course (approx. 3 hours) in JAVA, given by a university lecturer. The output from this group was expected to be the same as from the other groups, namely *ideas* for new services. The difference was that this group had the opportunity to test their ideas by additionally transforming them into working prototypes. This trial can be used to test the hypothesis that technically capable users produce more original ideas than less technically skilled ones (H_{2A}), as well as the hypothesis that user toolkits will have an effect on the quality of the ideas created (H_{3D}).

Trial C (19 people), *"Ordinary Users",* the participants in this trial were supposed to represent non-technically skilled people (at least no programming skills). The group was represented by university students on non-technical study programmes, e.g. social science, teacher training, business administration, etc.

Trial D (20 people), *"Consulting Ordinary Users",* came from the same sample of students as group C; the people were randomly assigned to either group C or D. The difference between trials C and D was that the participants in trial D, in groups of 4-5 persons, met a professional service designer for consultation for one to two hours. Before the meetings, the professionals were instructed to take a rather passive role. Even if they had ideas regarding how the participants' ideas could be improved, they were not to reveal them unless they would have done so in a real situation. The reason for this was to emulate a situation where the ownership of the idea is not in the hands of the company. One could thus not freely share thoughts regarding improvements since the idea could end up in the hands of a competitor. The information given by the professionals was therefore normally limited to informing the users as to whether an idea was feasible

or not. They could also tell the participants if they knew that the proposed idea already existed. This approach gave the participating users the opportunity for a more individualized learning of the technical possibilities and limitations of the system during the innovation process. The group discussion with an expert could also be expected to facilitate the users' ability to articulate their ideas. This trial can be used to test the hypotheses that users, when taught more about the underlying technology, who realise the services will produce ideas that are more original (H_{3A}) and have a higher level of producibility (H_{3C}).

Trial E (17 people), *"Creativity Trained Ordinary Users",* consisted of the same type of people as trials C and D, i.e. university students in non-technical study programs, e.g. social science, teacher training, business administration, etc. There was, however, one important difference; before entering the trial, this group had been trained in different creativity techniques, e.g. Brainstorming, Slip writing, Random input, Six thinking hats. Accordingly, this trial can be used to test the hypothesis that users who are trained in creative methods will produce more original ideas than those who are not trained (H_{3B}).

Table 5.1 summarizes the five trials of the study. Table 5.2 exhibits the characteristics of the groups related to the five set-ups.

Table 5.1
Set-ups used in the study.

Trial	Freq. of interaction	Type of user interaction	Available Tools	Num. of participants	Num. of ideas
A. Professionals (no user involvement)	*Not Applicable*	*Not Applicable*	US, Service Portfolio, Developers' toolkit	12	55
B. Technically Skilled Users	1 at start-up + 1 after innovation	Verbal at start-up Written at termination Verbal interview	US, Service Portfolio, Developers' toolkit	16	73
C. Ordinary Users	1 at start-up + 1 after innovation	Verbal at start-up Written at termination Verbal interview	US, Service Portfolio	19	123
D. Consulting Ordinary Users	1 at start-up + 2 during innovation + 1 after innovation	Verbal at start-up Verbal during innovation Written at termination Verbal interview	US, Service Portfolio	20	111
E. Creativity Trained Ordinary Users	1 at start-up + 1 after innovation	Verbal at start-up Written at termination Verbal interview	US, Service Portfolio	17	67
				84	**429**

Professional developers were professional service designers at the Mobile Internet Lab unit of Telia Mobile in Karlstad. *Technically skilled users* were computer science students at Karlstad University. *Ordinary users* were economics, teaching, and political science students at Karlstad University. *Creativity ordinary trained users* were students attending a special course in creativity development at Karlstad University.

Table 5.2
Personal characterstics of the participants in the five trials/groups

		A Pro-fessionals (N=12)	B Technically Skilled Users (N=16)	C Ordinary Users (N=19)	D Consulting Users (N=20)	E Creativity Trained Ordinary Users (N=17)	All Groups (N=84)
FS-test	M	5.92	3.94	6.37	4.55	5.76	5.29
	SD	1.56	1.61	1.77	1.23	1.86	1.83
LOT	M	23.08	20.88	24.53	23.50	23.47	23.17
	SD	3.70	4.13	4.34	3.75	5.04	4.31
TR	M	8.00	3.88	5.79	4.65	1.88	4.68
	SD	4.11	6.09	5.92	4.97	6.06	5.73
Age	M	36.50	25.63	23.79	22.10	27.53	26.31
	SD	8.13	5.62	2.18	2.02	9.07	7.31
Gender	Females	2 (17%)	4 (33%)	4 (21%)	8 (40%)	9 (53%)	27 (32%)
	Males	10 (83%)	12 (67%)	15 (79%)	12 (60%)	8 (47%)	57 (68%)
Mob. tele. experience (years)	M	10.42	2.97	3.60	3.88	4.32	4.67
	SD	6.04	2.17	2.33	2.50	3.28	4.02

Delivery

After the 12-day idea creation period, a meeting was held at which the *service ideas* and *diaries* were delivered. The service ideas were written descriptions in a predefined format, and could thus be seen as a first conceptualisation of the service. The format included; the date of the idea creation, the developer's name, the name of the service idea, a short functional description, and the intended user-value of the service. See Appendix C for a full description of the format. The five groups produced a total of 429 new service ideas; 55 came from the 12 professional developers and 374 from the 72 users. All participants were also interviewed within the next two weeks, the interview being semi-structured in nature. The interviews were tape-recorded and transcribed into print. The purpose of the interviews was to trace relevant process data, such as important incidents that made the participants come up with especially good ideas. Accordingly, much of the time during the interview was used for discussing how the submitted service ideas had been triggered. In several of the interviews, information was gathered that clarified the written service description in such a way that a totally new interpretation ensued. In some cases, a rather mediocre idea suddenly appeared ingenious. On the contrary, some of the ideas were perceived as less brilliant after clarification during the interview. For the coming evaluation, none of the data from the interviews was used to change any of the original written descriptions.

III. Assessment

When all trials had concluded and the 429 service descriptions had been collected, the evaluation phase followed. The purpose of this was to assess the dependent variable "quality of the produced ideas". In Chapter 3, a

framework for assessing ideas was proposed wherein product-intrinsic and business-context factors are separated. The product-intrinsic factors are to be evaluated before the market aspects. It was also stated that the important factors vary from context to context. To decide the pertinent quality dimensions for mobile telephony end-user services, a focus group session was arranged as described below.

Deciding dimensions for assessment

Participants included five company experts in the assessment of mobile telephony services. A short introduction was first held explaining the assignment. Then the participants individually wrote down up to five dimensions they considered important when assessing a new service idea. Each dimension was written on a separate piece of paper; also a brief reason was to be given as to why it was important. The experts were then asked to cluster their suggestions on a whiteboard, which resulted in five clusters tentatively called *originality, user-value, producibility, internal,* and *market*. The latter two are contextual; the first three can accordingly be regarded as the important intrinsic factors for mobile telephony end-user services. The following rationales for the three dimensions were put forward in the subsequent discussion. A lot of value in today's companies is determined by the future potential of their offerings. The ability to produce innovative products and services is often a necessity, at least in the telecommunications business. *Originality* is a concept that enfolds the innovative dimension. One reason for involving users in the development process is to co-opt their preferences, desires and needs. *User-value* takes the user's perspective; what value lies in using the service, is it likely that the target group will use the service? The third dimension *producibility*, i.e. the ability and ease by which the service can be produced, takes the producers' (the mobile operators') perspective. A concept can be excellent from a user's perspective, and also extraordinarily innovative, but if it cannot be produced (i.e. having a very low level of producibility), it will have no short-term business value for the company. However, the idea can have a long-term business value. For example, the level of producibility can be very low because current technologies cannot implement the idea. However, it might be possible with forthcoming technologies. If protected by a patent, the idea could hence be valuable in the future.

After the first meeting, three instructions for assessing the dimensions were drawn up. During a second round, the experts made an assessment of ten ideas using the instructions. The results showed that the three dimensions seemed to be relevant, but some modifications to the instructions were necessary.

Selecting judges

However, there was a problem; who would make an appropriate judge to assess the service descriptions? Is it the users who should make the assessment, or is it the experts? One can argue that it is the users' points of view that should guide the assessment, since they are the ones who will benefit from using the services. On the other hand, since the services are technically-based they might require that the assessor have some technical competence. We can conclude that the *type* of judge evaluating a certain result could affect the evaluation.

Due to the uncertainty regarding who would be appropriate to act as a judge, three different panels of judges were used to evaluate the ideas. The first panel was a group of six experts experienced in evaluating mobile communications service ideas. Three of them were Telia Mobile employees, whereas the other three were not employees but had more than ten years' experience each of mobile telephony service development. They could thus be considered good evaluators of the feasibility of implementation, as well as having a broad frame of reference in order to appraise the novelty of the ideas. To assess the ideas from the end-users' points of view, "users" constituted the two remaining panels. Panel number two represented technically-skilled users and was composed of three students of computer engineering; this panel could be assumed to be representative of *early adopters* (Rogers, 1995). The third panel represented ordinary users who are familiar with mobile telephony. This panel had the same background as the ordinary users participating in the experiment.

Assessment procedure

The ideas were assessed using the *Conceptual Assessment Technique* (CAT) proposed by Amabile (1996). CAT uses a panel of independent judges to evaluate the creativity of different "designs" presented to them. A design is a generic word for the object to be evaluated. It can, for example, be a product, a work of art, or even a poem. CAT can also be used for evaluating *other dimensions than creativity*. In one study concerning children's artistic creativity, as many as 23 dimensions were evaluated (ibid., p 45).

One dimension was evaluated at a time. In other words, if a judge were to evaluate all three dimensions, the procedure would be repeated three times. The judges made the assessment independently of each other, not knowing who the inventor of the idea was. Each idea was classified on a scale of one (1) to ten (10). For the three dimensions (originality, user-value, producibility), a score of one represented the least original, least valuable, and hardest to produce. Similarly, a score of ten corresponded to the most original, most valuable, and easiest to produce. To ensure that all the judges in the panel had understood how the dimension was to be evaluated and to *calibrate* the judges' assessments, a test round was completed. Five service

descriptions were picked and assessed individually by the judges, the panel then discussing the results. In particular, if some of the five ideas were assessed very differently, this was discussed. Finally, the service ideas were evaluated for the dimension in question. The assessment was made individually, i.e. no discussions were allowed among the judges.

The evaluation was carried out during the period March 2001 – June 2001. To reduce the workload, each judge assessed two-thirds of the ideas. Each idea was, however, assessed by at least two judges from each panel; accordingly, each judge assessed a total of approximately 290 ideas. The expert panel evaluated three dimensions, i.e. 870 assessments. The two user panels assessed two dimensions, i.e. 580 assessments. A grand total of 9 280 assessments were thus collected. For practical reasons, the assessments had to be performed in two different ways. For the experts, a two-day intensive workshop was held at a boarding house, where all the assessments were concluded. For the two user groups, an introduction meeting was held lasting half a day. Both dimensions to be assessed were presented and calibrated, as previously described. However, the judges had to conclude their assessments at home. They received a stamped-addressed envelope to return their assessments as soon as possible, at the very latest within a week.

IV. Analysis

Although the CuDIT study was a joint effort between myself and two other researchers, the final analysis has been made individually. The main reason for this was that we had different research questions to answer. The analysis of the material has been both quantitative and qualitative. For the quantitative analyses, the SPSS® software program has been used. This has mainly been in order to test the defined hypotheses. The qualitative data, i.e. diaries and interviews, has been used to gain a deeper understanding of what makes people come up with good ideas, or what makes them come up with bad ideas.

6. RESULTS AND ANALYSIS

The main purpose of this chapter is to account for the analysis and results from the CuDIT study[13]. The results will then be further discussed in the following chapter. Many of the results can also be found in the appended papers; however, all results relevant to the forthcoming discussion will be provided here.

The structure of the chapter is as follows. First, selection of the appropriate judges for assessing the service ideas is discussed. Then the analysis and results related to research question Q_1 are presented, i.e. what are the observable differences in the users' ideas compared to those of the professionals? The analysis is first done as a quantitative analysis and then by presenting descriptive differences beyond the dependent variables. Then follow the results and analysis of whether the selection of users can be optimised in relation to the dependent variables, i.e. an analysis related to research question Q_2; what are the personal characteristics that make users useful for involvement? Next, the question of whether the act of involving users can be optimised (Q3) is analysed, primarily using a number of hypothesis tests. Concluding the chapter is an analysis of the higher quartile, i.e. only the 25% best scores for each dimension. The fourth research question (Q_4), regarding the effects of user involvement on organising the development process, is not dealt with in the chapter. It is instead discussed in the coming chapter since it is dependent on the results of the other research questions.

Appropriate judges for idea assessment

As discussed in Chapter 5, panels of different types of judges were used for assessing the created ideas. The appropriateness of the different types of judges is discussed in appended paper no. 4 (Magnusson, 2003b, p IV-10). The paper comes to the tentative conclusion that the type of service ideas examined in this study – technology-based self-services – need technically-skilled judges. Therefore, unless otherwise stated, only assessments made by the *expert panel* have been used to calculate the results in this chapter. It could be argued that users should suitable to evaluate the user-value of the ideas. As previously discussed, the user-value is decided by the individual user's experience of the service. This indicates that it is difficult to evaluate the user-value of an idea if the judge is not the intended user. Service ideas with which the judge can identify himself or herself as a potential user would thus probably receive a more correct assessment. Nonetheless, it can be expected that all user judges can identify themselves as potential users of

[13] The results of the Genesis study are to be found in appended paper no. 1 (Magnusson, 2003a).

only a limited number of the ideas. The expert judges were all experienced in assessing services and technical designs so I have made the assumption that the expert panel would also be sufficiently good to evaluate the relative user-value of the services. A sign of the expert panel's competence as judges is the strong inter-judge correlation exhibited in Appendix H.

It must be noted that my conclusion that expert judges are to be preferred is only valid for the assessment of *ideas* in the specific context of the CuDIT study. Idea assessment is indeed something different to assessing a working prototype or a completed service. At the idea stage, many parameters are still not defined, putting extra demands on the judges' ability.

Analysing the contributions of users

This paragraph analyses differences in the characteristics of the created ideas between the users and the professionals, thus contributing to research question Q_1. If user involvement makes a contribution, it ought to be differences in the characteristics of the generated ideas between users and professionals. This will be analysed in two ways. First, in a quantitative analysis, the differences in certain characteristics of the created ideas between users and professionals are compared, i.e. analysing the dependent variables. Second, a descriptive analysis is made where other features than those related to the dependent variables are presented.

Users vs. Professionals a quantitative analysis

Table 6.1 displays the mean values and standard deviations from the service idea assessments for the three dimensions, done by the expert judges.

Table 6.1
Descriptives of Service Idea Assessment

Trial/group	*Number of ideas*	*O* Mean	*O* SD	*U* Mean	*U* SD	*P* Mean	*P* SD
A. Professionals (N=12)	55	2.99	1.07	4.05	1.22	6.84	1.48
B. Technically Skilled Users (N=16)	73	2.79	1.09	4.36	1.37	6.91	1.84
C. Ordinary Users (N=19)	123	3.55	1.79	4.54	1.71	6.01	2.36
D. Consulting Users (N=20)	111	2.98	1.27	4.56	1.52	6.63	2.09
E. Creativity Trained Ord. Users (N=17)	67	4.10	1.58	4.99	1.68	4.43	2.05
Total	***429***	***3.29***	***1.50***	***4.52***	***1.56***	***6.18***	***2.21***
F. All users, merger of groups B-E (N=72)	374	3.33	1.55	4.59	1.59	6.09	2.28

O = Originality; P = Producibility; U = User-value

We first investigate whether there are any differences between the assessed characteristics of the ideas. In Chapter 4, it was hypothesized that there are differences in all the three dimensions investigated, these were:

Hypothesis H_{1A}: Professional developers produce more original ideas than users.

Hypothesis H_{1B}: Users produce ideas which have a higher perceived user-value than the ideas of professional developers.

Hypothesis H_{1C}: Users produce ideas which have a lower level of producibility than the ideas of professional developers.

A first rough analysis in order to investigate the differences among users and professionals in the characteristics of the ideas is to compare the mean values of all the ideas of the professionals (A) with all the ideas of the users (F). Using a t-test for the three assessed dimensions yields significant differences between groups A and F for User-value (t=-2.39, p=.017) and Producibility (t=2.38, p=.018). However, the Originality did not yield any significant difference (t=-1.57, p=.116). The first analysis thus indicates that there is a difference between the ideas created by users and the ones created by professionals. It indicates that users tend to produce ideas with a higher user-value but a lower producibility than the professionals. The same conclusion is made in appended paper no. 4 (Magnusson, 2003b), when comparing the groups Professionals (A) and Ordinary Users (C). Both hypothesis H_{1B} and hypothesis H_{1C} are thus supported, at least in some of the trials.

Returning to originality, a visual inspection of the figures in Table 6.1 indicates that there are differences between the user groups. For example, group B's and group D's average originality scores are both *beneath* those of the professionals, whereas both group C's and group E's are *above*. Accordingly, since some group averages are higher and some lower, it could be that users produce, under some circumstances, ideas that are significantly different in their average originality than those of the professionals. Appended paper no. 3 (Kristensson et al., 2002) actually shows that users produced significantly more original ideas than did the professionals. In the paper, a one-way ANOVA test between the groups Professionals (A), Ordinary Users (C), and Creativity Trained Ordinary Users (E) yielded that the creativity trained users' ideas were assessed as significantly more original than those of the professionals. It also indicated that the ordinary users' ideas were more original than those of the professionals, although close not statistically significant (p= .102)[14]. The paper used the very moderate post hoc test of *Sheffé*; when instead applying the commonly used *LSD test,* this shows that the ordinary users' ideas were also assessed as significantly more original (p= .033) than those of the professionals. Hypothesis H_{1A} can thus be rejected. On the contrary, the findings suggest that the hypothesis should instead be that users can, under

[14] Scheffé actually recommends that the significance level (α) be set to 10 percent (Scheffé, 1959, p 71), making p=.102 very close to significant.

certain circumstances, produce more original ideas than the professional developers.

Descriptive differences in the users' and professionals' ideas

New categories

The users contributed with other categories of ideas than did the professionals. To facilitate the evaluation process in the CuDIT study, all ideas were categorised. To define the categories, five persons were asked to independently go through a selection of 100 of the ideas and structure them in between 5 and 15 categories. Each category was to have a common denominator. The result was twelve different categories shown in Table 6.2 below. The table shows how the ideas from the different groups were distributed across the twelve categories. The seven items that had significantly more or significantly fewer ideas than expected in a chi-square test are marked by indexes 1-7 in the table. Items with an absolute value greater than 2 for the adjusted residual are regarded as significant (Hinkle et al., 1998, p 581). A plus sign in the residual indicates significantly more ideas than expected; whereas a minus indicates significantly fewer than expected.

