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DOCTORAL THESIS

Forming Future IT

- *The Living Lab Way of User Involvement*

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Forming Future IT

The Living Lab Way of User Involvement

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ABSTRACT

This thesis addresses the process of user involvement in the development of information technology (IT) systems. The motive for this research is that there is still a need of more knowledge about how users can be involved in IT-development when the aim is to develop solutions that represent user needs. This is especially true when the IT-system is developed to attract users as private persons. One attempt to facilitate inclusion of private persons in IT development processes is a phenomenon called Living Lab. Living Labs is a human-centric research and development approach in which IT-systems are co-created, tested, and evaluated in the users' own private context. The Living Lab phenomena can be viewed in two ways, as an environment, and, as an approach and in this thesis, the perspective taken is Living Lab as an approach. Since the Living Lab phenomena is a rather new area there is a noticeable lack of theories and methods supporting its actions. Hence, the purpose of my research is to contribute to a successful use of Living Labs as a means for user involvement by answering the question: How can a Living Lab approach for user involvement that focus on user needs, be designed?

To gain insights into the topic I have been involved in three development projects in which the aim was to develop IT solutions based on users' needs. The research method applied in this research is action research based on an interpretive stance: I have used different methods for data-collection, such as focus-group interviews, surveys, and work-shops.

In short, the main lessons learned from this research relates to three overarching themes; User involvement, Grappling with user needs, and Living Labs. The first theme concern issues such as user characteristics, user roles, when and how users should be involved. The second theme is divided into two clusters, collecting user data, and generating and understanding user needs. Lessons related to collecting users data concern topics such as encouraging users, storytelling, understanding the social context and the users' situation. The lessons regarding generating and understanding user needs relates to users motivation, the importance of understanding different perspectives and different levels of user needs. The third theme relates to the key-principles of Living Lab approaches, and how these principles are handled, supported, and related to each other in user involvement processes that embrace a Living Lab approach.

Based on the lessons learned about the three themes, a methodology called FormIT is formed. The aim of FormIT is to assist Living Lab activities in Living Lab environments, and the methodology is built on ten guidelines. These guidelines are Identify, Inform, Interact, Iterate, Involve, Influence, Inspire, Illuminate, Integrate, and Implement, and they support the design of a Living Lab way of user involvement processes and contribute to fulfil the key-principles of Living Labs.

To conclude, this thesis contributes to the understanding of how data about user needs can be collected, generated, and understood through a Living Lab way for user involvement processes. This in turn, contributes to the development of future IT-systems based on user needs, which increases the probability for system acceptance among private persons.

ACKNOWLEDGEMENTS

As I am sitting here, looking back on the five years that has passed durng my research, I realise that there are so many people who have contributed to this work. Some people has contributed directly, while others more indirectly, but all contributions has been important to help me conclude my thesis.

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Writing a doctoral thesis and conducting research for this long period of time does not only include all wonderful work colleauges. It also includes and influence the family as well. Here I want to take the opportunity to thank my wonderful husband Urban and my lovely daughters Sandra and Angelica for making it all worth while, for supporting me and constantly sheering on me. I love you all more than I can say, you make my world spin! I also want to thank Sandra and Angelica for forcing me to do other things than reseach, such as driving taxi to your exersices, baking cakes, questionning on your homework, and being a commited football and basketball supporter. Urban, without

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Thank You!

Anna Ståhlbröst

Luleå, December 2008

An education isn't how much you have committed to memory, or even how much you know. It's being able to differentiate between what you do know and what you don't.

Anatole France (1844 - 1924)

MY PUBLICATIONS

This thesis consists of an introductory part and the following appended papers

Paper 1. Holst, M., and Ståhlbröst, A. (2006). Enriching the Process of Appreciating Needs with Storytelling. *International Journal of Technology, Knowledge and Society* 2 (4):61-68.

Paper 2: Ståhlbröst, A., and Holst, M. (2006). Appreciating Needs for Innovative IT Design. *International Journal of Knowledge, Culture and Change Management* 6 (4):37-46.

Paper 3: Bergvall-Kåreborn, B., Holst, M., and Ståhlbröst, A. (2008). Creating a New Leverage Point for Information Systems Development. In *Designing Information and Organizations with a Positive Lens*, edited by Avital, M., Boland, R. and Cooperrider, D. Oxford: Elsevier Science /JAI Press

Paper 4: Bergvall-Kåreborn, B., and Ståhlbröst, A. (2008). User Expressions Translated to Requirement. Human Technology (accepted with revisions in September 2008).

Paper 5: Bergvall-Kåreborn, B, Holst, M, and Ståhlbröst, A. (2009). Concept Design with a Living Lab Approach, accepted to HICSS-42, 5-8 January, at Big Island, Hawaii.

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Journal Articles

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CONTENTS

Chapter 1

INTRODUCTION

Information systems (IS) is a well established, and research intense, discipline that has been operational established since the early 1940s (Fitzgerald, Russo, and Stolterman 2002). Over the years, many methodologies, methods, approaches, and techniques have been developed to support the process of information systems development. In the beginning of the computing era, programmers moved from a plain planning process directly into system construction and implementation (Dennis, Wixom, and Tegarden 2002). As knowledge about systems development process has increased, approaches to support this process have evolved, moving from being structured and fixed into more radical and agile approaches (Fitzgerald et al. 2002), for example Extreme programming (XP) and SCRUM (Guntamukkala, Wen, and Tarn 2006). These approaches function well when the end users are employees where the expected effort is a part of their work-tasks, since they are anticipated to be part-time members of the development team (Guntamukkala et al. 2006). In addition, these agile methods also are used when end users are highly sophisticated in terms of technological advances. However, when users are not involved as employees in an organization, but rather as interested parties who want to contribute in their leisure time, such time-consuming effort cannot be expected from them.

Nowadays, researchers and practitioners in the IS discipline also need to grapple with the transformation and expansion of such central concepts as context and users, which influence how IT-systems could, and should, be developed and implemented, both now and in the future (Vidgen, Avison, Wood, and Wood-Harper 2004). There are many available systems supporting organizations, such as Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) systems, and Enterprise Content Management (ECM) systems. These systems are developed to support organizational activities and processes, and while these usage areas and organizational contexts still prevail, other usage areas focused on relation-building and entertainment

in private contexts have emerged. For example, IT use has expanded from being situated mostly in work contexts to include spare-time contexts as well. One reason for this expansion is the increased use of home PCs, the use of Internet services, and the use of mobile phones.

Today, IT systems also are used as means to interact continuously with other individuals and systems, and to facilitate human mobility in a ubiquitous manner (Wiberg 2005). The expansion and alteration in the usage of IT systems also can be noticed in the global impact of IT systems focusing on social networks such as Facebook and Linked In, and the use of mobile phones. Based on the above, it can be concluded that while traditional IT systems focus on supporting organizational processes, new IT systems need to focus on supporting social contacts and interactions in people's everyday lives (Wiberg 2005).

The users' role and use of IT also have been transformed and expanded in recent years and therefore influence how IT systems can be developed. Earlier, when IT systems mainly supported work practices, users did not have much choice whether to use the IT system or not, or whether they wanted to participate in the development of new products or services or not. Usage and participation often were expected from them in their role as employees. Today's users do not use IT systems only as support for their work practices; they also use IT systems in their spare time, wherever they are, almost whatever they do (Nielsen 2003; Sharp, Rogers, and Preece 2007). Hence, today's use of IT systems often is optional and voluntarily, with users who use systems without being attached to them in any way. In addition, users have changed their role from content consumers, i.e., extracting information from a system, to content producers, innovators, and problem-solvers (Følstad 2008b). This change in users' roles can be observed in situations in which users involve themselves, on a voluntary basis, in social networking and content producing in systems such as Goggle Earth, Linux, Second Life, Flickr, YouTube, and Wikipedia. These systems all are evidence of how users' joint efforts can create valuable assets such as content, products, services, etc. These changes in users' roles are enabled by today's technologies and phenomena such as:

- Web 2.0, which is a trend in the use of Internet technology and web design to facilitate creativity, information sharing, and, most notably, collaboration among users (Dearstyne 2007).

- Crowdsourcing, which is the act of taking a task, traditionally performed by employees, and outsourcing it to an undefined, generally large group of people in the form of an open call (Hempel 2007).

- Open innovation, which is a paradigm assuming that firms, in their efforts to enhance their technology, can use external as well as internal ideas, and internal and external paths to market (Chesbrough 2003; Chesbrough and Appleyard 2007; Davis 2006).

In many ways, these phenomena can open up for a renewal of user involvement in systems development processes. However, my endeavor is not to study these phenomena in detail; rather, it is to shed some light on the opportunities that companies

and systems developers can harvest from the alteration in user involvement, and to increase awareness of them, since future user involvement processes need to take these into account. Today, many IT systems are considered failures and they do not produce an added value for the users (Jones and Marsden 2006; Pitts and Browne 2007). Added value is an important quality, particularly when it comes to public IT systems. And to increase the probability that users actually will use a public IT system when it is introduced in the competitive and open market, it must offer users an added value of some sort. Therefore, it is important to gain knowledge about what the intended users need and want from technology (Burigat and Chittaro 2007; Nielsen 2003). One obvious way to gain knowledge about users and their needs is to involve them in the development process.

User involvement within the IS discipline is nothing new on the agenda; rather, user involvement has been a prerequisite in systems development processes for several years. To support these user involvement processes, different user involvement approaches have emerged over the years, for example participatory design (e.g. Bansler 1989; Bansler 1990; e.g. Bodker, Kensing, and Simonsen 2004; Bratteteig 2003; Hirschheim 1985; Mumford 1981; Mumford 1997; Namioka and Schuler 1993), interaction design (e.g. Dix, Finlay, Abowd, and Beale 1998; Jones and Marsden 2006; Löwgren and Stolterman 2004; Newman and Lamming 1995; Preece, Rogers, and Sharp 2002; Sharp et al. 2007), and user-centered design (e.g. Champion, Stowell, and O'Callaghan 2005; Holtzblatt and Beyer 1998; Karat, Atwood, Dray, Rantzer, and Wixon 1996; Karat and Karat 2003; Nieminen, Mannonen, and Turkki 2004; Patel, Stefani, Sharples, Hoffmann, Karaseitanidis, and Amditis 2006; Salovaara 2004), to mention a few.

Although many approaches for user involvement have been developed and applied, the process of involving users is considered to be complex. Flynn and Jazi stated in 1998 that one reason for this is the *user-developer culture gap* (Flynn and Jazi 1998). This means that the level of communication is low between users and developers concerning their mutual context. This, in turn, results in a situation in which developers assume that user requirements can be known completely at the beginning of the process. Conversably, users cannot understand the solution due to unfamiliar modeling languages and ignorance of the social context (Flynn and Jazi 1998). In addition, users seldom have all required knowledge about technological solutions and technological terms (Vidgen et al. 2004); hence, it becomes difficult for users and developers to communicate. Pitts and Browne (2007) declare that the difficulty with involving users has its background in users' as well as other stakeholders' uncertainty of their needs, including their inability to articulate them clearly. In addition, Pitts and Browne point to the fact that analysts often are poorly trained in techniques for information gathering; hence, they shortcut the user involvement process and start developing the final solution too early. To complicate the process of involving users even more, for several reasons it is considered impossible to ask a user "what are your needs?" (Hyysalo 2003).

In the following, I will present some examples of the difficulties such an approach to user involvement faces. Think about the scenario where a user is asked: "what are your needs of, for example, new mobile services?" Firstly, the question as such requires that the user has a notion about what a mobile service is and the possibilities it might offer; hence, it assumes that users have adequate knowledge and experiences about possible

solutions, which they often do not (Vidgen et al. 2004). Secondly, it assumes that the user can think of all possible situations in which s/he could need a mobile service, which users seldom do until they are exposed to a particular situation (Robertson 2001). Thirdly, it requires that the users can express their needs explicitly, which users rarely are able to do in the early stages of systems development, and it requires that the developer understand what the user is aiming to express (Pitts and Browne 2007; Sharp et al. 2007). If that is not enough, inherent in this approach is the assumption that users have needs related to new mobile services (Hyysalo 2003), and that they actually want to use the technology in question (Selwyn 2003). The above examples illustrate that asking users to tell developers about their needs and requirements is not a straightforward and easily accomplished process, and there still is a lot to learn in order to create systems that actually will give the users an added value.

Based on the presented difficulties, it can be concluded that users, as well as other stakeholders, usually are unsure of their needs for new technological solutions related to their current situation. They often are not aware of their needs, or they might be unable to articulate them early on in the development process (Fitzgerald et al. 2002; Vidgen et al. 2004). The support that users need and want from technology usually changes and evolves as users gain more knowledge about what is possible to get (Benyon, Turner, and Turner 2005; Fitzgerald et al. 2002; Gupta 2000; Hyysalo 2003; Imaz 2006; Kaasinen 2003; Kankainen and Oulasvirta 2003; Kaulio 1998; Larsson 2004; Reiss 2004a; Salovaara 2004). Hence, the process of identifying user needs or requirements related to new technological solutions is a complex technical, social, and cognitive process that is bounded to the actual context; at the same time, it is the most difficult phase in the development process (Maiden and Hare 1998).

Based on the changes in context and users' expanded behavior and expectations, as well as the obstacles mentioned above, it becomes clear that new approaches need to be developed to facilitate the understanding of users in the emerging situation more sufficiently. One attempt to employ the power of large user communities and to harvest the benefit of users' changed use behavior is the development of so-called Living Labs. In this approach, users are encouraged to become actively involved in ICT development processes as equal cocreators. The Living Lab approach aims to gain sufficient knowledge about users and their needs and desires related to their current life situation, and to use that knowledge as a base for future IT systems. Hence, the objective of the Living Lab approach is to develop IT systems that will attract users and therefore succeed in the increasingly competitive market.

The concept of Living Lab started to emerge in the late 1990s and the beginning of the 2000s (Markopoulos and Rauterberg 2000), and the focus initially was to test new technologies in homelike constructed environments. Since then, the concept has grown and today one precondition in Living Lab activities is that they are situated in a real-world context. During the development of the concept, Living Labs has been defined as an environment (Ballon, Pierson, and Delaere 2005; Schaffers, Cordoba, Hongistro, Kallai, Merz, and Rensburg 2007), as a methodology (Eriksson, Niitamo, and Kulkki 2005), and as a system (CoreLabs 2007c). The concept of Living Lab can be interpreted and used as a human-centric research and development approach in which ICT innovations are cocreated, tested, and evaluated in open, collaborative, multi-contextual real-world settings. Additionally, the Living Lab approach does not focus only on

involving users in the development processes; it also strives to facilitate the interaction between other relevant stakeholders, such as research organizations, companies, public and civis sectors and the society (Feurstein, Hesmer, Hribernik, Thoben, and Schumacher 2008).

The main difference between the Living Lab approach and traditional user involvement processes is the precondition that the user involvement activities should take place in real-world contexts (Ballon et al. 2005). This means, for example, that potential users are involved in their own private context all day round. Hence, when a Living Lab approach is applied, the aim is to create as authentic a use situation as possible. In traditional user involvement processes, users can be asked to use a system or device in a so-called field study. In these processes, the user is requested to use the device in a context in which the researcher, or developer, can observe users' actions and how the technology impacts them (Preece et al. 2002). Hence, the use situation is not fully authentic. Another difference between the Living Lab and systems development approaches is the focus on the vertical value chain in which customers, producers, and suppliers are involved, with the objective to create new businesses (Schaffers and Kulkki 2007). Since Living Lab is a new and upcoming approach, many aspects need to be explored and understood further (Schaffers et al. 2007). Hence, there is a need for research about methods and approaches suitable and supportive of Living Lab activities (Eriksson et al. 2005; Følstad 2008a).

Research Objective and Purpose

Living Lab is a rather immature concept and there are many aspects that need to be studied and further explored to understand the phenomena in depth; hence, more insights into how Living Lab activities and contexts can be supported are needed. Based on that, the focus of my research is to gain more knowledge about how voluntary user involvement processes can be supported in Living Lab contexts when the aim is to develop IT-systems based on users' needs. More specifically, my purpose is to contribute to Living Lab activities by developing a process that guides user involvement and integrates users' needs in the design of future IT-systems when a Living Lab approach is applied.

Delimitation

In my research, I have focused on users who have the ability to choose whether or not they want to use an IT system and whether or not they want to be involved in the system's development process. Thus, the IT-systems and the systems development process have not been organizationally based in a formal sense, which means that the development projects have not been driven by the users' organizations as such. For example, I have involved young entrepreneurs in my studies, but their involvement has not been on their initiative; they have been asked to be involved in a part of the project on a voluntary basis and without any economic compensation. Further, the focus in this thesis is on the early phases of the systems development process, i.e., concept design. This mean that I have not examined processes of programming, testing, or implementing a final solution in this thesis.

My research focus is on users' needs as drivers for developing new IT systems. Other drivers for systems development, such as subject experts (i.e., lead users), organizational strategies, or technological opportunities, are excluded from my research. In addition, even though one objective of Living Lab milieus is to create new businesses, my research focus is on user involvement; hence, business opportunities are excluded from my research.

Disposition of the Thesis

Research processes in general consist of three main ingredients: the frame of reference, the methodology, and the area of concern (Checkland and Holwell 1998b); see figure 1. This means that a particular combination of linked ideas is used in a methodology as a means to explore a defined area of concern; see figure 1 below. During my research, I have applied these elements at two levels, one in the research process as a whole, and one in each of the projects that I have been involved in. Checkland and Holwell (1998b) state that the alert researcher can learn things about all three elements in the research process; hence, I strive to clarify my learning about these elements throughout my thesis.

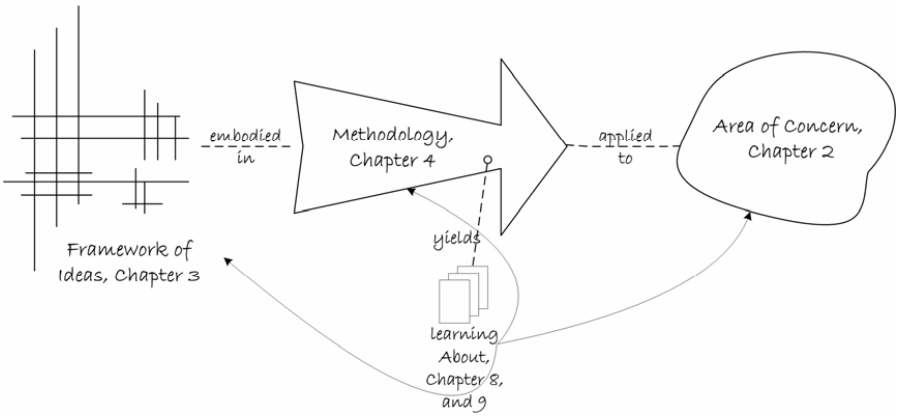
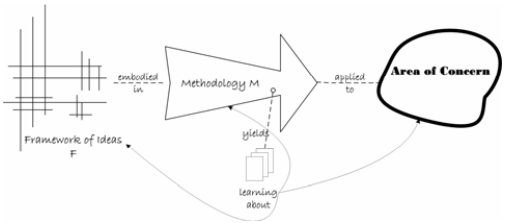


Figure 1. Elements relevant to any piece of research (after Checkland and Holwell 1998b)

The different parts of the research I present in this thesis are related to the elements of research processes. Hence, the starting point for my thesis is to present my *area of concern*, to give a notion about where I aim to contribute, and this is described in chapter two. In this chapter, a presentation is given of the three areas I combine and contribute to. These three areas are user involvement, understanding users' needs, and Living Lab. Thereafter, a description of my *framework of ideas,* which consists of interpretive perspective, soft systems thinking, and appreciative inquiry is presented in chapter three.

Following that is the *methodology* chapter, in which my action research approach is presented. Next comes a description of the projects I have been involved in and the lessons learned from these projects. Then, a summary of my papers is given, followed by the results and reflection chapter, in which the *learnings* from my research are presented and discussed. In the final chapter the conclusions and lessons learned are stated, together with implications for future research.



Chapter 2

AREA OF CONCERN

In this section, I describe the area of concern I aim to contribute to with my research. Area of concern refers to the real-world situation in which the researcher involves herself; in my research that has been user involvement processes that aim to gain understanding of users' situations and their needs with a Living Lab approach. In the following, my perspective on user involvement processes is presented, followed by a description of the different perspectives on the Living Lab concept and, finally, the Living Lab environment in which I have been involved during my research.

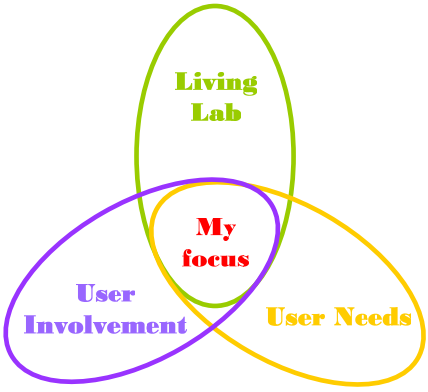


Figure 2. My Area of Concern

Figure 2, above, illustrates my area of concern. Here, I show the three different pieces of my area of concern – user involvement, users' needs, and Living Labs – and my research focus. That is the overlap of these three pieces, for example, users' needs in

relation to user involvement processes, and user involvement processes with a Living Lab approach. The following section gives a picture of the processes for user involvement in IT design processes from an interaction design perspective.

USER INVOLVEMENT

Even though research about the processes of user involvement has produced a vast number of methods, approaches and techniques through the years, there is no single "methodology" or sequence of steps that can guarantee a foolproof outcome when designing IT (Hyysalo 2003; Imaz 2006). A method might be successful in one situation and totally inappropriate in another (Newman and Lamming 1995), since designers, resources, and the situations are different each time (Löwgren and Stolterman 2004). In this section, I present an overarching perspective on a user-centered process within interaction design.

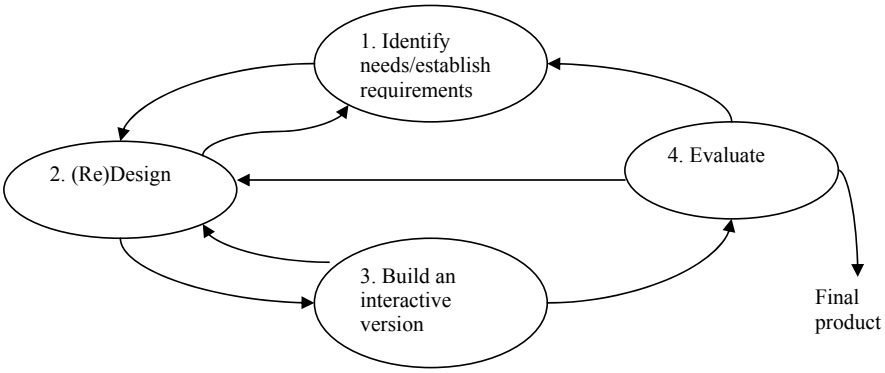


Figure 3. The Interaction Design Process (Preece et al. 2002)

The user-centered interaction design process involves four basic activities (Benyon et al. 2005; Jones and Marsden 2006; Preece et al. 2002); see figure 3 above:

- *Identifying needs and establishing requirements*. To be able to design something that supports people, it is important to know who the users are and what kind of support an interactive product could, and should, provide. The identified needs then underpin the product requirements, and the design and development of the IT system.
- *Developing alternative designs*. This is the core activity of designing, where different ideas, aiming to meet the established system requirements, are suggested. This activity might consist of two sub-activities: conceptual design and physical design.

- *Building interactive versions of the design:* Interactive design involves designing interactive products. The most rational way for users to evaluate such designs is to interact with them. This activity requires an interactive version of the system to be designed.
- *Evaluating designs*; This is a process of determining the usability and acceptability of the product, or design, that can be measured in relation to a variety of criteria, including the number of errors users make using it, how appealing it is, how well it matches the requirements, and so on.

These activities are intended to inform one another and to be repeated. In the figure, the iterative and interactive process is illustrated where the arrows pointing in different directions stress that it is not possible to have enough knowledge about users in the beginning and then design a system that fully responds to the users' needs and requirements. Hence, interaction design is about building an infrastructure aiming to improve users' experienced and lived life world, and it is about being grounded completely and guided by an understanding of the impact that design choices have on people's situations when they use the designed artifact (Jones and Marsden 2006). Related to this, I want to emphasize one issue I interpret as a weakness in interaction design approaches.

These approaches stress user involvement throughout the process with the aim to design a system that enhances users' experiences when they use the system. However, the evaluations usually performed, and mostly supported in literature about this approach, are focused on usability evaluations, not evaluation of how the users experience their use or concept evaluations—for example, how to carry out evaluations of whether a system is fun (Wiberg 2003), or if it actually answers to users' needs is not described in these approaches. In addition, the evaluation methods prescribed focus mainly on evaluations carried out in a controlled laboratory setting. Hence, methods do not exist that describe and support how evaluations should be carried out in the field, when the aim is to gain understanding of how users perceive their situation when they elaborate and test new interactive systems in their real (unobservable) context (Ståhlbröst 2006). From my perspective, the methods available that support user involvement emphasize methods for data collection, but do not describe explicitly how users can be involved in systems development processes' different stages. The existing methods that can be useful in the process of investigating users' needs can be grouped into three broad families based on how they approach validity and reliability of the gathered data (Hyysalo 2003).

The first, and most established, of the families could be described as approaches for *determination of preferences.* These approaches commonly are used in areas such as marketing and product development. According to Hyysalo (2003), it is typical in these approaches that users' preferences for different product concepts are gathered, ordered, measured, and transformed into (preferably measurable) characteristics of the product. These methods can be useful when it comes to quantifying users' preferences but are not helpful when it comes to discovering needs that cannot easily be articulated. In addition, these methods often miss important features of how the product really should be used.