Table 6.2
Category distribution of ideas for the groups

Category	Group A		Group B		Group C		Group D		Group E		TOTAL	
	n	%	n	%	n	%	n	%	n	%	n	%
Public information gathering	27	49.1[2]	30	41.1	34	27.6[4]	55	49.5[5]	12	17.9[6]	158	36,8
Others	1	1.8	1	1.4[3]	13	10.6	5	4.5	14	20.9[7]	34	7.9
Self-service and reservation	4	7.3	5	6.8	11	8.9	6	5.4	5	7.5	31	7,2
Remote Control	2	3.6	7	9.6	9	7.3	5	4.5	7	10.4	30	7,0
Communications & telephony	7	12.7[1]	6	8.2	9	7.3	3	2.7	3	4.5	28	6,5
Games and entertainment	3	5.5	3	4.1	7	5.7	9	8.1	5	7.5	27	6,3
Private information handling	2	3.6	8	11.0	4	3.3	9	8.1	3	4.5	26	6,1
E-business	4	7.3	1	1.4	11	8.9	5	4.5	4	6.0	25	5,8
Alert/alarm	0	0	3	4.1	10	8.1	4	3.6	6	9.0	23	5,4
Info + position	3	5.5	3	4.1	6	4.9	5	4.5	5	7.5	22	5,1
Personal assistant	2	3.6	4	5.5	8	6.5	4	3.6	2	3.0	20	4,7
Gambling	0	0	2	2.7	1	.8	1	.9	1	1.5	5	1,2
Total	*55*	*100*	*73*	*100*	*123*	*100*	*111*	*100*	*67*	*100*	*429*	*100*

A= Professionals; B=Technically Skilled Users; C= Ordinary Users; D= Consulting Ordinary Users; E= Creativity Trained Ordinary Users.

Significant Adjusted Residuals and p-values (Haberman, 1973): [1] R_{adj}=1.994; p=.046; [2] R_{adj}=1.994; p=.043; [3] R_{adj}= –2.276; p=.023; [4] R_{adj}= –2.501; p=.012; [5] R_{adj}= 3.227; p=.001; [6] R_{adj}= –3.495; p<.001; [7] R_{adj}= 4.278; p<.001

The Professionals' (Group A) ideas were mainly concentrated on two of the categories, namely Public Information Gathering (49.1%), and Communications & Telephony (12.7%). Public Information Gathering encompasses services that collect and extract data available on the Internet. Communications & Telephony encompasses extensions of traditional telecommunications. Both these categories had significantly more idea proposals if an equal distribution across the categories was expected. The

majority of the Professionals' ideas were, accordingly, within the scope of their expertise. Also, the Consulting Ordinary Users submitted significantly more proposals to the Public Information Gathering category, whereas the Ordinary Users made significantly fewer suggestions than expected[15]. It thus seems that Group D's interactions with the Professionals affected the categories of ideas. Almost one half of the ideas were in the Public Information Gathering category for the Professionals and Consulting Ordinary Users, whereas the Ordinary Users only had 27.6% in this category. However, the Creativity Trained Users were by far the ones with the lowest frequency in the Public Information Gathering category, only 17.9%.

Non-service suggestions

Many of the users' proposals were not considered to be actual *service* proposals, instead describing some hardware enhancement to the mobile phone. The Creativity Trained Users submitted significantly more ideas in this category. In total, non-service ideas accounted for 17.5% (64) of the proposals. The total distribution of the non-services can be seen in Table 6.3. The table also displays the standardized residual for each item.

Table 6.3
Distribution of non-services between the groups

		Group A	Group B	Group C	Group D	Group E	Total
Services	Observed	55	69	103	98	40	365
	Expected	46.8	62.1	104.7	94.4	57.0	365
	Std. R	1.2	.9	-.2	.4	-2.3*	
Non-services	Observed	0	4	20	13	27	64
	Expected	8.2	10.9	18.3	16.6	10.0	64
	Std. R	-2.9*	-2.1*	.4	-.9	5.4*	
	Total	*55*	*73*	*123*	*111*	*67*	*429*

A= Professionals; B=Technically Skilled Users; C= Ordinary Users;
D= Consulting Ordinary Users; E= Creativity Trained Ordinary Users
*Significant contribution because absolute value of *R* greater than 2.00.

It is notable that none of the Professionals submitted any non-service; it would thus appear that for them a service proposal should not include any changes to the handset. For the users, this distinction was apparently not obvious. Also notable, is the fact that 17% of the ideas submitted by Group-D were non-services, in spite of the fact that they consulted the experts.

More than merely ideas

The users' proposals in the CuDIT experiment could be organised in other ways than the categories just described. Another way is to analyse the *type of proposal*. Four different types can be identified, as illustrated in Table 6.4.

[15] If equal distribution across the categories was expected.

Table 6.4
Types of propsals exemplified

Type of proposal	Example using the bus timetable
1. Error report	"The service told me a time for the next bus that had expired two minutes ago, useless."
2. Suggestion for improvement in functionality	"When I was at the library, I wanted to know when the bus would leave two hours from now. This was not possible since the service only tells you when the *next* bus is leaving. I would like to have a time parameter included in the service."
3. Context translation	"I liked the concept of the bus timetable. It would be very useful for me to be able to get access to the train timetable as well."
4. Totally new service	*Not Applicable*

To illustrate the different types, the *bus timetable service* is used. This is one of the sample services included in the CuDIT experiments. The service consisted of two commands. The first was to get the time for the next bus leaving from the city centre up to the university. The second was to get the time for the next bus in the opposite direction. A dozen of the submitted services concerned modifications of the bus timetable. The type of proposal decides how the information can be further elaborated. Type 1 proposals, error reports, i.e. not service suggestions, yet valuable for fixing bugs in the original prototype. Type 2 proposals (functional improvements) can also be used to improve the original prototype by adding new functionality. Type 3 (context translations) can be the seed for new prototypes, e.g. the train timetable. In this case, most of the original service logic can be reused. The last type, type 4, however, is a proposal that has no obvious relationship with the tested prototypes. Type 4 ideas are thus the ones that are most difficult to predict.

Optimising the contribution by selecting the right users

So far, we have established that involving users makes a contribution to the idea generation process. But, can this contribution be optimized, either by selecting the "right" users to involve or through the manner used for involvement? In this paragraph, we will first attend to the former, i.e. are there any personal characteristics that make certain users suited to being employed as idea creators, i.e. research question Q_2.

Personal characteristics

In the experiments, data capturing the personal characteristics of the participants was collected; see Table 5.2 (p 60). To test for characteristics that could have an influence on the dependent variables, a Pearson's two-tailed correlation was performed between the personal characteristics variables and the participants' mean scores for each dimension. The results are shown in Table 6.5 below.

Table 6.5
Correlations between personality characteristics and the dependent variables

Dependent variable		AGE	Usage	FS	LOT	TR
Originality	r_p	.047	-.158	.093	-.080	-.139
	p (2-tailed)	*.678*	*.155*	*.408*	*.474*	*.213*
User-Value	r_p	-.205	-.174	-.090	-.096	-.289**
	p (2-tailed)	*.065*	*.117*	*.420*	*.391*	*.008*
Producibility	r_p	-.058	.088	-.160	-.013	.224*
	p (2-tailed)	*.606*	*.432*	*.150*	*.906*	*.043*

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

As can be seen, only the TR test displayed any correlation with the dependent variables. TR was positively correlated with producibility and inversely correlated with user-value. As the TR test can affect the dependent variable, it was investigated whether there were any significant differences between the groups in the TR variable. If so, this could cause an *interaction effect* in the results, i.e. it is not the set-up of the trial that causes the difference in results, it could instead be differences in the personal characteristics of the participants. Since it was only the TR test that correlated with the dependent variables, the investigation can be limited to this test. Applying the Kruskal-Wallis test to the TR scores for the five groups yields a significant difference ($H_{4,84}$=9.943, p=.041). Further examination of the result reveals that the professionals (Trial A) are the cause of the significant difference due to their high scores in the test. One could indeed expect the higher TR value among the professionals, compared to the common users, to be a normal feature of professional developers. Applying the Kruskal-Wallis test to the TR scores of the remaining four groups (after excluding the professionals) yields no significant difference ($H_{3,72}$=4.125, p=.248). The conclusion is that the TR value will not cause any interaction effect in the dependent variables, nor will any of the other background variables.

The influence of assessed creativity

Yet another hypothesis was formulated regarding the influence of personal characteristics, namely:

Hypothesis H_{2B}: A person's assessed creativity is positively related to his/her ability to produce original ideas.

The FS test was used to assess the user's creativity. In the previously presented Table 6.5 (p 71), we could see that there was no correlation between the assessed FS value of the participants and the assessed originality of their ideas (r_p=.093; p= .408). Accordingly, the findings yield no relationship between a person's assessed creativity and the originality assessed in his/her ideas; hypothesis H_{2B} is thus rejected.

The influence of technical capability

One hypothesis was that the technical capability of the participants would influence the result, especially regarding originality. It was stated as:

Hypothesis H_{2A}: Technically capable users produce more original ideas than less technically skilled.

The hypothesis has not been tested in any of the appended papers. Trial B containing the group of Technically Skilled Users was composed of students in grades 2-4 on the computer science program and could consequently be categorised as technically capable users. To test the hypothesis, an independent sample t-test was carried out which compared the Technically Skilled Users (Group B) with the Ordinary Users (Group C); t=-3.27, p= .001. The t-test thus shows that the Ordinary Users' ideas were significantly more original than the Technically Skilled Users'.

There is, however, a problem with the comparison. The Technically Skilled Users had access to a toolkit for innovation, which none of the other groups had access to. Ideally there should have been an additional trial with Technically Skilled Users who worked under the same conditions as the Ordinary Users; this was not the case. It could be argued that the differences between the groups could be caused both by the access to a toolkit and the participants' higher technical capability. On the other hand, the toolkit can be interpreted as a tool for gaining even further technical knowledge regarding the service platform used. Using the latter interpretation, the hypothesis test would be valid and hypothesis H_{2A} would thus be rejected. The findings show that the technical capability of the involved users does not have a positive influence on the originality of the ideas produced; the findings actually suggest the opposite.

Optimising the act of involving users

The second way to try and optimise the contribution is to find out if there are any preferable, or less preferable, ways of conducting user involvement. Accordingly, this relates to research question Q_3. In Chapter 4, some hypotheses were presented which concerned the influence of different process related actions.

The effect of learning more about the underlying technology

Technical knowledge of what is possible to do with the technology at hand has been assumed to be essential to idea creation. It was thus hypothesized that learning more about the underlying technology will influence the outcome as follows:

Hypothesis H_{3A}: Ordinary users, when taught more about the underlying technology that realises the services, will produce more original ideas.

Hypothesis H_{3C}: Users, when taught more about the technology that realises the services, will produce ideas with a higher level of producibility.

The hypotheses have been implicitly examined in appended paper no. 5 (Magnusson et al., 2003). Three groups were compared; Professionals (A), Ordinary Users (C), and Consulting Users (E). Groups C and D were randomly selected from the same sample of users. The difference was that group D had the opportunity to consult a professional developer during two meetings, thereby learning more about the technical possibilities and limitations of the underlying system. The level of producibility significantly improved after consultation, thus supporting hypothesis $H_{3C.}$ However, at the same time, the level of originality deteriorated to the same level as the Professionals, which is why hypothesis H_{3A} is rejected.

The effect of learning about creativity methods

The effect on idea generation of being taught about different creative methods was the second process interaction that was investigated.

Hypothesis H_{3B}: People who are trained in creative methods will produce more original ideas than those who are not trained.

The hypothesis has not been tested in any of the appended papers. A t-test shows that the creativity-trained users (Group E) produced significantly (t=2.12; p=.035) more creative ideas than the ordinary users (Group C). Accordingly, the findings support hypothesis H_{3B}, i.e. that creativity trained users produce more original ideas.

The effect of enabling toolkits for innovation

The third and final analysis of the innovation process is the effect of enabling toolkits for innovation. It was hypothesized that:

Hypothesis H_{3D}: Enabling user toolkits for innovation will have an effect on the quality of the ideas created.

Neither has hypothesis H_{3D} been tested in any of the appended papers. Trial B, the group of Technically Skilled Users, emulated a situation where the participants got access to a toolkit for innovation. This trial should ideally have been compared with another trial of technically skilled users who would not have used a toolkit. Since no such trial could be conducted within the framework of the study, I have instead compared Group B with the Ordinary Users (Group C). To test for significant differences between the two groups, an independent sample t-test was carried out for the three dimensions giving; Originality (t=-3.27, p=.001); Producibility (t=2.80, p=.006); User-value (t=-0.80, p=.427). Accordingly, both originality and producibility showed significant differences between the groups. The users who had access to the toolkits for innovation scored significantly worse in originality, but their ideas were significantly more producible, compared to the Ordinary Users. The empirical data shows that handing out a toolkit to the users will affect the results; hypothesis H_{3D} is thus supported.

Summary of mean value analysis

Table 6.7 summarises the results of the hypothesis tests when analysing the mean values. In the table, it can also be seen where the test is dealt with, i.e. in any of the papers or in the Cap.

Table 6.6
Recap of hypotheses

H_{1A}	Professional developers produce more original ideas than users.
H_{1B}	Users produce ideas which have a higher perceived user-value than the ideas of professional developers.
H_{1C}	Users produce ideas which have a lower level of producibility than the ideas of professional developers.
H_{2A}	Technically capable users produce more original ideas than less technically skilled.
H_{2B}	A person's assessed creativity is positively related to his/her ability to produce original ideas.
H_{3A}	Ordinary users, when taught more about the underlying technology that realises the services, will produce more original ideas.
H_{3B}	People who are trained in creative methods will produce more original ideas than those who are not trained.
H_{3C}	Users, when taught more about the technology that realises the services, will produce ideas with a higher level of producibility.
H_{3D}	Enabling user toolkits for innovation will have an effect on the quality of the ideas created.

Table 6.7
The appended papers' and the cap's linkage with the hypotheses

Paper	H_{1A}	H_{1B}	H_{1C}	H_{2A}	H_{2B}	H_{3A}	H_{3B}	H_{3C}	H_{3D}
No 3 (CAIM)	R								
No 4 (EJIM)		S	S						
No 5 (JSR)						R		S	
Cap				R	R		S		S

S = Hypothesis Supported
R = Hypothesis Rejected

Hypothesis test by higher quartile analysis

The results accounted for so far have been based on analyses of *all* the ideas submitted by the groups, i.e. the *means* of the groups' scores. In a "real situation", however, only the "best" ideas are of interest for further elaboration. A chi-square test can be used to analyse the highest-ranked ideas, i.e. the ideas falling into the higher quartile in each dimension. If all groups scored equally, i.e. no differences between the groups, the distribution of ideas in the higher quartile would correspond to the relative sizes of the groups; *Professionals* (12/84), *Technically Skilled Users* (16/84), *Ordinary Users* (19/84), *Consulting Users* (20/84) and *Creativity Trained Ordinary Users* (17/84). Table 6.8 shows the Chi-square test for the higher quartile.

Table 6.8
Chi-square (χ^2) test for the higher quartile

Dimension	*df*	N	χ^2	*p*
Originality	4	106	22.92	.000*
User-value	4	113	12.04	.017*
Producibility	4	111	20.18	.000*

NOTE: *Significant difference between the trials on the .05 level.

All three dimensions thus showed significant differences between the five groups in the chi-square test. To examine which groups could be considered major contributors to the significant χ^2 value, the standardized residuals R were computed[16], see Table 6.9. If the absolute value of R is greater than 2, the group is considered a major contributor (Hinkle et al., 1998, p 581).

Table 6.9
Chi-square residuals of the higher quartile

Dimension	*Groups*	*O*	*E*	*Residual*	*R*
Originality	Professionals	8	15.14	-7.14	-1.84
	Technically Skilled Users	9	20.19	-11.19	-2.49*
	Ordinary Users	37	23.98	13.02	2.66*
	Consulting Users	20	25.24	-5.24	-1.04
	Creativity Trained Ordinary Users	32	21.45	10.55	2.28*
	Total	*106*			
User-value	Professionals	7	16.14	-9.14	-2.28*
	Technically Skilled Users	16	21.52	-5.52	-1.19
	Ordinary Users	36	25.56	10.44	2.07*
	Consulting Users	26	26.90	-0.90	-0.17
	Creativity Trained Ordinary Users	28	22.87	5.13	1.07
	Total	*113*			
Producibility	Professionals	16	15.86	0.14	0.04
	Technically Skilled Users	27	21.14	5.86	1.27
	Ordinary Users	29	25.11	3.89	0.78
	Consulting Users	35	26.43	8.57	1.67
	Creativity Trained Ordinary Users	4	22.46	-18.46	-3.90*
	Total	*111*			

NOTE: *O* = Observed; *E* = Expected; *R* = Standardized residual
*Significant contribution because absolute value of *R* is greater than 2.00.

Comparing the higher analysis of the higher quartile data and the mean values analysis shows that they both comply with almost all hypotheses, as shown in Table 6.10.

[16] $R = \frac{O - E}{\sqrt{E}}$

Table 6.10
Comparison between mean value and higher quartile analysis

Test method	H_{1A}	H_{1B}	H_{1C}	H_{2A}	H_{2B}	H_{3A}	H_{3B}	H_{3C}	H_{3D}
Mean value	R	S	S	R	R	R	S	S	S
Higher quartile	R	S	–	R	$^{N}/_{A}$	R	R	–	S

S = Hypothesis Supported
R = Hypothesis Rejected
– = Neither supported nor rejected
$^{N}/_{A}$ = Not Applicable

As can be seen, it is only hypothesis H_{3B} – "People who are trained in creative methods will produce more original ideas than those who are not trained" – that gives conflicting results in the tests. The conclusion is that the Creativity Trained Ordinary Users did produce ideas which, on average, were assessed as more original than those of the Ordinary Users. However, for the most original ideas, there was no difference between the two groups.

7. USER INVOLVEMENT AND ITS CONTRIBUTIONS

In this chapter, I discuss, reflect and elaborate on the results of the two studies in relation to the first three research questions:

Q_1: What are the contributions of involving ordinary users in innovating new end-user services for mobile telephony, as opposed to confining this task to professional developers?

Q_2: What are the personal characteristics that make users useful to be involved?

Q_3: How does the process of involvement affect the results of user involvement?

The fourth, and last, research question – "What are the effects of user involvement on organizing the new product, or service, development of a company?" – is dealt with in the next chapter, since it is dependent on the outcome of Q_1 - Q_3.

The contribution of user involvement

From the results, it can be established that involving users does make a difference. The findings show that the ideas of the professional developers have other characteristics than those generated by the users involved; I will now pinpoint the general differences.

Impact on dependent variables

User-value

The users' ideas were assessed as having a higher perceived *user-value* than those of the professional developers. The users were asked to come up with ideas for new services that would provide them with added value. The findings imply that professional developers should be cautious when believing they can, on their own, develop "what is best for the user". Although users are not experts on the technology that is used to implement the different services they are indeed the prime experts on the problems that they encounter in their local environment on a daily basis. User-value is created when services meet the needs of the users, e.g. by solving a practical problem. There are probably no better experts as regards knowing about these problems than the users themselves. It seems difficult for the Professional developers to envision the problems ordinary users encounter; accordingly their suggestions are based on the current technology and assumptions of what would be usable for the target group. The effect was that the professionals tended to produce more technically feasible ideas, but less valuable to the users.