The second family contains the more qualitative *design-oriented* approaches. These approaches, such as participatory design and user-centered design, have reported promising results in creating innovative technologies that fit users' activities, according to Hyysalo (2003). Methods inspired by anthropology and sociology, such as interviews, observations, and codesigns with users, have been used (Kankainen and Oulasvirta 2003). These methods provide a great amount of data but often fail to expose opportunities. Hence, they support the process of describing the context under study (Kankainen and Oulasvirta 2003; Patnaik and Becker 1999), but they do not reveal users' needs in relation to new and innovative systems for new groups of users.

The third family is the *radically design-oriented* variants of the qualitative arena, which claims that the reliability of the methods is secondary to the inspirational value of the user data. Practitioners within these approaches say that scientific methods are inefficient in terms of time and money related to the impact the collected data have on the final design. The value of investigating use is only to inspire the designers (Hyysalo 2003). Hyysalo continue by claiming that the design-centered approaches have started to get recognition, but the traditional elicitation methods still are the dominating approaches for user involvement. However, the discussion about methods, with the aim to understand users' practices, has encouraged researchers to question and improve the methods (Hyysalo 2003).

Defining Users

When the aim of a study is to understand users' needs, the motivation for involving users in the process is obvious, and to really harvest the potentials that user involvement holds, it is important to know whom to involve, when to involve them, and how to involve them.

Through the years, users have been defined in many different ways, and the most apparent definition is that *users* are those who interact directly with the product to achieve a task (Sharp et al. 2007), but there are other definitions of users as well. For example, Eason (1987) has placed users in three categories: (1) *primary users,* those likely to be frequent hands-on users of the system; (2) *secondary users,* those who use the system through an intermediary; and (3) *tertiary users,* those affected by the introduction of the system or who will influence its purchase. Another kind of user that is important to understand in design processes is the *non-user* (Selwyn 2003). These are defined as those who actively choose to limit, completely or partly, the use and amount of digital artifacts in their homes and private lives. Important to note here is the norm that adoption and use of digital artifacts has been ruling for several years in user involvement research (Nyberg 2008). However, to involve non-users in user studies mean that sensitivity against the notion of use and non-use increases, and so does its meaning. However, the boundary for what is defined as use and non-use has not been settled.

Due to the similarities between systems development processes and business development processes, concepts related to that field will be presented, since the terms often are used interchangeably. This results in the following categories: *lead users*, *end users*, *customers*, and *consumers*. *Lead users* are defined as those who are in the leading edge of an important market and so are currently experiencing needs that will later be

experienced by many users in the same market. In addition, they anticipate relatively high benefits from obtaining a solution to their needs, and so may innovate (von Hippel 2005, 1986; von Hippel 2001). The concept *end users* include the users who actually use the system in some way and this can be both as a content user and as a content provider and can be divided into *actual end users* and *potential end users*. The actual end user is connected strongly to the current design situation, in which the system is developed for a specific and identifiable group of users. Potential end users are related to generic design situations, such as off-the-shelf systems, where we know the market segment but not the actual individual users or user group (Ives and Olson 1984).

Other concepts related to users are the *customer* and *consumer,* which are defined by Magnusson (2003) as follows: a *customer* is the person who is paying for the product, not necessarily meaning that the product will be used by that person, and a *consumer* is the person who both pays and uses the product. In the online world, especially in e-commerce, the consumer concept can be divided into two types, the *individual consumer,* who is given most attention in media, and the *organizational consumer,* who does most of the actual shopping (Turban and King 2003).

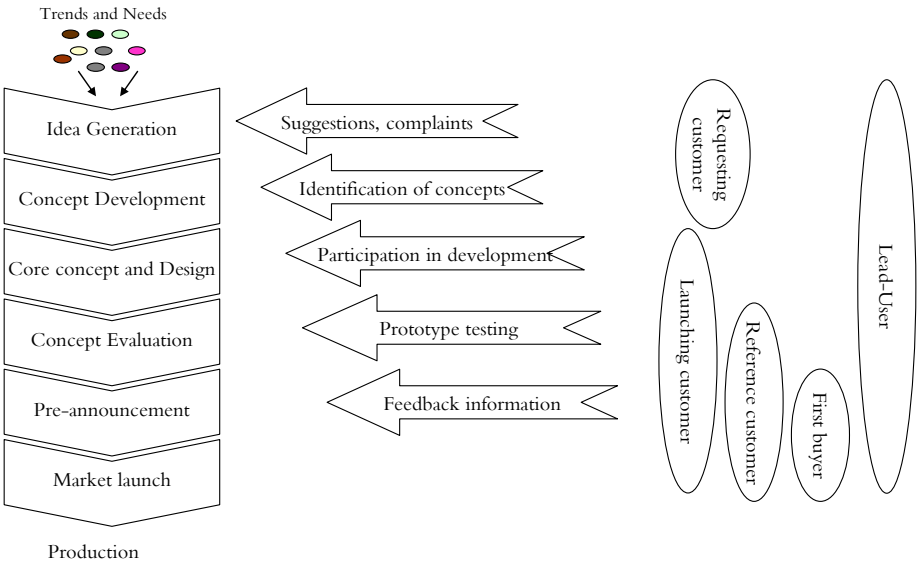


Figure 4. Customer involvement in innovation development processes, after (Enkel, Perez-Freije, and Gassmann 2005)

To provide guidance for product development and innovation processes, Enkel, Perez-Freije and Gassman, (2005) divided the customer concept into more defined clusters. They categorize customers into r*equesting customer, launching customer, reference customer, first buyer,* and *lead user,* according to their different qualifications. These authors state that the aim of including customers in the development process's different phases is to reduce market risks. In these processes, customers with different

qualifications should be included based on their suitability to achieve the expected output in the specific innovation phase; see figure 4.

Here, the *requesting customer* provides ideas for new products based on his/her needs (Enkel et al. 2005). How much a requesting customer can contribute often is dependent on the company's ability to capture his/her ideas and knowledge, which often are expressed in terms of complaints or suggestions. In this case, complaints often are anchored to a specific product; hence, the innovativeness in these complaints is limited. The *launching customer* is integrated right from the development phases to stimulate design or participate in development activities. The *reference customer* is involved to supply his/her experience of using different applications; hence, the ability to refer to his/her previous experience becomes important, while the *first buyer* customer has a more passive role in the development. Finally, there are the *lead users,* who should and could be involved in all stages of the development process, although the same customer does not necessarily always represent them (Enkel et al. 2005).

To sum up, users can be defined in many different ways, and users also can have many different characteristics, making them more or less suitable to participate in a specific systems development phase. The users I have involved during my research have been individual primary end users who have chosen, voluntarily, to be involved in the process. I also have chosen to involve users in the early stages (i.e., identifying needs, establishing requirements, and evaluating concepts and prototypes) of systems development. In these processes, I have involved users with the aim to gain insights into their situations and to see how the needs inherent in their situations can be represented in a proposed solution.

Degrees of User Involvement

Involving users means giving users the opportunity to participate in the systems development process as representatives of a target user group with the aim to improve the chances of successful systems (Ives and Olson 1984). User involvement can range from designers making assumptions about users' needs without actually involving users, to users' developing the final system themselves. To clarify what I mean with user involvement, I refer to Barki and Hartwick (1989), who state that the concepts of user participation and user involvement needs to be detached. They mean that the concept participation represents the actions a user performs during the development process, while involvement relate to a psychological state in which the users are more concerned about the system. Adding to that, Olsson (2004) declares that the participation concept is imprecise, and techniques claiming to be participatory treat users as sources of information instead of equal partners. In my research, I have involved users with the aim to give them the opportunity to influence the development and design of future IT systems. Hence, the users have been involved and have not merely participated in the development process.

In the following, a notion of the different degrees of user involvement that exists in user involvement processes is presented. First, let me clarify that when I write about degree of involvement I refer to the actual influence the user has on the final system. This means that the amount of user involvement in terms of more quantitative measures,

such as how often they are involved or how many users have been involved, is not emphasised in this thesis.

Ives and Olson (Ives and Olson 1984) categorized different sets of degrees of user involvement into the six subsequent clusters:

- *No involvement*; refers to the situation in which users are unwilling, or not invited, to take part of the development
- *Symbolic involvement*; refers to the situation in which input from users is requested but not used
- *Involvement by advice*; in this category, users' advice is asked for with help of interviews or questionnaires
- *Involvement by weak control*; refers to the situation in which users have the responsibility to "sign off" at each stage of the development process
- *Involvement by doing*; refers to the perspective that users are design team members, or official "liaisons" with the development team
- *Involvement by strong control;* in this category, users might pay for new development out of their own budget, or the users' organizational performance evaluation is dependent on the outcome of the development effort.

An additional degree of user involvement in design processes is that of users as hostages (Larsson, 2004). This means that in the initial steps of the design process, users are encouraged to make demands, and after this, the users are excluded from the process but the design is based on the users' demands. Then, if the final product is not acceptable to the users, the designer refers back to the demands the users stated initially and explains how these have been satisfied and considered in the design, leaving the users with all the responsibility but no actual influence (Larsson 2004). I emphasize that even though the clustering of different degrees of user involvement is not new, it still is actual. Users today are involved to different extents and have different influences on the final system.

Another way to differentiate degrees of user involvement is the *for*, *with,* and *by* categorization (Bekker and Long 2000; Eason 1987; Kaulio 1998). This refers both to users' degree of involvement and their responsibility in design processes in which users are involved in development and innovation processes in different ways. The first type, design *for* users, means that the system is developed on behalf of the user. Data about the users, general theories, and models of users' behavior are used as a base for the design. This approach often includes specific studies of users, such as interviews or focus groups. The second type, design *with* users, denotes a product development approach, focusing on the user, utilizing data on user preferences, needs, and requirements as in a design *for* approach, but, in addition, includes a demonstration of different solutions/concepts for the users, so they can react to the differing design solutions (Kaulio 1998; Larsson 2004). In the third type of user involvement, design *by* users, a product development approach is applied, in which the users are involved actively and partake in the design of their own product (Kaulio 1998; Larsson 2004). In

figure 5 below, I clarify my view of the different perspectives of degrees of users' involvement.

The bottom illustration represents design *for* users. Here, the designer is represented by the driver, who has full control of the situation; the user, represented by the car in the back of the trailer, is following passively from behind, being mostly a source of information. Inherent in this approach, and illustrated by the users' car being on the trailer, is the designer's responsibility to lead and know where to go. In this perspective, the users are involved relatively late in the development process, with the focus on verifying requirement specifications and prototypes.

The middle illustration represents the perspective design *with* users. Here, the users are involved throughout the process and are on equal terms in cocreation of future solutions based on their needs and experiences. This is represented by the two persons sitting next to each other in the car. In this perspective, the designer is active and in charge of design and development activities (driving the car) while the user is active and in charge of context and evaluation activities (reading the map and giving the directions).

The top illustration is the design *by* users' perspective. Here, users are involved in the role of process initiators; hence, they drive the process. This is illustrated by the car in the back, where the driver has full control and can determine the speed and if s/he wants to follow. In this design perspective, users contribute with inspiration and ideas; they produce content and they develop products or parts of products. The role of the designer is to be the facilitator, represented in the picture by the car in front paving the way for the user driving the car in the back. This means that the designer still has influence over what is possible to do or where to go, but the user decides how, when, and if s/he wants to follow.

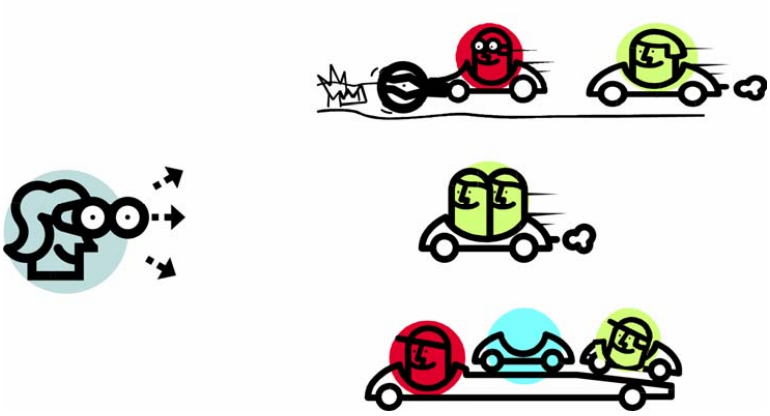


Figure 5: Design for, with, and by users

It now is possible to discern a trend in systems development processes within user involvement, moving from designing *for* users to being stationed in designing *with* users, where users are involved naturally in systems development, toward designing *by* users, where users are given toolkits to design their own desirable solutions (Jeppesen

2005; Kanstrup and Christiansen 2006; von Hippel 2001). With this shift in perspective, it is becoming progressively easier for many users to get precisely what they want by designing it for themselves. In addition, this user-driven approach offers great potential to combine democracy and creativity in design processes (Kanstrup and Christiansen 2006).

In my studies, I have involved users in a design *for* and design *with* manner. The users have been involved with the aim to inspire and inform the development team so that the developed solution can answer to users' needs and desires in an innovative manner. The users' role also has been to discuss and redesign the developed concepts on the basis of their needs and requirements in a specific situation.

IDENTIFYING NEEDS AND ESTABLISHING REQUIREMENTS

In any development process, users' needs, requirements, ambitions, and hopes have to be generated, discussed, developed, elucidated, and probably rescoped in order to develop an IT system that users will enjoy using; to be able to do this, a holistic understanding of the users' current situation is required. The need for this understanding has its background in the fact that the developed system must support users in achieving their goals, and based on the collected knowledge gained in these inquiries, a set of systems requirements can form a starting point for the forthcoming development. Preece et al (2002) refer to this process as the identifying needs process, which has the end goal to produce a set of stable systems requirements. However, the identification of needs and the establishment of requirements is not an easy, straightforward process. In every development phase, much needs to be known and clarified about the current situation in order to develop a system that will enhance the tasks at hand. Here, it is important to note that anything that can be learnt about the users will facilitate the process of designing IT products or services better. Some of the important knowledge we need about users already is out there; for example, knowledge about people's short-time memory that greatly influenced how we can design IT systems to support users without overloading their memory. This knowledge is related to human characteristics in general, which is important, but it is equally important to get to know the particularities among the group of users the developed system is aimed for (Jones and Marsden 2006).

To do this, different data collection methods can be used to observe and probe people and their current situation. What needs to be strived for is to gain thorough understanding of how users' capabilities, their actions, and goals, could be achieved more effectively if they were supported differently. One approach to understand users' needs is to study current and past behaviour since already established behaviour influences what is possible to implement successfully in the user's context. In addition, every implementation of a new system implies that a cultural change must occur in the user's context, and it takes time to change users' behaviour and habits (Nielsen 2003; Preece et al. 2002; Sharp et al. 2007).

To get a really good payoff from all the efforts of collecting data about users, the results also need to be made explicable to others in the design team. This can be accomplished

by using personas or scenarios developed from the reality, which then form the basis for the constructive design (Jones and Marsden 2006). Having said that, it is easy to get the impression that getting an understanding of users' needs and their situation is an uncomplicated and straightforward process in which the users are observed and/or asked about their situation and in which the findings are obvious and can be summarised neatly into personas or scenarios. This often is not the case, for many reasons.

These reasons can be that users have difficulties articulating and explaining their needs (Holst and Ståhlbröst 2006; Robertson 2001); that they also might have needs they are not aware of, which complicates their ability to express what they really need (Hyysalo 2003; Salovaara 2004); and even if they are aware of their needs, they might forget to express needs and requirements that they are to used to having in their surrounding. Hence, important aspects can be missed when expecting users to express their needs and requirements explicitly, according to Robertson (2001). Users also have a fixed idea of what they believe is possible and the kinds of constraints in the context. Thus, they avoid mentioning requirements and needs they believe cannot become fulfilled based on their understanding of the constraints (Robertson 2001).

Other factors that influence users' ability to express their needs can be the notion of user needs that are inflated by the panoply of definitions and different usages seen in the design literature. Needs often are mixed up with other concepts, such as requirements, functions, and solutions (Ericson and Ståhlbröst 2005; Hyysalo 2003), and to make the process of finding needs even more complex, there is almost no linkage between the use of the needfinding notion in interaction design and modern psychology. This means that there exists no common, shared typology within the design discipline about the kinds of needs that are relevant in interaction (Oulasvirta 2005). Needs also is a complex concept that can have many different forms and appears at different levels (Preece et al. 2002). Additionally, users sometimes become acclimated to obstacles in their environment and find alternative ways to perform their tasks, and this affects their awareness and possibility of expressing what they need (Patnaik and Becker 1999). To stimulate the process of gaining insights into users' situations and their needs, it is useful to give the users something to relate to. When users gain more knowledge and insights into possible solutions, they also expand their needs (Dennis et al. 2002).

Due to all the obstacles and difficulties related to the process of generating user needs and requirements, an approach of asking users directly what their needs are is insufficient, and a more sophisticated approach is needed. As needs can be difficult to detect, generating needs reliably requires an organised research effort.

One appropriate question now is: why should we focus on needs when they apparently are so difficult to handle? To start with, a focus on needs offers a less uncertain development strategy compared to planning around different forecasts of what tomorrow might hold. Human needs also are more stable than specific requirements; hence, they are more long-lasting and can be met by many different requirements. Besides, needs are opportunities waiting to be explored and responded to; hence, focusing on needs facilitates the designers to expand their frames of reference, since the final design is not determined beforehand (Patnaik and Becker 1999). Additionally,

understanding and analysing users' needs has been seen as one of the key factors for success or failure of innovation.

Another benefit of focusing on needs is the fact that it helps designers avoid premature limitations of possibilities. Therefore, more doors are kept open, which, in turn, facilitates creativity. Moreover, needs are long-lasting and can be met by different solutions, while expressed requirements are more unstable and can be influenced by trends that change over time and are associated strongly with a specific product (Patnaik and Becker 1999). For example, the need to store data is more stable than specific solutions, such as punch cards, magnetic tape or 5¼-inch floppy disks, memory sticks, or a requirement such as a certain amount of storage capacity.

To start my theoretical discussion about users' needs and closely related concepts, I will explain how the concept is used in areas such as interaction design, market research, and psychology. I have chosen these areas due to their focus on users' needs. In market research, knowing consumer needs is important to be able to sell products or services; in psychology, the concept of needs, motives, and desires has been grappled with for several years in an effort to understand what drives human behaviour. Hyysalo (2003) states that the standard starting point for most development projects is to analyse users' needs, but the concept often is applied without being defined explicitly since it is mixed up with wants, requirements and so on. Thus, I strive to contribute to the systems development field by starting to define what a user need can be.

User Needs

One traditional view of user needs in user-centered processes is based epistemologically on the assumption of an individual user who has needs and wants for a particular piece of technology. This assumption includes, according to Hyysalo (2003), three important limitations in the understanding of new technology. First, it is insensitive to the way technologies are used with an array of other artifacts. New technology enters the life of users' contexts that already are packed with previous technologies. Hence, dividing human subjectivity into desires for characteristics of a particular piece of technology does little justice to the way people actually use technology. Second, the traditional individualistic perspective takes no notice of the interactive aspect of the technology use. Very few technologies are used by isolated users; rather, technology is developed to support interaction and cooperation among other users as well. Third, the standard perspective takes users' preferences and needs as something that is given or preexisting and, as such, can be recognised and met. While this presupposition may fit established product lines, it has severe limitations when the technologies, as well as their users, are new (Hyysalo 2003). In addition, the assumption that users have needs, or want new technologies, assumes that users want, or can, use technology. Following that, the desire to use technology becomes the norm of society (Nyberg 2008).

Starting with the confusion as to what the concept of need stands for and its relation to closely linked concepts, this has been discussed by a number of authors (Bergvall-Kåreborn, Holst, and Ståhlbröst 2008; Ericson and Ståhlbröst 2005; Hyysalo 2003; Oulasvirta 2005; Vidgen et al. 2004). The main conclusions drawn by these authors are that we need to define and separate more clearly the related concepts, and that we need

to shift our focus from requirements to needs due to the previously mentioned benefits of focusing on needs.

Among the authors who do talk about what a need is, though often implicitly, needs are related closely to motivation and "underlying rationalities" (Bergvall-Kåreborn 2002; Vidgen et al. 2004). Oulasvirta (2004), for example, does not discuss explicitly what a need is, but in his writing, it is possible to find a statement that indicates that needs are something that determine behaviour. Tiitta (2003) talks about "motivational needs" and Mumford (1981) talks about satisfaction. Salovaara (2004), claims that a need is the goal that a user wants to achieve by using a product. Oulasvirta (2004) categorises needs into two types of human needs: motivational needs and action level needs.

- Action level: Action-level needs define what kind of behaviour users are interested in and in what kind of context (Kankainen 2003).
- Motivational level: Motivational needs rationalise and motivate action in a context and provide a starting point for discovering design opportunities on an individual level. There are two types of motivational needs: basic and quasi.
    - Basic needs: some related to regulating bodily homeostasis (physiological needs), some related to providing psychological nutriments for growth and healthy development (self determination, competence), and some preferring some aspects of the environment rather than other (social needs such as achievement, intimacy, power, and affiliation).
    - Quasi needs: these are more ephemeral, situationally induced wants that create tense energy to engage in behaviour capable of reducing built-up tension." They are not full-blown needs in the same sense as basic needs, but they have influence on how we act, think, and feel (Kankainen 2003).

Both basic and quasi needs are instantiated in a given situation in which users eventually wants to perform a certain action that takes them closer to satisfying motivational needs.

The concept user needs often is mentioned among authors in systems development as something important to gain knowledge about. However, there seldom is any description about how to proceed to gain knowledge or what to focus on. For example, Preece et al. (2002) say that a set of stable requirements can be produced from the identified needs.. I interpret this expression as saying there is a distinction between the concepts of needs and requirements (Ericson and Ståhlbröst 2005), but, the authors do not give any guidance on how needs can be identified, or what to look for when identifying needs from the collected user data. The only guideline is the general suggestion from Preece et al. (2002) to study past and present behaviour. However, they describe different types of requirements, which I will discuss later on. Another example of the absence of handling users needs can be detected in Benyon et al. (2005). They state that we need to understand the users' context, their activities, the people, and the technologies they use, and from this understanding generate the necessary requirements for the system that is to be designed. In their book, they do not handle the term user

needs; instead, they talk about understanding the people, which might be a way to understand their needs, but this is not made explicit; hence, the likelihood that an understanding of needs might happen if that focus is not limited.

In my interpretation, the aim of gaining understanding of users and their situation is to fully grasp users' needs, but Benyon et al. (2005) do not discuss the concept in those terms, which makes it difficult for the developer to know what to look for and to harvest the benefits of a focus on needs. Jones and Marsden (2006), on the other hand, highlight the importance of identifying values, goals, and actions to produce an added value of the design. In my interpretation, this is related strongly to understanding users' needs and motivations, since the aim is to create an added value and to understand the underlying rationale for why people do or value something. However, they do not distinguish between the concepts; hence, a deep understanding of the concepts separately, as well as the relation among them, becomes difficult to obtain. To be able to construct theory about users' needs, it is important that the related concepts are interpreted in a similar manner, and that users' needs are declared explicitly in the user studies. The notions of user need should be understood as an evolving relationship among the users, the communities in which they participate, and the related technological environment (Hyysalo 2003).

Perspectives on Requirement Engineering

When it comes to the area of requirement engineering, there are many different perspectives on how this process should proceed. In this section, I have chosen to base the description of requirement engineering process on references that are related to my own perspective, since these contribute to increase my understanding of the concept requirements. Improving the requirement determination process is a critical goal in systems development, since one generally accepted cause of system failures is poor requirement determination. The process of determining requirements has three stages: (1) information gathering, (2) representation, and (3) verification (Pitts and Browne 2007). The activity of understanding what a system should do has been given many different labels, such as requirements gathering, requirements elicitation, requirements analysis, and requirements engineering (Sharp et al. 2007). To explain different perspectives that aim to understand and identify systems requirements, Imaz (2006) uses different descriptions: extraction, capture, gathering, construction, and generation, and they represent different perspectives on how requirements can be identified.

Requirement extraction can be seen as a process in which the requirement engineer has to "dig" down, and clear away all the mess and rubbish until the requirement is located and can be pulled out and presented. The requirement capture description represents the perspective that the requirements have to be trapped and that they might slip away if you do not grab them (Imaz 2006). Within the requirement gathering description lies the assumption that the requirement are lying around waiting to be picked up, with little interaction between designers and users (Benyon et al. 2005; Imaz 2006). The description requirement construction represents the view that requirements consists of elements that need to be put together; hence, the analyst creates something new. Related to that perspective is the description that requirements are generated from a thorough understanding of people's needs. Benyon et al. (2005) state that requirement generation

tends to deemphasise links to users' current practices, and they add the description requirement elicitation, which they believe supports interaction between the user and the designer.

On the basis of these descriptions, two different perspectives on the process of identifying requirements are noticeable: the locating perspective and the constructing perspective. Requirement gathering, elucidating, capturing, and extracting represent the locating perspective, which assumes that the requirements are something that actually exist and merely have to be found. That perspective follows that requirements can be expressed by someone and they are stable and recognisable. In some cases, this is true; users might be very aware and familiar with the requirements they have on a system, but often they are not. The other perspective is the constructing view (Imaz 2006; Sharp et al. 2007). This perspective is more sensitive to users' needs and it represents the view that requirements can be generated, or constructed, from understanding and interpreting the user data and activities. Following this line of thought, the requirements are emergent; they are socially constructed by the interactions between users and developers in the requirements process (Flynn and Jazi 1998).

The constructionist perspective also includes creating something new by combining identified elements in new ways (Imaz 2006). In my research, I have followed a constructing perspective; for me, this means that the findings from my interactions with users have been constructions that I have generated from their expressions. Following that line of thoughts, users do not need to be able to express explicitly what they need. It becomes the development teams' task to generate constructions from the user data.

Included in the constructivist perspective is the position that the outcome of any study is not a description of how things really and truly are, nor are they representations of how the reality functions. In this perspective, there is no reality except the one that people cocreate as they try to make sense of their world. With that perspective, the findings from any constructivist study are not facts in some ultimate sense; rather the findings are being created through an interactive process, and what emerge from this process are constructions that represent the reality of that specific case (Guba and Lincoln 1989). Following this line of thought, it also is acknowledged that the constructions being shaped are influenced by the values of the constructor. Thus, questions regarding whose values to take into account, and how different value positions might be accommodated, become important to discuss. The constructions also are dependent on a certain physical, psychological, social, and cultural context that form the constructions (Guba and Lincoln 1989).

The basic thoughts of the constructionist view can be related to Suchman's (1994) concept situated actions. She says that the situated action concept emphasises that every course of action depends upon its material and social circumstances. She means that, in general, people do not foresee alternative courses of actions, or their consequences, until some course of action already is on its way. Possibilities, veiled in the current situation, become clear only when people act in that situation. Hence, people cannot know ahead of time, at least not specifically, what future state they desire to bring about (Suchman 1994).

My approach to the identifying needs and establishing requirement process is related to the constructivist perspective and in correlation with Flynn and Jazi (1998). I see this process as a social process in which the requirements are not objective items; rather, the requirements evolve, meaning that the requirements are socially constructed by the interactions between users and developers.

IDENTIFYING NEEDS IN RELATED AREAS

In this section, I will give an overview of how the concept of needs is discussed and handled in two other related areas. These areas are market research and psychology. In market research, the focus is on customers' needs and how these can be responded to. In the psychology field, the focus mainly is on human needs and motivation, with the aim to understand human behaviour. I have chosen to include psychology since I strive to understand what motivates human behaviour.

In the following section, a presentation is given of the perspective on needs inspired by market research and the product development areas. I have interpreted these as relevant since these areas grapple with similar issues as the systems development area regarding involvement of customers. Within the marketing area, it is commonly known that the customers want products or services that improve their quality of life and work, and that is what motivates users to buy and use a specific product or service (Gerstheimer and Lupp 2004). Customers mostly are interested in their individual benefit; hence, the possibilities for profitable applications and services and for success in the increasingly competitive market only can be sustained by knowledge of the customers needs and motives (Gerstheimer and Lupp 2004). However, understanding customers, and how to involve them in product development activities, is an issue that has been in focus for several years within these areas.

When I studied the area of product development and how it involves customers when they focus on needs, I found some guidelines that support the need-generation phase originated from Patnaik and Becker (1999). Their aim is to contribute to the identified drawbacks with the methods used in market research for finding needs (Patnaik and Becker 1999). Their guidelines are summarised in these eight points:

- Look for needs rather than specific solutions
- Make research and design seamless
- Go to the customer's environment
- Look beyond the immediate solvable problem
- Let the customer set the agenda
- Collect eclectic forms of data
- Make findings tangible and prescriptive, using drawings, photos, or video
- Iterate and refine the findings

I argue that most of these guidelines are described very generally and do not go into any detail as to what should count as a need, how needs are identified and prioritised, and how needs generate product innovation in practice (Bergvall-Kåreborn and Ståhlbröst 2007). In my interpretation, what separates these steps from more traditional methodologies is their stress on needs seen in, for example, the guideline "look for needs rather that specific solutions." This reminds the researcher to keep all doors open as long as possible, just as does the expression look beyond the immediate solvable problem. This perspective is important since needs often are mixed up with solutions to needs (Katz 2006), and this limits possible solutions and innovativeness among designers.

To support the process of focusing on customers' needs in market research, a concept called Voice of the Customer (VOC) has been developed. This concept is defined by Katz (2006) as the development of a detailed and prioritised set of customer wants and needs in support of new product development. As such, it belongs to the very beginning of a new product initiative. He argues that VOC is often misdefined, misapplied, and misunderstood in New Product Development practices. According to Katz, marketing researchers have started to question the approach, claiming that VOC kills innovation and hampers creativity, and the produced needs are too vague to be useful for product developers. He says that they are wrong; these researchers have misunderstood the concept. For example, one researcher dismisses the concept VOC as being too vague because it produces needs such as "easy-to-use." Katz argues that this is not a need or a desired outcome.

From my own perspective, I would say that "easy-to-use" is a requirement and as such does not facilitate innovation; instead, the focus should be to gain understanding of what the user believe that easy-to-use includes. Other researcher has argued, according to Katz, that the VOC should be ignored. That researcher gave the example of a multifunctional device that combined a cell phone, a PDA, remote e-mail, audio and video playback, digital camera, etc. He asserted that, a few years back, no customer could have told you a thing about this device (Katz 2006). This expression highlights the difficulty with understanding customers' needs; they do not express a specific solution or their specific needs. Instead, they give the researcher a notion about their situation, what they like and dislike, what makes their lives hard and easy, what they wish for, and what they are trying to accomplish. Related to the multifunctional device, I argue that the customers could have expressed that they do not want to carry an armada of devices with them. Related to that, I stress the importance of remembering that it is not their task to define exactly what they need; the customers' task is to describe what they aim to achieve. Thus, many authors argue that it is the designer's job to, in close relation to the collected data, design the final solution (Hyysalo 2003; Katz 2006; Olsson 2004).

Customer Needs

Katz define needs as being either a desired outcome or an expressed wish that will lead to a desired outcome (Katz 2006). A need also can be expressed as a perceived lack of something. Therefore, the process of finding needs can be described as a paradoxical

activity, since what is sought actually is a circumstance whereby something is missing (Faste 1987; van Kleef, van Trijp, and Luning 2005).

Other definitions of customer needs can be found in Patnaik's article "*Systems Logics: Organizing Your Offerings to Solve People's Big Needs"* (Patnaik 2004), in which he states that people have differing types of needs from immediate to more far-reaching. The challenge is to be able to distinguish among these needs and rigorously map out effective solutions. Patnaik also argue that not all needs are created equally; people face different challenges in their daily lives with all their different problems, the goals they want to achieve, and their ambitions.

Patnaik clusters customer needs into four different types: Qualifier Needs, Activity Needs, Context Needs, and Common Needs, see table 1 below.

	Qualifier Needs	**Activity Needs**	**Context Needs**	**Common Needs**
Stem From	Are a results of problems with existing solutions	Result from specific activities a person perform	Result from the situation in which people live, work, operate, are goal-oriented	Needs of nearly everyone
Existence	The same need exists for everyone using the same solutions in similar ways	Needs are the same for all who want to do the same thing	The same need exist for people operating in the same context	Most fundamental and universal need
Usually Solved By	Disappear if current solution is redesigned	Disappear if current solution are made obsolete	Changes in the context or change context	Met by more immediate needs
Awareness	People are aware of them	People are aware of them	People may not perceive or immediately articulate the needs	People are aware of them
Described By	Can be describe in terms of changes	Described in terms of existing product or service solutions	As long as context and conditions remains the same the needs will continue	
Satisfied By	New Features New Offerings	New Offerings New Families	New Families Systems of Solutions	Systems of Solutions

Table 1: Types of Needs and their Characteristics based on Patnaik (2004)

Some human needs are a result of a current scenario and will disappear when the current situation changes. Some needs are created by a solution to other needs and the most universal needs are separated decisively to long-lasting problems that cannot be fixed by a single solution. Following that line of thought, needs can be characterised by their relation to current solutions, situations, and behaviour (Patnaik 2004). The differentiation of people's needs provides a way for companies to act on insights they have about their customers. Qualifier Needs suggest immediate actions a company can take to improve their current offerings. To meet those needs, a company may have to modify an existing product or service. Activity Needs may require a company to create a completely new offering. Context Needs provide focus for a firm's activities, showing where different offerings might provide complementary effects, and Common Needs indicate areas for long-term strategic actions.

This framework, Patnaik (2004) argues, captures vital customer information often lost in current research methods. Typically, product developers seek information they can act on and usually end up with a list of qualifier needs that only leads to incremental improvements of their current products. Common Needs and Context Needs often are disregarded or go unexplored because firms do not have a strategy for using them. When this happens, companies lose the opportunity to create more valuable, profitable, and strategically powerful solutions for their customers (Patnaik 2004). Ericson divided this framework into needs and requirements where she relates context and common needs to needs, and qualifier and activity needs to requirements (2007). Ericson (2007) argues that qualifier and activity needs are aligned to requirements since the findings relate to existing solutions.

Human Needs and Motivation

Within the interaction design area, a clearly defined process of how to proceed in the process of generating users needs has not been established as a mature methodology, for several reasons. First, the notion of user needs is influenced by the flora of definitions and different usages seen in the design literature (Oulasvirta 2005). Second, there is almost no linkage between the use of the need-generating approach in interaction design and in modern psychology, which means that no common, shared typology exists within the design discipline about the kinds of needs that are relevant in interaction design (Oulasvirta 2005). The area that has influenced modern interaction design mainly is cognitive psychology, whereas other branches of psychology have lagged behind. Today's psychology, with its emphasis on motivation, personality, and emotion, has distinguished and sophisticated concepts to describe intrinsic behaviour, such as goals, strivings, tasks, life narratives, and so on (Oulasvirta 2005). Hence, psychology has much to offer to increase the collected knowledge about what drives users to use certain IT systems. In this section, I will present an overview of how the concepts of motivation, needs, and desires are grappled with in the area of psychology. My focus has been to identify a framework that that can support the understanding of users' needs and requirements.

When writing about human needs and motivation, mentioning Maslow's theory of human motivation become inevitable. Maslow claimed that a theory about human motivation should stress and focus on the basic goals human have, instead of focusing

on superficial ones, and it should focus upon ends rather than the means to these ends (Maslow 1943c). Maslow's early writings (Maslow 1943a, 1943b, 1943c) of human behaviour classified humans' basic needs into five entities *(physiological, safety, love, esteem, and self-actualisation)* arranged in a hierarchy, and this hierarchy was complemented with an additional need, self-transcendence, in the later writings; see table 2 (Koltko-Rivera 2006). Maslow defines the physiological needs (physiological drives) as related to classical instances such as sleepiness, hunger, thirst, and sex.

Maslow highlights that any of the physiological needs can serve as channels for all sorts of other needs, as well. This means that a person who, for example, is hungry may satisfy this need by drinking water instead of eating. The second need identified by Maslow is the safety need, which has to do with both physical safety and psychological safety. The third basic need is the need for love, which Maslow relates to humans' desires for affection and belongingness; this need includes both giving and receiving love. Maslow relates the need for esteem to people's desire for a firmly based, high evaluation of themselves for self-respect, or self-esteem, and for the esteem of others. The fifth need is the need for self-actualisation, which is related to humans' need to do what they are fitted for, "what a man *can* be, he *must* be" (p.382 Maslow 1943c), and finally, the sixth need, self-transcendence, refers to the state in which humans put their individual needs aside, to a great extent, to favour service of others (Koltko-Rivera 2006).

Motivational Level	Description of person at this level
Self-transcendence	Seeks to further a cause beyond the self and to experience a communion beyond the boundaries of the self through peak experience.
Self-actualisation	Seeks fulfilment of personal potential
Esteem needs	Seeks esteem through recognition or achievement.
Belongingness or love needs	Seeks affiliation with a group
Safety needs	Seeks security though order and law
Physiological (survivor) needs	Seeks to obtain the basic necessities of life

Table 2. A version of Maslow's Hierarchy of Needs

Based on my research, I have decided not to use Maslow's theory of human motivation as a basis for understanding users' motivations. I believe that the theory is too abstract and as such does not support gaining deepened insights into why people act in the way they do, or what kind of goals they are trying to achieve in relation to new technological solutions. Hence, it does not support the process of finding implications for design. Another reason I have chosen not to include Maslow's theory is due to its theoretical underpinning. Maslow state that the hierarchy of needs is based on extreme and chronic conditions whereby humans have severe difficulties to satisfy their basic needs (Maslow 1943c). In the society we live in today in the Western world, this is very seldom the case. Instead, most people have their basic needs satisfied to different extents, and the fact that satisfied needs are not motivators delimits the probability that these needs would facilitate innovations.

It is important to note here that I have not tested Maslow's theory to see how and if it could support design processes. In my research, I have used another motivational framework with sixteen basic desires, see table 3 (Reiss 2004a), instead of Maslow's six, to see how these could support the process of analysing users' expression in search of design implications, since this is a more nuanced framework (Bergvall-Kåreborn and Ståhlbröst 2008b; Ståhlbröst and Bergvall-Kåreborn 2007).

Reiss and Havercamp (Reiss 2004a) have conducted numerous studies since 1995 aiming to facilitate the understanding of what people experience as meaningful behaviour, or what motivates them to act. During their research, they have empirically derived and validated their work in three independent confirmatory studies. The motivational subscales they developed have been validated against forecasts of meaningful behaviour shown over a long period of time, and their studies finally ended up in sixteen basic desires (Reiss 2000).

The basic principle of this theory is that nearly all meaningful human behaviour is motivated by some compound variation of the sixteen primary desires (Reiss 2004a, 2001a). These sixteen desires are satisfied by meaningful behaviour, which usually is sought after in relationships, careers, families, sports, and spirituality (Reiss 2001a). According to Reiss, all mass-appeal activities seem to be organised to satisfy these specific sixteen motives and their common variation (Reiss 2000). Reiss has found that motives are the underlying reasons for why people, on a voluntary basis, are willing to do things; hence, knowing what motivates users is important in the processes of user involvement.

One basic principle in motivational theories is the goals, or ends, that people are trying to reach (Maslow 1943c). The idea of end motives goes back to Aristotle, who divided motives into ends and means (Reiss 2000). End motives are thing people enjoy for their own sake, whereas means are the methods or tools used to satisfy the end motives. Loosely speaking, end motives can be thought of as primary motives that determine our goals and desires. One goal can be reached by several different means, but the feeling of desire appears only if the right goal is fulfilled. We feel secure, for example, when we are in an environment with the degree of stability and order we like. We experience love when we spend time with our children and satisfy the desire for family. The satisfaction of each basic desire gives rise to a different joy, so we go through life trying to experience sixteen different types of intrinsically valued feelings.

In Reiss's theory, each of his sixteen basic desires is an end motive that is desired intrinsically. This means that an end motive is desired for its own sake and is determined by the individual's purpose for why s/he acts in a certain way. For example, a professional football player can play football as a means to get salary and a student can study as a means to improve a grade. In each of these cases, the goal (salary and grade) can be desired because it produces something else; a person might want a salary as a means to enhance his/her social status (Reiss 2004a).

As a matter of logic, humans value what we desire for its own sake; therefore, the list of sixteen basic motivators can be reworded as a list of sixteen fundamental values. The motivators provide indications of different actors' values and, hence, can reveal people's motives and desires. Hence, they can be regarded as factors influencing

people's cognitions, feelings, actions, and perceptions. Consequently, people may have reasons for acting in a certain way without being explicitly aware of these reasons. Hence, I interpret motivators as being related to users' needs, particularly in situations in which people have needs they are not aware of, or cannot express.

These sixteen motivators, see table 3, are experienced by all humans, but every individual varies with regard to the perceived the strengths of each motive. In addition, each basic motive is a continuum between two extremes, which indicates the strong versus the weak variations of that motive. Individuals aim for different places along each continuum; that is, we seek to experience different intensities and frequencies of each of the sixteen basic motives (Reiss 2005).

Motivator	**Motive**	**Intrinsic Feeling**
Power	Desire to influence (including leadership; related to mastery)	Efficacy
Curiosity	Desire for knowledge	Wonder
Independence	Desire to be autonomous	Freedom
Status	Desire for social standing (including desire for attention)	Self-importance
Social contact	Desire for peer companionship (desire to play)	Fun
Vengeance	Desire to get even (including desire to compete, to win)	Vindication
Honor	Desire to obey a traditional moral code	Loyalty
Idealism	Desire to improve society (including altruism, justice)	Compassion
Physical exercise	Desire to exercise muscles	Vitality
Romance	Desire for sex (including courting)	Lust
Family	Desire to raise own children	Love
Order	Desire to organise (including desire for ritual)	Stability
Eating	Desire to eat	Satiation (avoidance of hunger)
Acceptance	Desire for approval	Self-confidence
Tranquility	Desire to avoid anxiety, fear	Safe, relaxed
Saving	Desire to collect, value of frugality	Ownership

Table 3: Human Motivators (after Reiss 2004)

When it comes to people's priorities among the sixteen basic desires, one size does not fit all. Although everyone is motivated by each basic desire, we are not motivated to the same extent. Each individual sets priorities among the sixteen basic desires in a unique way (Reiss 2005).

Another character of human motivators is their fluidity. This means that as soon as we have satisfied a motivator, the joy we first experienced dissipates and the desire reasserts itself. Therefore, we seek activities that make it possible to get repeated satisfaction of our basic desires (Reiss 2005, 2004a). Since human motivation is fundamentally multifaceted, the sixteen joys cannot be reduced further into super categories, such as pleasure versus pain or intrinsic versus extrinsic motivation, since to a great extent these sixteen basic motives are unrelated to each other (Reiss 2005).

Reiss argues that people's actions are affected by their endeavor to satisfy their experience of the sixteen basic desires, as illustrated in the second column of Table 4. When each basic desire is fulfilled, an intrinsic feeling of happiness emerges, and that feeling is different for each desire; see third column of Table 4. In addition, people prioritise the desires differently; what is important for one person in a specific situation might be unimportant for another. Conversely, the desires of the same individual might be prioritised differently in a different situation. The number of means that can be used to reach the end is limited only by people's imaginations, while the end is genetically limited (Reiss 2001b).

Concluding Needs, Motivations, and Requirements

Based on the definitions of needs and requirements given above, I interpret requirements as being associated strongly with what a specific product or a predetermined solution must do to facilitate the user in accomplishing his/her goal. More precisely, a requirement is a statement about an intended product that specifies *what* it should do and, as such, it is strongly related to the means the users can use to fulfil their ends. Based on my interpretation, a user need is an expression of the goal (end) that the users want to reach by using a system; as such, it is related strongly to the concept motivation. Motivation explains *why* people act at all, and why people prefer some things rather than others, and as such, it clarifies the processes that start, maintain, and direct people's behaviour. Consequently, a need is the base from which the motivation starts. I argue that a need can be defined as the end goal the user wants to reach, and it is strongly related to *why* a user needs something.

THE LIVING LAB CONCEPT

A new concept supporting the processes of user-driven ICT systems development has started to emerge in Europe; this concept is called Living Labs. This concept started to develop in the late 1990s and one of the first to mention it was the Georgia Institute of Technology, where the technology was developed for capturing a live experience from an educational situation and then provide it to users for later access and review (Abowd 1999). Other areas where Living Labs has been used as a concept have been in tests of new technologies in home-like constructed environments (Markopoulos and Rauterberg

2000). Since then, the concept has grown and, today, one precondition in Living Lab activities is that they are situated in real-world contexts, not constructed laboratory settings.

The development of Living Labs has two main underlying factors; one is the changed use patterns among ICT users; the other is the fact that many traditional ICT development projects carried out in closed environments have failed due to limited and late interaction with the potential market. When I am referring to change in use patterns, I mean the transformation that can be discerned among users in the use of ICT for engaging in large user communities, for example in Facebook, Goggle Earth, Linux, Second Life, YouTube, and Wikipedia. These all are successful evidence of how users' joint efforts create valuable assets, such as content, products, services, etc. Hence, users have changed from being passive content consumers to becoming active cocreators of services and content (Følstad 2008b). Based on the assumption that the power of large user communities situated in real-life contexts and built upon public-private partnership (PPP) can support the processes of innovation, the concept of Living Labs has started to get rooted around Europe. To facilitate the build-up phase of these Living Labs around Europe, a network was established in 2006, European Network of Living Labs (ENoLL). Today, this network includes fifty-two Living Labs from eighteen of the twenty-five European member states, and it is still growing.

In the following section a description of the Living Lab concept is given. This starts by a presentation of different definitions of Living Labs. It is followed by a view of the characteristics of Living Lab environments and approaches, and finally a description of the Living Lab environment I have been involved in during my research.

Defining Living Labs

The concept of Living Labs is a rather new phenomenon that started to emerge around Europe in 2000. During its rapid growth, many somewhat different definitions of the concept Living Labs coexist. Følstad (2008a), in his literature review, offered three categories of Living Labs: (1) Living Labs to experience and experiment with ubiquitous computing; (2) Living Labs as open innovation platforms; and (3) Living Labs exposing testbed applications to the users. These categories show the range of the Living Labs described in existing Living Lab literature. Eriksson et al (2005) define Living Labs as a research and development methodology whereby innovations, such as services, products, and application enhancements, are created and validated in collaborative, multi-contextual empirical real-world settings. This definition implies that humans are considered as the collaborative sources of innovation, not merely involved for testing and validating products and services. Inherent in this definition is the assumption that the involvement processes should be carried out in real-world settings and in close connection to research. In this definition, the perspective of Living Labs is that it is a methodology.

Ballon et al. (2005), present another definition of Living Labs: *"An experimentation environment in which technology is given shape in real life contexts and in which (end) users are considered 'co-producers'."* (p. 3). This definition gives a slightly different meaning to the concept. Here, the experimentation is stressed and the connection to research is not included. In addition, in this definition, the perspective of the Living

Labs has been altered to an environment instead of a methodology. The common ground between these two definitions is the inclusion of users and the relation to real-life contexts. Users are seen as cocreators and the elaboration and cocreation of systems should be carried out in real-life environments.

Yet another definition of Living Labs was presented based on the work done in the CoreLabs project. Here, Living Labs is defined as *"a system enabling people, users/consumers of services and product, to take active roles as contributors and co-creators in the research, development, and innovation process"* (CoreLabs 2007a). In this definition, Living Lab is viewed from a system perspective, and it includes users as active cocreators, but here the real-life multi-contextual environment is excluded. Also in this definition, users are considered to have an active role, and research is included. The system perspective means that there is a system boundary that needs to be defined; related to the system perspective also is the relation between the parts and the whole. Hence, the interrelation among people, products, research, and development process needs to be considered and taken care of.

Based on the above definitions, the starting point for any Living Lab is to, in close cooperation among involved stakeholders, develop product and services from the basis of what users really want and need, where the main role of the Living Lab is to engage and empower users to participate in the creation of valuable and viable assets. The interaction with users should be carried out in real-world contexts with active users aiming for innovation in close correlation with ongoing research and development processes. In addition, from my perspective, Living Labs is both an environment and an approach that will be explained in more detail in subsequent sections.

Objective of Living Labs

The primary goal of Living Lab environments is to enhance and stimulate European cooperation and innovation in research and development activities. Related to that, the aim of Living Labs is to facilitate user involvement in innovation processes, suggesting an innovation system that is human-centric, in contrast to technology-centric. In these processes, users are invited to participate in the innovation and development process in their own context in authentic usage situations, facilitating the users to gain deep understanding of how a new product or service will function and correlate to their context based on their own lived experience. Following that line of thoughts, the risk of developing IT systems from a technology driven approach can be reduced in favor of the user-centered approach aiming to consider users' needs and desires in every development phase (Ståhlbröst and Bergvall-Kåreborn 2008b). In this thesis, I have chosen not to focus on the aspect of innovation; instead I relate to system development processes in general, since the final outcome of the process has not been in focus for my research. This means that I have not judged if the suggested solution was an innovation or not, even though the focus for the projects has been to develop innovative IT solutions.

In Living Labs the activities go around the clock, since the user involvement process is situated in users' real-life everyday context (CoreLabs 2006; Eriksson et al. 2005; Fahy, Ponce de Leon, Ståhlbröst, and Schaffers 2007; Mulder, Fahy, Hribernik, Velthausz, Feurstein, Garcia, Schaffers, A, and Ståhlbröst 2007; Ståhlbröst 2006). With such an

approach, it follows that users are involved actively in development processes in their own context; hence, the users are facilitated to communicate their needs and requirements on the basis of their everyday experiences. For example, if a user tests a mobile service, s/he can gain understanding of how it functions and fits into his/her usage context at all times and in diverse ordinary situations (Eriksson et al. 2005; Mirijamdotter, Ståhlbröst, Sällström, Niitamo, and Kulkki 2007; Ståhlbröst 2006).

Even today, the most advanced Living Labs are rather immature. Hence, there is a significant need for research and development to gain knowledge about how to manage a Living Lab with its inherent complexity. Følstad (2008a) argues that the most pressing challenge for research in Living Labs is related to the current lack of studies of Living Lab methods and tools. The aim of this research is to contribute to this lack of understanding for how to use methods and tool to support Living Lab activities.

Key Elements of Living Labs

To coordinate the ongoing activities around Europe toward the establishment of a European Network of Living Labs, a Coordination Action project called CoreLabs was developed and carried out in 2006–2007. In this project, a study among ten of the involved Living Labs was conducted with the aim to gain insights into the Living Lab phenomena. The study was carried out in structured telephone interviews, and the results from this study are reported on in project report D2.1A – Best Practice Report (CoreLabs 2007d). The aim of the interviews was to identify key elements of Living Labs, and four elements were identified. These are:

- *Participation and Context*: This refers to the participation, not only of the potential users but also of all the relevant stakeholders in the value chain; this has been identified as the most important element for a successful operation of Living Labs. The context refers to the multi-contextual sphere in which product and service development takes place. The ability to have close interaction with users in their own context is what separates the Living Lab approach from traditional user involvement.
- *Services*: This element refers to the services the Living Labs provide to their customers. These customers can be SMEs, industry, researchers, or civic organisations. The services offered include *cocreation* throughout the whole development process, *integration* of the customers' products into the Living Lab, and summarised and standardised *data preparation*.
- *Methodology:* In Living Labs, many different methods can be applied to involve users in the innovation process. One fundamental aspect to consider when selecting and using methods in a Living Lab is the user perspective. Users are not considered to be guinea pigs; hence, methods being used must support that view.
- *Infrastructure:* This element refers to the local infrastructure that is used and promoted. This means that infrastructure can be used to support the process

> of interacting with users, and also that infrastructure can be the object being developed, tested, and validated in the Living Lab (CoreLabs 2007d).