Originality

The finding that ordinary users can contribute *more original* ideas than the professional developers is more surprising, and at odds with some of the NPD literature (Bennett and Cooper, 1981; Christensen and Bower, 1996; Christensen, 1997). It seems that knowledge regarding what is currently feasible becomes a obstacle to professionals 'thinking out of the box'. The same phenomenon was found in the case of the two user groups that were taught more about the technical opportunities and limitations, i.e. Group B (Technically Skilled Users) and Group D (Consulting Ordinary Users).

One plausible explanation as to why the ordinary users' ideas were assessed so relatively highly in originality and user-value can be found in their content. The Professionals, as well as the user groups that were aware of the technical limitations, seemed to be stuck in a confined way of thinking, which was reflected in their ideas. The vast majority of Professional developers' ideas fell into two of the twelve categories (Table 6.2) namely, *Public Information Gathering services* accounted for 49.1%, and *Communications & Telephony services* for 12.7%. Both categories are within the streamline of the Professionals' core competence. It seems to be difficult for the professionals to create ideas that are outside the current core business. The two groups, Ordinary Users and Consulting Ordinary Users, that received the most limited information regarding technical systems did, however, manage to break free of merely producing ideas within the current streamline. This indicates that users, under the right conditions, *can* introduce fresh perspectives to the service innovation process.

One can identify two main approaches to creating new ideas in the experiments. The first, people aware of the limitations of the underlying technology seemed to take the limitations into account before generating new ideas. Whereas those less familiar with the technology started to think instead about what usage they could get from the mobile phone and its services in their daily lives, resulting in ideas that are not necessarily technically feasible. The idea creation process was thus either oriented towards feasibility, or problem-solving.

The fact that many of the ideas were not pure services, but rather suggestions for how to enhance the mobile phone so as to be more useful is yet another indication that these contributors did not bother about feasibility. They were instead interested in solving a user problem. Users cannot, or do not want to, separate service from equipment. For them, it is the final offering that is of interest. As a consequence, operators might consider co-operating with mobile terminal manufacturers in order to accomplish better end-user offerings.

A factor that probably stimulated the users' innovativeness was their access to the sample of implemented test services, initially invented by the professional developers. The mobile phone, in combination with the sample

services, could indeed be seen as a type of *tool kit* for creative *mind opening*. The users could freely try out the sample-services and reflect over how the new 'tool' could help them in their daily lives.

Producibility

The enhanced level of originality did, however, simultaneously result in a decreased level of producibility. As discussed in paper no. 4 (Magnusson, 2003b), this is a serious deficiency. It could actually even imply that the extra innovativeness supplied by the users cannot be exploited; this will be discussed further on in the thesis. It should, however, be noted that the low level of producibility could to some extent be a delusion. The judges were instructed to assess the ability of the *participating mobile-telephony operator* to realise the idea, i.e. for the operator Telia Mobile. Some of the ideas assessed as original, but not producible, could actually be perceived as more producible for another firm. Take, for instance, the ideas that were not considered to be services (Table 6.3). Many of these were innovative ideas concerning how the mobile telephone should be equipped with some new hardware feature, e.g. an alco-meter, a radio-receiver, a bottle opener, etc. For an operator, these ideas are of virtually no direct interest, since an operator does not control the design of the mobile phone. On the contrary, for a mobile-telephone *manufacturer*, those ideas would probably have been assessed as both original *and* producible.

The elusive contribution of user ideas

The contributions accounted for so far have mainly concerned the outcome of the idea generation process, i.e. the characteristics of the idea proposals. There is, however, a less observable contribution made by user involvement. It is the knowledge creation that takes place in the interaction between the company and the users. The CuDIT study was not primarily designed to obtain this kind of data; it was rather captured by coincidence. In paper no. 5 (Magnusson et al., 2003) some of these experiences are described from the expert consultations performed during Trial D. It gives a glimpse of the kind of user knowledge that could be attained during the meetings. As noted in the paper, user-to-expert interactions did in fact have a rather destructive effect on the created ideas. On the other hand, the experts gained knowledge of the users needs and wants unique to the trial.

The users' idea proposals are fundamentally different to those created by the professional developers. We can regard each idea proposal as a first tentative concept of the idea. The professionals' concepts build upon, firstly, an *interpretation* of the users' needs. Data concerning user needs can, for example, be obtained using different marketing methods, or, as in the CuDIT project, through the professional trying to envision the user's needs. In the second step, the captured needs are *translated* into a concept. There are, thus, two weak links in concept generation, firstly the need for

interpretation and secondly the transformation of the needs into a concept. When involving the users in concept creation, they are encouraged to discover new, as yet unknown, needs; these needs would probably not have been discovered during a traditional inquiry process. To meet the newly discovered need, the user designs a satisfying service. Accordingly, the users do not have to express their needs verbally, or in writing, instead expressing them indirectly by proposing a service that can satisfy these needs. In doing so, the user's submitted service idea could, theoretically, be perceived as a tentative service concept whereby the user's *needs are embedded* in the design; this ought to result in a greater likelihood that the user designed concept also creates a purchase demand.

The users' service proposals were not, as noted in the previous chapter, always novel ideas. They included both error-reports and suggestions for improvements of the pre-developed services that the users had access to during the trial. In a "real" situation, this is, of course, considered to be valuable information for the company; nonetheless this contribution will not be analysed in detail in this thesis. However, it was essentially this kind of information that was achieved in the DOF case described in appended paper no. 1 (Magnusson, 2003a). The company utilized a group of pilots to obtain feedback on a number of prototype services. The CuDIT experiments indicate that the same user involvement setting can be used to produce feedback about existing products or prototypes, as well as generating proposals for totally new ideas.

Optimising user involvement – personal characteristics

This paragraph refers to research question Q_2. Only one of the investigated background or personality factors correlated with the dependent variables (Table 6.5), namely the TR test. It was positively related towards producibility and inversely related towards user-value. The relationship between TR and producibility is intelligible. To achieve good producibility, the creator normally needs to possess a good knowledge of the underlying technology. People with good technical knowledge could also be expected to score highly in the TR test. However, the negative correlation between TR and user-value is puzzling. It could thus be that the correlation is only statistical with no practical relevance.

The only personality measurement that seems usable in the CuDIT study is, thus, the TR test; the other ones cannot be used to predict whether or not a person would be suitable to be involved in the idea generation process. It is notable that the creativity test, the FS-test, failed to predict the likelihood of producing original (innovative) ideas. It must be emphasized that the findings only show that there is no linkage between the employed personality tests and the dependent variables of the study. The tests could indeed work well in other contexts and for other purposes. There could also

be, and likely are, other personality tests that could serve as a predictor of outcome. Investigating other personality predictors is, thus, a challenge for further research.

The practical relevance of having personality tests that can predict the participants' results would ideally be selecting the appropriate users to be occupied in user-involvement endeavours. However, a word of warning must be voiced; selecting or blocking certain people on the basis of personality tests could be a trap. The criteria for selecting people to participate will likely reflect the *dominant paradigm* of the company. In doing so, only people who are expected to create ideas within the dominant design would be selected. The opportunity to utilise the users as a lever for bringing in innovative ideas could thus vanish.

The findings also indicated that the technical capability of the involved users made a difference. Whether or not this is a personal characteristic is debatable. Technical capability can be learned, as seen in Group D (Consulting Ordinary Users, see Magnusson et al., 2003, appended paper no 5). Group D consisted of non-technically skilled people, nevertheless they learned about the limitations and opportunities of the underlying technology. I therefore contend that the technical capability in this study should not be regarded as a personal characteristic; it is something that can be adopted during involvement.

Optimising user involvement – tuning the process

The findings from the CuDIT study indicate that the outcome is more dependent on *how* the users are involved than on *who* is involved. I will now discuss some of the effects attributable to the process of involving users, i.e. related to Q_3.

The burden of knowing too much

As previously noted, the resulting ideas were affected when the participants learned more about the opportunities and limitations of the underlying technology. The ideas became more producible but at the same time less original and, more seriously, the assessed user-value decreased. When comparing the trials 'Ordinary Users' (Group C) and 'Consulting Ordinary Users' (Group D), it appeared that the latter group had been "ruined" by consulting the experts. Both the originality and user-value of their ideas had been denigrated. The seemingly small difference between the groups – i.e. Group D's opportunity to consult experts on two occasions – resulted in significantly different outcomes[17].

[17] More details about this can be found in appended paper no. 5 (Magnusson et al., 2003).

Tool-kits for innovation

The findings from the experiment of handing out a tool-kit to the users, (Trial B), showed that this group scored significantly worse in originality, compared to the Ordinary Users. However, the opposite was the case for producibility. It thus seems that the tool-kit for innovation was more a *toolkit for producibility* than for encouraging innovativeness.

There are, however, several factors that make the study of tool-kit usage problematic. A tool-kit can be designed in an unlimited number of ways. In the study, the users were given access to essentially the same tool-kit as the one the professionals used. The user-interface was thus designed for people skilled in Java programming. Although the participating users were also capable of programming in Java this does not mean that they were skilled programmers. They only had twelve days to learn how to use the tool-kit and produce new services. Nonetheless, the empirical data shows that handing out a tool-kit to the users will affect the results. Much more is yet to be learned about the usage of toolkits.

Creativity training

Group E, which had received special training in creative methods, also produced more original ideas. At the same time, their producibility decreased. The findings confirm that creative methods can be useful to think 'out of the box'. However, the findings also indicated that the really innovative ideas were rarely directly usable.

The high-quartile analysis showed that the creativity-trained people did not produce any better than the ones who had not been trained. A complementary ANOVA test showed that no differences could be established in the measured personality variables between users who contributed with ideas in the higher quartile and those who did not[18]. The cause of people coming up with really original ideas is thus yet to be found. Of course, it does not need to be factors that systematically trigger people into creating original ideas. Original ideas could indeed happen by accident. As previously discussed, knowing "too much" regarding what is possible to do could be a burden. A common theme among the best trials in high quartile originality was actually that neither of them received any additional information regarding the technical limitations of the platform.

In search of the mechanisms for innovativeness

As previously mentioned, all participants had a diary in which to write down their ideas as well as what triggered the idea creation. The diary data was supplemented with interview data after the trial. This material constitutes a rich source of further understanding of the underlying mechanisms that make people come up with innovative ideas. So far, we

[18] FS ($F_{1,71}$=0.002, p=.965); TR ($F_{1,71}$=0.472, p=.494); LOT ($F_{1,71}$=0.101, p=.751)

have not exploited the potential of the material, i.e. no thorough analysis has been made to chart innovative patterns among the participants. However, some tentative observations have been made.

Many of the ideas that scored really badly in all three dimensions were attempts to transfer access to the participants' favourite web pages. The participants had spent some time in front of their PCs and rather unreflectively proposed a service that would enable them to access information from the web page using their mobile phones. In a sense, these participants tried to squeeze an existing service into the mobile phone. This resulted in services that needed too many input parameters and an output too large to fit into the small display of a phone. These "fixed services" did not bring any extra advantage when becoming mobilised, instead they became quite unusable.

The tentative investigation of the individual idea creation processes indicates that the procedure of coming up with new ideas matters. There is, however, a need for further in-depth studies of the mechanisms that might lead to good idea proposals.

The nasty truth about user involvement

CuDIT essentially used two approaches to involving users in the idea generation process. The first was the "*guided user*" approach in which users received extensive information regarding the possibilities and limitations of the underlying technical systems; one group (B) was even provided with the tools to transform their own ideas into prototypes. This approach was emulated in CuDIT by Trials B and D and led to ideas that were producible. The drawback was, however, that both the originality and the user-value seemed to be suffering. Their ideas could thus be classified as "me too".

In the second approach, the users were involved in the role of "*pioneering users*". Here, the users were given great freedom to explore by themselves what use they could have of mobile telephony services in their daily lives; this was emulated by Trials C and E. They were given a minimum of guidance concerning feasibility. The additional advantage was the high originality and user-value of many of their ideas. The drawback was that the original ideas were mostly unfeasible; they could be classified as "totally out of the blue".

To summarise, the experiments have demonstrated that users can bring in ideas for new services which are more innovative and which have a higher user-value. Nevertheless, it is not possible to exploit the originality since it is linked to a poor level of producibility. Even more devastating, when experts tried to guide the users into creating more producible services, the added user-value disappeared. The potential benefit that users could bring to the company was thus blocked.

The nasty truth seems to be that involving users in the idea generation process has a rather limited value; users produce services that are either "*me too*", or "*totally out of the blue*". Me too in the sense that the ideas do not differ very much from the ones created by professional developers without any user involvement. The ideas considered to be totally out of the blue would most likely be rejected in the first gate of the company's service or product development process. User involvement in the idea generation process has indeed proven itself to make contributions, but can the contributions be utilised by the company? The conclusion seems to be that user involvement for idea generation is a dead-end.

Is this the end of the story? We will soon discover that user involvement can indeed be most beneficial, *if* properly managed. The design of the company's idea management process is actually the key to the successful utilisation of the user's ideas. We will now delve into an alternative to the established idea-screening model. This will unveil new potential contributions of user involvement. In new idea management, ideas that normally end up in the dustbin of traditional idea screening will be found to hold an as yet unexplored potential. This indicates that the effectiveness of user involvement in the idea creation process is thus linked to the organisation of the product development process, i.e. research question Q_4.

Discovering the rough diamonds

The mindset used so far in analysing the ideas has been the same as the one a company normally uses. Ideas are assessed in a screening process where the incoming ideas will either be accepted *or* rejected, *not* subject to further design. The ideas form input to the funnel of a *filtering process* (Wheelwright and Clark, 1992). By coincidence, I discovered that the users' ideas could instead form the input to a *design process*. An idea, the "newspaper boy", was assessed as extremely original (score = 10), but also virtually impossible to implement (score = 1). The idea was described as follows[19]:

> "*I had received the wrong Sunday paper for the third consecutive week. It suddenly occurred to me that the phone ought to have a function that would enable me to induce an electric shock in the newspaper boy, so that he would learn to give me the right newspaper*".

I brought along the newspaper boy idea, together with some other ideas, to an internal meeting at the company's development department. The attendees, eight people, could be considered experts in mobile telephony service development. My intention was to illustrate how original, yet unusable, some of the user-ideas obtained in the experiments could be. After presenting the newspaper boy idea, their first reaction was that the

[19] This case is also discussed in appended paper no. 4 (Magnusson, 2003b).

idea had to be a joke. However, after a few seconds, one of the attendees said loud and clear, "that could be an interesting service". It went quiet in the room. "Oh sorry, I was only thinking aloud", he said. The silence then became embarrassing. Then, he understood that the others had taken him for a sadist. "Oh, I have to explain. I was thinking about how the idea could be developed into something interesting". He explained how the lethal service proposed could be redesigned into an innocuous one that would bring value to its user. The group collectively started to refine the design even further.

From something very original, but completely unfeasible, the group had, within the space of a few minutes, come up with a new, realizable design that produced user-value. The idea had thus *triggered a design process*, which led to a new idea which was feasible yet original. The process is illustrated in Figure 7.1.

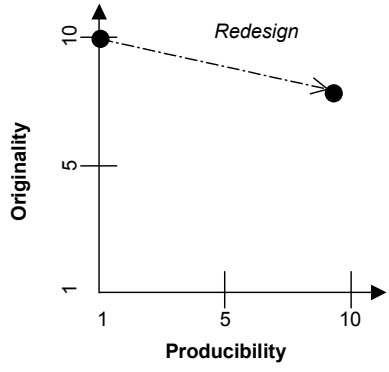

Figure 7.1 Redesign of the "Newspaper boy" service.

The episode just described made me see the light. Among the users' ideas, there could actually be *rough diamonds* just waiting to be cut. The value of a diamond cannot be decided until it has been cut and polished. It would thus be ignorant to think that the users' ideas could actually be correctly valued in their initial form. Before this discovery, I had personally not reflected over the possibility that the ideas could be processed further.

As previously discussed, the management of innovation can be regarded as having a dual yet contradictory logic, as previously illustrated by the EC framework (see p 44). I had been stuck in the C logic (capitalization), i.e. only trying to assess ideas on the basis of their ability to be readily capitalized. However, the newspaper boy demonstrated that ideas could trigger exploration, i.e. activate the E logic. The newspaper boy was thus an idea for the E logic. Ideas can, accordingly, be directed to either side of the EC framework. Ideas that are easy to realise, and will bring expected user-value, easily find their place in the C logic. Other ideas, however, will have to struggle on the E side. With a myopic mind – as mine was before I had

seen the newspaper boy's transformation – these ideas are likely to be discarded since they are not readily realisable. This would thus close the door to utilising the full potential of user-involvement.

To utilise E logic ideas, one must *break free* of the traditional "idea selection by filtering model". The new model is quite the opposite of the filtering model; instead being a building or design process that elaborates upon the ideas so that they can be realised. In fact, the users' ideas can provide value even if they are not fully implemented and commercialised. They can function as learning tools for learning more about the users' needs; this will be discussed later on.

In the forthcoming text, I will describe the characteristics of this model. But first, we need a tool to identify the rough diamonds and understand how they should be further processed. For this purpose, I introduce the *Eight Idea Zones* framework (EIZ).

EIZ – "Eight Idea Zones"

EIZ analyses the product-intrinsic dimensions concurrently. Figure 7.2 illustrates the three dimensions – originality, producibility, and user-value – used for assessing the service proposals in the CuDIT study. In the figure, each circle represents one dimension's '*area for acceptance*', e.g. for an idea to come inside the originality circle, it must thus be assessed as being above the threshold-value for originality. After three assessments, the ideas end up in one of the eight zones, 0 – 7.

A service idea must fulfil at least two basic criteria to be commercially interesting. First, it must be producible, i.e. possible to realise. Second, the implemented service must create value for its user. Fulfilling the criteria corresponds to an intersection between the user-value and producibility areas enclosing zone *seven* and zone *four*; these two zones form the *value-delivery space*, i.e. the space where value can be delivered to the users.

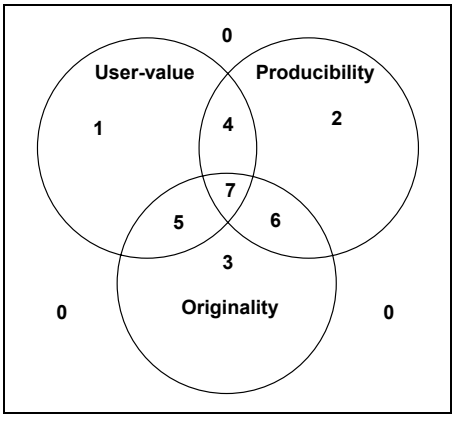

Figure 7.2 The eight idea zones.

Zone-0, is the "hall of shame". Ideas ending up in this area have been assessed as inferior in all three dimensions. It is, however, quite rare that a submitted idea scores so badly in all three dimensions[20]. The ideas falling into this zone can probably be regarded as hopeless cases.

Zone-7, is of course the most interesting zone since the ideas have been assessed as good in all three dimensions. In other words, they are innovative, producible and provide a high user-value. The commercialised services from this zone can be classified as radically new. However, very few ideas can be expected to initially end up here.