Based on my understanding of these elements, I think that they represent different abstraction levels or entities. For example, I do not believe that *participation* and *methodology* represent two separate elements. I consider participation as a characteristic that should be included in the methodologies used in Living Labs, since participation cannot be reached if it is not a characteristic in the methodologies applied. The participative aspect does not refer only to user participation but also to stakeholder participation. In my perspective, their participation also needs to be an explicit characteristic in the methodologies applied in the Living Lab activities.

Another example of the difficulty to separate the elements is found in *service* and *infrastructure*. These are not necessarily two different elements, since the infrastructure can be something a Living Lab offers as a service to make it possible to test, for example, a technological device. The infrastructure also can be something that is used in a methodology to support participation (i.e., distributed user participation), and it can be a part of a context. Based on this reasoning, I believe that these elements do not give any guidance about what constitutes a Living Lab, neither as an approach nor as an environment. In the subsequent sections, I will present characteristics I have identified as relevant for Living Lab environments and approaches based on the findings from the CoreLabs project.

Components in Living Lab Environments

To support the process of understanding what constitutes the basis of a Living Lab environment, I highlight some key components that I interpret as strongly related to a Living Lab environment. These components are described, in report D3.1A – Innovation Aspects, Prerequisites & Requirements from the CoreLabs project, as the roles different stakeholders can play in a Living Lab environment (CoreLabs 2007b). I do not interpret these components as stakeholder roles; instead, I view them as components that are important to include in a Living Lab environment so they can reach their general aim, which is to facilitate user involvement in open innovation processes. In addition, I see these aspects as being observable objects, and as such they can guide the design of a Living Lab environment.

I have rewritten the picture to fit the definition of the components better; for example, the component users replaced the CoreLabs component citizens and workers, since I interpret that those involved in development processes can have other roles than as citizens and workers. In addition, the component partners replaced what the CoreLabs project called Living Lab expertise. This change had its background in my view that the relevant stakeholders are partners, and they are not expected to be experts of Living Labs; instead, they bring in their own area of expertise and, by that, contribute to the Living Lab.

In the CoreLabs report (CoreLabs 2007b), these components are described as follows: citizens and workers represent the end-users, who are viewed as innovation cocreators and valuators. Application environments represent the context in which those users interact and reflect on the real world's usage scenarios. The technology and

infrastructure component outlines the role that new and existing ICT technology can play to facilitate new ways of cooperating and cocreating new innovations among the partners and stakeholders. Organisation and methods relate to proposed standards and methods that emerge as best practices within the Living Labs environment. Finally, the Living Lab expertise that refers to partners who bring their own specific wealth of knowledge and expertise to the collective, helping to achieve higher standards of excellence of every area.

Figure 6: Key Components of a Living Lab

The clear distinction between Living Labs as an environment and as an approach has not been expressed and elaborated on explicitly in any CoreLabs report or other Living Labs literature; hence, it is solely my interpretation of the components character. Founded upon my understanding, a Living Lab environment should have a good relation with, and access to, users willing to be involved in systems development processes. Any Living Lab should also have access to multi-contextual environments, as well as high-end technology and infrastructure that can support both the processes of user involvement and technology development and tests. Each Living Lab environment also needs organisation and methodologies suitable for its specific circumstances. Finally, a Living Lab needs access to a diversity of expertise in terms of different partners, since the scope of Living Lab activities often differ in character. Here, I want to stress that those involved are not obliged to be experts on Living Lab, but rather on their own specific area that can contribute to the Living Labs current activities. However, setting up a Living Lab with all the right components does not guarantee that it becomes a Living Lab; equally important are the key principles of the approaches applied in Living Lab activities.

Key Principles of Living Lab Approaches

Adding to the components mentioned above, some key principles that should permeate all Living Lab operations have been generated from the basis of the interviews carried out with Living Lab representatives in the CoreLabs project (CoreLabs 2007a). The key principles that were considered as crucial in Living Lab operations are: Continuity, Openness, Realism, Empowerment of Users, and Spontaneity (CORES), and these are described as follows (CoreLabs 2007a):

- *Continuity*: This principle is important since good cross-border collaboration, which strengthens creativity and innovation, builds on trust, which takes time to develop.
- *Openness*: The innovation process should be as open as possible since gathering of many perspectives and bringing enough power to achieve rapid progress is important. The open process also makes its possible to support the process of user-driven innovation, including users wherever and whoever they are.
- *Realism*: To generate results that are valid for real markets, it is necessary to facilitate as realistic use situations and behaviour as possible. This principle also is relevant since focusing on real users, in real-life situations, is what distinguishes Living Labs from other kinds of open cocreation environments, such as Second Life.
- *Empowerment of users*: The engagement of users is fundamental in order to bring the innovation process in a desired direction based on human needs and desires. Living Labs efficiency is based on the creative power of user communities; hence, it becomes important to motivate and empower the users to engage in these processes.
- *Spontaneity*: In order to succeed with new innovations, it is important to inspire usage, meet personal desires, and both fit and contribute to societal and social needs. Here, it becomes important to have the ability to detect, aggregate, and analyse spontaneous users' reactions and ideas over time.

Living Labs arise from the need to support innovation over disciplinary boundaries and technologies. With this multi-contextual approach, it follows that many divergent Living Labs coexist and represent specific disciplines, and also that many Living Labs exist across communities and regions, thus incorporating a mixture of disciplines or objectives. During the CoreLabs project, eleven different Living Labs were identified, for example, Rural Living Labs, Media Living Labs, and Learning Living Labs. It is important to note here that none of the existing Living Labs are solely representing one, but are more likely to cross over between these domains, and a few of them cross over most of the Living Labs.

Important Stakeholders in Living Lab Contexts

There also are a number of stakeholders important to include, or at least consider, in Living Lab initiatives. In the CoreLabs project (CoreLabs 2007b), relevant stakeholders were identified. The relevant stakeholders who give input to Living Lab activities are:

- *Academia and research organisations*. These are key stakeholders in determining the efficacy of collaborative validation approaches.
- *SMEs*. These are considered the chief beneficiaries of the environment of increased innovation and competitiveness fostered through the Living Lab approach.
- *Business Industry and Service on broader scale*. These stakeholders can have an interest in market trends and business practices that emerge from close collaboration with players in that field.
- *Civic Sector and End Users*, These users will play a critical role in the validation environment that drives innovation.
- *ICT professionals*. These stakeholders have an important stake in the technical aspect and requisites for a project of this scope or nature.
- *Public Partners*. Their aim is to drive the development and innovation in a specific region in order to encourage enterprises and industry, and attract specific resident groups.

The diversity of the stakeholders and the scope of the interests that they encompass demonstrate the complete cocreation approach that Living Labs embraces.

Success Factors for Living Labs

A Living Labs objective is to enable sustainable, collaborative, multi-disciplinary, and user-relevant innovation. Hence, it can be assumed that the success of the Living Lab can be measured broadly in terms of the following four elements (CoreLabs 2007b) .

- *Innovation*: Living Labs aspire to stimulate creativity and innovation; hence, its main success will be measured against quantifiable, accepted, and sustainable innovations. In the Living Lab context, three measurable innovation success metrics exist, the three Ps (CoreLabs 2007b).
  - Number of peer-reviewed **Publications**
  - Number of legally held **Patents**
  - Number of **Products** that reach the market
- *Collaboration*: It has become obvious, since cooperation is one important facilitator for innovation, that collaboration among as many participating stakeholders as possible and also with different combinations of stakeholders is an important measure of success of Living Labs. Here, it is important to

look at the maturity of the collaboration to stimulate positive outcome of the collaboration.

- *Multi-Contextuality*: Another important success factor is the context. By introducing an environment of multiple and diverse dimensions, users can contribute, evaluate, and be evaluated in real-life situations. This perspective takes user participation to a new level of multiple and merging contexts.
- *Sustainability*: To determine long-term success, sustainability becomes an important indicator. In the Living Lab context sustainability can be measured in terms of:
  - Durable employment creation
  - Inclusion and equality issues
  - Competitiveness

It is important to note here the significant relevance the Living Lab must offer to its location, intended audience, and stakeholders (CoreLabs 2007b). Again, the context is of great importance, but in this case, it is the Living Labs context, the region and society, that must be considered and in which the Living Lab must fit. Reflecting on the relation between the success elements for Living Labs, and the key components for Living Lab operations, I interpret that the Spontaneity principle can be related to the element Innovation, Continuity can be related to Collaboration, Realism can be related to the element Multi-contextuality, and Empowerment of users and Sustainability can be interpreted as related to each other. However, one important principle, openness, cannot be related to any success factor for Living Labs. I do not have any suggestion for how this principle could be measured since this is beyond the scope of this thesis, but I interpret it as an important aspect to handle in the future for Living Lab environments.

BOTNIA LIVING LAB

During my time as a researcher, I have been involved in the ongoing activities of a Living Lab called Botnia Living Lab. Botnia is part of an organisation called Centre for Distance-spanning Technology (CDT), which is an R,D & I joint venture between core partners with the main objective to generate sustainable business innovation. CDT offers an integrated environment for business-driven, and research- and development-driven projects in the area of advanced information, interaction, and communication technology. They offer an integrated environment of people, infrastructure, tools, processes, and services for research, development, and testing of new and emerging distance-spanning technologies and their applications.

The organisation of CDT is a contractual partnership between Luleå University of Technology and commercial IT companies. The university is host and legal body for their operations; a board of directors with industrial majority sets their strategic directions; and a core management team is responsible for tactical planning and daily operations. The ongoing activities in CDT's organisation consist of integrated projects that depend on collaboration between people from different organisations.

One important part of CDT's organisation is its collaboration with its partners. The partners are divided into five main categories: (1) *Sponsors* are referred to as those partners who provides financial support to their business and in return request some results to be generated, for example research financers such as Vinnova. (2) *Core partners,* defined as those who have a wide and long-term interest in CDT business and who participate in their strategic planning and engage in their projects. (3) *Members* with specific long-term interest in CDT business. Members typically have capability to participate in CDT tactic planning and engage in just a few specific CDT programmes and projects. (4) *Allies* are referred to as partner with interest to collaborate repeatedly with CDT in projects. And (5) *Project Partners* that are engaged in project(s) together with CDT. Botnia Living Lab's role in CDT's organisation is that it represents a real-life research factory for methods, tools, and processes for open user-driven innovation and research. The basic idea of Botnia is to engage end-users, individuals, and stakeholder organisations in an interactive and iterative process from need- and idea-generation through concept-development and prototype testing to market validation. Botnia also is open for all kinds of IT stakeholders in the value-chain, and its aim is to help these stakeholders manage their development process with a user-centered approach.

One of Botnia's strengths is its virtual network organisation, which consists of the partners CDT has, but also includes the end-users. Due to its networks and partners, it has access to expertise in many diverse areas, such as project-management, IT technicians, entrepreneurship, business development, and policy making. This means that Botnia does not need to hold all the assets on its own; instead, it has access to expertise through its partners and networks. The diversity of partners also makes it possible for Botnia to have access to different kinds of infrastructures and technologies, such as 3G-nets, MWIMAX, and broadband nets. Hence, Botnia's accessible expertise in the IT technology area stretches from hybrid nets to user involvement processes.

During my years as a researcher connected to Botnia, the scope has altered. In the beginning, the main objective for Botnia was to facilitate user tests of innovations for SMEs and researchers. This focus has matured and widened. Today, Botnia not only perform user tests; it aims to support processes in which users are involved as equal cocreators of innovations in close cooperation with companies, users, academia, and authorities. Over the years, Botnia has built up a community of end-users that it easily can communicate with. In this community, approximately 6,500 test pilots are accessible, and the test pilots are represented as individuals who have chosen voluntarily to be part of the Living Lab community. The users in this community are motivated to participate in technology development based on their curiosity to try new technical artifacts, and to get the opportunity to influence them. What separates them are demographical and psychosocial factors (Ståhlbröst 2004). Botnia does not include only users from the database in its projects; if users with some specific character are needed, these are recruited specifically. For example, if the aim of a development project is to develop mobile services for rural areas, people living in those areas are contacted. The user perspective is that they are involved as partners with the right to exit from the process whenever they choose; they are not bound by any contract.

When users are involved in Botnia activities, the aim is to involve them in the whole development process that should be grounded stably in reality. This means that each

development process and its methods are customised in accordance with the unique requirements for its particular situation. The aim is to involve users in their natural environment by means of technology, with the objective to gain access to users' needs, ideas, and attitudes in their current situation. Due to Botnia's focus on products and services to support a mobile life, the circumstances in which the user involvement processes are conducted become multi-contextual in character. This means that the users can be involved, for example, in their homes, when they walk around the city, when they drive a car, or when they work. Hence, the methods applied in Botnia operations needs to handle this multi-contextuality

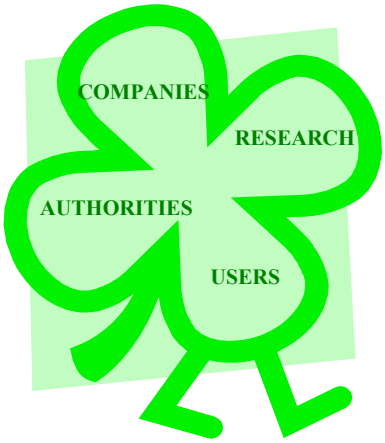


Figure 7. Botnia Living Labs Stakeholders

Botnia aims to harmonise the development process among four main stakeholders: companies, users, authorities, and researchers, see figure 7, and the close connection between research and development is one important characteristic of its activities. From a research perspective, these experimental settings enable, for example, research on methods for user involvement in which different approaches can be elaborated and compared. One important thing that needs to be developed soon in this Living Lab environment is a new distribution method for user involvement, since users are involved in the development process independent of their location.

The activities in Botnia depends on the development project that currently is running; hence, the project's aim and process greatly influences which activities need to be taken, which partners to include, and the structure for the project. This, for example, can mean that if a certain competence is missing in the organisation, an SME can be involved to fill that spot.

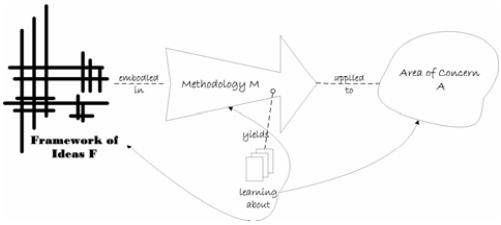
My Perspective on the Living Lab Concept

Based on the above descriptions, this is my summarised view on Living Lab. First of all, a Living Lab can be an environment in which the component's users, application environment, organisation and method, infrastructure and technology, and partners are included. A Living Lab also can be defined as an approach in which the principle's

continuity, openness, realism, empowerment of users, and spontaneity are included. The Living Lab approach consists of characteristics that are not unique as such; however, the combination of these parts into one approach makes Living Labs unique.

For instance, in Living Lab approaches, it is assumed that the development and innovation process should be open for all relevant and interested stakeholders. This is influenced by the open innovation approach posed by Chesbrough (Chesbrough 2003), and by the emerging Web 2.0 approach, aiming to facilitate creativity, information sharing, and, collaboration among users (Dearstyne 2007; Leibs 2008; Walters 2007). Included in that approach also is the distributed aspect aiming to reach and inspire people independent of where they are, or what time it is. In addition, Living Lab activities are carried out in real-world contexts and this approach is influenced by ethnographical approaches such as contextual design (Holtzblatt and Beyer 1998), field studies (Preece et al. 2002; Sharp et al. 2007; Ståhlbröst 2004) and ubiquitous computing (Følstad 2008a). In addition, Living Lab processes are closely related to, and should support, research activities, which distinguishes Living Labs from ordinary user involvement approaches. However, the overarching objective of these Living Labs is, in close cooperation between involved partners, to develop products and services that end-users really want and need. Since the activities in Living Labs are applied into real-world contexts, the innovation and user involvement activities take place 24/7.

Another important aspect of a Living Labs environment is the "living" aspect, which means that the people involved in any development project live with the process and constantly check how the process proceeds. Hence, they are prepared for any necessary adjustments to ensure, for example, that users are stimulated to participate, or that the development process proceeds as planned. If the process does not proceed as planned, the aim is to gather data about what has happened and how the plans can be adjusted accordingly.



Chapter 3

FRAMEWORK OF IDEAS

In this chapter, I present the aspects that have influenced me to act as I have during my research; in other words, my framework of ideas. Framework of ideas represents a declaration of what constitutes the researcher's pre-knowledge about the situation being researched. To declare the framework of ideas in qualitative research is essential since what is seen as knowledge in human situations is not always obvious (Checkland and Holwell 1998b), but it influences the results generated from the research. This means that the process of research can be handled in many different ways, with different approaches and from different perspectives. Moreover, what the researcher perceives depends on the researcher's approach or worldview, and what the observed phenomenon means for the researcher depends on the context in which the phenomenon is observed. This phenomena of researcher influence is a occurring situation in all research; therefore, as a researcher, it is important to explain the approaches that are representative for the specific research (Patel and Tebelius 1987). The following sections present the ideas that are part of my framework of idea and my intellectual framework. The ideas that constitute my framework of ideas are the interpretive approach, soft systems thinking, and appreciative inquiry, and these will be described in more detail below.

An Interpretive Approach

My research is based on an interpretive approach, within which the basic idea is that the social reality surrounding us is subjective, socially constructed, and interpreted by humans (Checkland and Holwell 1998b; Denscombe 2004; Jönsson 1991; Walsham 1995). A researcher who studies a social situation needs to apply an organised research effort to understand how people make sense of their perceived world and how the perceptions might differ from one group to another. Within the interpretive approach, it also is recognised that perceptions might change over time as the environment changes and knowledge increases. Hence, to understand the social situation and to make sense of people's perceptions, one approach is that the researcher immerse herself in a situation,

following it along whatever path it takes as it develops through time, i.e., action research (Checkland and Holwell 1998b; Jönsson 1991).

When an interpretive approach is applied, the basic thought is that knowledge is produced in a situation, and it thereby is situated. Following that, the knowledge produced from studying the situation should be fed back to the situation to accomplish a learning cycle (Denscombe 2004), i.e., the hermeneutical spiral. The approach, accepted by most researchers, within this perspective is based on a collaborative process between researchers and people in the situation, a process of critical inquiry, a focus on social practice, and a purposeful process of continuous learning (Checkland and Holwell 1998b).

As an interpretive researcher, it is important to describe, in some detail, what occurred during the research process to make it possible for other researchers to see how the researcher has arrived at the results, and if they believe that the reached results are trustworthy based on the applied research approach (Patel and Davidson 2002; Walsham 1995). One way to accomplish this is through so-called thick descriptions. My way of handling this is to give a thorough presentation and argumentation of my research process and what happened during the process. During my research, I have been involved in user involvement processes aiming fort user-centered systems development with a Living Lab approach. In these processes, I critically reflected on, and gave feedback to, the choices made. Thus, it is apparent that my research is strongly connected to, and influenced by, the interpretive approach and action research.

Soft Systems Thinking

Another strong influence on my research approach, and worldview, is soft systems thinking that has its underpinning in the interpretive strand. This way of thinking is founded upon the notion that the world is not organised as systems, but that we can organise it as systems to make sense of it and to understand it better (Checkland and Holwell 1998b; Lundahl and Öquist 2002). This means that a soft systems thinker thinks of the world in models with common characters whereby everything clings together and moves together. Hence, to be a soft systems thinker means to understand the world in the form of wholeness, relations, functions, contexts, and patterns, and the functionality of the whole always is more important than the parts (Checkland and Holwell 1998b; Lundahl and Öquist 2002).

Within the soft systems thinking approach is the ontological perspective subjective in which humans are in the center and the emphasis is on gaining understanding and empathy of their experienced situation. Hence, the soft systems thinking approach is connected strongly to the interpretive approach through its subjective perspective. To gain understanding of people's lives and situations based on this tradition, the process of inquiry and research is based upon gaining insight and understanding through qualitative approaches (Checkland and Holwell 1998b).

This way of thinking has an influence on the approaches I applied during my research. As a soft systems thinker, my endeavor is to understand relations between both entities under study, as well as to gain an understanding of the whole. This means that, in this thesis, my aim is to gain understanding of the relation between each separate user

involvement process, as well as understanding how these issues can be applied in the overall process of systems development in the context of a Living Lab. In the soft systems thinking approach, it also is inherent that it is not possible to find an optimal solution for all users who are involved in systems development processes; the intent is more about developing technological solutions that users are willing to accept and understand.

One basic thought in soft systems thinking is that people – in general – want to improve situations they find problematic. However, what is seen as problematic by one observer is not necessarily interpreted the same way by another observer and, therefore, some kind of accommodation between different points of view needs to be achieved. It also is assumed that a certain situation may involve misunderstandings that are related to different needs, objectives, and/or measures of performance (Bergvall-Kåreborn 2002).

The perspective of soft systems thinking also influences the choices of methods for data collection I have made during the user involvement processes, in which the chosen methods for data chosen mostly have been of a qualitative nature. In my research, I have used focus group interviews, interviews, and on-line surveys as methods for data collection. Where I have applied on-line surveys, the aim has not been to determine specific phenomena statistically; instead, the aim of these studies has been to gain insights into a specific area. During my research, I constantly reflect on my reserach process and the choices I have made.

Appreciative Inquiry

The third approach and world view that has inspired and influenced my research approach and methods for data collection is Appreciative Inquiry (AI). My interest of appreciative inquiry is founded on my desire to step away from focusing on defining problems in a situation and instead take a positive and affirmative perspective to change. Here, I wanted to get hands-on suggestions for how this approach could be achieved, hence the description of Appreciative Inquiry is more on a method level than methodological. Appreciative Inquiry starts with the assumption that something in every situation is working (Shepherd 2001); hence, it is an inquiry that searches for the best of what already exists in a system and as such searches for the life-giving forces of the system (Norum 2001). AI first was expressed by David Cooperrider and Suresh Srivastva, and there have been thousands of people involved in cocreating the concepts and practices for understanding AI. The approach is said to revolutionise the field of organisational development and change (Cooperrider and Avital 2004).

One basic thought in AI is that good and bad exists in all systems, and we can choose to focus on the good (Norum 2001). Thereby, it is a search for the things that give life to the system when they are most alive, effective, creative, and healthy (Avital and Boland 2008). When the experienced strengths in a particular situation have been identified, it becomes possible to design a system around these strengths; hence, the system gets more of what is desired (Norum 2001). Focusing on the strengths and possibilities differs from traditional problem solving. With a traditional problem-solving approach, the inquiry process usually involves identifying the problems, analysing the causes of the problems, coming up with possible solutions, and finally creating a plan for implementation. Problems call for solutions, while challenges invite us to meet them,

replicating the dance of co-construction (Cooperrider and Avital 2004). Seeking out the positive experiences and past successes and building on them in the future gives positive affects and encourages social bonding (Norum 2001). However, accentuating the positive in a situation is a demanding task due to people's tendency to look for what is wrong. This is ingrained so deeply in people that they are not even aware they are doing it (Shepherd 2001). Zemke (1999) argues that the problem solving focus is a null-sum game that directs the focus on what is wrong instead of focusing on the potentials inherent in every situation.

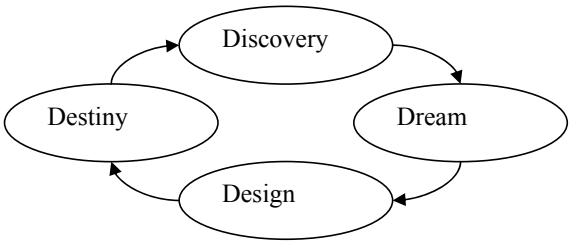
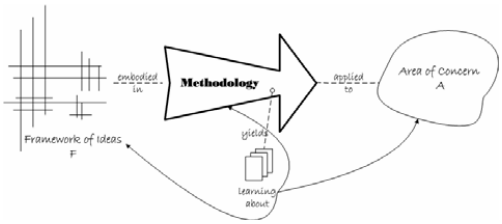


Figure 8: The process of the Four Ds (after Norum 2001)

The four-phase process of AI begins with an appreciation of "what is." Then it moves to envisioning "what could be,", co-constructing "what should be," and sustaining "what will be" (Kinni 2003; Norum 2001). The first step is the Discovery phase, with its focal point to find, describe, and explain the best of "what is." This phase is meant to generate new knowledge that will increase the realms of what is possible through questions that are posed as an invitation and evoke storytelling about peak experiences (Norum 2001). The telling of stories is the basis of AI; therefore, the questions asked are fundamental and innovations often stem from original questions that challenge conventional form (Avital and Carlo 2004). The second step is the Dream phase, in which a positive future is envisioned. Here, the aim is to gain an understanding of the factors identified in the first step and through this understanding develop a vision of "what might be." Following this is the Design phase, in which the defined and prioritised data from the first two phases is used to design a system that support the cocreated dreams (Bergvall-Kåreborn et al. 2008; Norum 2001). Finally, there is the Destiny phase, in which the researcher reflects and develops a plan to sustain, maintain, improve, or adjust what has been designed. This phase is about valuing what works well with what has been designed, thereby bringing the process back to the beginning: discover the best of the new system (Norum 2001).

In my research, I have not used AI as a method for organisational development; instead, I have used it as an inspirational stream for the user involvement approach and for my research as such. Hence, I do not focus on identifying problems; instead, my focus is on identifying opportunities waiting to be exploited and handled.



Chapter 4

METHODOLOGY

The following chapter presents my action research approach. This illustrates how my research process has been designed, along with my perspective on action research. It also contains a short introduction to the projects I have been involved in during my research as well as the data collection processes in these projects.