Zone-4, represents the ideas providing a high user-value and being producible. The only drawback with those ideas is that they are not innovative, thus being of the type incremental innovations. However, for most users on a mature market, this does not matter; the ideas still have a commercial potential.

The remaining five zones (1, 2, 3, 5, and 6) are not directly interesting from a business perspective since the ideas have been perceived as lacking user-value or not being producible. These remaining zones thus encompass the ideas that are rejected in the traditional filtering (idea screening) process. We will now delve into these six zones in order to comprehend how the ideas need to be processed to become commercially interesting.

Zones 1 and 5, ideas in both these zones share the same problem, having a high level of user-value but low producibility. These ideas are candidates for becoming members of the value-delivery space, if they can overcome the producibility problems. The ideas in zone 5 are the most interesting, since these are also perceived as original thus good candidates for entering zone 7. Ideas can qualify to move into the value-delivery space in two ways. First, the idea itself can be redesigned so the resulting new idea is producible. For example, some functions difficult to implement can be removed, or changed. Second, the other way is to develop the resources needed to transform the idea into a service, i.e. lowering the threshold and expanding the producibility circle. It is not necessarily technical obstacles that make the producibility score low. It might just as well be the fact that the necessary personnel resources are lacking, or that the firm needs to access resources owned by other firms, e.g. context databases. It could also be a strategic decision that the company does not offer the kind of services represented by the idea, virtually making the producibility threshold insurmountable.

Zones 2 and 6, in these two zones the ideas have been deemed lacking in sufficient user-value to enter the value-delivery space. Ideas assessed as having a low user-value are difficult to handle. However, if it is a user-submitted idea, it has been rated as valuable by at least one user, the creator.

[20] In the data from the CuDIT, less than 8% of the ideas scored below the median in all three dimensions. See appendix G.

User-value is a rather abstract dimension. It is indeed difficult to assess how much value the users are going to get from something that is still only a paper concept. A low rating could be caused by uncertainty as to whether the service would produce user-value, rather than being a well-grounded fact. To obtain a more valid assessment of the user-value, prototypes can be used to let the users actually try out the concept. This can be used to revise the assessed user-value, and to obtain suggestions regarding how to improve the concept so it offers an even higher user-value. This was indeed the case for some of the service ideas in the CuDIT project. Several of the users' "idea suggestions" were in fact suggestions regarding how to improve the sample services they had tested.

Zone 3, these ideas are original but lack both the features required in order to be commercially interesting, i.e. they are neither feasible nor usable. To get into the value-delivery space, the idea must thus pass two thresholds. Nevertheless, these ideas are interesting since they are perceived as rather unique and could thus be excellent seeds for further elaboration, or a source of inspiration. The previously described newspaper boy is one of the ideas that can be found in zone 3. Remember how the idea worked as a catalyst for one of the company experts to create a new producible service idea that could provide user-value.

Two of the zones, 1 and 2, consist of ideas that are assessed as not being innovative. Enhancing the originality of an idea is probably the most difficult to handle. It is probably almost impossible to make something more innovative without affecting its user-value and producibility. However, it could be that many of the ideas might concern the same basic service, for example the bus timetable. If combined into a *cluster,* this might be considered more original than if the ideas were assessed individually. There are also various creativity techniques claiming to be able to enhance the innovativeness of existing products (see for example Goldenberg et al., 1999).

We return to the purpose of the thesis, namely to understand user involvement during the idea generation process. I will therefore use the EIZ framework in order to analyse *if* and *how* users can contribute to the idea generation process.

Idea processing revisited

EIZ enables us to see the service ideas in a new light. Traditional idea processing in CuDIT would have been a screening process consisting of three filters in series – originality, user-value, and producibility. Only the ideas that directly fit into the value-delivery-space would pass on to further elaboration. In Appendix G, a table can be found which shows the distribution across the eight zones when choosing the median value of the

dimensions as threshold values. This table will be used for further analysis of the ideas.

Applying EIZ

We will use EIZ to analyse the differences in contributions between the two user approaches previously discussed. One of the approaches was the *guided users,* represented by the two trials *Technically Skilled Users* (B) and *Consulting Ordinary Users* (D). They were given extensive information about the possibilities and limitations of the underlying technical systems. Group D met experts twice during the trial for feasibility consultations. Group B was provided with the tools to transform its own ideas into prototypes.

The other approach was named *pioneering users*. These freely explored the use they could have of mobile telephony services in their daily lives. Limited information was given to the groups regarding feasibility issues. This approach was represented by the trials *Ordinary Users* (C) and *Creativity Trained Users* (E). Table 7.1 shows the distribution of ideas for the two user involvement approaches, and the professionals. It also includes the adjusted residuals to analyse whether a cell contains significantly more, or less, ideas if no differences between the approaches were expected.

In traditional idea screening, only the ideas in columns (zones) four and seven would have passed the first round, i.e. only about 18%. EIZ blocks only about 8% (zone-0) of the ideas during the first round. Instead of 78 ideas in the traditional model, EIZ will pass on 397. Among the 319 extra ideas, there can be some "rough diamonds" that would otherwise have ended up in the dustbin.

Table 7.1
Distribution of ideas and residuals for the different approaches

Approach		oup 0	oUp 1	ouP 2	Oup 3	oUP 4	OUp 5	OuP 6	OUP 7	
	O	5	0	20	9	9	4	5	3	55
Professionals	E	4.1	4.5	12.3	9.5	7.4	10.0	4.6	2.6	55
	Adj. R	.5	-2.4*	2.7*	-.2	.7	-2.2*	.2	.3	
	O	11	20	47	24	33	25	17	7	184
Guided Users	E	13.7	15.0	41.2	31.7	24.9	33.5	15.4	8.6	184
	Adj. R	-1.0	1.8	1.4	-2.0*	2.3*	-2.1*	.5	-.7	
	O	16	15	29	41	16	49	14	10	190
Pioneering Users	E	14.2	15.5	42.5	32.8	25.7	34.5	15.9	8.9	190
	Adj. R	.7	-.2	-3.2*	2.1*	-2.8*	3.6*	-.7	.5	
Total		*32*	*35*	*96*	*74*	*58*	*78*	*36*	*20*	*429*

NOTE: *O* = Observed; *E* = Expected; *R* = Standardized residual
*Significant contribution when absolute value of *R* is greater than 2.00 (Hinkle et al., 1998, page 581).

Table 7.1 reveals some interesting differences between the two approaches. Figure 7.3 displays the relative distribution of ideas in the eight zones (EIZ) between the professionals, guided users and pioneering users.

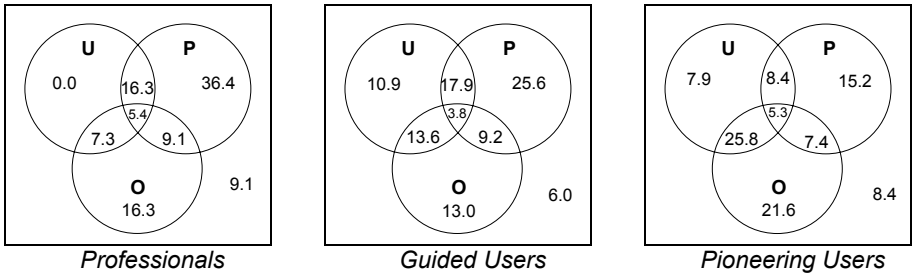

Figure 7.3 Relative distribution (percentage) of ideas between the three approaches

To elucidate the patterns even better, the significant residuals between the approaches are illustrated in Figure 7.4. A plus indicated a significant positive adjusted residual, meaning that the approach produced significantly more ideas for the indicated zone. Correspondingly, a minus indicates significantly fewer ideas. If the absolute value of the residual lay between 1.5 and 2.0, this was indicated by a plus or a minus in brackets.

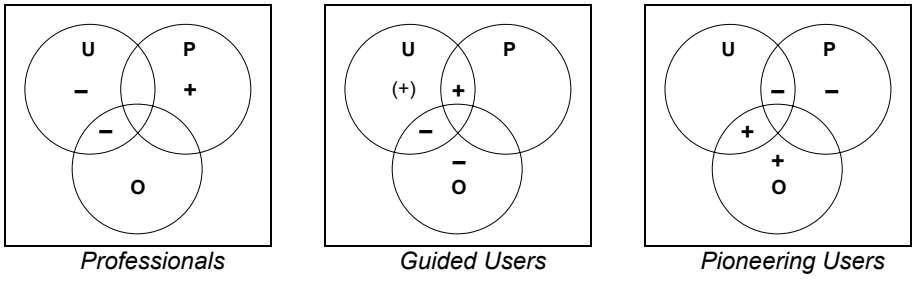

Figure 7.4 EIZ diagram exhibiting the residuals between the three approaches

Interesting patterns occur. The *guided users* approach clearly appears as the one that should be used to produce ideas for zone four, since it contributes ideas which are feasible and which create user-value. The main contribution seems to be ideas with a greater user-value than those of the professionals. The drawback with the approach, as previously discussed, is the poor originality of the ideas. Producing original ideas does, however, seem to be the major advantage of the *pioneering users* approach. On the other hand, very many of their ideas, i.e. 64%, are not perceived as readily producible. Most interesting, about one quarter of the pioneers were assessed as original as well as having a high level of user-value. These are, accordingly, hot candidates for moving into zone seven, if one can overcome the producibility problem.

The analysis indicates that the outcome of user involvement is, at least to some extent, *controllable*. Depending on whether the company is aiming for incremental or radical innovation, different approaches to involving users appear preferable. Based on the findings, it is recommendable to use a guided users approach if *stepwise refinement* is required. The pioneering

user approach is the preferred one when aiming for *radically* new innovation. The pioneering users' ideas are rarely directly producible, due to an unawareness of what is feasible. At the same time, this lack of knowledge seems to be a prerequisite for really breaking free in order to think out of the box. The results thus indicate that the process of involving users can be, and ought to be, managed in detail.

An additional test of the different approaches

Further support for the above will be gained if we investigate whether the different approaches would contribute differently to a simulated mature market versus a mature market. On a mature market, it can be expected that producibility and user-value are more important than originality. On the contrary, on an emergent market, it is the originality that is most important, with user-value being moderately important, and producibility the least important. This implies that a weighted index can be computed for each idea whereby the three dimensions are given different weights depending on the target market (for a further discussion, see p 28). A simulation was run using the following weights:

Mature market index = 0.475**producibility* + 0.475**user-value* + 0.05**originality*
Emergent market index = 0.05**producibility* + 0.25**user-value* + 0.70**originality*

Table 7.2
Descriptives of Service Idea Assessment

		Mature		***Emergent***	
	Number of ideas	Mean	SD	Mean	SD
Professionals (N=12)	55	5.34	0.86	3.45	0.86
Guided Users (N=36)	184	5.48	1.04	3.49	0.85
Pioneering Users (N=36)	190	5.01	1.18	4.07	1.27

An ANOVA test showed significant differences between the groups, for both the Mature market index ($F_{2,426}$=8.69, p<.001) and the Emergent market index ($F_{2,426}$=16.26, p<.001). For the mature market, a *post hoc* analysis using Scheffé's test (Scheffé, 1959) showed that the Guided Users scored significantly better than the Pioneering Users (p<.001). However, there was no significant difference between Professionals and Guided Users (p=.669), nor between Professionals and Pioneers (p=.168). For the emergent market, Scheffé's test showed that the Pioneering Users were significantly better than both the Guided Users (p<.001) and the Professionals (p=.001). No significant difference was found between the Professionals and the Guided Users (p=.966).

The above test thus supports the previous observation that the Guided Users approach supports *stepwise refinement,* whereas the Pioneering User approach is preferable when aiming for *radically* new innovation.

Concept adaptation - alternative idea processing[21]

The ideas that fall outside the value-delivery space (zones four and seven) will need further processing. As previously discussed, of particular interest are those in zone five, i.e. ideas which are original and which hold a high user-value. I will now discuss a theory regarding how this transition can be carried out.

If idea handling is not a filtering process, then what is it? In this paragraph, I will present a model for alternative idea handling, called *Concept Adaptation*. The term concept here refers to the conceptualisation of an idea for a new service. In CuDIT, the submitted ideas were all written in a specified format and could thus be regarded as a conceptualisation of the idea, i.e. a tentative service concept $\mathbf{C_x}$.

The ideas could thus be described as a set of tentative service concepts ($\mathbf{C_1}..\mathbf{C_n}$). To be realisable, the concepts must lie within the firm's *feasibility field* **F**. This field corresponds to the ability of the company to realise new products, or services. It is primarily defined by the answers to the two questions, *what can* we do, and *what should* we do? **F** thus comprises two components; one decided by the firm's *capability* ($\mathbf{F_c}$), and the other one by its *intention* ($\mathbf{F_i}$). Factors that affect the capability component of the feasibility field are, for example, technical opportunities, legislation and regulation, the internal resources of the company. These will probably be different for different companies since they might, for instance, have a different perception of what is technically possible. The 'real' technical possibilities can thus be greater than the company has yet been able to explore. Different internal resources will also provide diverse boundaries for different companies. It should be noted that *time* is an important issue in many industries. New technologies are constantly emerging which offer new opportunities. The intention component is essentially decided by the firm's strategic choice and ultimately, by the company's business idea.

If a concept **C** fits into the feasibility field **F,** it will be, by definition, realisable and there will be no need to redesign the concept; this is the case for ideas that pass traditional idea screening. However, for concepts that do not fit inside **F,** there is, accordingly, a gap that must be filled. Concept Adaptation implies a redesigning of the original concept **C** in to a new one **C'**, see Figure 7.5.

[21] The theoretical discussion is, to a large extent, influenced by direct discussions with Professor Armand Hatchuel and his research group at Ecole des Mines in Paris, and especially Doctor Pascal Le Masson. To a certain extent, the influences can thereby be traced in some of the writings of Hatcuel et al. (Hatchuel and Weil, 1999; Hatchuel et al., 2001).

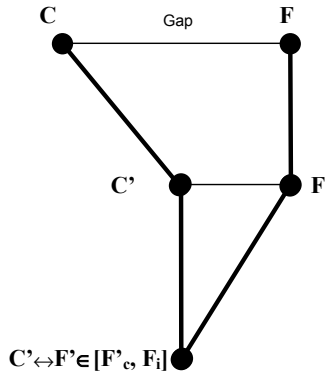

Figure 7.5 The Concept adaptation process

The process so far is purely a redesigning activity whereby features of the concept that cannot be realised are modified or removed. If the revised concept **C'** still does not match **F,** the firm will also have to develop **F**. In this development process, it is the "capability component" $\mathbf{F_c}$ that is affected. This can, for example, include developing the underlying technology that realises the service, outsourcing, co-operation with other companies, etc. When the adaptation process is finished, it has resulted in a revised concept **C'** that can be realised within the modified feasibility field **F'**. In **F,** only the $\mathbf{F_c}$ component has been affected, $\mathbf{F_i}$ remains intact.

A potential drawback with Concept Adaptation is that the concept can, in fact, be modified so much that it loses either its initial user-value or its originality. It has to be a management decision to decide upon the balance between modifying the concept and developing the feasibility field. Modifying the concept is virtually free of cost, whereas developing the feasibility field can be costly, depending on what is needed.

The perceptual switching of the screening process from filtering to design can be taken even one step further. One can even discern an *alternative contribution* of user involvement. This is discussed in more detail in paper no. 6 which is co-authored by Pascal Le Masson[22] (Le Masson and Magnusson, 2002); below I briefly describe the alternative contribution of user involvement.

User involvement contribution revisited

So far, in the thesis, the contribution of user-involvement has been expected to be ideas that can be developed into new *commercial services*, which are hopefully more original and provide a higher experienced user-value than those originating from professional developers. However, the knowledge

[22] Pascal Le Masson is a research engineer at the Centre de Gestion Scientifique at Ecole des Mines in Paris.

gained from user involvement can also be used to *renew the firm's business strategies*.

Without user involvement, the vast majority of the Professionals' ideas end up in the ingrained technological trajectory within the established dominant technological paradigm (Dosi, 1982), i.e. Public Information Gathering services, and Communications & Telephony services (see Table 6.2). Both these categories are within the dominant design paradigm "connection for verbal communication and data exchange". From the empirical data, it can be deduced that many of the users' ideas break free of the dominating paradigm. Among the users' service suggestions, one can find, for instance, the mobile phone as; 'a remote control', 'a safety alarm', 'an alert indicator'. The problem is, when using traditional idea processing (the filtering model), that there is a great probability that most of the ideas outside the dominant design paradigm will be immediately rejected since the selection filters reflect the dominating design paradigm. Thus, ideas that do not fit the paradigm will probably be blocked. In appended paper no. 6 (Le Masson and Magnusson, 2002), Pascal Le Masson and I suggest that the users' ideas should be utilised to regenerate the selection filters. Accordingly, this would also affect the overall business strategy. We call this approach *"generative model revision"*. This approach should not be seen as a substitute for the filtering model, but is instead a complement. The two approaches have different time perspectives. Idea selection by filtering is short-term, and aims to bring out directly profitable services; the same is true of concept adaptation, which is discussed in the previous paragraph. Whereas the generative model revision approach aims towards long-term objectives, such as *reframing* businesses, or even changing the strategy, or the business idea of the company. The generative revision model can also be illustrated in the form of the C-F gap model, see Figure 7.6.

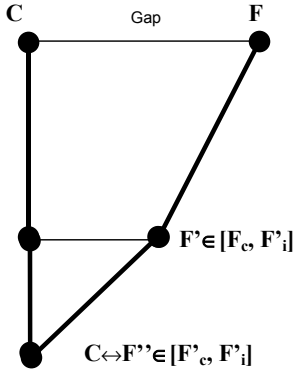

Figure 7.6 The generative model revision

In this process, the concept **C is** fixed and used as a lever for reformatting, primarily, the *intention* component of the feasibility field. It is not necessary to run the process until the concept **C** can be realised, i.e. where **C↔F''** in Figure 7.6. It could be sufficient to stop when **F** has been revised into **F'**, since the objective is not to produce a new service but to change the mindset of the company.

To ease understanding of how the process might work, we can take a practical example. Several of the ideas were, as previously mentioned, suggestions concerning the redesign of the actual mobile telephone. In the filtering model, these ideas would immediately be rejected. Neither would the Concept Adaptation process be applicable, since the company does not develop mobile phones, i.e. it falls outside the $\mathbf{F_i}$ field which is fixed. However, applying the generative revision model would imply that the company has reflected upon whether it should expand its businesses to include the development of the actual equipment. The data from the experiments indicates, indeed, that users do not care whether their needs are met by a service or a telephone. They do not distinguish between service and equipment; it is the overall offering that matters. If the company decides to change its business scope to include control of the telephone equipment, this can be implemented in various ways. Taken to an extreme, the company could start manufacturing its own brand, or alternatively, it could collaborate with some of the established manufacturers.

Summary - Supplementary idea-screening

To summarise, two supplements to the traditional idea-screening model have been presented. The new approach enables completely new contributions from user involvement. The first, Conceptual Adaptation, aims to redesign incoming ideas so that they can be realised by new services. The other approach, the generative model revision, makes a contribution by utilising the users' service proposals as a lever for reframing the firm's mindset. The users' ideas thus work as a 'feeler' regarding what the users will need and ask for. To take full advantage of user involvement, companies should thus break free of just perceiving the users' service ideas as input to a filtering process. Otherwise, they will be disappointed since most of the users' ideas will end up in the idea-dustbin. It is, indeed, rather thought-provoking that it is the ideas found in the dustbin that are the most interesting regarding regenerative purposes. Accordingly, the dustbin for rejected ideas could actually turn – out to be a wellspring of new innovative services, as well as a lever for strategy formation.

8. MANAGING USER INVOLVEMENT

This chapter aims to discuss the managerial implications of the findings, i.e. the effects of user involvement on organizing new product, or service, development for a company. In other words, the chapter relates to research question Q_4.

The findings in this thesis will hopefully contribute some fresh knowledge; nonetheless, these findings are as yet at a seminal stage. The chapter is thus intentionally rather speculative and normative. Speculative and normative in the sense that the advice emanates from a deductive reasoning based on the findings of the thesis, in combination with my own experience of twelve years as a practitioner in this area.

Some of the issues dealt with in the chapter have partly been dealt with in the previous chapters; however, they are put into a managerial context here. The outline is as follows. First, I contend that one of the main purposes for involving users is to engage the company in a learning process. The company learns from the users and the users can learn from the company. However, many established new product development (NPD) models could, in the worst case, block the learning process and hence drain the benefits of user involvement. What features the NPD process must fulfil is thus discussed. Second, idea processing is discussed. This has already been discussed in the previous chapter, but here it is put into a normative procedure. In the third part, I discuss how the act of involving users can be adapted to different purposes, i.e. whether the company aims towards stepwise-refinement or radical innovation. Fourth, the important issue of intellectual property rights is briefly highlighted. Fifth and finally, user involvement is discussed as a strategic choice.

User Involvement a learning process

A major purpose of involving users is to *learn* from them, to learn their needs, wants, wishes, etc. The opposite can also be important, i.e. the users learning from the company. This implies that the new service (or product) development process must have mechanisms that enable learning. Traditional development models are normally defined and documented as a series of sequential and separate activities, (see for example Scheuing and Johnson, 1989; Crawford and Di Benedetto, 2000). The different activities of the process are separated by so-called gates. In the gates, decisions are made as to whether to continue to the next activity or to stop developing the product. Once a gate has been passed, the process is not expected to return to it again. Accordingly, the process is directed one way, namely straight ahead. However, this complies poorly with the nature of learning normally described as being circular rather than sequential. In both the DOF case (see

appended paper no 1 Magnusson, 2003a) and the CuDIT experiments, prototypes were used to stimulate user-information. In the DOF case, the prototypes were intended to trigger the feeding back of errors and suggestions for improvements. Whereas in CuDIT, the prototypes (the pre-implemented sample services) were intended to inspire the users to come up with new ideas. In both cases, the process can be regarded as an experiential learning model (Kolb, 1984), see Figure 8.1.

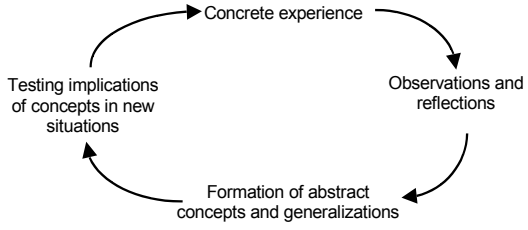

Figure 8.1 Lewins experiential learning model. Source: Kolb (1984, page 21.)

A first implication is thus; having gates that interrupt the learning circle should be avoided. This does *not*, however, imply that sequential stage-gate models cannot, or should not, be used when involving users. However, the scope of activities must be chosen in such a way that the gates are between, not within, the iterative learning loops.

A second implication of user involvement is that the "*planning paradigm"* cannot be used, at least not in the same manner as traditionally applied. In the DOF case (Magnusson, 2003a, appended paper no 1), the prescribed development model stipulated that the whole project should be planned in advance. This seems to be the established practice in many other organizations as well (Engwall, 2003). Some examples of items supposed to be defined and specified before a project can be started up in the planning paradigm are; a written specification of the outcome (the service), the duration of the project, the necessary resources, the total cost, the expected profit for the commercial service, etc. If all these items are to be defined in advance, there is essentially no reason for involving users in the development process. The whole project is fixed and the information obtained from the users during the project is of no value since it cannot be co-opted and put to use. In practice, this means that the experimental approach used in the CuDIT project is not applicable to a company that uses a strict planning model for its product development. Accordingly, to utilize the benefits of involving users, a company must abandon the planning perspective and instead adopt a learning perspective. It can be argued that certain things must be planned and decided on in advance, product development cannot be conducted on an *ad hoc* basis to be effective. A development project that is completely planned on day zero cannot be

anything but a 'product modifying project' with minimal deviation from the current state. Innovating is, by definition, creating something new not previously known. It is virtually impossible to thoroughly plan something before it is invented. I contend that it is utterly important to combine the *learning* and *implementing* perspectives to succeed with user involvement. The two must not, however, be synthesized into some new awkward "plearning" perspective. No, learning has its place in the development process just like implementation has. Planning is necessary to effectively *implement* new products and services in an organization. However, you cannot plan the *output* from innovation. This does not mean that innovation is unmanageable. The *process* of innovation can be planned and controlled. Innovation, can, for example, be controlled by budget, the number of persons employed in innovation, and a vision describing the kind of products the company offers.

By reflecting upon the results from the CuDIT and DOF studies, I will now discuss the implications of involving users in the new service development (NSD) process, illustrated in Figure 8.2.

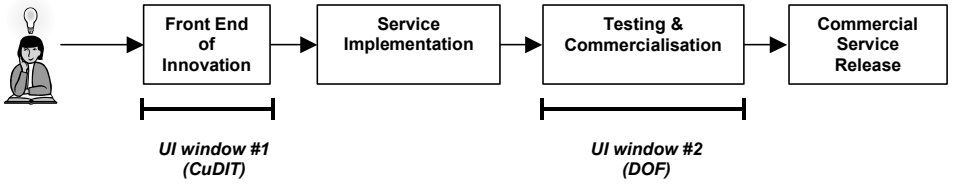

Figure 8.2 Conceptual framework for new service development when involving users

A new service starts with an idea and, following successful processing, ends up with the release of a new commercial service. There are two windows where users are preferably involved during this process. First, during the initial phases for generating and testing new service concepts, as in the CuDIT experiments. This first window is the main focus of the thesis. The second window is open during the later phases of the development process when the beta version of the new service is ready for testing. The second window complies with the DOF study described in paper no. 2 (Magnusson, 2003a). In this window, the final adjustments are made before releasing the product. Between the two "user involvement windows" lies the implementation phase where the users have little to contribute. It is thus convenient to use traditional project management models for this phase, e.g. some stage-gate model as used in the DOF case.

User Involvement and idea processing

The first phase of the development process is often referred to in the literature as the front-end of innovation (Koen et al., 2001), or the fuzzy front-end (Reinertsen, 1994). The vast majority of writings concerning the front-end of innovation regard this primarily as an idea screening process. The aim is to remove the "bad" ideas and let the "good" ones pass. The previous chapter, however, concluded that an idea screening approach would not utilise the full potential of user involvement during the idea generation phase. As stated before, the traditional idea filtering process must be supplemented with other ways of handling the users' ideas. I propose the following approach in order to process the incoming ideas.

1. Apply traditional idea screening using filtering. Some of the ideas will pass on for further evaluation, whilst others will be blocked. The ideas that are blocked do not meet one or several criteria. It was found that many user ideas scored poorly in respect of feasibility, probably due to the users' lack of technical knowledge.
2. Analyse the ideas that did not pass idea screening. The EIZ-framework, presented in Chapter 7, can be a helpful tool. EIZ structures the ideas in such a way that further elaboration is facilitated. The ideas in each zone share some common deficiency that must be dealt with to make the idea commercial. For example, the ideas in zone 1 have a good user-value but are not producible.
3. Depending on the zone, different types of processing are needed. Concept Adaptation is a way to overcome the producibility problem for ideas in zones 1, 3, and 5.
4. Finally, investigate the ideas still not possible to continue with and especially those falling outside the current business concept. Analyse whether the ideas can be a trigger for reconsidering the business strategy (*Generative Revision*).

It should be noted that the four steps above are not only applicable to user ideas, they can, of course, be applied to company-developed ideas as well.

Adapting user involvement to different purposes

In Chapter 7, it was concluded that *details matter* when involving users for innovation. Small differences in the procedure of involving users yielded large variations in the characteristics of the created ideas. Accordingly, user involvement should be managed in detail. Present knowledge is rather limited regarding how users should be involved in a preferable way.

However, we have gained some tentative knowledge. From the findings in the thesis, we can, however, discern two approaches to user involvement yielding disparate results. The *guided user* approach can work as a role model when *stepwise-refinement* is desired, i.e. the emphasis is on producibility. In this approach, the users are taught about the opportunities

and limitations of the current technology. On the other hand, if the objective is to enhance *innovativeness* and *renewal,* the *pioneering users* approach seems to be preferable. This stimulates a divergent process where innovative ideas can arise. Here, the users are given minimum information regarding the limitations of the underlying technology and encouraged to think out of "the ingrained".

User involvement and intellectual property rights

An important issue when involving users in idea generation is the intellectual property rights regarding the ideas. This problem becomes especially delicate when company personnel and users interact, as in Trial D of CuDIT. Who owns an idea that is the result of a creative group session? In the CuDIT –study, the participants were granted ownership of their own ideas. In a real case, there must be an agreement whereby the company can assert ownership of the ideas resulting from user involvement; how this should be performed in practice is, however, beyond the scope of this thesis.

Beyond technology-push and demand-pull

From a strategic perspective, user involvement can be a means of going beyond the debate regarding whether a company should adopt a technology-push or a demand-pull strategy. As will be shown, user involvement can actually work as a combination of the two.

In the past, most companies in the mobile telephony business were guided by a *technology-push* approach. New technological opportunities were the seed for the development process. Without doubt, mobile telephony would not have reached the point where it is today if it had not been for enthusiastic engineers who struggled to explore new technological opportunities and people with a vision beyond the existing market surveys and short-term profitability. In the early days of mobile telephony, before pan-continental standards existed, technology was definitely important. Today, however, virtually all mobile communication is standardised. No one can gain a comparative advantage by selecting the "right technology"; instead the battle for the customer is won by supplying the best value to the customer. This also indicates that the technology-push approach might be out-of-date. It could be tempting to think that the new approach should be a *demand-pull* strategy; however, I contend that only relying on a demand-pull strategy would lead the company astray. The firm will instead need to adopt a *dual* strategy that includes both technology-push and demand-pull in concert. To expound my argument, we return to the previous discussion regarding the value-delivery space introduced in Chapter 7. Figure 8.3 illustrates how value can be delivered when the product possesses user-value while at the same time being producible, i.e. the intersection between

user-value and producibility. Originality is normally a desirable but not always a necessary feature in a commercial product.

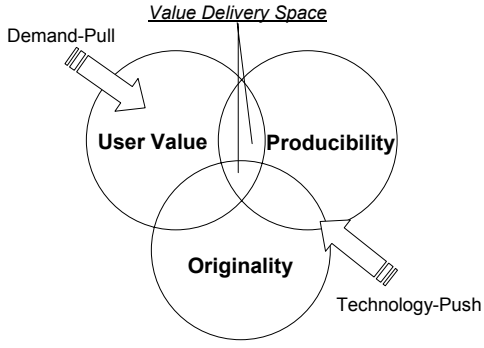

Figure 8.3 Demand-pull vs Technology-push

A technology-push approach contributes ideas that primarily end up in the intersection of the producibility and originality zones. The emphasis is on understanding how the technology can be developed so as to offer new exciting features. In the next step, one must understand how these new features can create value for the users. At the beginning of a new technology, the first customers to adopt that technology seem to be quite satisfied with just buying technically-advanced and innovative products. As the technology matures, however, there will be other features that become important as new categories of customers start to adopt the technology. The emphasis shifts from originality to delivering user-value (Rogers, 1995; Norman, 1998). During this phase, the demand-pull strategy seems to be favourable. Understanding the needs and wants of the users is the main issue. The new ideas will be entered from the user-value circle. A new product or service thus starts with a user need that is to be met through a new offering. Critics claim that this approach will suffer from the originality of the products (Bennett and Cooper, 1981).

What happens when users are involved? One could expect that involving users is purely a demand-pull strategy. This is partly right; the guided-user approach succeeded in delivering relatively more ideas that were assessed with a high user-value and being producible. The ideas in this approach were assessed to be rather poor regarding originality. On the other hand, the pioneering users' ideas combined a high user-value with originality, but lacking in producibility. Pioneers thus seem to deliver a combination of technology-push and demand-pull. Figure 8.4 illustrates how the dual-user involvement approaches and the professionals' ideas enter.

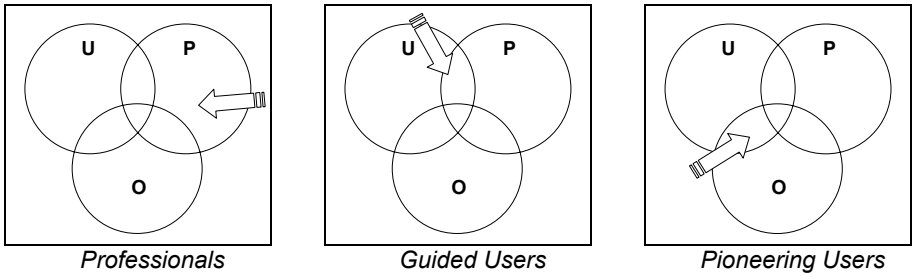

Figure 8.4 The entry of three approaches

In a sense, it does not matter whether the company is driven by *technology* or by *demand*. If driven by technology, the company must find a demand for its offering. If driven by demand, the company must instead find a way of designing an offering that meets the demand. In the CuDIT – study, the origin was a technical opportunity explored by a professional developer at Telia Mobile, accordingly a technology-push. To explore how this new opportunity could deliver user-value, a working prototype (the US platform) was implemented. In the CuDIT experiments, users were invited to test the prototype and come up with ideas for new services. In several cases, the users not only found a use for the technology, they also discovered new needs that could not readily be satisfied by the presented technology; the technology-driven process thus changed over to being demand-driven. User involvement can thus neither be classified as demand-pull nor technology-push; it was rather an interplay between the two. A prerequisite for this interplay is, however, that the company accepts ideas that do not fall inside the feasibility field, i.e. it must adopt the approaches of Concept Adaptation, and Generative Revision. If stuck in traditional idea screening, the new non-feasible ideas will end up in the dustbin. However, if the company accepts the users' ideas as visionary concepts, this will be able to aid the company in developing offerings in the business frontier.

9. RESEARCH CONTRIBUTIONS AND FURTHER RESEARCH

All contributions and conclusions given in the chapter are only valid, unless otherwise stated, for the defined scope of the thesis, i.e. the early stages of end-user mobile telephony services.

The research contributions of the thesis
The thesis has made contributions in the form of empirical findings, methodological contributions, and new theories.

Empirical findings
The thesis contributes empirical findings that provide the contribution from user involvement (Q_1) and how it can be optimised (Q_2-Q_3). These contributions can also be related to the existing research literature. As previously identified, there is a debate in the literature as to whether or not users can make a positive contribution to new product innovation. The findings of the thesis have indeed unveiled comparative advantages by involving users in the idea generation process. Differences have been established between users' and professionals' new service ideas in the three product-intrinsic dimensions of originality, user-value and producibility. Under *certain circumstances,* users can produce ideas containing a higher level of user-value as well as more originality. This result is thus in contrast with writings claiming that users do not possess the necessary expert knowledge to contribute to the innovation of new products (e.g. Bennett and Cooper, 1981; Christensen and Bower, 1996; Christensen, 1997).

One important contribution is the finding that the act of involving users, i.e. how users are involved, has an influence on the results. The findings show that even seemingly small differences in the procedure of involving users can affect the outcome a lot. The act of involving users must therefore be accurately managed. The results of the thesis indicate that, using different approaches, user involvement can be manipulated towards either stepwise-refinement (guided user approach) or radical innovation (pioneering user approach). This implies that research into user involvement should pay detailed attention to how the user involvement under study is, or has been, carried out. However, the existing research literature has not, with some exceptions, defined the notion of user-involvement. The vast majority of previous research findings regarding user-involvement are thus difficult to apply in the case of practitioners, since they rarely account for how the users have contributed (Magnusson, 2003c).

Although the procedure of involving users can be used to optimise the outcome, none of the investigated personality variables, besides technology

readiness, affected the characteristics of the created ideas. Technology readiness was positively related to the producibility of the ideas.

New theory

The thesis contributes theoretical frameworks to be used when analysing new service ideas. One theory introduced is that traditional idea screening, which is abundantly promoted in the existing new product development literature (e.g. Wheelwright and Clark, 1992; Crawford and Di Benedetto, 2000), has problems handling most of the users' innovative ideas; these will probably be blocked during screening due to a poor level of producibility. Accordingly, the traditional idea processing methods, based on screening and filtering, must be complemented with other frameworks if the potential benefits of user involvement in idea generation are to be exploited. The thesis presents a theoretical model for alternative idea processing, namely *Concept Adaptation*. Instead of focusing on blocking ideas, concept adaptation examines how the ideas can be redesigned so as to become feasible.

The thesis introduces the eight-idea-zone (EIZ) framework that can be used as a tool to analyse and categorise ideas before further processing. EIZ enables a holistic analysis of the service ideas. Instead of analysing one idea characteristic at a time, it takes all three characteristics into account simultaneously. The true potential of the ideas will in this way be better elucidated. An illustrating example of EIZ applicability is the analysis of the differences in contribution between the two approaches of guided users and pioneering users (see Figure 7.4).

The thesis also introduces a theory for an alternative interpretation of user involvement contribution, called *Generative Model Revision*, where rejected user ideas can function as a lever for regenerating the companies' business. The basis for this mechanism is that users are not stuck in the dominating technological paradigm of the company, thereby having the potential to break out of the ingrained patterns that the professional developers might be stuck in. The Generative Model Revision can actually be regarded as a framework for strategy formation through the involvement of users.

Methodological contribution

Critique is raised in the thesis towards the research methodologies used in most of the previous research into user involvement (Magnusson, 2003c). To gain knowledge that can be used in the practice of involving users, new methods should be used. Broad inquiries into retrospective events will rarely produce the knowledge needed for practitioners. Hereby, the thesis makes a methodological research contribution by presenting the research design CED (Collaborative Experimental Design). CED is the research

design developed for the CuDIT project. CED emulates "real user involvement" and can be used for comparative studies wherein different variants of involvements are compared. The design enables the concurrent production of actionable knowledge for academics as well as practitioners. The data collected can be analysed by using both quantitative and qualitative methods.

The research process accounted for in the thesis can actually work as a role model for real user involvement. The experiments emulated a situation where the users, during a period of time, could reflect upon how wireless services could be applied to bring them benefit. Their ideas were thus generated by "reflection in action", hereby generating services that solved a real problem. This is quite the opposite of just asking a sample of users what new services they would like to have. The results indicate that this way of deep involvement can be favourable.