AN ACTION RESEARCH APPROACH

The study of a phenomenon can be accomplished in many different ways, such as theoretical studies, interviewing people involved, or by actively becoming part of the phenomenon in person, and the last way is called action research. In my research, I have chosen to be actively involved in the processes concerning human-centric development of IT systems. Hence, my methodology has been action research (AR) and the milieu in which my study has taken place has been in a Living Lab, Botnia Living Lab.

AR is a form of applied research in which the aim is to develop a solution to a practical problem; it is of value for the people with whom the researcher is working, while at the same time developing theoretical knowledge of value to the research community (Chiasson, Germonprez, and Mathiassen 2008).

As such, AR is an established research method that often is used in social science, as well as within the IS discipline. Because of its foundation in practical action and its aim to solve an immediate problem while informing theory, this method produces highly relevant results (Baskerville 1999; Baskerville and Pries-Heje 1999; Baskerville and Wood-Harper 1998; Rönnerman 2004; Starrin and Holmer 1993). The method emphasises both theory and practice; hence, it is important that the researcher consider these two parallel and interacting cycles: the research cycle (focused on the scientific goals) and the real-world practice cycle (focusing on the problematical situation) (Chiasson et al. 2008); see figure 9 below.

The figure illustrates the dual and interactive processes of research and actions. The process might start from the basis of some relevant research themes, or from the real-world situation. From the real-world situation cycle, the outcome can be in terms of new knowledge discoveries that contribute to the research community.

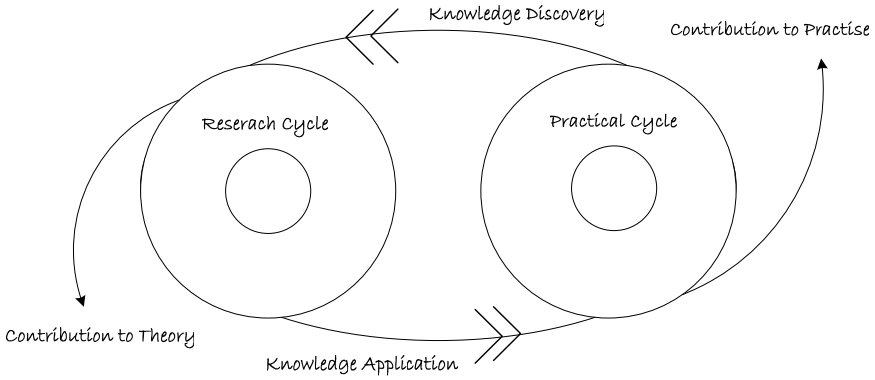


Figure 9: The Dual Processes of Action Research after Chiasson et al. (2008)

In this process, the researcher can be involved in one or more research and problem-solving activities, which can be related intrinsically and often be difficult to distinguish (Chiasson et al. 2008). Another outcome from the process can be in terms of contributions to the practice as such, with the aim to enhance the situation under study. In the research cycle, theoretical knowledge can be applied onto the practical situation based on the researcher's focus. In addition, practical insights from the actions in the practial cycle is used to discover new theoretical knowledge and inform future research (Chiasson et al. 2008).

According to Checkland and Holwell (1998a), the process of AR can be divided into three main phases; see figure 10 below. First, the researcher enters a real-world situation and takes part in the considerations in that situation (Checkland and Holwell 1998a; Checkland and Holwell 1998b). Initially, the researcher will enter a real-world situation that is regarded as relevant from the point of the research interest. Then, it is important to negotiate carefully the respective roles of the researcher and the people in the real-world situation. In addition, when a researcher enters a social practice s/he becomes involved both as a participant in the situation and as a researcher of the situation. Also, the framework of ideas and the methodology in which they are embodied need to be declared. Then, actions in the situation can begin. This work entails a researcher becoming involved in the actions and implementing changes aimed at contributing to the situation. Thirdly, the researcher leaves the situation and reflects on it in order to find a variety of lessons learned (Rönnerman 2004; Checkland 1998). These lessons should contribute both to research and to practice (Chiasson et al. 2008). In my projects, my participative role in the projects activities was to contribute with my

knowledge and skills in user involvement processes. My role as a researcher has been to make sense of the findings generated from the lessons learned from the projects.

Hence, action research is an interactive process between research and practice, with one emphasis within this approach being to help participants discover new ways of seeing and designing their actions (Jönsson 1991; Rönnerman 2004). Related to that, many authors (e.g. Baskerville and Wood-Harper 1998; Baskerville and Wood-Harper 1996; Checkland 1999; Checkland 2000; Checkland and Holwell 1998b; Chiasson et al. 2008; Denscombe 2004; Dick 2006; Hilsen 2006; Patton 1990; Pyrch 2007) state that action research handles problems that needs to be solved. I argue that in the situation I have been involved in, the focus has not been on solving problems. Instead, the focus has been to contribute to a situation, namely processes for user involvement with a Living Lab approach in a Living Lab milieu, from an opportunity seeking perspective. This perspective is built on the findings from my licentiate thesis (Ståhlbröst 2006), in which I identified an opportunity for Living Lab milieus to include users early on in their processes, instead of mainly involving users as evaluators of innovations. Consequently, a new situation surfaced that became an opportunity for me as a researcher to develop methodological support for the Living Lab approach, which is the focus of this thesis.

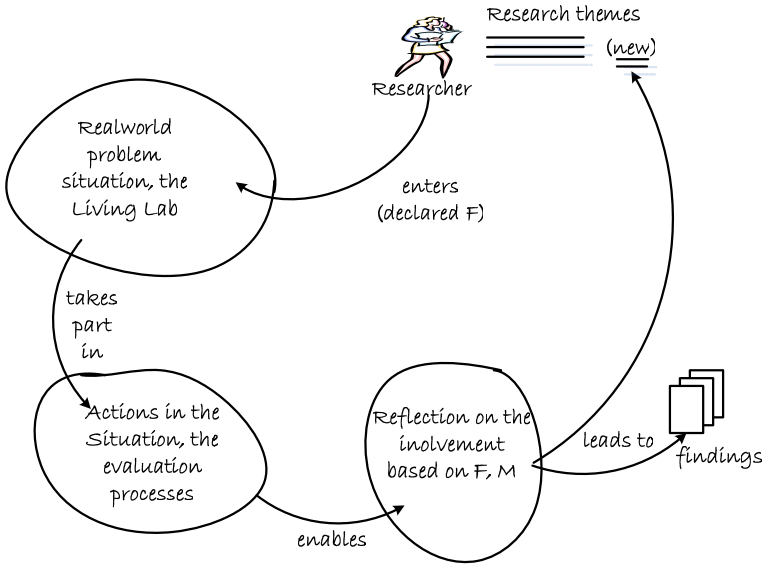


Figure 10. The action research cycle (after Checkland and Holwell 1998b)

Using action research to facilitate the understanding of complex human processes, rather than constructing universal social laws, is a situation whereby a researcher is involved actively and from which the obtained knowledge can be applied immediately (Baskerville 1999).

My study involves an action research approach since I have participated in the activities in the Living Lab milieu and, as a consequence, have influenced decisions and approaches in the processes based on my theoretical framework and my frames of reference. Applying the action research method also involves some risks, identified by Baskerville & Wood-Harper (1996). The risks that relate to action research are:

- *Lack of impartiality of the researcher*. During my studies, I have handled this by reflecting continuously on my role and research in cooperation with other researchers and with those involved in the real-world situation.
- *Lack of rigor*. I have handled this risk by such means as constant documentation of the outcomes from the individual projects in both project reports (practice) and research papers (research). I also have kept notes from meetings and e-mail conversations relevant to my research themes.
- *Often mistaken for consulting.* To meet the criticism that AR is an act of consulting, Baskerville and Wood-Harper (1996) have defined five ways in which AR and consulting differ:
  - *Motivation.* Action research is motivated by its scientific prospects, perhaps being categorised in scientific publications. Consulting is motivated by commercial benefits, including profits and knowledge about the solution. I have handled this by constantly relating my research findings to relevant theories and trends.
  - *Commitment*. Action research makes a commitment to the research community, as well as to the client. In consultation, commitment is to the client alone. In the projects I have been involved in, I have stated research themes before entering to make sure that my research focus in the projects could contribute both to research and to practice.
  - *Approach.* Collaboration is essential in action research, because of its underlying theories. Consulting typically values its unbiased "outsider" viewpoint, providing an objective perspective (Baskerville and Pries-Heje 1999). In addition, research is usually cyclical while consultation is linear. In my work, I have worked in close cooperation with other researchers and project participants, as well as representatives from the Living Lab milieu. In collaboration with the users, we always have informed them that they are involved in research and the consequences that follow.
  - *Foundation for recommendations.* For researchers, the foundation for recommendations require theoretical justifications while the consultants are expected to suggest solutions that have proven successful in comparable situations. Research also require more rigorous documentation than consultation does. Based on the findings from my research and reported on in scientific articles, I have made

recommendations on how the Living Labs can design and carry out their user involvement processes.

- *Essence of organisational understanding.* In research, organizsational understanding is based on practical success from iterative experimental changes in the organisation. While typical consultation teams develop an understanding through their independent critical analysis of the problem situation. Due to the close cooperation between me and representatives from the Living Lab milieu, I have gained a thorough understanding of their organisation and how my research can contribute to it. In addition, I have reflected continuously, meaning that the actions planned and taken during my study have been reflected upon critically, in interaction with research colleagues, representatives of the Living Lab, and individually.

- *Context dependency leading to difficulty in generalising the findings*. I have handled this risk by relating findings and processes to relevant theories and scientific questions that need to be addressed. Checkland argue that repeatability cannot be reached in action research since the phenomena that we study is not "homogenous through time" we can, and should, make sure that our process is recoverable. Checkland further argues that if the criterion of recoverability is met it helps to justify generalisation and transferability of results. Recoverability is achieved by declaring, in advance, the epistemology in terms of which a piece of AR will acquire what counts as knowledge (Checkland and Holwell 2007).

Adding to that, Mattson (2004) voiced some criticism against action research: he said that action researchers often exaggerate their own, as well as their research's, significance to the change work, and that action research runs the risk of becoming more action than research. In addition, the researcher in action research becomes a part of the study and personal understanding will invade the observations and deductions that follow (Baskerville and Pries-Heje 1999). The identified risks mentioned concern not only action research; they are general problems of social science research. However, action researchers faces more challenges in maintaining rigor in the research (Baskerville and Wood-Harper 1996). Chiasson et al. (2008) argue that AR lends itself toward many forms of pluralistic approaches to research. These approaches provide guidance for researchers on how to manage the identified risks.

Real-World Situation

The first phase of action research is to gain knowledge about the current situation and use that knowledge to extract relevant research themes. This is enabled by identifying the primary situations that constitute the basis for the organisation's desire to change, or alter its behaviour (Baskerville and Pries-Heje 1999). The *real-world situation* I am referring to in this thesis also includes what I have called areas of concern, described in chapter 2. Here, I will describe the streams that affect the Living Lab environment as well as the Living Lab approach and its inherent characteristics. Based on these streams,

and the Living Lab environment's current circumstances, the following research themes have guided my work:

- How can we gain understanding of users and their needs in systems development processes?
- How can user-centred involvement processes be designed to support a Living Lab approach?
- Armed with these themes, I started to involve myself in the Living Lab environment's activities and ongoing projects.

Actions in the Situation

The second phase in my action research approach has been to plan, carry out, and analyse the ongoing actions in the situation. Each of these activities has been guided by my frame of references and the declared methodology, with the aim to help bring about changes experienced as an improvement in the Living Lab environment. In this process, it is important that the researcher endeavor to make sense of her increasing experience and knowledge in the situation (Checkland and Holwell 1998b). Checkland and Holwell describes the action research process as one iterative cycle (Chiasson et al. 2008). In my research, the process has consisted of several iterative processes, as illustrated in figure 5 below and as highlighted by Chiasson et al. (2008), though it has not always been tied up so neatly as in the figure, of course.

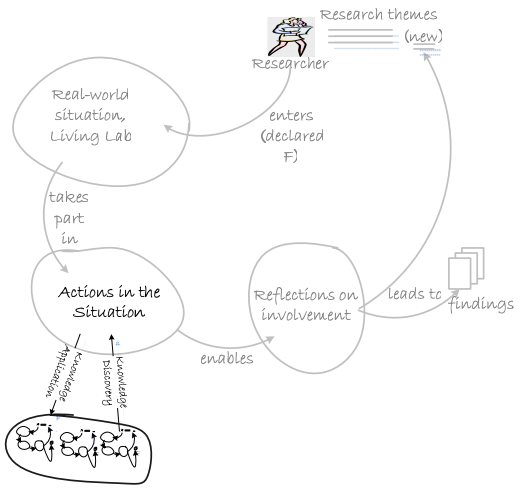


Figure 11: My Research Process

To clarify the figure above, I have entered a real-world situation, the Living Lab environment. I took part in some actions and will describe the cases in more detail in the following chapter. In this process, I have applied knowledge to a project, and I discovered some knowledge from each case separately, which will be described in more

detail below. The discovered knowledge led to reflections on the research level, which in turn led to findings and new research themes that were applied in the following case. Hence, the actions in the situation have been linear, while my learning and knowledge acquisition have been more iterative in character. Figure 11 illustrates that the knowledge gained from each study is incorporated into the next study. Hence, a progression in learning was reached.

During my process, I have been involved in twelve research projects and from these I selected three that constitute the basis for this thesis. These are illustrated as the small action research processes at the bottom of figure 11 above and in figure 12 below. I selected these projects based on their openness through which I could have influence on the method applied for the user involvement, as well as the projects' focus on user-centered systems development with a Living Lab approach.

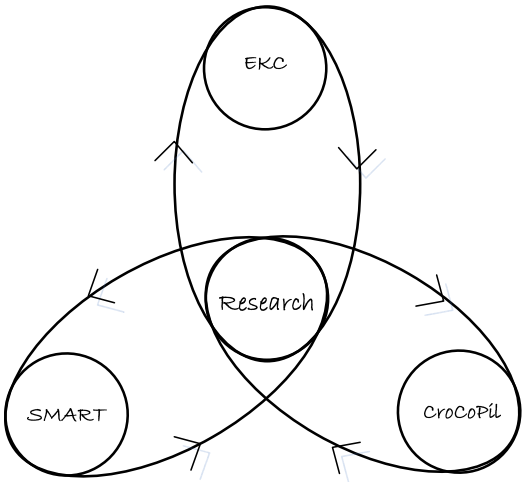


Figure 12: Actions Contribution to Research

The projects that matched my selection criterions were the EKC-project (Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006), the CroCoPil project (Bergvall-Kåreborn et al. 2008; Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006), and the SMART project (Ståhlbröst and Bergvall-Kåreborn 2008a). The purpose of these projects was two-fold, one to gain insight into Living Lab methods and approaches for user involvement (the research focus), and two, to gain knowledge about users needs (the practical focus). Based on that, the aim was to involve users early and throughout the whole development process, and to design new IT systems from the basis of these users' needs. In figure 12, I have illustrated the process of going from one project to the next, taking the knowledge and reflections from each project as input to the next project. Hence, I want to illustrate that each actionable situation has contributed to research that in turn has contributed to actions.

In the following table, I present the methodologies applied to support my research. The matrix shows how the data was collected in each of the studies is followed by a

presentation of my framework of ideas, which has been the same in all three studies in my research. Thereafter, I introduce the projects I have been involved in, starting with the EKC-project, followed by the CroCoPil project, and finally, the SMART project. In each presentation, I will introduce the context and my area of concern, then give a notion about the methodology applied in the project, followed by lessons learnt from each project.

Project	**Method for data collection**	**No. of groups**	**Summary of participants**	**Gender**	**Age**	**Duration**	**Target Group**
EKC Round 1	Focus- group interviews, Storytelling	4	18 persons (4+4+5+5)	2 women 16 men	18-30	50-90 min each	Young entrepre-neurs
EKC Round 2	Questionnaire Mock-up test, Work-shop		18 respond	2 women 16 men	20-35	5 question areas	Young entrepre-neurs
EKC Round 3	On-Line Questionnaire Prototype test		13 respond	4 woman 9 men	20-40	7 Question areas	Young entrepre-neurs,
CroCoPil Round 1	Focus-group interviews, Storytelling	8	24 persons (4+4+6+4+2 +2+1+1)	3 women 21 men	20-50	1 hour each	Reindeer herders, tourist guides, rangers, police, home care assistants
CroCoPil Round 2	Focus-group interviews, Concept test	2	10 persons (7+3)	1 women 9 men	35-60	1.5 hours each	Reindeer herders, tourist guides, rangers
SMART Round 1	On-Line Survey, Scenario reflections		599 respond	248 women 351 men	21-45	21 questions	Citizens selected from the Living Lab
SMART Round 2	Focus-group interviews, Scenario reflection, Storytelling	6	24 persons (1+5+4 +4+4+6)	11 women 13 men	18-50	1 hour each	Citizens selected from the Living Lab

Table 4: Summary of Data-collection Methods

Reflections on Involvement

Once the actions in the research process are completed, the collaborative researchers and practitioners evaluate and reflect upon the outcomes (Baskerville and Pries-Heje 1999; Checkland and Holwell 1998b). In action research, it usually is an ongoing process to specify learning in different processes, and that has been presented in the previous section. In my case, learning has occurred in two different processes: (1) as an ongoing process in reflections and discussion in each project, and (2), as an ongoing process in my research while reflecting on the method and projects as a whole.

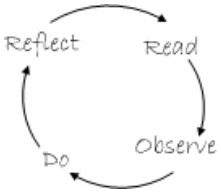


Figure 13: Reflection in Action

Figure 13 above illustrates the process of action and research. I want to show that AR is a continuous, interactive process of reflecting, reading, doing, and observing. In my research I started by an observation, based on my research findings from my licentiate thesis, that Living Labs processes could gain from expanding their processes of user involvement to include users in the very beginning of a design project. After this observation, I started developing a method that I implemented in the design projects. After using the methodological approach, as described above, I reflected on what happened and then started to read more about user involvement and related areas, such as needs elicitation described in chapter 4. Thereafter, I observed opportunities that I could incorporate and test in the methodology in the next design process, and the process continued iteratively and interactively throughout my research.

When your work speaks for itself, don't interrupt.
Henry J. Kaiser (1882 - 1967)

Chapter 5

PROJECTS

In this chapter is a presentation of the cases I have been involved in during my research. The starting point is a presentation of my basic framework of ideas that has been incorporated in the methodology I have applied in the projects.

Basic Framework of Ideas in the Projects

During these projects, some theoretical streams guided my methodological approach, i.e., my framework of ideas in the particular setting. In these projects, I have been inspired by three theoretical streams: Soft Systems Thinking (SST), Appreciative Inquiry (AI), and NeedFinding (NF), . From the first stream, Soft Systems Thinking (Checkland 1981; Checkland, Forbes, and Martin 1990; Ståhlbröst and Bergvall-Kåreborn 2008b), the assumption utilized is that changes can occur only through changes in mental models. This implies that it is important to understand both our own as well as other stakeholders' worldviews and we need to be clear about our interpretations and the base on which they are made (Bergvall-Kåreborn and Ståhlbröst 2007; Ståhlbröst and Bergvall-Kåreborn 2007). The second stream, Appreciative Inquiry (Cooperrider and Avital 2004; Cooperrider and Whitney 2005; Cooperrider, Whitney, and Stavros 2005; Norum 2001), encouraged us to start the development cycle by identifying the stakeholders' dreams and visions of how IT can improve and support the lives of people. This includes a focus on opportunities, related to specific trends, contexts or user groups, and, on the positive and life-generating experiences of people .

This way of thinking is aligned closely with the philosophy behind SST, since it also highlights the importance of people's thoughts about themselves and the world around them in a design situation. Hence, instead of starting the process by searching for problems to solve in a situation, the aim is to identify what works well and use this as a basis for design.

The third stream, NeedFinding, has two different inspirational sources. The NeedFinding concept, as such, and its motivation finds its origin in a paper by Patnaik

and Becker (Holst and Ståhlbröst 2006; 1999; Ståhlbröst and Holst 2006). They argue that the main motivators for the NeedFinding approach are that needs are not influenced highly by trends, hence they are more long lasting. The needs elicitation process, on the other hand, is inspired by Kankainen and Oulasvirta (2003) and Tiitta (2003). These authors inspire us to focus on user needs throughout the development process, and to use these as a foundation for the requirement specification.

THE ENTREPRENEURIAL KNOWLEDGE COMMUNITY PROJECT (EKC)

In the following section, I present an overview of the EKC project's context, including my area of concern, the methodology applied, and the lessons learned about these elements. The framework of ideas that I have embodied in the methodology in this project is the basic framework of ideas described above. Due to my action research approach in this project, my role was, firstly, to gather data about users' needs related to knowledge sharing and creating, and secondly, to reflect on an approach applied for user involvement in which the aim is to understand users' needs.

Context and Area of Concern

The aim of the EKC project was to develop an Entrepreneurial Knowledge Community built upon the knowledge about young entrepreneurial behaviour, needs, and demands. The starting point was the entrepreneurs themselves and their IT experience. The main objective of the project was to stimulate the entrepreneurial spirit, knowledge building, and business opportunities by using modern technology in an entrepreneurial way. One underlying assumption of the project was that a mixture of experiences in the use of different technologies supportive for learning among young entrepreneurs could create important input to the design of an EKC.

Thus, the purpose of the EKC project was to create a community in which knowledge could be shared, created, and used in rich and efficient ways. In order to create the knowledge community, in which Information Technology (IT) in a natural and efficient way supports and enables the knowledge processes, it was considered important, as a first step, to obtain a rich picture of today's use of IT and future needs and wishes of IT as support for these processes. The details of the project and the motivations for methodological choices that were made in the project are reported on in paper 1 and paper 2 (Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006). The area of concern that I aimed to study in this project was how we could enrich the process of appreciating users' needs with narrative inquiry. The subsequent section gives a description of how this process was conducted.

Methodology

The basic assumption guiding the methodology in this project was that the needfinding approach could be enriched by narrative inquiry. (Dodge, Ospina, and Foldy 2005; Ospina and Dodge 2005). This was founded on the assumption that stories contain knowledge that is richer than the results achieved from questioning in surveys or

interviews. Hence, narrative inquiry focused on storytelling was used in this project. Another assumption in the methodology applied was that it is important to understand user needs in order to design future solution that users actually will use. In this study, user needs represent the goals that users find important to achieve in their life and their work – and needs satisfaction strategies are the means by which goals can be reached (Salovaara 2004). The research effort focused on needs as contributors to the planning process in both the short and long term because needs endure longer than any specific solution. A focus on needs also functions as a way to avoid a "too early" limitation of possibilities in the design phase. Through the identification of needs, a "roadmap" is provided, thereby ensuring the possibility to prioritise among identified needs, according to Patnaik and Becker (1999).

In this project, users were involved on three different occasions during the development process in two of the three phases of our process model; see figure 7 below. Firstly, they were involved in what was called the "discovery and dream" phase, secondly, the users were involved in the "decide and disseminate" phase combined with the "discovery and dream" phase, and thirdly, they were involved in the "decide and disseminate" phase, again to evaluate a prototype of the final solution. In this project, the users were not involved directly in the "design and develop" phase. When the users were involved in the "decide and disseminate" phase, this phase was combined with a second round of "discovery and dream." This means that in the evaluation of a system mock-up, the users were encouraged to give their feedback on the mock-up, but they also were encouraged to discuss their experiences and attitudes as well as their needs. In the third users interaction, "decide and disseminate," the users were involved in testing and evaluating the prototype of the system.

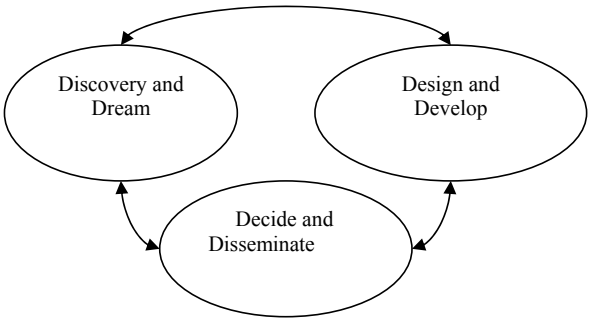


Figure 14: The Basic Process of Appreciating Needs

In the first and the second of the three data-collection processes in this project, users were encouraged to talk both about "what is" and "what might be," i.e., a focus on both the present and the future, as related to technology-enabled information exchange and knowledge creation in their community. In the third user interaction process, this was not applied because the method for data collection that was a structured questionnaire with closed questions. In keeping with the narrative inquiry construct (Dodge et al. 2005; Ospina and Dodge 2005), questions were formulated in such ways that users were encouraged to tell their stories and by this means illustrate their situation; from their

stories, we then could generate their needs. In the third data-collection process, the users answered a questionnaire; hence, asking structured questions with predefined answers as alternatives about their visions about their future was not considered suitable.

In the following, I give an overview of the method applied in the first user interaction process, followed by a short description of the method used in the second and third interaction.

Method – Interaction 1

In the first user interaction process, the *appreciating needs* process included in the "discover and dream" phase, the users (in this case young entrepreneurs) were involved in focus groups with the aim to gain insights about their everyday situation. In this first interaction process, representatives from business-incubator organisations in France, Poland, Italy and Sweden, performed the focus-groups interviews in their native language according to an interview guide that and been developed by a colleague and me. The first part of the interview-guide presented the background and purpose of the project. This was followed by a short background to the chosen methods for obtaining the rich picture and how to perform the interviews, what to think about during the interview, and how to transcribe the interviews. At the end of the document, question areas around which the discussion in the focus groups should take place were found.

In this first interaction, focus group interviews were used as the main data-collection method. Focus groups are useful for creating interactive communication among newly constituted conversation groups that share characteristics of interest (Bloor, Frankland, Thomas, and Robson 2001; Wibeck 2000). However, there always is a risk that the participants in the focus group say what they think they are expected to say, or that they exaggerate to make an impression or to convince the other participants of a certain opinion. Following that, it becomes the researcher's task to judge to what extent it is possible to trust the generated data (Wibeck 2000).