Validity and generalisation of the findings

The internal validity (e.g. possible effects of interaction) of the empirical findings is discussed together with the results in the Cap, as well as the appended empirical papers (Kristensson et al., 2002, p. 57; Magnusson, 2003b, p. IV-11; Magnusson et al., 2003, p. V-11). Over and above this, more general validity issues are discussed in Chapter 5 and in appended paper no. 2 (Magnusson, 2003c). I will focus the remaining discussion in this paragraph on the generalisation of the findings.

The study in the thesis has been limited to a rather narrow context, the question therefore naturally arises as to what extent the findings can be applied to other contexts. It is a relevant but difficult question to answer since this is, at least to my knowledge, the first and only study that has performed a comparative analysis of user contribution during the idea generation process. The answer must thus be speculative.

Some distinguishing characteristics of the investigated services can be listed. It can be tentatively assumed that other products or services that share the same characteristics are good candidates for sharing the findings of the thesis.

Technical platform

The services investigated were based on a technical platform, meaning that they could be programmed and repeated over and over again. The platform is perceived as a kind of general-purpose machine that can be adapted to individual needs. Another example of this is a computer, whose use is decided by the software that is installed. Ultimately, one could also regard a *car* as a general-purpose machine for transportation. However, the car can be equipped with various extra features that bring new value to its user; e.g.

an onboard computer that computes fuel consumption etc, GPS as a navigation aid etc.

What but not how
Although the services were based on a technical platform, the participants did not need to understand how their service suggestions would be implemented. They could freely make suggestions regarding what function the service should offer without bothering about how it would be realised. In the study, the separation between function and implementation was very distinct. Access to the services was via the mobile phone. An ordinary user could use the services without understanding anything about how they were actually realised. This is not unusual, most people who drive a car do not know anything about how the engine is built, or how the transmission system is designed. The findings actually indicate that ignorance of the underlying technology is an asset when it comes to thinking out creative new service ideas.

It is thus probably much more difficult to obtain innovative suggestions if function and implementation are not distinctly separated. For example, for a hair-dressing service, it is very difficult to make this distinction.

Access to prototypes
To trigger the idea creation process, it was probably essential for the participants to have access to the prototype services. For almost two weeks, the participants could freely try the pre-implemented services in their own natural environment. The services were thus assimilated as a natural part of their daily lives. The service ideas could thereby be the solutions to problems the moment they appeared. The prerequisite for using working prototypes during user involvement is a limitation in some contexts. It is difficult to imagine what a prototype for a haircut would look like.

Conclusion
It could be assumed, at least tentatively, that the presented empirical findings, methodology, and theory could be applicable to contexts sharing the characteristics listed above. This would, for instance, include other automated services, e.g. self-services for banks, booking tickets, etc. But it could also include products that can be perceived as platforms for add-on services, e.g. cars and computers. Nonetheless, in order to make anything but tentative or speculative assumptions, more research for other contexts is needed.

For further research
As just mentioned, the study should be validated in another context. The previous paragraph mentions some contexts where the findings are likely to be confirmed.

Research with a great potential is to further investigate the detailed mechanisms of involving users. The findings presented in the thesis are promising since they indicate that user involvement is manageable towards either feasibility or innovativeness.

Also, on the micro level, the tentative investigation of the individual idea creation processes indicates that the procedure of coming up with new ideas matters. However, there is a need for further in-depth studies of the mechanisms that might lead to good idea proposals. Actually, data for this kind of in-depth analysis was obtained during the CuDIT study. As previously described, all participants kept a diary wherein all ideas were to be noted, and the process that preceded the creation of the idea described. The participants were also interviewed regarding their ideas and the background to their creation. Together, this forms a rich material for the further investigation of why great ideas arise. However, only a cursory analysis of the material has so far been made.

Although the study could not find any link between personality factors and outcome, this is indeed an important area for further investigation. Other personality tests should be investigated in order to find predictors for selecting the appropriate users to involve.

The thesis has not thoroughly analysed the contribution of users during the idea screening procedure. The study obtained data from two different users panels which can be further analysed in order to understand how users can contribute to the evaluation of ideas.

The issue of whether it is economically justifiable to involve users during the idea generation process has been omitted from this study. This is, however, a most relevant issue for further research. The findings made in the current study can form the input for a further profitability analysis.

10. SUMMARY OF APPENDED PAPERS

The chapter gives a brief summary of the six appended papers. The papers can be divided into four different types of papers, explorative (no. 1), methodological (no. 2), empirical results (nos. 3,4,5), and theoretical (no. 6).

The first is an *explorative* article investigating the effects on organising when involving users.

Paper No 1: Explorative, The DOF Case study

***Title:* "The DOF – Act First, Think Later (How user-involved service development can impact upon the organisation of development work)"**

Magnusson, Peter (Magnusson, 2003a), "The DOF – Act First, Think Later (How user-involved service development can impact upon the organisation of development work)", original Swedish title "Dof - Gör först och tänk sen (hur användardriven tjänsteutveckling kan påverka organiseringen av utvecklingsarbetet.)", in Beyond the models (original Swedish title Bortom modellerna), Engwall, M., Ed., Studentlitteratur. Forthcoming

Abstract

The paper is based on a case study, describing the development of DOF – a new concept in mobile telephony – at Telia Mobile (Sweden's biggest mobile operator). The case illustrates how a new approach was adopted of involving customers/users during the early phases of the development. The established project model at the company was a sequential stage-gate model. In order to co-opt user-input, an iterative model had to be introduced. The paper analyses the intra organisational problems that arose.

Comment

The paper's main contribution is to illustrate the adaptation a company has to make in order to involve users, i.e. Q_4.

Paper No 2: Methodological

***Title:* "User Involvement and Experimentation in Collaborative Research"**

Magnusson, Peter R (2003c), "User involvement and experimentation in collaborative research", in New horizons in management research - building collaborative partnerships, Adler, N. and Shani, A. B. R. and Styhre, A., Eds., SAGE. In Press

Abstract

Although user involvement has been a research area for more than twenty-five years, most of the findings do not offer practicing managers knowledge that can be used as a basis for their actions. One reason for the lack of actionable knowledge can be attributed to the research methods used. A

review of the research literature reveals that the vast majority of studies have been broad surveys producing results on an aggregated level which is hard to apply in the practitioner's particular situation.

The experiment is an under-used research approach in studies of product innovation management. The chapter argues that experiments can be used to produce knowledge useful to both academics and practitioners, thus bridging the academy-industry gap. However, one major difficulty has to be solved. The criteria for considering the results useable differ between academy and industry. Practitioners want results that can be used to implement favourable actions at the company, something academics do not normally pay any attention to.

The chapter presents a research design (CED) where academics and practitioners jointly perform collaborative experiments, producing usable knowledge for both scholars and practitioners. Findings from a recent application of CED are presented in order to prove the design's validity. Finally, to successfully apply the proposed research design, the scholarly and managerial implications are discussed.

Keywords: Research design (method), Academic-industrial collaboration, user-involvement, experiments.

Comment

The paper does not directly address any of the research questions; nonetheless, it makes a major methodological contribution. The method accounted for is the one developed in the CuDIT study. The CuDIT design enables action research that produces academic knowledge regarding user involvement while at the same time producing valuable idea proposals for the participating company. The design also enables comparison between different settings of user involvement; it enables the capture of process data for qualitative analysis to explain the underlying mechanisms of user involvement, i.e. why different setups works better than others.

Paper No 3: Empirical findings from the CuDIT study #1

***Title:* "Users as a hidden resource for creativity - Findings from an experimental study on user involvement"**

Kristensson, P., Magnusson, P. R., and Matthing, J. (2002), "Users as a hidden resource for creativity: Findings from an experimental study of user involvement", *Creativity and Innovation Management*, Vol. 11 No. 1, pp. 55-61.

Abstract

(Abstract extracted from the journal)

The main objective of this article is to report the empirical findings from a study on user involvement in service innovation. In doing this, we seek to answer the question of how user involvement affects the originality of new service ideas. An experimental investigation was carried out which included 54 participants arranged into three groups of creative users, ordinary users

and professional service developers. The empirical data revealed that the users produced more original ideas than the company's professional service developers. It is thus suggested that business organizations that attempting to innovate original products would benefit from involving their customers.

Comment
The paper addresses research questions $Q_1 - Q_3$.

Paper No 4: Empirical findings from the CuDIT study #2.
***Title*: "Benefits of Involving Users in Service Innovation"**

Magnusson, Peter R (2003b), "Benefits of involving users in service innovation", *European Journal of Innovation Management*, In Press.

Abstract
(Abstract from the journal)
Past research has demonstrated that industrial customers can, in effect, bring about product innovation among their suppliers. However, little seems to be known as to whether consumers are also potential inventors of new services. This article presents results from an empirical study with the objective of exploring whether ordinary users can contribute novel service ideas regarding mobile telephony. An experimental approach was used to compare the characteristics of new services suggested by *ordinary users* with services suggested by *professional* developers.

It was found that the service innovations suggested by the users were more creative and useful than those suggested by the professionals. On the other hand, the suggestions of the professionals were deemed easier to produce. The article concludes with a discussion on the contributions and limitations of user involvement, wherein the organisational role of the users involved is discussed. A proposal is also made regarding how to further investigate the potential of the user as a co-worker in the innovation process.

Comment
The paper mainly addresses research questions $Q_1 - Q_3$.

Paper No 5: Empirical findings from the CuDIT study #3
***Title*: "Managing User Involvement for Service Innovation: Findings from end-user telecom services innovation"**

Magnusson, P. R., Kristensson, P., Matthing, J. (2003), "Managing user involvement for service innovation: Findings from telecom service innovation", *Journal of Service Research*, In Press.

Abstract
User involvement is frequently practiced in order to enhance companies' innovation processes. However, previous research findings are contradictory regarding its benefit. This article experimentally assesses the contributions made by users in comparison with those of professional

service-developers. It also examines how the implementation of user involvement affects the outcome.

During periods of twelve days, three different groups were assigned the task of generating ideas for end-user telecom services. One group consisted of professional designers, while the other two consisted of ordinary users. The users in one of the groups coped with idea creation by themselves, while the other group consulted a service design expert at two controlled meetings who provided feedback regarding technical feasibility, and whether or not the proposed idea already existed.

The findings show that involving the users makes the quality of the generated ideas more original, holding a higher level of perceived user-value. However, the users' ideas are less producible on average. The outcome was also affected by how user involvement was implemented (intensity and mode). Scholarly as well as managerial implications conclude the article.

Comment
The paper mainly addresses research questions $Q_1 - Q_3$.

Paper No 6: Theoretical paper based on the CuDIT study

***Title*: "Towards an Understanding of User Involvement Contribution to the Design of Mobile Telecommunications Services"**

Le Masson, P. and Magnusson, P. R. (2002), "Towards an understanding of user involvement contribution to the design of mobile telecommunications services", in The 9th International Product Development Management Conference, May 27-28, 2002. Sofia Antipolis, France[23].

Abstract
Previous research into user involvement in service innovation has found that the effective contribution of users might be minor, since users' ideas are generally non-feasible. We have assumed that this might have to do with the way ideas were processed by the company, i.e. the idea selection process. We have therefore proposed and tested a new way of utilising the users' ideas, called *generative model revision*. This new approach has unveiled new potential contributions through user involvement. While previous approaches in user involvement have been directed at gaining rather short-term returns, the new approach advocated in the paper has a longer horizon, and is more focused on reframing the companies' businesses. The proposed approach is complementary rather than exclusive to the existing ones.

Comment
The article proposes a new theory for screening ideas, giving rise to both practical and theoretical implications.

[23] The paper was awarded Runner-up (second place) in the Best Paper Award.

REFERENCES

Abernathy, W. J. and Utterback, J. M. (1978), "Patterns of industrial innovation", *Technology Review*, Vol. 80 No. 1, pp. 40-47.

Alam, Ian (2002), "An exploratory investigation of user involvement in new service development", *Journal of the Academy of Marketing Science*, Vol. 30 No. 3, pp. 250-61.

Alam, Ian and Perry, Chad (2002), "A customer-oriented new service development process", *Journal of Services Marketing*, Vol. 16 No. 6, pp. 515-34.

Altshuller, G. S, Altshuller, Genrikh, Shulyak, Lev, and Rodman, Steven (1997), *40 principles - TRIZ keys to technical innovation*, Technical Innovation.

Amabile, Teresa M (1998), "How to kill creativity", *Harvard Business Review*, Vol. 76 No. 5, pp. 76 - 87.

Amabile, Teresa M. (1988), "A model of creativity and innovation in organizations", *Research in Organizational Behavior*, Vol. 10, pp. 123-67.

Amabile, Teresa M. (1996), *Creativity in context*, Westview Press, Boulder, Colorado.

Amabile, Teresa M. (1997), "Motivating creativity in organizations: On doing what you love and loving what you do", *California Management Review*, Vol. 40 No. 1, pp. 39-58.

Amabile, Teresa M., Conti, Regina, Coon, Heather, Lazenby, Jeffrey, and Herron, Michael (1996), "Assessing the work environment for creativity", *Academy of Management Journal*, Vol. 39 No. 5, pp. 1154-84.

Anderson, William L. and Crocca, William T. (1993), "Engineering practice and codevelopment of product prototypes", *Communications of the ACM*, Vol. 36 No. 4, pp. 49-56.

Balakrishnan, Subra (1996), "Benefits of customer and competitive orientations in industrial markets", *Industrial Marketing Management*, Vol. 25, pp. 257-69.

Bennett, Roger C. and Cooper, Robert G. (1981), "The misuse of marketing: An American tragedy", *Business Horizons*, Vol. 24 No. 6, pp. 51-61.

Bitner, Mary Jo, Brown, Stephen W., and Meuter, Matthew L. (2000), "Technology infusion in service encounters", *Journal of the Academy of Marketing Science*, Vol. 28 No. 1, pp. 138-49.

Bowers, Michael R. (1989), "Developing new services: Improving the process makes it better", *Journal of Services Marketing*, Vol. 3 No. 1, pp. 15-20.

Burkart, Robert E. (1994), "Reducing R&D cycle time: A diagnostic aid matches potential solutions with causes of uncertainty at the 'fuzzy front end' of the innovation process." *Research Technology Management*, No. May-June, pp. 27-32.

Burns, Tom and Stalker, George M. (1961), *The management of innovation*, London : Tavistock.

Christensen, Clayton (1997), *The innovator's dilemma: When new technologies cause great firms to fail*, Harvard Business School Press, Boston (MA).

Christensen, Clayton M. and Bower, J. (1996), "Customer power, strategic investment and the failure of leading firms", *Strategic Management Journal*, Vol. 17, pp. 197-218.

Ciccantelli, S. and Madgison, J. (1993), "Consumer idealized design: Involving customers in the product development process." *Journal of Product Innovation Management*, Vol. 10, pp. 341-47.

Clark, Charles (1989), *Brainstorming: How to create successful ideas*, Wilshire Book Company.

Cooper, Robert G. (1993), *Winning at new products : Accelerating the process from idea to launch* (2nd ed.), Perseus Books.

Cooper, Robert G. (1997), "Fixing the fuzzy front end of the new product process: Building the business case", *CMA*, Vol. 71 No. 8, pp. 21-23.

Crawford, C. Merle and Di Benedetto, Anthony (2000), *New products management* (6th ed.), Mc Graw Hill.

Dabholkar, Pratibha A. (1996), "Consumer evaluations of new technology-based self-service options: An investigation of alternative models of service quality", *Research in Marketing*, Vol. 13, pp. 29-51.

Dahlsten, Fredrik (2003), "Hollywood wives revisited - a study of customer involvement in the xc 90-project at Volvo cars": IMIT/Chalmers University of Technology.

de Bono, Edward (2000), *Six thinking hats*, Penguin, London, UK.

Dosi, Giovanni (1982), "Technological paradigms and technological trajectories", *Research Policy*, Vol. 11, pp. 147-62.

Edvardsson, Bo, Gustafsson, Anders, Johnson, Michael D., and Sandén, Bodil (2000), *New service development and innovation in the new economy*, Studentlitteratur, Lund.

Eisenhardt, Kathleen M. and Tabrizi, Behnam N. (1995), "Accelerating adaptive processes: Product innovation in the global computer industry", *Administrative Science Quarterly*, Vol. 40, pp. 84-110.

Engwall, Mats (2003), *Modellen mellan raderna*, Studentlitteratur.

Ericsson (2002). *"technologies a-z" http://www.Ericsson.Com/technology/technologies_az.Shtml, access date 12 may 2002.* Retrieved May 12, 2002, from WEB-page

Fesist, Gregory J. (1999), "The influence of personality on artistic and scientific creativity", in Handbook of creativity, Sternberg, R. J., Ed., Cambridge University Press.

Fujita, Junko (2000). *Docomo bets u.S. Users will see beyond tiny screen (update 2).* Retrieved December 11, 2000, from Bloomberg L.P. Web site: www.bloomberg.com

Gales, L. and Mansour-Cole, D. (1995), "User involvement in innovation projects", *Journal of Engineering and Technology Management*, Vol. 12 No. 1-2, pp. 77-109.

Gales, Lawrence and Mansour-Cole, Dina (1991), "User involvement in innovation projects: A reassessment using information processing", in Academy of Management Proceedings.

Gerdes, Olle (1991), "Nordisk mobiltelefoni nmt - från trådlös telegraf till mobiltelefon", in Tekniska museets årsbok 1991, Daedalus, Ed.

Goldenberg, Jacob, Mazursky, David, and Solomon, Sorin (1999), "Toward identifying the inventive templates of new products: A channelled ideation approach", *Journal of Marketing Research*, Vol. 36 No. May, pp. 200-10.

Grant, Robert M. (1991), "The resource-based theory of competitive advantage: Implications for strategy formulation", *California Management Review*, No. Spring, pp. 114-34.

Grant, Robert M. (1996), "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, Vol. 17 No. Winter Special Issue, pp. 109-22.

Grönroos, Christian (1990), *Service management and marketing. Managing the moments of truth in service competition*, Lexington Books, Toronto.

Gummesson, Evert (1987), "The new marketing: Developing long-term interactive relationsships", *Long Range Planning*, Vol. 20 No. 4, pp. 10-20.

Gummesson, Evert (1991), "Quality control in service businesses (in Swedish)," in Forskningsrapport 91:4: CTF Högskolan i Karlstad.

Gupta, Ashok. K. and Wilemon, David. L. (1990), "Accelerating the development of technology-based new products", *California Management Review*, Vol. 32 No. 2, pp. 24-44.

Gurteen, D. (1998), "Knowledge, creativity and innovation", *Journal of Knowledge Management*, Vol. 2, pp. 5-13.

Haberman, S. J. (1973), "The analysis of residuals in cross-classified tables", *Biometrics*, Vol. 29, pp. 205-20.

Hart, Susan, Hultink, Erik Jan, Tzokas, Nikolaos, and Commandeur, Harry R. (2003), "Industrial companies' evaluation criteria in new product development gates", *Journal of Product Innovation Management*, Vol. 20 No. 1, pp. 22-36.