Four focus- group interviews with four or five young entrepreneurs in each group were conducted in this project. Among these entrepreneurs were sixteen men and two females, and their age spanned from 26–35 years old. The interviews ranged from 50–90 minutes, and it was entrepreneurs connected to a specific incubator organisation that were the target group. These were selected according to how many years they had been entrepreneurs. The entrepreneurs selected had been established for about three years so they had experience and were familiar with the situation of being an entrepreneur, even though they were not fully established and very experienced, which was included in our selection criterion.

The *appreciating needs* process consists of two parts, or focuses. The first is the "discovery" part, in which the focus is on *what is;* the second part is called "dreams" and here is the focus is on *what might be*. When we were in discovery mode, we searched for descriptions and explanations about what worked well in the situation they have today, with a focus on information exchange and information flows in their current situation between entrepreneurs and other relevant stakeholders. The question areas were designed around areas about *what is,* and the users were encouraged to tell stories

about their everyday life and their activities. In this process, one precondition was that it was important to focus on what works well and what in their situation they experienced as positive. This way of thinking is aligned with appreciative inquiry (Cooperrider and Avital 2004).

The question areas covered in this project was formed in ways to inspire the users to narrate about their experiences. Hence, the questions were formulated in an overarching way, such as "tell me about," "can you give examples of," and "what is your experience of," to make it possible for the respondent to tell his/her story about the subject being discussed. In the "dream" mode, the focus was on a positive future, i.e., *what might be*. The aim was to gain understanding of the factors that they considered as positive today and take that as the starting point toward the future. Here, the stakeholders are encouraged to dream and fantasise freely about the future and how we can develop what works well today into even better solutions in the future.

Transcription and Analysis of Interviews. When all interviews had been finalised, all interviews were transcribed and translated to English, which means that the interviews were transcribed in such a way so that everything that was said was transcribed, except humming, coughing, pauses, or other sounds.

When the material was analysed, a method for analysis was applied that takes the analysis through two phases, a vertical and a horizontal analysis (Thomsson 2002). No themes were decided on beforehand; the aim was to scrutinise the data openly and to search for statements that indicated a need. This type of analysis often is called open analysis or qualitative analysis. In the vertical analysis, each interview was analysed individually as a way to identify needs. Thereafter the identified needs in all interviews were compared and clustered into themes in the horizontal analysis. The purpose was not to identify differences between the different countries or organisations; instead, the aim was to identify the common and shared needs.

The result from the analysis revealed that the users had many different needs that the intended community could address. For example, the users had needs of mentorship, business networking, and networks where they could get information about the process of starting up and managing a business successfully. These needs were expressed as important and central to their situation. Hence, the users had needs of technological support for knowledge sharing and creation. The users also expressed needs of practical guidance on economical and juridical bureaucratic issues. One need that all users discussed was to have a place where they could discuss their ideas and get feedback from others.

When all needs had been generated, the next step in the process was activated: the "design and develop" phase. In this phase, the design and development of concepts and/or solutions is focused. I will not go into details about this process in this thesis since I have focused on processes for user involvement and this is not a prerequisite in this phase. However, during the process of concept development, designers and user interactors codevelop concepts with the aim to make them easy for users to relate to. In this phase, the focus is on "what can be." Here, a discussion and analysis of the appreciated needs was made. In this process, both designers and researchers interacted with the material and each other trying to find a way to construct representations of the

generated needs; based on that, a description of the required functionalities of the mock-up was developed. When several concepts had been constructed to represent the categorising and prioritising of the generated needs, users were involved to value the concepts in phase three, "Decide and Disseminate."

In this phase, the focus is on defining "what will be." Here, it is important to be open and attentive; since user needs are not fixed, they might be changed or refined.

Method – User Interaction 2

In the second and the third user interaction (described in the section below), my focus was mainly to collect data about users' experiences of the mock-up and the prototype and to see if the method used in the project supported the process of understanding users' needs. Hence, the data and the method has been analysed and I have reflected on their ability to support the process of appreciating needs. To give an overall view of the process applied in the project, I have to chosen give a brief description of the user interactions followed by lessons I have learnt during this project.

The project assignment in the second user interaction was to test the mock-up of the future EKC to see if it represented the needs that had been generated in the first user interaction process, and to explore if any new needs emerged when the users were introduced to the mock-up. These needs had been generated from the data collected in the focus group interviews described above. To find out if the mock-up represented a specific need, we used the generated needs as a foundation for a questionnaire regarding five question areas focusing on users' attitudes and experiences.

To begin with, the users (18) were asked some background questions about themselves and their occupation. Then they were asked questions about their computer competence and usage, followed by their experiences of using communities. Thereafter, they were asked to design related questions regarding the mock-up and finally, questions about their needs and requirements related to the mock-up were asked.

In this interaction cycle, the users were instructed to grade to what extent the different functionalities were important to them, and if they believed that the mock-up supported a specific need, requirement, or function. To get deeper understanding of how the mock-up was perceived by the entrepreneurs, a workshop with questions regarding the most important needs was performed in each country, i.e., Poland, Sweden, Italy, and France. In the workshop, the users were encouraged to discuss their experiences and attitudes and to relate their answers to the mock-up. The workshop focused on areas such as their overall opinion about the EKC, what they value most with the EKC, how they would change it if they could, and if they thought they would be regular users of the EKC.

Method – Interaction 3

In this third user interaction, the aim was to test a prototype of the mock-up that had been tested before. The users (13) got the opportunity to use the prototype for four weeks during which they visited, used, participated in, and contributed to the EKC prototype. After the test period had ceased, the users got the opportunity to evaluate the tested prototype. The aim of the evaluation was to find out if the prototype met the users' needs of a virtual knowledge community and their experience of the usability and functionally of the EKC. The questionnaire was divided into seven parts. The first three were related to the entrepreneurs themselves, their company, their computer experience, and usage. The others were connected to the EKC prototype. We chose to use online questionnaires because it seemed to be the preferred method among our target group, the entrepreneurs, since they had expressed that they almost always had a lack of time.

Lessons Learned

In the following section, I present the lessons learned about the overall framework of ideas, the methodology we had applied in this project, and the lessons learned about the area of concern in this specific project.

Framework of Ideas

In this project, I embodied appreciative inquiry, needfinding, and SSM into the methodology applied. Experiences from this project generated some lessons about this approach, firstly related to the needfinding approach as such. Here I learnt that exploring the users' current activities is a well-functioning way to generate needs. For example, one of the users said that he used online communities to read discussion forums where likeminded people do similar things. Based on that, the need for personal contact and a need of sharing and creating knowledge in interaction with others became apparent. Hence, needs could be generated with the approach.

Secondly, in line with the appreciative inquiry perspective to focus on possibilities instead of problems, I acknowledged that stories about "what is" and "what might be" led to a focus on future possibilities instead of on problems the users wanted to solve. In their explanations of future situations, things they did not want were discovered, giving indications about what they saw as working in an unsatisfactory way today. For example, the entrepreneurs expressed a desire for support for cooperation in virtual places, where they could create business contacts and exchange experiences in a time- and cost-effective way. (When the project took place, in 2004–2005, online communities was more uncommon than today.) These users, who were considered as advanced IT users when the project was carried out, mostly used ICQ, e-mail, telephone, and face-to-face meetings when they wanted to communicate with others. Based on their desire to carry out these activities online, the tools they used were not perceived as time- and cost-effective; hence, their future vision about an effective online community revealed their problems with their current solutions but from a positive perspective.

Methodology

During this project, I learned lessons about the methodology applied in this context. These lessons are related to the data collection process as such and the storytelling approach that was applied in this project.

In the user interaction process, focus group interviews were applied as main method for data collection. In these groups, it became possible to create a dynamic discussion in which rich stories were revealed. This became apparent in the users' way of telling stories about, for example, their typical day in which the users compared their days between each other and validated some of the issues they encountered. As one of the users said: *I think that it is really difficult to know what to go for, where is it possible to earn money, and you always feel that you have to learn new technologies and then it becomes difficult to choose which technology to focus on learning.* Related to that, the other users said, *Ohh, I agree. I have the same problem.* Founded in this expression, I acknowledged that the storytelling approach facilitated users to validate each others expressions and experiences.

Another situation in which I could conclude that the group climate was open was when one user told a story about a situation he had encountered and the moderator asked if the other users agreed, and they stated that they did not. Based on that, I could see that the users related their narratives to each other's and, in this way, they could take a stand and then discuss each other's experiences openly. Hence, I felt certain that the expressions in the narratives were not experienced only by one person and that the group climate was good where the users felt free to express their own thoughts and experiences regardless of what the other users had expressed.

One important factor I want to stress, based on the learning from this project, is that as long as the planned IT system is excluded from the discussions, the discussion can proceed on an overarching level. This means that they discussed their experiences of becoming and being entrepreneurs, of using IT as support for their everyday practice, together with their everyday situation with the activities and issues they have to handle. However, as soon as a suggestion for a technical solution was mentioned, the users started to talk about requirements, i.e., what they required that the future system should support them with. As one user expressed, *I would like an online forum that could mediate questions and answers not only in writing, but also with sound and illustrations.* However, this user continued his argument about his requirement by stating that he was dyslectic and it would be easier for him to record himself with pictures instead of writing a question in a discussion forum. Based on that, I learnt that it is important to look beyond *what* the user expresses to understand *why* s/he expresses it. In this case, keeping an open mind and looking for underlying rationales revealed that the solution span is not determined. Here, it is the creativity among the designers who sets the boundaries for how dyslectic users can be supported and encouraged to use online discussion forums.

In the mock-up test, in interaction 2, one thing that became apparent in the discussion among the users was that the mock-up did not support some of the needs that had been generated in the first user involvement process. For example, the users had expressed that they needed information on how to start a new business; this need was not

supported by the EKC even though the users had stressed that this was important for them in their current situation. Another need, which we had generated and that was not represented in the mock-up, was the need to get feedback on their ideas and activities. Even though their needs were not represented in the mock-up, these lessons confirm our approach to find users' needs, since the users confirmed that the needs that had been generated in the first iteration still were considered important even though the design did not support all of them.

Area of Concern

The area of concern in this project was to determine how the process of appreciating needs could be enriched by narrative inquiry. During this process, it became noticeable that the process of appreciating needs could contribute to understanding the situated needs of the entrepreneurs. For example, the entrepreneurs' stories about their current work situation, in which they expressed difficulties in finding answers to their questions about specific entrepreneurial matters such as financing, made it possible for me to understand that this was related strongly to their expressed feeling of lack of time and difficulties to prioritise their actions

The storytelling approach also revealed that users' history is important to grasp fully the users' situation and expressions. For example, in the interviews with the entrepreneurs, they started to describe how they become entrepreneurs. Based on these stories, it became possible to discern a pattern among entrepreneurs; independent of which country they came from, they all had followed the same road with almost the same obstacles. From those stories, I could discern a process consisting of four distinct phases in which their need of information and support differed. Hence, their history could give input to future designs.

Using a storytelling approach includes some drawbacks as well. With this approach, a vast amount of material is rendered which makes it difficult to grasp and handle it all. Hence, analysing and generating users' needs and dreams from the material becomes time consuming, which is a shortcoming, as time usually is a scarce resource (Holst and Ståhlbröst 2006).

Another issue in the process of designing concepts and developing prototypes on the basis of users' needs is that the needfinding approach does not give any guidance on how to prioritise the needs. This is an issue that is not supported in the method applied in this project, either.

Critical Reflections on Method Sharing

One issue, which I assume affects the quality of the collected data in the different focus groups in this project, is the fact that the interviews were translated from their native language into English. In this process, it is likely that some nuances in the users' expressions and experiences were lost, which might have influenced my opportunity to generate implicit needs. One aspect pointing in that direction is the difference between the data from Sweden (which I did not have to translate) and the data from Poland, (where participants expressed some difficulties in using the English language). The quality of the data, and the amount of generated needs, differed a lot between these

studies, but since the aim of the project was to explore and identify similarities among entrepreneurs, the effect of the methodological approach with native interviewers from each participating country was not studied in detail.

Another issue influencing the quality of the data and our ability to compare the data between the different studies was the differences in how the methodology had been used. Some of the countries had applied our questions in a questionnaire form in which they had asked each question in the right order, while other had used it as a basis for discussions and storytelling. Based on that, not all interviews have been used to inquire into the suitability for a storytelling approach in the appreciating needs phase.

THE CROCOPIL PROJECT

In the following section, I give an overview of the CroCoPil projects area of concern, the methodology applied, and the lessons learned about these aspects. The framework of ideas embodied in the methodology I applied in this project is the basic framework of ideas described above, which consists of appreciative inquiry, needfinding, and SSM. Due to the dual purposes of action research, my role in this project was twofold, one as a researcher with the aim to explore methods for user involvement, and two, to gather data about users' needs of technological support in rural areas and to use these as basis for mobile services.

Context and Area of Concern

"How can new ICT services improve life and working conditions in remote rural areas?" That was the starting point for the CroCoPil project. This project included regional actors from the northern parts of Norway, Sweden, and Finland.

The background of this project was that new technologies are evolving today that build on dynamic and mobile structures rather than fixed infrastructures. Examples of such technologies are high speed wireless networks, Delay Tolerant Networking (DTN), Peer-to-Peer networking, and new satellite systems. Together with this shifting technology management, from fixed to dynamic and mobile connectivity, a potential appears for rural and remote areas to become involved and to take a lead in forming the new technologies and the requirements they are to meet.

The overall objective of the CroCoPil project was to apply user needs as requirements for technology development, evaluation, and adaptation, in order to create services, which may reduce the digital divide between rural and urban areas, and to create cross-border business opportunities in the Northcalotte. In this project, I was involved in two stages of user studies, the so-called needfinding study and the concept evaluation. The details of the project and the motivations for methodological choices are reported on in paper 2 (Ståhlbröst and Holst 2006), paper 3 (Bergvall-Kåreborn et al. 2008) and paper 5 (Bergvall-Kåreborn, Holst, and Ståhlbröst 2009). My area of concern in the study in this project was to explore methods supportive of generating users' needs.

Methodology

In this project, we applied the appreciating needs method described in the EKC project above, with some adjustments based on the lessons learned in that project, which are explained in more detail below. At this time, the development of a method for user involvement with a Living Lab approach also started to take form. The method is called FormIT and will be explained in more detail in chapter 7 (Ståhlbröst and Bergvall-Kåreborn 2008b). In the CroCoPil project, the users were involved on two separate occasions, first in the "Discovery and Dream" phase in which the aim was to collect data about the users' situations, and second in the "Decide and Disseminate" phase, where the aim was to give the users an opportunity to evaluate concepts that had been constructed. The guiding principle for the data collection process in this project was focus group interviews with an appreciating needs approach focusing on "what has been," "what is," and "what might be" (Bergvall-Kåreborn et al. 2008). In the EKC project, I found that it was important to know the users' history to fully understand their current situation, hence, studying "what has been" became an additional focus in this project.

The data collection process was divided among Norway, Finland, and Sweden, and an interview guide was developed for the other project partners to use in their studies to make sure that the results would be comparable within the project. Based on the experiences gained in the EKC project, we spent more time on educating the other project partners about needfinding and focus group interviews. In addition, discussions and clarifications of the developed approach occurred more frequently in this project.

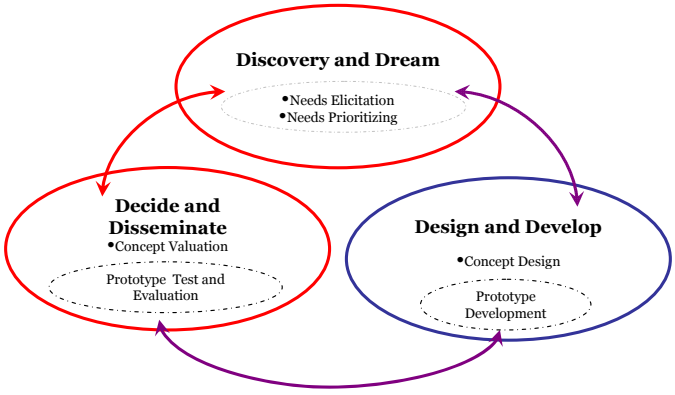


Figure 15; Process for Appreciating Needs

Yet another aspect that was stressed in this project based on the experiences from the EKC case was the importance of encouraging users to explain *why* they thought of a situation in a certain way, and what they valued most in their current situation (Bergvall-Kåreborn et al. 2008; Ståhlbröst and Holst 2006). Based on the learning from the EKC project, we also decided to keep the discussion in the focus groups open for

different angles and possibilities as long as possible, i.e., to introduce the proposed IT system in the latter parts of the project due to its steering characteristics. This means that when an IT system is introduced, the users starts to express requirements instead of needs; hence the solution span becomes limited.

We started this project with a study with user groups in Finland, Norway, and Sweden. The users were recruited according to the criterion that their workplace should be outdoors in the field, they should work mainly in solitude, and in sparsely populated areas. The user groups we focused on were reindeer herders, police, rangers, home-care assistants, and tourist entrepreneurs. The findings from this study then formed the basis for the process of concept development. The aim of the project was to develop nine different concepts of IT solutions supportive of usage in rural areas, and the project rendered fourteen concepts. These concepts were distributed openly on a web page for anyone to develop further if they wanted to. In the following, I have chosen to include the Swedish studies, since I was involved in person in them; hence, the lessons learnt stem from these studies.

Method User Interaction 1

In Sweden, we performed three focus group interviews. First, we interviewed six persons who worked with activity tourism in the northern parts of Sweden. Thereafter, four reindeer herders were interviewed in Kiruna. Finally, four rangers were interviewed in Jokkmokk. Each interview was carried out in the subject's work premises; it lasted for approximately one hour; and the interview guide was used as support for the process. The interviews began with introductions and presentations of all participants where they were informed about the process of focus group interviews, their freedom, and our expectations on their participation.

The first user interaction process consisted of two focuses, discovery and dream. When we were in discovery mode, we searched for descriptions and explanations about what worked well today and what had worked well in their history. The focus was on information exchange and information flows in rural areas and in field work. The question areas were designed around areas about *what is* and we encouraged the stakeholders to describe their everyday life and their activities. The focus on "what has been" included questions about how they had performed a specific activity earlier and their view on the past. In this process, one precondition was that it was important to focus on what works well and what is experienced as positive in accordance with appreciative inquiry (Cooperrider and Avital 2004). The questions were formed in ways to inspire the stakeholders to narrate about their experiences. In the Dream mode we focused on a positive future, i.e., *what might be*. The objective was to gain understanding of the factors that were considered as positive today and we took those as the starting point toward the future. The aim was to explore how we could develop what works well today into even better solutions in the future based on their experiences from the past.

Each interview was recorded and transcribed verbatim and they were analysed according to horizontal and vertical analysis, as described in the EKC case. No themes in this case were decided on beforehand in the analysis; hence, the needs were generated openly.

The result from this analysis ended up in a list of values, needs, requirements, functions, and solutions that the users had expressed in their stories about their context. One example of what they expressed as a value was that can be in the mountains or in the field as much as possible; some of them see it as a place of refuge. They also talked about their situation, from which we could generate needs of security, both their own physical safety and their instruments. We also found that they had needs of monitor and control, communication with their families and work colleagues and, from the reindeer herders, a need of getting in contact with a whole group at the same time. When it comes to requirements, the users expressed that they wanted to be able to gather and transfer large amounts of data in different formats continuously during their field work, and they wanted to have mobile connectivity to make it possible for them to transfer, update, and store data they gather in the field.

The users also expressed some functionalities they wanted, such as intelligent and interactive maps, on which both local names and Sámi names on positions are available. The rangers expressed a need of a device in which interactive maps are combined with GPS solutions and information can be stored via a touch-screen and audio recording as well as photos or videos. They needed to be able to send the information, either at once from their position or later on when docking, into the computer in the cabin or in the office. Another solution or function is Rfid chips in animals to be able to monitor and control their movement and position. The users also expressed their dreams of a future desired state; for example, they suggested virtual fences and dogs for monitor and control of the reindeer herd. Moreover, they suggested a virtual helicopter, a kind of satellite monitoring to cover larger land areas.

When all the values, needs, requirements, functions, and dreams has been generated and discussed, the design phase started. The basis for the design was the list of generated needs, etc., that then formed the design. This process was a collaborative process in which developers from each country presented their concept for the others in the project team. When fourteen concepts had been constructed on the basis of the users' needs, four of them were selected on the foundation of their originality, how they were visualised, and which needs they represented. The aim was to get a blend of concepts, and a blend of needs. These concepts then were discussed and evaluated in the next user interaction process.

Method User Interaction 2

The focus of the interviews in the second interaction was to discuss and evaluate four of the fourteen developed concepts, representing constructions of users' needs. In this concept evaluation in the "Decide and Disseminate" phase, we aimed to carry out three focus groups, but it was not possible to have one of the focus groups since the participants did not show up. Hence, we performed two focus group interviews, one with seven reindeer herders in Kiruna, and one with two rangers and one tourist company owner situated in Norrbotten's inland parts. The participants in the focus groups were selected among those who had been part of the earlier focus group interviews. However, not all of those participating in earlier interviews were able to participate; hence, five new reindeer herders were recommended by another reindeer herder. Before the interviews, a few key questions areas were prepared, based on the generated needs and requirements from the earlier study. In addition, the questions were

formative in nature, aiming to inspire the users to enrich the presented concepts. Hence, the questions focused on issues such as how and when they would use the concept that was in focus and what changes they require in order to use it when it becomes a final solution.

We started the interviews by presenting the project, ourselves, and the process of the focus group. Thereafter, the interview participants presented themselves and we started the evaluation. The developed concepts were presented in different forms, a visual narrative of a scenario, a use case, and a rich picture, and were evaluated in open discussions with the users. The process for the evaluation was designed to start with a visual narrative; thereafter, the respondents gave their spontaneous feedback, and when the subject was emptied, a discussion was held on how the concept related to their needs. Then, the next concept was shown and discussed. These focus groups were held for one and a half hours each and they were of semi-structured character.

Lessons Learned

In the following section, I present and reflect upon the lessons I learnt during the CroCoPil project. These lessons will be related to my framework of ideas in this particular case, the methodology applied, and the area of concern. The area of concern in the study in this project was to explore the concept users' needs.

Framework of Ideas

During this study, lessons that I have learnt related to my defined framework of ideas include soft systems thinking, appreciative inquiry, and needfinding.

In this project, I acknowledged some aspects in the study that need to be given specific attention; I have chosen to call these aspects motivators, or values. These aspects are related strongly to the motive for development projects and these are the driving force behind the actual usage of the future solution. In this project, the users expressed that what they valued most of all in their situation were their freedom and their possibility to work outdoors in close relation to nature's fluctuating circumstances. I argue that any future solution that is not sensitive to this will not be adopted enthusiastically. Hence, knowing what users value and what motivates them in their current situation is of utmost importance to develop successful innovative systems. From my perspective, to increase the probability that a final design solution will succeed and users actually will use it, the solution must take into account these motivators or values.

Methodology

Related to the methodology I have used in this case and to facilitate the development of the methodology in the future, I will start by reflecting on the data collection method, i.e., the focus group interviews. Then, I will continue by reflecting on the storytelling approach.

One thing I acknowledge as important when focus group interviews are used as the main method for data collection is the difficulty to stimulate participants in a group

discussion to tell rich stories needed to appreciate their needs. In these situations, it is difficult to focus on what one participant says and risk leaving out others in the group.

Another lesson I have learnt from this project is the necessity of a mix of moderators during the focus group interviews. In this study, the respondents sometimes asked curious questions about the technology behind the concepts and we were not able to give them an exact description of how the technique functioned. In the concept test, the discussions could have gained from more knowledge about the Delayed Tolerant Networking technology. In addition, the systems developers would have gained from having direct communication with the users and participate in these meetings, since they would get a thorough understanding of the users' needs.

Related to the appreciative inquiry perspective taken in this project, I acknowledged that the users had some difficulty leaving their current problems and to be visionary about the future. As one of the tourist entrepreneurs said: *I would like a future situation where there is less ability communicate with others while we are out in the field since my customers would talk in their mobile phones instead of enjoying the nature. We are selling silence and recreation and not being able to communicate is an important part of that.* Since there is no communication in the field today, this expression does not really express a desired future; instead, it expresses a possible future problem situation. Hence, the expression as such does not reveal a dream and it is related to a problem situation, but when we continued the interview with the users, they said they would like a communication net that only they have access to. In that way, they could communicate with their customers while they are out in the field, while their customers could not. Then, it became a desired future situation for the entrepreneurs. Based on that I learned that it is important to ask questions about a desired future state, since the explanations of the desired future give inspiration for future solutions as well as insights into their current situation.

When we applied a storytelling approach in this project, I found that users do not have to be able to express their needs explicitly; it is possible to generate them from their stories. For example, the reindeer herders told some stories about situations in which their lives had been in danger. One such situation was when a reindeer herder said that he had been out in the mountains driving his off-road motorcycle. Suddenly, and accidentally, he drove into a shallow brook, where he fell and had severe difficulty getting up again since his leg got stuck under the motorcycle in the cold water. Since there was no mobile net coverage in that area, he could not make any phone call. Based on that, it is easy to understand that, in their context, under nature's demanding circumstances, one need is the feeling of safety, but how that need could be fulfilled is a challenging task for the design team to solve. In addition, the situation in the water also can generate requirements on a future device, such as being waterproof and knock resistant.

The storytelling approach also revealed that history is important to understand and fully grasp the users' situation and expressions. For example, in the interviews with the reindeer herders, they described how they had been able to communicate with each other for a few years ago, before the NMT 450 net was shut down. They stated that if they only could get up to that level of communication possibilities, they would be satisfied. Knowing about their history also made it possible for me to understand their

frustration and distrust. They sensed that their situation is going backward while the rest of society, from their perspective, moves forward.