Hatchuel, Armand, Le Masson, Pascal, and Weil, Benoît (2001), "Design strategies and the management of "innovation fields"", in 8th International product development management conference. Enschede, June 2001.

Hatchuel, Armand and Weil, Benoit (1999), "Design-oriented organizations: Towards a unified theory of design activities", in 6th international product development management conference. Churchill College, Cambridge, UK, July 5-6.

Hauser, J.R. and Zettelmeyer, F. (1997), "Metrics to evaluate rd&e", *Research-Technology Management*, Vol. 40, pp. 32-38.

Hennestad, Bjorn W. (1999), "Infusing the organisation with customer knowledge", *Scandinavian Journal of Management*, Vol. 15 No. 1, pp. 17-41.

Hinkle, Dennis E., Wiersma, William, and Jurs, Stephen G. (1998), *Applied statistics for the behavioral sciences*, Houghton Mifflin.

Holbrook, Morris B. (1998), *Introduction to consumer value*, Routledge.

Holmquist, Rune and Ekvall, Göran (1986), *Bpe: Bedömning av personliga egenskaper*, Psykologiförlaget, Stockholm.

Holt, Charles A. (1995), "Industrial organization: A survey of laboratory research", in The handbook of experimental economics, Kagel, J. H. and Roth, A. E., Eds., Princeton University Press, New Jersey.

Iansiti, M. and MacCormack, A. (1997), "Developing products on internet time", *Harvard Business Review*, Vol. 75 No. 5, pp. 108-17.

ISO (1994), *Iso 8402:1994, quality management and quality assurance - vocabulary*, SIS - Standardiseringen i Sverige.

ITU (2003). *Http://www.Itu.Int/aboutitu, access date 6 January 2003.* Retrieved January 6, 2003, from WEB-page

Ives, Blake and Olson, Margerethe H. (1984), "User involvement and mis success: A review of research", *Management Science*, Vol. 30 No. 5, pp. 586-603.

Jonsson, Kent (2001). *Pressrelease 2001-09-17 "Halebop stärker sitt erbjudande med mobilabonnemang".* Retrieved August 5, 2002, from Halebop's Web site: www.halebop.se/halebop/control/pressrelease?url=/press/pressreleases/010917.jsp

Katz, Ralph and Allen, Thomas J. (1997), "Organizational issues in the introduction of new technologies", in The human side of managing technological innovation : A collection of readings, Katz, R., Ed., New York : Oxford University Press.

Kaulio, Matti (1997), "Customer-focused product development - a practice-centred perspective," Doctorial Thesis, Chalmers University of Technology.

Kaulio, Matti A. (1998), "Customer, consumer and user involvement in product development: A framework and a review of selected methods", *Total Quality Management*, Vol. 9 No. 1, pp. 141-49.

Kelly, David and Storey, Christofer (2000), "New service development: Initiation strategies", *International Journal of Services Industry Management*, Vol. 11 No. 1, pp. 45-62.

Khurana, Anil and Rosenthal, Stephen R. (1997), "Integrating the fuzzy front end of new product development", *Sloan Management Review*, No. Winter, pp. 103-20.

Khurana, Anil and Rosenthal, Stephen R. (1998), "Towards holistic "front ends" in new product development", *Journal of Product Innovation Management*, Vol. 15, pp. 57-74.

Koen, Peter, Ajamian, Greg, Burkart, Robert, Clamen, Allen, Davidson, Jeffrey, D'Amore, Robb, Elkins, Claduia, Kathy, Heraldm, Incorvia, Michael, Johnson, Albert, Karol, Robin, Seibert, Rebecca, Slavejkov, Aleksandar, and Wagner, Klaus (2001), "Providing clarity and a common language to the "fuzzy front end"", *Research Technology Management*, No. April-May, pp. 46-55.

Kolb, David A. (1984), *Experiential learning: Experience as the source of learning and development*, Prentice Hall, Engelwood Cliffs, New Jersey.

Kristensson, Per, Magnusson, Peter R, and Matthing, Jonas (2002), "Users as a hidden resource for creativity: Findings from an experimental study of user involvement", *Creativity and Innovation Management*, Vol. 11 No. 1, pp. 55-61.

Le Masson, Pascal and Magnusson, Peter R (2002), "Towards an understanding of user involvement contribution to the design of mobile telecommunications services", in The 9th International Product Development Management Conference, May 27-28, 2002. Sofia Antipolis, France.

Leonard, Dorothy and Rayport, Jeffrey F. (1997), "Spark innovation through empathic design", *Harvard Business Review*, Vol. 75 No. 6, pp. 102-13.

Lovelock, C. H. (1983), "Classifying services to gain strategic marketing insight", *Journal of Marketing*, No. Summer.

Magnusson, Peter (2003a), "The DOF- act first, think later (how user-involved service development can impact upon the organisation of development work)", in Modellen mellan raderna., Engwall, M., Ed., Studentlitteratur, Lund, Forthcoming.

Magnusson, Peter R (2003b), "Benefits of involving users in service innovation", *European Journal of Innovation Management*, pp. In Press.

Magnusson, Peter R (2003c), "User involvement and experimentation in collaborative research", in Collaborative research in organizations, Adler, N. and Shani, A. B. R. and Styhre, A., Eds., SAGE, Forthcoming.

Magnusson, Peter R and Marshall, Cassandra (1999), "Timing invention and rationalization - npd issues in large mature companies", in Paper submitted to the Academy of Management 2000: Fenix.

Magnusson, Peter R, Matthing, Jonas, and Kristensson, Per (2003), "Managing user involvement for service innovation: Findings from end-user telecom services innovation", *Journal of Service Research*, No. Forthcoming.

Mahajan, Vijay and Peterson, Robert A. (1985), *Models for innovation diffusion*, Sage Publications, Inc., Beverly Hills, CA.

March, J.G. (1991), "Exploration and exploitation in organizational learning", *Organization Science*, Vol. 2 No. 1, February 1991, pp. 71-87.

Martinez, Eva, Polo, Yolanda, and Flavián, Carlos (1998), "The acceptance and diffusion of new consumer durables: Differences between first and last adopters", *Journal of Consumer Marketing*, Vol. 15 No. 4, pp. 323-42.

McAdam, Rodney and McClelland, John (2002), "Individual and teambased idea generation within innovation management: Organisational and research agendas", *European Journal of Innovation Management*, Vol. 5 No. 2, pp. 86-97.

McQuarrie, E.F. and McIntyre, S.H. (1986), "Focus groups and the development of new products by technologically driven companies: Some guidelines", *Journal of Product Innovation Management*, Vol. 3 No. 1, pp. 40-47.

Mejdevi, Hans (2002), "Historisk brödrakamp, puma vs adidas", *Stadium Magazine*, No. Maj 2002, pp. 23.

Miller, Danny (1993), "The architecture of simplicity", *Academy of Management Review*, Vol. 18 No. 1, pp. 116-38.

Mills, P. K. and Morris, J. H. (1986), "Client as "partial" employees of service organizations: Role development in client participation", *Academy of Management Review*, Vol. 11 No. 4, pp. 726-35.

MISA (2002). *Misa - mobile internet students awards 2002.* Retrieved August 19, 2002, from MISA Web site: www.misaward.com

Morrison, Pamela D. , Roberts, John H. , and von Hippel, Eric (2000), "Determinants of user innovation and innovation sharing in a local market", *Management Science*, Vol. 46 No. 12, pp. 1513-27.

Muller, M. J., Wildman, D. M., and White, E. A. (1993), "Taxonomy of PD practices: A brief practitioner's guide", *Communications of the ACM*, Vol. 36 No. 6, pp. 26-28.

Mullins, John W. and Sutherland, Daniel J. (1998), "New product development in rapidly changing markets: An exploratory study", *Journal of Product Innovation Management*, Vol. 15 No. 3, pp. 224-36.

Mölleryd, Bengt G. (1999), "Entrepreneurship in technological systems - the development of mobile telephony in Sweden," PhD, Stockholm School of Economics.

Nambisan, Satish (2002), "Designing virtual customer environments for new product development: Toward a theory", *Academy of Management Review*, Vol. 27 No. 3, pp. 392-413.

Neale, Michael R. and Corkindale, David R. (1998), "Co-developing products: Involving customers earlier and more deeply", *Long Range Planning*, Vol. 31 No. 3, pp. 418-25.

Nonaka, Ikujiro and Takeuchi, Hirotaka (1995), *The knowledge-creating company : How japanese companies create the dynamics of innovation ikujiro nonaka and hirotaka takeuchi*, New York : Oxford University Press.

Norman, Donald A. (1998), *The invisible computer*, The MIT Press.

Normann, Richard (1977), *Management for growth*, Chichester : Wiley.

Parasuraman, A. (2000), "Technology readiness index (tri) - a multiple-item scale to measure readiness to embrace new technologies", *Journal of Service Research*, Vol. 2 No. 4, pp. 307-20.

Polyani, Michael (1966), *The tacit dimension*, Routledge & Kegan Paul, London.

Prahalad, C.K. and Ramaswamy, Venkatram (2000), "Co-opting customer competence", *Harvard Business Review*, Vol. 78 No. 1, pp. 79-87.

Ramirez, Rafael (1999), "Value co-production: Intellectual origins and implications for practice and research", *Strategic Management Journal*, Vol. 20 No. 1, pp. 49-65.

Reinertsen, Donald G. (1994), "Streamlining the fuzzy front-end", *World Class Design to Manufacture*, Vol. 1 No. 5, pp. 4-8.

Reinertsen, Donald G. (1999), "Taking the fuzziness out of the fuzzy front end", *Research Technology Management*, No. Nov-Dec, pp. 25-31.

Roberts, Edward B. (1988), "What we've learned - managing invention and innovation", *Research Technology Management*, No. January-February, pp. 11-29.

Rogers, Everett M. (1995), *Diffusion of innovations* (4 ed.), Free Press, New York.

Rothwell, Roy (1992), "Successful industrial innovation: Critical factors for the 1990s", *R&D Management*, Vol. 22 No. 3, pp. 221-39.

Scheffé, Henry (1959), *The analysis of variance*, John Wiley & Sons, Inc, New York.

Scheier, Michael F. and Carver, Charles S. (1985), "Optimism, coping, and health: Assessment and implications of generalized outcome expectancies", *Health Psychology*, Vol. 4 No. 3, pp. 219-47.

Scheuing, Eberhard E. and Johnson, Eugene M. (1989), "A proposed model for new service development", *Journal of Services Marketing*, Vol. 3 No. 2, pp. 25-34.

Schrage, Michael (1999), *Serious play: How the world's best companies simulate to innovate*, Harvard Business School Press.

Schumpeter, J. A. (1934), *The theory of economic development*, Harvard University Press, Cambridge, MA.

Schwartz, Ephraim and Jones, Jennifer (2001), "Race is on for 3g", *Telecommunication*, Vol. 23 No. 13, pp. 1-2.

Shaw, Brian (1985), "The role of the interaction between the user and the manufacturer in medical equipment innovation", *R&D Management*, Vol. 15 No. 4, pp. 283-92.

Sinkula, James M. (1994), "Market information process and organizational learning", *Journal of Marketing*, Vol. 58 No. 1, pp. 35-45.

Smith, Preston G. and Reinertsen, Donald G. (1991), *Developing products in half the time: New rules new tools*, John Wiley & Sons, New York.

Sonera (2002). *Sonera mspace - introduction.* Retrieved August 19, 2002, from Sonera Mspace Web site: www.mspace.fi

Sony-Ericsson (2002). *It's a developer world! Share our technology.* Retrieved August 19, 2002, from Sony Ericsson Web site: www.sonyericsson.com/codetocash/P800Home.do

Souder, William E. (1989), "Improving productivity through technology push", *Research-Technology Management*, Vol. 32 No. 2, pp. 19-24.

Spector, P. E. (1993), "Research designs", in Experimental design & methods, Lewis-Beck, M. S., Ed., SAGE.

Spender, J.-C. and Kessler, Eric H. (1995), "Managing the uncertainties of innovation: Extending Thompson (1967)", *Human Relations*, Vol. 48 No. 1, pp. 35-56.

Tellis, Gerard J. and Golder, Peter N. (1996), "First to market, first to fail? Real causes of enduring market leadership." *Sloan Management Review*, No. Winter, pp. 65-75.

Thomke, Stefan H. , von Hippel, Erik, and Franke, Roland (1998), "Modes of experimentation: An innovation process - and competitive - variable", *Research Policy*, Vol. 27, pp. 315-32.

Thomke, Stefan and Von Hippel, Eric (2002), "Customers as innovators", *Harvard Business Review*, Vol. 80 No. 4, pp. 74-81.

Thompson, J.D. (1967), *Organizations in action*, McGraw-Hill.

Trott, Paul (2001), "The role of market research in the development of new products", *European Journal of Innovation Management*, Vol. 4 No. 3, pp. 117-25.

Tushman, Michael L. and O´Reilly III, Charles A. (1996), "Ambidextrous organizations: Managing evolutionary and revolutionary change", *California Management Review*, Vol. 38 No. 4, Summer 1996, pp. 8 - 30.

Walko, John (2001), "UMTS official says 3g apps will pay off", *Electronic Engineering Times*, No. 1156, pp. 32.

Van de Ven, Andrew (1986), "Central problems in the management of innovation", *Management Science*, Vol. 32 No. 5, pp. 590-607.

Veryzer, Robert W. Jr. (1998a), "Distant innovation and the new product development process." *Journal of Product Innovation Management*, Vol. 15 No. 4, pp. 304-21.

Veryzer, Robert W. Jr. (1998b), "Key factors affecting customer evaluation of discontinuous new products", *Journal of Product Innovation Management*, Vol. 15 No. 2, pp. 136-50.

Wheelwright, Steven C. and Clark, Kim B. (1992), *Revolutionizing product development : Quantum leaps in speed, efficiency and quality*, New York : Free Press.

Wikström, Solveig (1995), "The customer as a co-producer", *European Journal of Marketing*, Vol. 30 No. 4, pp. 6-19.

von Hippel, Eric (1977), "Has a customer already developed your next product", *Sloan Management Review*, Vol. 18 No. 2, pp. 63-74.

von Hippel, Eric (1978), "Successful industrial products from customer ideas", *Journal of Marketing*, Vol. 42 No. 1, pp. 39-49.

von Hippel, Eric (1982), "Get new products from customers", *Harvard Business Review*, Vol. 60 No. 2, pp. 117-22.

von Hippel, Eric (1986), "Lead users: A source of novel product concepts", *Management Science*, Vol. 32 No. 7, pp. 791-805.

von Hippel, Eric (1988), *The sources of innovation*, New York : Oxford U.P.

von Hippel, Eric (1994), ""sticky information" and the locus of problem solving: Implications for innovation", *Management Science*, Vol. 40 No. 4, pp. 429-39.

von Hippel, Eric (1998), "Economics of product development by users: The impact of "sticky" local information", *Management Science*, Vol. 44 No. 5, pp. 629-44.

von Hippel, Eric (1999), "Toolkits for user innovations".

von Hippel, Eric (2001a), "Learning from open-source software", *MIT Sloan Mamagement Review*, Vol. Summer 2001, pp. 82-86.

von Hippel, Eric (2001b), "User toolkits for innovation", *Journal of Product Innovation Management*, Vol. 18 No. 4, pp. 247-57.

von Hippel, Eric, Thomke, Stefan, and Sonnack, Mary (1999), "Creating breakthroughs at 3m", *Harvard Business Review*, Vol. 77 No. 5, pp. 3-9.

Zhuang, L., Williamson, D., and Carter, M. (1999), "Innovate or liquidate - are all organisations convinced?" *Management Decision*, Vol. 37 No. 1, pp. 57-71.

APPENDICES

The following appendices are attached:

- **Appendix A:** *The CuDIT assignment*
- **Appendix B:** *The CuDIT Instructions*
- **Appendix C:** *Format for Service Idea Descriptions*
- **Appendix D:** *Instructions for evaluating the originality*
- **Appendix E:** *Instructions for evaluating the user-value*
- **Appendix F:** *Instructions for evaluating the producibility*
- **Appendix G:** *The distribution of ideas into the eight ideas zones*
- **Appendix H:** *Interjudge reliability*

Your chance

– create your own service!

In today's modern society, there is an ever-increasing demand as well as supply of information. Information technology (IT) makes new possibilities available, for instance, for information retrieval and new experiences.

Your assignment is to create – using the knowledge you have attained of Unified Services, along with a mobile phone – services that produce an added value for you.

Put simply, you are going to create one or more services that you perceive as important. It is important that you are able describe how your solution creates an added value for you. The solution can, for instance, facilitate information retrieval, or create a beneficial experience of some kind. The one who decides the value adding is you yourself, accordingly, there is no right or wrong here.

Instructions

We want you to consider your **opportunities** from now on and until this experiment is over within 12 days.

Write down every idea impulse and thought in the diary that comes to your mind. Bring your diary with you so that you can always jot down ideas. Do not reject any ideas;, there is nothing right or wrong.

Write down your ideas in the diary and – when you have the opportunity – document them more thoroughly in the template handed out. The intention is that your ideas should be able to be implemented on the service platform US.

It is important that you make notes in the diary of *how your ideas emerged*. That is, where did you get the idea? Was it from someone you have worked or been in discussion with? Did the idea arise from an association path when you saw or heard something? The purpose of the narratives is to enable us to understand the originating process of your ideas.

Any problems that might arise (for instance, trouble with the mobile phone or the US platform) should also be reported in the diary.

Finally, remember that your ideas are of interest to us.

Appendix C: *Format for Service Idea Descriptions*

Date

Name of service

Designer(s)

Target Group:

Who else besides you can be expected to benefit from the service?

Functional description – how does the service work?

Describe how one operates the service; feel free to use figures if appropriate. Use the backside of the paper if the space is to short.

Added value (benefit):

A service can give the user a benefit in different forms. It can, for example, save time or cost for the user. Another possible benefit can be that a service produces an experience, for example, a game service. Try to specify below the user's benefit of your service, observe that more than one alternative can be feasible. If possible, try to value the benefit.

The service creates value for the user in the form of:

☐ Time saving: _____ min/usage

☐ Cost reduction: _____ kronor/usage

☐ Experience: _____ (e.g. excitement, humour, etc)

☐

Annat:_____

____.

(Please use the backside of the paper if there is not enough space)

Appendix D: *Instructions for evaluating the originality*

Instructions for evaluating creativity/innovativeness in mobile services.
First, we would like to warmly thank you for kindly taking part as an evaluator in the CuDIT-project. The work that you do is of the utmost importance in scientifically being able to evaluate the creativity of the service ideas appearing in our study.
In the current study, the test subjects have had access for twelve days to mobile telephony equipment as well as training in how to develop their own mobile services. In connection with this, the test subjects have been given an assignment to work with. The test subjects were given the following instruction:

> *In today's modern society, the need for as well as the supply of information are continually growing. Information technology (IT) opens up new opportunities for information acquisition and new experiences, for instance.*
> *Your assignment is to devise – using the tools you have been given in the form of knowledge of Unified Services and a mobile phone – services that will create added value for you.*
> *In plain language, the above means that you are to create one or more services of your own which you consider important to you. It is important that you are able to describe how your solution creates added value for you. Your solution could, for instance, facilitate information acquisition, or provide you with a nice experience of some sort. The person who will judge the benefit is you yourself. Consequently, there is no right or wrong here.*

When the study concluded, the test subjects had to report their service ideas on a form (called the "Service Description"). It is these service descriptions that you will be evaluating.
One important factor during the development of new products and services is that they be perceived as creative/innovative, and thus "stand out" and gain attention. The concepts of creativity and innovativeness can, however, have many different definitions and interpretations. What we are interested in here, however, is **originality**, i.e. how unusual, unique and "new wave" the evaluated service can be considered to be.
Consequently, you will only be evaluating the Service Descriptions on the basis of their originality. How you will do this is described on the next page.

Appendix D: *Instructions for evaluating the originality*

Evaluation manual for the dimension of creativity/innovativeness in respect of originality

1. You are to evaluate **how original the various service ideas** in the service descriptions are.
2. We believe you have an intuitive feeling for what originality is; your starting point should, however, be how unusual, unique and "new wave" you consider the relevant service idea to be. At this juncture, you are not to think about whether the idea is realizable or not, this will be evaluated in another dimension (the ability to commercialize).
3. You do your evaluation by placing each Service Description on a scale of 1 to 10. **Begin by defining the end points,** i.e. 1 and 10. In concrete terms, this is done in such a way that you find the "worst" contribution and position it at 1 and then the "best" and position it at 10. Subsequently, you place all the other contributions at discretionary points on the scale. Thus when you have finished, you may well have several 1s, several 2s and so on.
4. To simplify evaluation, the Service Descriptions have been sorted into a number of categories. The sole purpose of this is to simplify your evaluation through similar services being grouped together. *NB: You are not to sort each category separately, i.e. in one particular category, there does not need to be a 1 and a 10.*
5. In order to be able to do the evaluation, you will thus have to read through all the Service Descriptions. By way of a suggestion, the evaluation can be done in two stages. In connection with reading through the Service Descriptions, you can do a primary sort into 5 piles, for instance, where the first pile corresponds to the ideas you think will get a grade of 1-2, and the second pile will get a grade of 3-4, and so on. When this has been done, go through the five piles and do your final evaluation. It might be the case here that an idea you evaluated as a 1 or a 2 might turn out to be a 5 upon second examination.
6. It is you yourself who will, based on the brief description in point two, create the definition of how you evaluate the originality of the service ideas.
7. Once you have decided which grade you are going to give a service idea, **you then write on the back of each Service Description** a capital **O** (originality) and the ranking number you have decided upon, e.g. O2, O6 or O10, or any number you like from 1 to 10.
8. When you are finished, put the marked Service Descriptions in the envelope provided.

Appendix E: *Instructions for evaluating the user-value*

Instructions for evaluating the user benefit of mobile services.

First, we would like to warmly thank you for kindly taking part as an evaluator in the CuDIT-project. The work that you do is of the utmost importance in scientifically being able to evaluate the creativity of the service ideas appearing in our study.

In the current study, the test subjects have had access for twelve days to mobile telephony equipment as well as training in how to develop their own mobile services. In connection with this, the test subjects have been given an assignment to work with. The test subjects were given the following instruction:

> *In today's modern society, the need for as well as the supply of information are continually growing. Information technology (IT) opens up new opportunities for information acquisition and new experiences, for instance.*
> *Your assignment is to devise – using the tools you have been given in the form of knowledge of Unified Services and a mobile phone – services that will create added value for you.*
> *In plain language, the above means that you are to create one or more services of your own which you consider important to you. It is important that you are able to describe how your solution creates added value for you. Your solution could, for instance, facilitate information acquisition, or provide you with a nice experience of some sort. The person who will judge the benefit is you yourself. Consequently, there is no right or wrong here.*

When the study concluded, the test subjects had to report their service ideas on a form (called the "Service Description"). It is these service descriptions that you will be evaluating.

One fundamental consideration when involving customers in product and service development is getting the customer's preferences, needs and requirements actively integrated into the process, thus capturing the often tacit knowledge that he or she possesses. The customer's perspective lies at the centre of this approach, with the aim of bringing greater user benefit (value) to a product or service.

You are to evaluate the Service Descriptions on the basis of the benefit (value) you judge them to create for their users. How you will do this is described later in this document.

Appendix E: *Instructions for evaluating the user-value*

Evaluation manual for the dimension of USER BENEFIT

1. You are to evaluate the **user benefit of the various service ideas** in the Service Descriptions.
2. We believe you have an intuitive feeling for what user benefit is. It can be, for instance, saving time, saving cost, an experience or something else that provides the user with added value. In order to evaluate the benefit of a product or service, it is important, for instance, that it meets the user requirements of the *relevant target group* and that this target group can really be expected to want to use the service.
3. You do your evaluation by placing each Service Description on a scale of 1 to 10. **Begin by defining the end points,** i.e. 1 and 10. In concrete terms, this is done in such a way that you find the "worst" contribution and position it at 1 and then the "best" and position it at 10. Subsequently, you place all the other contributions at discretionary points on the scale. Thus when you have finished, you may well have several 1s, several 2s and so on.
4. To simplify evaluation, the Service Descriptions have been sorted into a number of categories. The sole purpose of this is to simplify your evaluation through similar services being grouped together. *NB: You are not to sort each category separately, i.e. in one particular category, there does not need to be a 1 and a 10.*
5. In order to be able to do the evaluation, you will thus have to read through all the Service Descriptions. By way of a suggestion, the evaluation can be done in two stages. In connection with reading through the Service Descriptions, you can do a primary sort into 5 piles, for instance, where the first pile corresponds to the ideas you think will get a grade of 1-2, and the second pile will get a grade of 3-4, and so on. When this has been done, go through the five piles and do your final evaluation. It might be the case here that an idea you evaluated as a 1 or a 2 might turn out to be a 5 upon second examination.
6. It is you yourself who will, based on the brief description in point two, create the definition of how you evaluate the user benefit of the service ideas.
7. Once you have decided which grade you are going to give a service idea, **you then write on the back of each Service Description** a capital **A** (användarnytta[24]) and the ranking number you have decided upon, e.g. A2, A6 or A10, or any number you like from 1 to 10.
8. When you are finished, put the marked Service Descriptions in the envelope provided.

[24] Användarnytta = User benefit in Swedish.

Appendix F: *Instructions for evaluating the producibility*

Instructions for evaluating the producibility of mobile services.

First, we would like to warmly thank you for kindly taking part as an evaluator in the CuDIT-project. The work that you do is of the utmost importance in scientifically being able to evaluate the creativity of the service ideas appearing in our study.

In the current study, the test subjects have had access for twelve days to mobile telephony equipment as well as training in how to develop their own mobile services. In connection with this, the test subjects have been given an assignment to work with. The test subjects were given the following instruction:

> *In today's modern society, the need for as well as the supply of information are continually growing. Information technology (IT) opens up new opportunities for information acquisition and new experiences, for instance.*
> *Your assignment is to devise – using the tools you have been given in the form of knowledge of Unified Services and a mobile phone – services that will create added value for you.*
> *In plain language, the above means that you are to create one or more services of your own which you consider important to you. It is important that you are able to describe how your solution creates added value for you. Your solution could, for instance, facilitate information acquisition, or provide you with a nice experience of some sort. The person who will judge the benefit is you yourself. Consequently, there is no right or wrong here.*

When the study concluded, the test subjects had to report their service ideas on a form (called the "Service Description"). It is these service descriptions that you will be evaluating.

In the CuDIT studies, we are working on the fundamental assumption that customers can contribute interesting ideas and prototypes during a product and service development process. It is, however, seldom that a customer has the knowledge or resources to be able to evaluate whether or not an idea can be implemented. We would like you, with your knowledge of technical and administrative possibilities, to evaluate how good the services are from the perspective of producibility; in other words, questions such as whether the idea is realizable, can it be charged for, etc.

You are to evaluate the Service Descriptions on the basis of their producibility. How you will do this is described on the next page.

Appendix F: *Instructions for evaluating the producibility*

Evaluation instructions for the dimension of PRODUCIBILITY

1. You are to evaluate the **producibility of the various service ideas** in the Service Descriptions.
2. When you are doing the evaluation, it does not need to be realizable directly, but still within a 'reasonable time'. Producibility concerns questions such as whether it is technically and administratively feasible to implement the service, can the use of the service be measured, etc.
3. You do your evaluation by placing each Service Description on a scale of 1 to 10. **Begin by defining the end points,** i.e. 1 and 10. In concrete terms, this is done in such a way that you find the "worst" contribution and position it at 1 and then the "best" and position it at 10. Subsequently, you place all the other contributions at discretionary points on the scale. Thus when you have finished, you may well have several 1s, several 2s and so on.
4. To simplify evaluation, the Service Descriptions have been sorted into a number of categories. The sole purpose of this is to simplify your evaluation through similar services being grouped together. *NB: You are not to sort each category separately, i.e. in one particular category, there does not need to be a 1 and a 10.*
5. In order to be able to do the evaluation, you will thus have to read through all the Service Descriptions. By way of a suggestion, the evaluation can be done in two stages. In connection with reading through the Service Descriptions, you can do a primary sort into 5 piles, for instance, where the first pile corresponds to the ideas you think will get a grade of 1-2, and the second pile will get a grade of 3-4, and so on. When this has been done, go through the five piles and do your final evaluation. It might be the case here that an idea you evaluated as a 1 or a 2 might turn out to be a 5 upon second examination.
6. It is you yourself who will, based on the brief description in point two, create the definition of how you evaluate the producibility of the service ideas.
7. Once you have decided which grade you are going to give a service idea, **you then write on the back of each Service Description** a capital **P** (producibility) and the ranking number you have decided upon, e.g. P2, P6 or P10, or any number you like from 1 to 10.
8. When you are finished, put the marked Service Descriptions in the envelope provided.

Groups	oup 0	OUp 1	ouP 2	Zone Oup 3	oUP 4	OUp 5	OuP 6	OUP 7	
Professionals	4	2	40	1	8	0	0	0	55
Technically Skilled Users	6	6	45	0	15	1	0	0	73
Ordinary Users	16	12	50	8	26	8	2	1	123
Consulting Ordinary Users	9	10	62	2	24	1	1	2	111
Creativity Trained Ord. Users	12	15	15	7	8	7	2	1	67
Total	*47*	*45*	*212*	*18*	*81*	*17*	*5*	*4*	*429*

Table showing the distribution of the ideas into the eight zones.
Thresholds used O>5.0; U>5.0; P>5.0.
Assessment made by the expert-panel in all three dimensions.

Groups	oup 0	oUp 1	ouP 2	Zone Oup 3	oUP 4	OUp 5	OuP 6	OUP 7	
Professionals	7.3%	3.6%	72.7%	1.8%	14.5%	0.0%	0.0%	0.0%	100%
Technically Skilled Users	8.2%	8.2%	61.6%	0.0%	20.5%	1.4%	0.0%	0.0%	100%
Ordinary Users	13.0%	9.8%	40.7%	6.5%	21.1%	6.5%	1.6%	0.8%	100%
Consulting Ordinary Users	8.1%	9.0%	55.9%	1.8%	21.6%	0.9%	0.9%	1.8%	100%
Creativity Trained Ord. Users	17.9%	22.4%	22.4%	10.4%	11.9%	10.4%	3.0%	1.5%	100%
Total	*11.0%*	*10.5%*	*49.4%*	*4.2%*	*18.9%*	*4.0%*	*1.2%*	*0.9%*	*100%*

Table showing the relative distribution of the groups' ideas into the eight zones.
Thresholds used O>5.0; U>5.0; P>5.0.
Assessment made by the expert-panel in all three dimensions.

Groups	Zone								
	oup	oUp	ouP	Oup	oUP	OUp	OuP	OUP	
	0	1	2	3	4	5	6	7	
Professionals	5	0	20	9	9	4	5	3	*55*
Technically Skilled Users	6	7	16	10	18	5	10	1	*73*
Ordinary Users	12	8	24	24	13	24	11	7	*123*
Consulting Ordinary Users	5	13	31	14	15	20	7	6	*111*
Creativity Trained Ord. Users	4	7	5	17	3	25	3	3	*67*
Total	*32*	*35*	*96*	*74*	*58*	*78*	*36*	*20*	*429*

Table showing the distribution of the ideas into the eight zones.
Thresholds used are the median values O>3.00; U>4.50; P>6.25.
Assessment made by the expert-panel in all three dimensions.

Groups	Zone								
	oup	oUp	ouP	Oup	oUP	OUp	OuP	OUP	
	0	1	2	3	4	5	6	7	
Professionals	9.1%	0.0%	36.4%	16.4%	16.4%	7.3%	9.1%	5.5%	100%
Technically Skilled Users	8.2%	9.6%	21.9%	13.7%	24.7%	6.8%	13.7%	1.4%	100%
Ordinary Users	9.8%	6.5%	19.5%	19.5%	10.6%	19.5%	8.9%	5.7%	100%
Consulting Ordinary Users	4.5%	11.7%	27.9%	12.6%	13.5%	18.0%	6.3%	5.4%	100%
Creativity Trained Ord. Users	6.0%	10.4%	7.5%	25.4%	4.5%	37.3%	4.5%	4.5%	100%
Total	*7.5%*	*8.2%*	*22.4%*	*17.2%*	*13.5%*	*18.2%*	*8.4%*	*4.7%*	*100%*

Table showing the relative distribution of the groups' ideas into the eight zones.
Thresholds used are the median values O>3.00; U>4.50; P>6.25.
Assessment made by the expert-panel in all three dimensions.

Interjudge Correlations for Originality

		IX 1	IX 2	IX 3	EX 1	EX 2	EX 3	OU 1	OU 2	OU 3	OU 4	TSU 1	TSU 2	TSU 3
IX 1	r_p	1												
	p. (2-tailed)	,												
IX 2	r_p	.417**	1											
	p. (2-tailed)	.000	.											
IX 3	r_p	.531**	.431**	1										
	p. (2-tailed)	.000	.000	.										
EX 1	r_p	.360**	.286**	.504**	1									
	p. (2-tailed)	.000	.001	.000	.									
EX 2	r_p	.482**	.394**	.387**	.376**	1								
	p. (2-tailed)	.000	.000	.000	.000	.								
EX 3	r_p	.271**	.430**	.436**	.341**	.341**	1							
	p. (2-tailed)	.001	.000	.000	.000	.000	.							
OU 1	r_p	.341**	.307**	.497**	.449**	.492**	.436**	1						
	p. (2-tailed)	.000	.000	.000	.000	.000	.000	.						
OU 2	r_p	.145	.131	.081	.364**	.239**	.242**	.132	1					
	p. (2-tailed)	.085	.031	.308	.000	.000	.002	.097	.					
OU 3	r_p	.348**	.434**	.330**	.422**	.407**	.458**	.455**	.332**	1				
	p. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.				
OU 4	r_p	.325**	.447**	.310**	.405**	.398**	.339**	.337**	.345**	.348**	1			
	p. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.			
TSU 1	r_p	.249**	.238**	.295**	.208**	.126	.241**	.301**	.067	.126	.226**	1		
	p. (2-tailed)	.000	.004	.000	.000	.135	.004	.000	.427	.115	.006	.		
TSU 2	r_p	.248**	.313**	.283**	.331**	.310**	.191*	.361**	.232**	.205*	.342**	.247**	1	
	p. (2-tailed)	.003	.000	.001	.000	.000	.022	.000	.000	.014	.000	.003	.	
TSU 3	r_p	.262**	.316**	.366**	.446**	.242**	.391**	.471**	.354**	.593**	.461**	.230**	.334**	1
	p. (2-tailed)	.003	.000	.000	.000	.006	.000	.000	.000	.000	.000	.009	.000	.

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

IX = Internal expert; EX = External expert; OU = Ordinary User; TSU = Technically skilled user

Interjudge Correlations for User-value

		IX 1	IX 2	IX 3	EX 1	EX 2	EX 3	OU 1	OU 2	OU 3	OU 4	TSU 1	TSU 2	TSU 3
IX 1	r_p	1												
	p. (2-tailed)	.												
IX 2	r_p	.549**	1											
	p. (2-tailed)	.000	.											
IX 3	r_p	.483**	.288**	1										
	p. (2-tailed)	.000	.000	.										
EX 1	r_p	.238**	.264**	.148	1									
	p. (2-tailed)	.000	.002	.080	.									
EX 2	r_p	.358**	.241**	.265**	.403**	1								
	p. (2-tailed)	.000	.000	.001	.000	.								
EX 3	r_p	.229**	.299**	.080	.247**	.426**	1							
	p. (2-tailed)	.006	.000	.179	.003	.000	.							
OU 1	r_p	.149*	.048	.207**	.059	.242**	-.160	1						
	p. (2-tailed)	.014	.569	.009	.343	.004	.045	.						
OU 2	r_p	.146	.163**	.050	.247**	.344**	.082	.221**	1					
	p. (2-tailed)	.083	.007	.531	.003	.000	.304	.005	.					
OU 3	r_p	.243**	.117	.190**	.135	.285**	.110	.335**	.263**	1				
	p. (2-tailed)	.002	.162	.002	.090	.001	.072	.000	.002	.				
OU 4	r_p	.342**	.093	.288**	.249**	.225**	.160**	.201*	.375**	.271**	1			
	p. (2-tailed)	.000	.244	.000	.003	.004	.009	.016	.000	.000	.			
TSU 1	r_p	.410**	.314**	.270**	.286**	.296**	.112	.253**	.095	.276**	.309**	1		
	p. (2-tailed)	.000	.000	.001	.000	.000	.183	.000	.260	.000	.000	.		
TSU 2	r_p	.257**	.085	.033	-.016	.105	.064	.263**	.172**	.258**	.164*	.364**	1	
	p. (2-tailed)	.002	.155	.697	.850	.077	.451	.002	.005	.002	.039	.000	.	
TSU 3	r_p	.283**	.121	.094	.252**	.121	.161*	.335**	.171	.499**	.217**	.452**	-.037	1
	p. (2-tailed)	.001	.174	.135	.005	.177	.010	.000	.055	.000	.001	.000	.678	.

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

IX = Internal expert; EX = External expert; OU = Ordinary User; TSU = Technically skilled user

Appendix H: *Interjudge realibility*

Interjudge Correlations for Producibility

		IX 1	IX 2	IX 3	EX 1	EX 2	EX 3
IX 1	r_p	1					
	p. (2-tailed)	,					
IX 2	r_p	.532**	1				
	p. (2-tailed)	.000	.				
IX 3	r_p	.771**	.679**	1			
	p. (2-tailed)	.000	.000	.			
EX 1	r_p	.522**	.251**	.433**	1		
	p. (2-tailed)	.000	.002	.000	.		
EX 2	r_p	.571**	.457**	.474**	.531**	1	
	p. (2-tailed)	.000	.000	.000	.000	.	
EX 3	r_p	.582**	.586**	.674**	.507**	.564**	1
	p. (2-tailed)	.000	.000	.000	.000	.000	.

** Correlation is significant at the 0.01 level (2-tailed).

IX = Internal expert; EX = External expert; OU = Ordinary User; TSU = Technically skilled user

APPENDED PAPERS