When I analysed the process of concept evaluation in this study, I found that using the stimulus material both boosted and smoothed the progress of the discussions and the focus groups imaginations; hence, the users became aware of possible situations and solutions which in turn stimulated them to discuss an issue from another perspective. Thus, they could elevate their perspective from what might be technically feasible to what they consider as desirable and meaningful in their current situation. This became apparent during the concept test in the second user interaction. The concepts had been constructed to represent the needs we had generated from the first user study. We showed a visualisation of the seamless office concept to the reindeer herders. The service in this concept had been constructed on the basis of the needs generated from the rangers, and the device (a PDA called Arc_Bob) in the visualisation answered to requirements that were expressed as important for all user groups. The rangers needed to be able to store their collected data safely when they work in the field. They also need to inform other people in the area about ongoing things, such as bad ice or risks of avalanches. The requirements on the device were that it needs to be small, lightweight, easy to use, stable, resistant to moisture and cold, and it has to be knock-resistant. The batteries must have long durability, yet still being small and lightweight. The PDA, Arc_Bob, covered all these requirements and it had GPS.

When the reindeer herders were introduced to the concept, the discussion became lively and engaged and they were able to express a lot of new solutions to needs they had. For example, when they saw the device, the reindeer herders immediately saw that they could use the device as a support in their work keeping notes on all their reindeers. They could use it to keep track of how many calves each reindeer had, how old they are, etc. They also could see use of the device to plan and redirect their work between seasons. Based on that, I found that the right stimuli could help users express needs they had not been aware of earlier.

Related to the concept evaluation, I also found that a concept that does not surprise or excite the user does not stimulate the discussion. This became apparent in the focus group with the rangers, who had been able to express explicitly the needs represented in the concept. They more or less confirmed that the concept was relevant, but they were not surprised or inspired by it. This also shows that when the users are aware of and can express their needs, their expressions become more closely connected to requirements. Hence, it is easier for users to express needs and requirements that they are aware of. Another lesson that can be learnt from the situation above is that users needs becomes enriched and expand during a systems development process as their frame of reference expands, which leads to the notion that users' needs are not fixed through time.

In correlation to what has been discussed, I also have found evidence that the method we applied in the project actually functioned as a support for finding users' needs. The users could confirm that the concept we had constructed from the generated needs actually represented their needs and they could also see that one need could be a door into other unexpected needs. I also learnt how important it is to take users' expressions seriously and show that they are important. I learnt this lesson in the concept evaluation, in which we evaluated three concepts. None of these concepts represented their explicit

need of safety. This need was not tested and evaluated in the concept evaluation phase; thus, the subject was discussed repeatedly during the focus groups since the users had difficulty leaving it out. This also might have affected their opinions about the evaluated concepts as a whole, being more negative in their expressions, since their main need was not fulfilled.

The experiences from the CroCoPil project showed that when users were asked to tell appreciative narratives related to their work practices and IT usage, focusing on past, present, and future situations instead of present problems and existing IT solutions, positive energy was generated in the group. This atmosphere combined with the focus group interview technique also stimulated the users to generate innovative ideas and visions.

Finally, our studies have indicated that the appreciating needs method contributes to processes of knowledge-sharing, creation, and use through its iterative and interactive approach. These knowledge processes exists between needfinders, users, and designers, contributing to a continuous learning process.

Area of Concern

Related to my area of concern in this project, to explore the concept of users' needs, I have acknowledged that the concept of needs, as such, is difficult to grasp and occurs on many different layers. I have found that users express a lot of things during the focus group interviews, such as desired functionalities, their dreams, visions, and values, their experiences and problems, and their desires. Based on the before mentioned differences, I have found that it is important to be aware of the actual difference between these concepts and to handle that in the analysis of the user data, especially if the aim if to harvest the benefits of focusing on needs instead of requirement in systems development processes.

To stimulate users to talk about their needs in their stories, I have found that users need to explain why they do thing in a certain way or why they choose to use a certain technology, and from their explanations, needs can be generated and understood. I learned this when the rangers told stories about their work about how they documented their work while they were out in the field. They had a map on which they drew a line, showing where they had been. They also had a notebook in which they kept all their data about things they observed while they were out. When we asked why they document in that way, they said that they choose to use paper and pen because that is the only thing that always works when it is cold outside and when they have gloves on their hands.

This indicates the importance of using "why" questions as a way to find needs. In the situation described above, needs that could be generated might be to have a device that is resistant to cold (if that ever will exist), and perhaps being able to record a voice message, combined with a waypoint from the GPS, and a photo that visualised their observation. The rangers also said that saving all the data in a notebook and on maps is hazardous; all of their data can be lost if they fall into a river or if they lose their book. In their situation today, they must tap the collected data into a computer system when they come into their office, which is time consuming but important, since the data is

needed to support different databases. This task also is disliked among the rangers. When we asked why, they stated that they want to spend their time socialising with colleagues and family when they are home. They also want to get back out into the field as soon as possible because that is what they really value about their work. This illustrates that asking "why" questions reveals what the users see as life giving factors in a particular situation. This situation also shows that the grounding in today's activities is a well-functioning way to understand and be able to generate needs.

THE SMART PROJECT

The following section presents an overview of the SMART project, its context, area of concern, the methodology applied, and the lessons learned about these aspects. The framework of ideas embodied in the methodology I applied in this project is the basic framework of ideas described above. In this case, my role also was twofold, first as a researcher with the aim to explore methods for understanding users' needs, and second, to explore users' needs related to their possibility to actively influence and improve the society, and to use these as a foundation to develop IT services.

Context and Area of Concern

SMART was a development project with the objective to explore the concept of "reaction media," allowing individuals to engage and take an active part in the development and improvement of their municipality. Today, citizens seldom give suggestions and opinions for how they want the municipality to develop, nor do they alert or alarm identified risks or dangers in their environment. The main reason for this was believed to be uncertainty about whom to contact, as well as the effort needed to carry out the activity.

To facilitate active participation among citizens, the project aimed to develop IT services that increased citizens' possibilities to actively influence and improve the society. The development of these services was carried out in an interactive manner in cooperation among citizens, companies, and authorities. The SMART project had three different but intertwined purposes: (1) to give product and service developers the opportunity to engage citizens and user groups in their innovation processes; (2) to give citizens and individuals the opportunity to engage in these processes; and (3) to create opportunities for a dynamic region in which boundary crossing cooperation becomes usual in the change processes on all levels, from product development to community building.

The project was carried out in an interactive manner in cooperation among citizens, companies, and authorities. Here, this meant local universities, municipalities, and private SME companies, as well as citizens. All of these partners brought valuable knowledge and expertise into the project. The universities brought knowledge about user centric methods for design; the municipalities contributed with the situation as such, and with visions on how they would like the interaction with citizens to be; the SMEs brought the technical know-how to the project; and the citizens contributed their

stories about how they interact with public authorities today and how they would like to interact in the future.

In this project, we were involved mostly in the needfinding phase that served as a starting point for the project. The details of the project and the motivations for methodological choices are reported on in paper 4 (Bergvall-Kåreborn and Ståhlbröst 2008b). The areas of concern that I aimed to study in this project were, firstly, to gain insights into users' needs, and second, to expand the understanding of how users' expressions could be understood and translated into needs and relevant systems requirements. To facilitate a participatory approach, this project was set in a Living Lab environment.

Methodology

In this case, a revised version of the appreciating needs methods described in previous cases was applied. In this project, the process was called needfinding and requirement specification. This change in focus had its background in an internal discussion about suitable conceptions related to what we actually do in this phase; hence, the concept appreciating was replaced with needfinding and requirement specification, since the aim of this phase is to find the needs and specify the requirements. Also in this project was the Appreciating Needs method described in the other project descriptions applied.

In this project, the focus was on the needfinding process. The starting point was to identify opportunities, strengths, and best practices by stimulating users to provide rich and appreciative narratives about past and present situations. Based on these narratives, the users then were asked to shift focus from appreciating "what has been" and "what is" to envision the future and "what might be." From the stories of best practice and the dreams and wishes of the users, needs were identified and categorised, and later translated into requirements.

Based on the learning experiences from the CroCoPil case, the focus in this project was on understanding the concept of user needs since I had found that the stories users tell contain expressions of needs, requirements, values, and motivators. Hence, the aim of this study was to grapple with questions such as: what is a need, how is it expressed, how can it be interpreted, and how does the interpretation influence what is being designed> Another aspect I had found in the CroCoPil case was the motivators, which seemed to be the determining factor for users' motivation to actually use an IT system. To look into that aspect, I applied a psychological framework consisting of sixteen motivators (Reiss 2004a) as an analytical framework, to see if that could increase my understanding of the concept of needs.

In the process of concept design in the CroCoPil case, one learning experience was that stimuli could open doors to new unexplored needs and the concepts could enrich and expand the user's frame of reference. Hence, in this project, we applied scenarios in the process of data collection to stimulate users' fantasy.

Method User Interaction 1

As a starting point for this project, a survey was distributed to the users connected to the Living Lab. This survey had dual purposes, one to explore which needs the users had related to the opportunity to give suggestions and viewpoints to their municipality representatives. The other purpose was to get in contact with users who were willing to participate in focus group interviews to make it possible for us to gain deeper insights into users' needs. The survey consisted of twenty-one questions. The first three were related to them as persons, who they were. The forthcoming questions were related to different scenarios describing different situation in which the users could be willing and motivated to give their suggestions, viewpoints, or alarms. In relation to each scenario, some statements were presented by which the users could express to what extent the statement correlates with their experiences and opinions. The survey was available online during three weeks in June 2006 and was answered by 599 persons.

Method User Interaction 2

To gain understanding of the potential users and their situation, we used focus group interviews as the main data-collection method in the second user interaction process. In this study, six focus group interviews were carried out with participants selected from the Living Lab community. The focus of the interviews was to discuss citizens' experiences and thoughts related to communication with municipalities and governments. These groups involved between one to six participants. The citizens were between 18–50 years old and there were eleven men and thirteen women. The participants were selected from the Living Lab community based on where they lived, their age, gender, and occupation. The aim was that the group be heterogeneous and should, to some extent, represent the diversity of citizens. Diverse groups also have the benefit of generating mixed perspectives that challenges the statue quo and present alternative ways of viewing situations. The aim of the interviews was to find out more about citizens' experiences, dreams, and visions related to communication with local government. The findings from this phase formed the basis for the design of the final solution (Ståhlbröst and Bergvall-Kåreborn 2007). Each of the interviews was transcribed verbatim, except for coughing, humming, and other noises.

In each focus group, the aim was to stimulate the citizens to talk as much as possible with each other. The stimulus material we used in these focus groups was scenarios related to communication with authorities, alarm, and suggestions for improvement of society. The focus group discussion went on uninterrupted, and whenever the discussion stopped, we introduced a new theme or question. These focus group interviews lasted between one and two hours. Three of the focus groups were conducted with citizens from a larger city and three with citizens from smaller cities. The reason for this approach was an interest to investigate if citizens' communication with local authorities differed between large and small cities. In this study, we could not identify any differences in the communication patterns with local authorities between large and small cities.

Technology should facilitate the possibility for citizens to interact and communicate with public authorities when a need occurred, independent of time or space. Based on

this, it was decided to explore and develop the concept of "reaction media." It also was decided that the service should be able to run on both mobile and stationary devices.

From the users' stories, needs were generated and translated into requirements for designing the prototype. In the process of understanding what users need, the analysis of the material from the study was separated into two stages of analysis: vertical and horizontal (Thomsson 2002). The vertical analysis focused on generating needs while the horizontal analyses had the aim to cluster the needs into themes and gain a more thorough understanding of them.

In the vertical analysis, each interview first was analysed separately and open, without using a framework for analysis. Thereafter, each interview was analysed using Reiss's sixteen motivators (Reiss 2004a) as a framework to support the identification of needs and to cluster them into categories. In this case, we have observed that the users express their needs, desires, and requirements on two identifiable levels. The first level, described above, refers to the users' expressions related to their needs of the service as such, whiles the second level, described below, refers to users' expressions related to their needs in the service.

When the users talked about the service as such, they talked about certain characteristics that any future solution must have. The characteristics they stressed were mobile and that it should be democratic and offer a great amount of freedom for the users. They also said that any future solution focusing on interaction between citizens and local government must be very easy to use and free of charge; otherwise, they will not use it at all. In the second step of this analysis, we applied Reiss's framework and, based on this, we found that the motivators of idealism, power, status, acceptance, curiosity, and tranquility were the most outstanding. To clarify, for example, the motivator idealism was identified as important since it is the driving force behind citizen engagement. Here, users were motivated because they feel a responsibility to set an alarm in situations they feel are hazardous in any way. One important aspect related to this motivator was that the final solution is democratic. Looking at needs that could influence the design of the implemented system most, and as such are included in the system, were the motivators of saving, order, and independence.

In this project, there was no evaluation of the prototype since we were unable to recruit the necessary amount of users to conduct a relevant test, despite a number of recruitment activities. We decided not to recruit citizens from the Living Lab community since these people have a bias toward technology-interested people, are early adopters, and have a willingness to influence situations. They also had participated in questionnaires in the beginning of the project, and we wanted people who were new to the project and its ideas. We advertised for test people three times in the local newspapers but, despite this repeated effort, we only managed to recruit about ten people. Therefore, we decided not to have a regular evaluation. Instead, we did an internal test within the project.

The result of the project was a well functioning prototype for a system in which citizens could enter a web portal and give suggestions for improvements or cite hazardous situations. The portal could be entered either via mobile phones or PCs. However, it never was implemented at the municipals. The reasons for this never were investigated.

But, a simpler version of the concept was developed and implemented about a year later. Even though this might not be seen as a success story, it is our experience that it represents a standard illustration of many development projects.

Lessons Learned

In the following section, I present and reflect upon the lessons I have learnt during the SMART project. These lessons will be related to the framework of ideas integrated in the methodology applied, and the area of concern. One overall learning aspect from this project was that the process applied mostly was confirmed as a functioning method.

Framework of Ideas

The framework of ideas that was applied in this project was the same as in the other projects, namely appreciative inquiry, needfinding, and SSM. Related to the appreciative inquiry approach in this study, I found that when users express the things they consider relevant to their activities, there often are some aspects that are situationally dependent and some that are more general in character. For example, in this study, the users expressed a need to be able to have influence in questions regarding their municipality. I interpret this expression as being strongly related to their current situation in their current context. This means that, as of today, the users do not feel that they have any possibility to influence anything in their municipality; however if something changes in their municipality that facilitates influence, this need is influenced and might change as well. Related to that, it becomes noticeable that some users' expressions are related strongly to the goal the users want to achieve by using the system, in this case influence. However, how the technological solution (the means) should be designed to fulfill the goal is not determined at this stage.

Methodology

In this project, we used scenarios as stimulus material to help the users see themselves in a situation. I have found that when a stimulus is used, some things are important to consider. The usage of stimuli steers the discussions to a high degree; hence, it is important to choose stimuli with great care. In the interviews in this project, I have found that users often relate their expressions to the currently presented scenario and then have difficulty seeing beyond what has been presented, or what they have experienced themselves. For example, in one of the groups, the discussion was focused on the means by which they would like to communicate with the local authorities. This discussion stemmed from a scenario in which it was suggested that they send a picture they have taken with their mobile phone camera. Related to that, one of the users said, surprised: *"Ohh, I did not think of using a camera since I do not have a camera in my phone."* Related to that expression, I could see that users relate their spontaneous reactions to their own experiences and their own habits which might limit their solution and innovation span. By using scenarios, users' capability to put themselves in a new situation is strengthened.

Another indicator pointing to the influence of the scenarios is the similarities in data between the different groups and the two user data-collection processes. For example, in both processes, the users expressed a desire for feedback on their communication, and

their interest in rewards was quite moderate in both studies. Based on those results, among others, I believe that the stimuli were influential factors on the collected data.

Area of Concern

In this project, one aim was to elaborate with a framework that could support our process of understanding users' needs and translating them into requirements. In this process, I found that the debate of what constituted a need and what the actual meaning of an expression could be was interesting. Based on these debates, it became apparent that users seldom express stated needs clearly. Rather, their contributions include a mix of needs, suggestions, conditions, and problems. It therefore is important to analyse and interpret user expressions. Here, the framework was supportive of the process since we could avoid a translation and categorisation process driven only by preconceptions of the researcher by providing scientifically sound theories on user needs. Through the debate in the translation process, the importance of dividing needs into two hierarchical levels or categories crystallised: The first is related to needs *of* the service, i.e., what motivates a user to buy and use a product or service, and the second is related to needs *in* the service, i.e., systems requirement.

I also have learnt that it is important to document the process of translating user expressions to needs and requirements. This means that if the translation process is documented, a clear pattern of traceability among expressions, needs, and requirements is provided, which in turn makes it possible for people who have not been immediately involved in the translation process to understand the background for the requirement. This in turn facilitates decision making when it comes to prioritising the needs and requirements for the designers. Further, the analysis demonstrated that elaborating with the users' expressions from different motivators generated different requirements and, as such, resulted in different services.

However, the general weakness of using a framework as support for the analysis is applicable also to Reiss's framework. That is, using a framework to support the analysis of needs always presents a risk of forcing a need into a predetermined box. This might hinder the development of new types of needs; hence, the analyst need to be attentive and open to this (Bergvall-Kåreborn and Ståhlbröst 2008b). Another aspect, important to consider in this process, is the risk of missing inspirational possibilities since the emphasis easily becomes focused on relating an expression from the users to a specific motivator, instead of letting the material give inspiration. In the translation process, this has been handled by keeping an open mind and keeping notes of expressions that fall outside the framework.

Chapter 6

SUMMARY OF PAPERS

In this chapter, the summary of the paper which I have included in my thesis will be presented. The papers I have chosen to use in this thesis are all paper that has been co-authored. In the first paper, both authors have contributed equally to the paper, but the first name has been the responsible person for that specific paper. It is the same with the second paper presented below, we have both contributed equally, but the first author has been responsible for the writing. In the third paper, we contributed equally and in the fourth paper Bergvall-Kåreborn was the main contributor, while Holst and Ståhlbröst contributed equally to the paper. Finally, in the fifth paper all three authors contributed equally.

Paper 1: Enriching the Process of Appreciating Needs With Storytelling

Holst, M., and Ståhlbröst, A. (2006). Enriching the Process of Appreciating Needs with Storytelling. *International Journal of Technology, Knowledge and Society* 2 (4):61-68.

This paper explicates the possibility to enrich the process of appreciating needs with storytelling. In this way we are able to identify needs and, thus, facilitate the design process of a viable community for knowledge-sharing and creation across boundaries among young entrepreneurs. The specific situation which the design of a knowledge community constitute is discussed and the usefulness of our approach is thereafter valued in relation to the challenges of creating a viable community constructed from participants' identified needs and interests.

Paper 2: Appreciating Needs for Innovative IT-Design

Ståhlbröst, A., and Holst, M. (2006). Appreciating Needs for Innovative IT Design. *International Journal of Knowledge, Culture and Change Management* 6 (4): 37-46.

To identify user needs has become increasingly important as new interaction technology (IT) and services become available continuously and the use of interaction technologies such as, for example, internet or mobile phones have grown to be ubiquitous, influencing leisure as well as work. Therefore, new interaction technologies must offer added value for the user or the products or services will stay unused since most of them are optional to use. To increase the possibility for actual use, a responsive process for discovery of needs among users should become a natural part in design and development of innovative interaction technologies. But, the process of identifying user needs is complicated because the needs are situated in the user's context and are experienced by the user as a perceived lack of satisfying solutions. The purpose of this paper is to present a method for identifying and operationalising needs that are difficult to articulate, i.e. tacit needs, and needs that are easy to articulate, i.e. explicit needs, in design processes. Appreciating Needs (AN) is an interpretative approach where the study of people aims to identify unmet needs and it is to some extent a paradoxical activity, since what is sought for is a circumstance where something is missing. Our method has its basis in the underlying ideas of Needfinding and is inspired by Appreciative Design. In our method, rich stories/narratives about the intended users' situation are generated and these stories give a rich understanding of their context. From this understanding, needs are appreciated and operationalised in innovative design of new technical solutions. Hence, with a focus on discovering users' needs early on, we involve users throughout the design process, leading to perpetual and persistent user-centred systems.

Paper 3: User Expressions Translated to Requirement

Bergvall-Kåreborn, B., and Ståhlbröst, A. (2008). User Expressions Translated to Requirement. *Human Technology (accepted with minor revisions September 2008)*.

Grounding the development of mobile and ubiquitous services on actual needs and behaviors of users, rather than on designers intuition, is a well established tradition today. However, gathering data about users in different contexts usually result in large amounts of data that have to be analyzed and translated into requirements. This is a crucial process in the development cycle and its outcome is usually very dependent on the preconceptions of the developers or researchers. Despite this strong element of subjective influence the translation process is seldom made transparent. Nor are the user needs related to psychological discussions and existing taxonomies. The aim of this paper is, therefore, to contribute to the field by presenting a process for translating user expressions to needs and later to requirements using Reiss taxonomy of human needs as a theoretical base. Using this translation process we were able to identify two hierarchical levels of needs: needs *of* a service and needs *in* the service. The process also made it possible for us to see needs hidden in general expressions and to reformulate them accordingly. Further, it generated a clear traceability from user expressions to requirements, and finally, confirmed the importance of focusing on, and understanding, the situated needs of users.

Paper 4: Creating a New Leverage Point for Information Systems Development

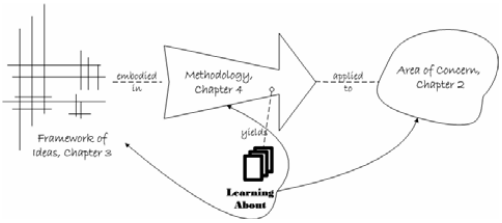
Bergvall-Kåreborn, B., M. Holst, and A. Ståhlbröst, eds. *Creating a New Leverage Point for Information Systems Development*. Designing Information and Organizations with a Positive Lens Advances in Appreciative Inquiry, ed. M. Avital, R. Boland, and D. Cooperrider. Vol. 2. 2008, Elsevier Science /JAI Press 75-95.

In this paper, we present a new approach to information systems development that shifts its leverage point from problem orientation to opportunity development and focuses on strong user involvement, concentrating on the user as a human being and on user needs as opposed to user requirements. To accomplish this we use appreciative inquiry's 4-D circle and needfinding as theoretical and methodological foundations. Through our new approach, called FormIT, we are able to generate a process that shift the development focus from a reactive to a proactive approach. The method also leads to a mix of radical and incremental changes that builds on what users define as existing and positive. Through this radical changes can be accepted more easily and implemented with fewer problems. Moreover, FormIT also distinguish between user and designer qualifications and stimulates the generation of rich local knowledge in unique contexts, thereby revealing deep insights into the situation.

Paper 5: Concept Design in Living Labs

Bergvall-Kåreborn, B, Holst, M, and Ståhlbröst, A. (2009). Concept Design with a Living Lab Approach, accepted to HICSS-42, 5-8 January, at Big Island, Hawaii.

Living Labs is a rather new research area and phenomena which introduce new ways of managing innovation processes. The underlying idea is that people's ideas, experiences, and knowledge as well as their daily needs of support from products, services, or applications should be the starting point in innovation. This paper illuminates experiences and accumulated knowledge to the area of concept design in an innovation process within a Living Lab. FormIT, a methodology, developed for innovation processes within Living Labs is introduced through an illustration of how it has been utilized in a case. The experiences and the method are related to characteristics of Living Labs and the paper closes with lessons learned in relation to concept design in a Living Lab.



Chapter 7

BRINGING IT TOGETHER

In this chapter, the results of my research are presented and discussed. The starting point for this chapter is the discussion of user involvement, which is followed by a discussion about grappling with users' needs. In this discussion, my reflections are presented on the process of collecting user data and generating and understanding users' needs. A discussion follows of the key principles for Living Lab operations in relation to the presented projects. Finally, there is a presentation of a methodology for Living Lab operations called FormIT. This methodology is based on the lessons learned from the projects I have been involved in, and its recommendations are founded on the findings from the forthcoming discussions.

USER INVOLVEMENT

In systems development processes, it is important to involve users to help the development team gain deep insights into users' needs, their current situation, what actions they want to achieve, what kind of technology they use, and the difficulties they experience, as well as the opportunities they perceive in their everyday life. Nevertheless, involving users is not easy; it is difficult to know whom to involve, when to facilitate the process, and how to collect relevant data, etc.

In user involvement processes, users can be defined in many different ways, such as end-users (Ives and Olson 1984) , primary users (Eason 1987), lead-users (von Hippel 2005, 1986), non-users (Selwyn 2003), customers, and consumers (Turban and King 2003). In the user involvement processes I have been involved in, the users primarily can be defined as end-users. This means that the people who have been involved in my processes represent those likely to be frequent users of the final solution. For example, in the EKC project in which the aim was to develop an entrepreneurial knowledge community, young entrepreneurs were involved. However, in the projects, it was not possible to know if those involved actually would end up as the final users. Hence, to gain insights into their characteristics, the users were asked to answer a few questions

about their use of technology, their views on themselves as users, and some demographic questions. By this approach, it became possible to select those users who matched the profile for the target user group. Knowing the characteristics of the users makes it possible to design a system according to their needs, and to select the user representatives who are most appropriate to contribute to the current phase in the development process. Hence, even though systems are developed for a large and quite undefined audience, users should be selected and categorised based on their characteristics in order to increase the understanding of the potential users and to design useful systems.

In relation to defining users, I want to emphasise one limitation that I believe the concept user carries. I argue that the people I have involved not only are primary end-users; they can be involved in other roles as well, such as citizens, young adults, or entrepreneurs (Bergvall-Kåreborn et al. 2008; Ståhlbröst and Bergvall-Kåreborn 2008a; Ståhlbröst and Holst 2006). This means that I believe that when users are involved in the systems development process, it is important to consider in which role they are involved. I have found that when users talk in their role as a user, they relate their expressions to an IT solution, but when they talk in their role as a citizen, for example, they express themselves in general terms, such as how they believe the society should function, or how they would like their contacts with local authorities to be. Hence, being aware of the role in which the user views him/herself when involved becomes important, since different roles gives different perspectives and different implications to systems development.

When it comes to users and user involvement in general, a vagueness exists about what specific behavioural and personal characteristics users should have to be suited to be involved in the systems development process and when they should be involved based on their characteristics. I argue that there is a lack of supporting theories about what kind of characteristics a user should have to contribute best in the different stages of systems development. Involving users according to their characteristics can contribute to make it possible to cluster user groups into different characteristic groups; hence, the development team can gain insights into how different personal characteristics among the users influence their expressions. Such an approach also would contribute to building theory about users and their characteristics in the area of systems development.

In the area of innovation management, Enkel et al. (2005) have clustered customers into five categories: the requesting customers, launching customers, reference customers, first buyers, and lead users. Based on this categorisation, it becomes noticeable that diverse behavioural and personality characters are suitable differently to contribute insights in a specific phase of the development process. In my research, I have not found any equivalent categorisation in systems development literature about what kind of characteristic users should have to contribute best to the systems developments' different phases. I view this as an exciting and important research area since users' specific characters most certainly will influence what users could contribute within systems development processes. In some of the projects that are not included in this thesis, the work of understanding users' characteristics has started.

In systems development processes, users usually are involved with the aim to give them the opportunity to influence the future development of the system, and to improve the

chances for the development team to develop a successful system. Here, I want to clarify how I interpret concept involvement as opposed to participation by referring to Barki and Hartwick (1989), who state that these concepts need to be detached. Barki and Harkwick argue that participation is the activity users do, while involvement is a psychological state whereby the users are more engaged in the system. According to Olsson (2004), many participatory approaches treat users as informers who may turn the whole process of participation into an illusion. The goal of my user involvement processes has been to make sure that users actually have influence over the system the project aims to develop. To accomplish this, I have involved users in the very early stages of systems development, where the possibility to have influence on the system being developed is the greatest. This also is the phase in which users' needs are viewed as important input that can be used as guidance of the development process.

However, this has not been an easy task to accomplish at all times. In the CroCoPil project, the users expressed needs of security but when the concepts were developed with the users, we did not develop any concept based on this need due to technological limitations. Hence, even though the intention in the project was to let the users have influence over the system being designed, the environmental circumstances impeded the approach. Nevertheless, even though all the generated needs were not fulfilled, the users still had the opportunity to have influence on the developed concepts since they were encouraged to give their feedback on how they want the concept to function, and how they want it to be designed to fulfill their needs in a satisfactory manner. Hence, users' input influenced the design of the final system due to early and continuous user involvement that is important for achieving actual user influence on the design of the final system.

When it comes to different degrees of user involvement, users can be involved in a span ranging from developers making assumptions about their needs to users developing the system themselves (Ives and Olson 1984). In my projects, I have aimed to involve users in a design *for* and *with* users' modes. This means that the objective was to involve users not only as informers, but also as cocreators of the developed system. During this process, I have found that it is a challenging task to encourage users to involve themselves in a design *with* mode. For example in the evaluations of the concepts in the EKC project, the users mostly confirmed that the concept answered their needs, but they did not give any suggestions for how the concepts could be redesigned to fulfill their needs in a more satisfying manner. I suspect that there are many different reasons why this situation emerges. For example, the users who had been selected to be involved in the process might not be innovative, creative, and open to give their input since they do not get any direct credit for it. Another example can be that the users might not feel comfortable to give their suggestions in the group, meaning that they do not feel safe and do not trust the group. Yet another example can be that the users feel that it is not their responsibility to design the solution; it is the developers'. However, I have not researched the reasons why users are unwilling, or unable, to cocreate the design, but I still wanted to highlight it since I believe that in the future, if we want the users' role to alter and for them to become more involved and steer the process, many challenges need to be handled. Hence, building long-term relationships with voluntary users becomes important to get to know them and their characteristics.

GRAPPLING WITH USERS' NEEDS

Within the information systems area, it is commonly known that it is important to have good insights into user needs and requirements when developing a new system, but even though this has been known and researched for a long period of time, the process of understanding users still is considered to be complex (Flynn and Jazi 1998). Olsson (2004) says that the difficulty with understanding users is founded in users' inability to articulate both their needs and their requirements clearly. This situation, combined with the fact that analysts often are poorly trained in how they can collect user data makes the developers short-cut the user involvement process and start designing the final solution too soon (Pitts and Browne 2007). One issue I have identified that might reinforce this behaviour is the scarcity of methods that clearly and sturdily support the process of understanding user needs within the area of information systems development (Ståhlbröst 2006).

This situation is rather unanticipated since understanding users' situations, needs, and contexts usually is stressed in system development approaches. However, when the methods are scrutinised with the aim to use them as support of the processes of understanding users' needs, I have experienced that the methods do not give sufficient guidance on how to proceed. For example, Preece et al. (2007) state that stable requirements can be produced from the basis of the identified needs, but they do not give any guidance for how the needs could be identified and how requirements can be generated from the needs. Another example is Dennis, Wixom, and Tegarden (2002 p.120), who say that "*the best analyst will thoroughly gather requirements using a variety of information-gathering techniques and make sure that the current business processes and the needs for the new system are well understood before moving into design"*. Firstly, I argue that this quotation includes two hindrances for the developers to understand users' needs. One, it is the view that the requirements can be gathered while my view is that requirements need to be constructed since they do not lay around ready to be picked up. The second hindrance is the view that if requirements are gathered, the needs can be understood and represented in the design. Related to that, I claim that requirements do not contribute to understanding needs since requirements relate to *what* a user wants a system to do, while needs relates to *why* s/he wants it. Hence, exploring what users want does not reveal why they want it. Secondly, when the method Dennis et al. (2002) suggests is studied, they do not give any guidance on how to proceed in analysing the collected data or how the data can be included in the use cases they suggest as a means to understand requirements.

Following that, the process of understanding user needs in systems development processes is an important task, but it is a process that is not understood fully. Hence, the collection of user data becomes more focused on gathering user requirements, which in turn hinders the possibility to achieve the benefits a focus on needs can bring. In the following, a discussion of the findings I have generated from the process of grappling with users' needs in the early phases of systems development processes is presented. This starts with the process of collecting user data, followed by a discussion about understanding and generating users' needs, and finally, issues related to representing users' needs.

Collecting User Data

When users are involved in systems development processes, it is not always an easy task to know how to proceed to collect relevant and adequate data concerning them and their situations. Among the issues that need to be grappled with during this process is the fact that users oftentimes are unaware of, or unable to express, their needs explicitly (Fitzgerald et al. 2002; Pitts and Browne 2007; Vidgen et al. 2004); users' expressions are influenced by situational circumstances (Robertson 2001); and there is a cultural gap between developers and users due to the fact that they do not use the same terminology or have the same knowledge base from which their expressions and judgments are made (Flynn and Jazi 1998).

In my research, I have found that one way to gather data about users (Bergvall-Kåreborn et al. 2008; Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006), without requiring them to express their needs in explicit terms, is to examine their current life and work situation by letting them tell stories about how they experience their situation. In the projects I have been involved in, I found that with this approach, users could express themselves with their own terminology, instead of being forced into technological terms, which might hamper their expressions to become less nuanced and to express requirements instead of needs. For example, one of the users in the EKC case said that he would like an online forum that could mediate questions and answers not only in writing, but also with sound and illustrations. This expression showed that the user could express what kind of support he needed, and he was not forced to state it explicitly in technological requirements. In addition, when this expression was elaborated a bit more, in search for its underlying rationale, it also became obvious that he was dyslectic and a solution whereby he was not forced into using writing was desired. With this way of progressively examining users' stories and expressions, a deep understanding of users' situations can be reached. Hence, the communication about users' social context becomes stimulated.

In addition, by understanding the underlying rationale, the goal, for the users' expressions, it also became possible to open up other possible solutions for the online forum. The goal for the user was to be spared from being forced to express his thoughts in writing, but the means by which the goal could be reached is limited only by the developer's creativity. Reiss (2004) means that humans are motivated by the goal we want to achieve in life, but the means to reach our goals are numerous. Consequently, by digging into users' goals, more solutions that are possible might appear, and following that, the developer's creativity and innovation can be stimulated. Hence, to gain insights into users' current situations, and to stimulate innovation and creativity, it is vital to let them express themselves with their own terminology and to encourage them to explain the underlying rationale for their expressions.

People are influenced not only by their current situations, but it also is important to gain knowledge about their history in order to fully understand their feelings and attitudes. Suchman (1994) means that users' actions are dependent on social circumstances and people's contemporary attitudes are founded upon their experiences from yesterday. In the EKC and CroCoPil projects, I experienced that it is important to have knowledge about the users' history to understand the underlying reasons for users' expressions and

actions. When the users told histories about their past, for example when the reindeer herders talked about how they had been able to use NMT450 phones independent of time and location in the past and that they now only could communicate via satellite phones and GSM phones, in defined locations at definite times, it became possible to understand their frustration and irritation toward technology development. Their possibilities to use technology in their everyday life had gone backwards in contrast to the surrounding society, where users' possibilities to use technology have gone steadily forward. This insight makes it possible to understand their frustration and suspicion toward technology development. Hence, to really understand what users express, we need to grasp their history as well as their contemporary situation.

When users are involved in systems development processes, they also often have a fixed idea of what is possible to develop, and based on that, they might avoid expressing needs they don't believe can be fulfilled by any technological device (Robertson 2001). To avoid this situation, users have been encouraged to dream about "what might be," where users should envision a situation without hindrance. By this approach, the users are encouraged to let go of their current problem situation and focus on how they would like their future situation to be from a positive perspective, letting go of their perceived problems. My experiences from the EKC, CroCoPil, and SMART projects show that it is difficult for users to leave their problems and to visualise a positive future situation, but when they were guided in the process by investigative questions, their dreams could be revealed, for example, in the CroCoPil project, in which the tourist guides talked about a future desired situation whereby their clients should not be able to use their mobile phones when out in the field; instead, they should enjoy nature. This expression does not really dream since the technology does not function in that area today, so the users cannot communicate. However, when the discussion continued about this situation, the users expressed a dream of a mobile net that only they could access. This revealed a future desired state because it focused on an opportunity and it expressed something that did not exist today. Hence, the users' dreams do not only give a notion about what users might need if they were not hindered by their experiences; their dreams also can function as inspiration for technology development. Consequently, encouraging users to explain more about their expressions can facilitate understanding of their dreams and visions of the future, which in turn can inspire technology development.

Users' difficulties to leave their problems and to visualise a positive future situation can be explained by users' inability to foresee consequences and future scenarios before they have taken one step in that direction (Suchman 1994). This also can be explained by theory of human motivation (Maslow 1943c; Reiss 2005, 2004a, 2001a, 2004b). Maslow and Reiss mean that a need that is not active at the moment, i.e., that is satisfied, is one that people usually are not aware of and therefore cannot express. Consequently, an inactive and unaware need cannot support the process of foreseeing a consequence because the users cannot express what they might need. This implies that a need that is not active remains unaware if the users are not stimulated to activate it. Lead users on the other hand experience needs earlier than many users in the market since they are at the leading edge of an important market (von Hippel 2005, 1986). Hence, they experience needs today that the bulk of the market will experience tomorrow. Following that, involving lead users in development processes could contribute to the process since they are aware of, and can express, their needs.

In my studies, I have chosen to include users in general since I wanted to explore how they can be understood. Hence, I aimed to "activate" users' needs by encouraging them to talk about a future desired state, i.e., "what might be," with help of stimuli in terms of short scenario descriptions. These scenarios have helped users to see opportunities in new and unfamiliar situations. By this means, it becomes possible for users to express needs that they were not aware of before; hence, possible new solutions could be rendered;. Thus, using stimuli in the data-collection phase facilitates users' ability to activate needs they were not able to express before.

In the SMART case, I also found that users can have a rather limited solution space when they are asked to express themselves spontaneously. This became apparent in the discussions about different solutions for communication with the local authorities. Here, it was suggested in one of the scenarios that the camera in the mobile phone could be used as one way to communicate. In association to this, one of the users said that he did not think of that solution since he did not have a camera in his mobile. This situation shows that users initially can have a rather limited solution span when they are asked to respond spontaneously to a certain matter since their expressions become influenced by their habits and experiences. Here, I find it important to stimulate users to expand their vision to increase the probability that the collected data is of inspirational value to the developers. However, using stimuli not only is positive but also can guide the discussion in a certain direction.

Using stimulus material to help users expand their vision of what is possible can be seen as a way for users to anticipate a course of action, since they have been stimulated to take one step in a certain direction. Suchman (1994) means that every course of action depends on its material and social circumstances, and that possibilities veiled in a situation only become clear when people act in a situation (Suchman 1994). Related to that, it can be assumed that the stimuli influence what the users express since stimuli represent an act in a situation. This has been confirmed in my studies, as well. I have found that users who are exposed to stimuli are influenced by the course of action that has been presented to them, and they therefore have difficulties to see beyond what is presented to them. Another observation that confirms the influential impact from stimuli is the similarities in the discussions from the different focus group interviews in the SMART project. The hampering effect of prior experiences (in this case the stimuli) on users' ability to generate innovative possibilities has been highlighted in earlier studies as well (e.g. Duncker 1945; Luchins 1942). Thus, any presented stimuli influence the users' mindset; hence, their ability to generate new solutions can be hindered. Related to that, I want to stress the importance of considering possible effects of the stimuli on the data the users generate. In sum, using stimuli to support users' imaginations should be developed with great care and consideration, since it both boosts and hampers the discussion.

Generating and Understanding Users Needs

When new systems are developed, the aim most certainly is to develop solutions that users will feel motivated to use in their context, i.e., a system that the user has a need of using. However, knowing what kind of actions users are motivated by, and what kind of support they need from a system in a particular situation, is a tricky task. According to

Reiss (2004), humans in general are motivated by the same set of motivators (for example independence, curiosity, or saving), but the strength of each motivator differs among individuals. This means that what motivates one user in a particular situation does not necessarily motivate another user in the same situation. For example in the SMART project, the users talked about what would motivate them to use an IT system to give suggestions for improvement in the society. Here, some of the users expressed that they would be motivated by the opportunity to have influence on the development of the society; others said that they would be motivated by the opportunity to get some acknowledgement for their ideas; and some would be motivated by an opportunity to get some kind of reward for their suggestion. Thus, knowing what users are motivated by in a particular situation is crucial for designing systems for voluntary use and to make it possible to design a system that users feel motivated to use.

Elaborating with motivators is a complex task due to the fluidity of the motivators. This means that when a motivational situation has passed, the users' motivation for that particular action ceases (Reiss 2004a). This situation was also experienced in the SMART project when the users expressed that when the situation that had triggered their motivation, for example to give suggestions, has passed, such as when they got home, they often forget all about it; i.e., the motivation is no longer active. During the analysis of the users' expressions, I also could confirm that motivators are situated; that is, they are individual, and arise based on the situated reality in which the individual takes part in a certain context and at a certain point of time. From a design perspective, it is the situated needs and motives that give the direction or design implication, not the motivators as such. This means that the focus should be on how the motivator takes form in the specific situation under study. Consequently, if users should be motivated to use a system, it has to be available in the situation in which the motivation is alleged to be triggered; otherwise, the users might not be motivated to use it any longer when the motivating situation has diminished.

Further, when the aim of the system development process is to harvest the potential benefits of a focus on users' needs, it is important to identify the needs and thereafter translate them into relevant requirements and finally an IT solution. In SMART, a framework (Reiss 2004a) was applied to support the process of analysing and translating users' expressions to systems requirement. This framework made it possible see needs hidden in general expressions and to reformulate these accordingly (Bergvall-Kåreborn and Ståhlbröst 2007; Bergvall-Kåreborn and Ståhlbröst 2008b; Ståhlbröst and Bergvall-Kåreborn 2007). However, the general weakness of frameworks is applicable also to Reiss's framework. That is, when using a framework to support the analysis of needs, there always is a risk of forcing a need into a predetermined box. This might hinder the development of new types of needs; hence, the analyst need to be attentive and open to this.

In the process of generating representations of users' needs and motivations, it is the designer's task to analyse users' expressions sensitively with the aim to understand users' goals. A goal can be reached in many different ways, but the feeling of joy and satisfaction arises only when the right goal has been reached (Reiss 2004a). Here, we cannot expect users to be knowledgeable enough to formulate their needs that are related to a system in explicit terms. Therefore, to reach understanding of users' needs, their expressions needs to be translated from general expressions to needs and to

systems requirements (Bergvall-Kåreborn and Ståhlbröst 2008b). In the SMART project, I found that the debate the translation generates is important, since many different perspectives and interpretations of user expressions are elaborated, which in turn deepens the collective knowledge about users. In the analysis, the emphasis was to elaborate with users expressions by clustering them in different ways and to view them from different motivators. This process was also supported by a stress on "what could be," which means that the aim was to design alternative solutions for the same goal and thus, give the users the opportunity to give feedback on different perspectives on the same motivator. Further, the analyses of the user data also demonstrated that interpreting users' expressions from different motivators and perspectives generated different requirements and as such resulted in different services. Hence, elaborating the translation from expressions to systems requirements makes it possible to generate diverse solutions for the same expression. This, in turn, makes it possible for the user to give feedback on if they would feel motivated to use the system, that is, if the right motivator and needs has been generated.

Users' needs also are complex to generate and understand because they appear at many different levels (Sharp et al. 2007). Oulasvirta and Kankainen (Kankainen and Oulasvirta 2003; Oulasvirta 2005) categorise human needs into two types: motivational needs and action needs. They mean that action-level needs define what kind of behaviour the users are interested in and in what kind of context, and the motivational level needs rationalise and motivate actions in a context. The motivational level can also be divided into two types of needs, basic needs and quasi needs. In the SMART project, I also found that users' needs can be clustered into two hierarchical levels, but I have defined those needs as needs *of* a system and needs *in* a system. These needs can be related to ends and means (Reiss 2004a), where the needs *of* a system are associated with the end the users aims to achieve by using the system, while needs *in* a system are related to the means by which the ends could be achieved. This means that when users talk about needs *in* a system, they actually talk about requirements of the system, by which their goals can be achieved. An example from the SMART project of how users can express their need *of* a system was when the users said that they would be motivated to use the future system if they felt that the system would help them to influence society (Bergvall-Kåreborn and Ståhlbröst 2008b). The users also expressed that when they use the system, if they felt that they could influence, they would like the system to be free of charge and mobile that show the needs *in* the system.

If I relate the needs *of* and *in* to motivational and action level needs (Oulasvirta 2005), I see that motivational needs are closely related to needs *of* a system. However, the action level needs and the needs *in* are not synonymous, but they are related to each other. Referring back to the example above, the motivation behind using the system is the ability to influence. Based on my interpretation, the needs *in* a system give a hint of the system requirements desired by users, for example support mobility. The action level needs focus on defining what kind of behaviour the user are interested in, that is being mobile. I interpret the action level needs as being related to the actions the user wants to be able to do *while using* the future system. The needs *in* the system, on the other hand, relates to what the future system should do to help them both reach their motivational level needs and their action level needs. In sum, to gain an understanding of what would actually trigger and motivate users to use a future IT system it is important to investigate there needs *of* a system. When this has been established, in interaction with

the users, together with the users' activity needs, the investigation of users' needs *in* a system should take place to support the design of the future IT system.

Reflecting on the Process

During my research, I have found that the methodology I have applied to collect data about users' situations, and from which representations of their needs are generated, has shown to be suitable for its purpose. The data that I have collected have contained information about users that could be translated to needs and later into systems requirements. I have verified this process in the concept evaluation phase where the users were invited to give their spontaneous reactions to some suggested concepts that represented users' needs. In these evaluations, one task has been to discuss if the construction, i.e., the concept, represented their needs and the users confirmed that they did.

During this process, I also have found that some of the needs the users expressed as important were not considered in the concepts; for example, in the EKC project, where the users had expressed a need for a system that supported knowledge sharing, but instead the system ended up supporting business relation-building, which they also had said they needed. The fact that the final system did not answer to the all the generated needs illustrates that the process of translating needs to requirements and then communicating it to the developers is an intricate process. In addition, the needs also have to be prioritised in an open and conscious process. One way to overcome this problem is to involve diverse competencies in all the different phases of the systems development process. The idea is that knowledge increases through iterative interactions between phases and people with diverse competencies and perspectives (Holst 2007; Mirijamdotter, Somerville, and Holst 2006). This means that both developers and "needfinders" should be involved in the different processes to increase the collected knowledge about the users and base their decision and prioritising on that (Bansler 1989). Hence, by involving different competencies with different knowledge about users and technology, the probability that the final system will answer to users' needs increases.

Involving people with diverse competencies also has another benefit. This benefit is the possibility to contribute with different perspectives in the ongoing dialogue in the concept evaluation, and thus boost the discussion. In the CroCoPil project, I observed that the discussion would have benefited from a group of diverse competencies contributing to the focus group discussions, since the users asked questions that we, as needfinders, could not give answers to, such as the functionality of Delay Tolerant Networking. Hence, involving diverse competencies in the process of constructing representations of users' needs contribute to both the on-going group discussions, as well as the development teams understanding of the users' situations.

In the CroCoPil project, I found that when a concept that was developed on the basis of the generated needs from one user group was introduced to another group of users, the concept boosted and smoothed the user involvement process. In this project, the different user groups operated within the same context, but their activities differed. Hence, I relate to Patnaik and his definition of activity and context needs. He defines activity needs as the result of specific activities people perform (Patnaik 2004). These

needs are the same for all who want to do the same thing and people usually are aware of them. The context needs are defined by Patnaik (2004) as those that result from the situation in which people live, work, and operate. People usually are not aware of these needs or they cannot immediately articulate them (Patnaik 2004).

In the CroCoPil project, one of the groups, the rangers, was aware of its activity needs, such as being able to trust that their data was stored safely while they worked out in the field; hence, they could express them in explicit terms. However, when these activity needs were introduced to the other user group, the reindeer herders, the needs altered in character and became the reindeer herders' context needs, since these needs were a result of the situation in which they all operated. This means that the specific concept, Seamless Office, which included the ability to store data safely, with all its functionalities, was not adopted as a whole by the reindeer herders. Instead, they were inspired by the opportunities this kind of concept, with some of its functionalities, could offer to them in context with their activity needs. They also wanted to have the capability to store data about their reindeers while they worked outdoors, which is the situation these users have, but they had not been able to express that in earlier iterations. Hence, using concepts based on the activity needs of one user group and then introducing the representations of their needs to another user group, operating in a similar context, enabled the users to express needs and requirements they had been unaware of, or unable to express until now. Consequently, concepts based on activity needs in one user-group, can generate new needs, and boost the ongoing discussion in another user-group with similar contextual circumstances.

Another way to explain users' ability to express their needs when a scenario developed for another user-group was introduced is Flynn and Jazi's view that needs and requirements are socially constructed in interactions between users and developers (Flynn and Jazi 1998; Imaz 2006). This means that when the users were exposed to a scenario they started, in cooperation with the developers, to construct their needs to make sense of their world. Since the results for a cocreative construction of the users' needs and requirements represent the reality in a specific case, they do not represent a definite truth (Guba and Lincoln 1989). Based on that, an iterative and interactive process in which users are involved with other people on different occasions gives information about how well the developed concepts/systems answer to their needs.

A LIVING LAB APPROACH

Due to the focus of my research to contribute to the processes of user involvement in Living Labs, I give an illustration of how the Living Lab approach takes form in the projects I have been involved in. Hence, a discussion is presented about the five key principles that should permeate all Living Lab operations and how these came to life in the three projects, EKC, CroCoPil, and SMART. The five key principles I am referring to are continuity, openness, realism, empowerment of users, and spontaneity, and the starting point is the discussion about continuity.

Continuity

This principle highlights the importance of good cross-border collaboration that builds on trust since it strengthens creativity and innovation. However, trust takes time to build up (CoreLabs 2007a).

In the projects I have been involved in, continuity is represented by the cross-border cooperation among competencies, partners, and countries. In each of the three projects, I have involved the same user representatives throughout the concept design cycle; for example, in the EKC project, the same entrepreneurs were involved during the whole process. From a continuity perspective, this is very important in order to verify the relevance of the designed concepts and their relation to the needs of the user group. This approach builds trust since users feel that their opinions and needs are important and considered in the design. Additionally, in both the EKC and the CroCoPil projects, the project team consisted of cooperating partners from different countries, as well. Since the projects lasted for two years, this facilitates continuity in terms of building long-term relationships that in turn can build trust.

Hence, to integrate the continuity principle in the user involvement process, the most apparent way to facilitate this is would be through the flow from needs and concept, to prototypes and finished products where users' needs should be in focus, being assessed continuously. In addition, the iterative process in the projects strengthens continuity through a constant interaction back and forth between phases and cycles, and between competencies and contexts. Consequently, it can be argued that continuity through iterations is just as important as continuity between collaborative partners. Here, I stress that continuity through iterations does not mean that additional users with other characteristics cannot be involved in the development processes different phases. Rather, I view this as a way to gain fresh insights and new perspectives. Hence, a mixture of stable and dynamic relations is preferable.

Openness

The principle of openness emphasises that the innovation process should be as open as possible. The idea is that multiple perspectives bring power to the development process and achieves rapid progress. The openness supports the process of user-driven innovation (CoreLabs 2007a).

In the projects I have been involved in, openness occurred in three different circumstances, namely an open mind, an open process, and open results. Related to having an open mind, i.e., actually listening to the users and to take their ideas into consideration, the projects managed very well and most of the generated needs were represented in the final design of the concepts. This can be regarded as both an openness in the design team for this way of working and to the nature of the methodological approach as such, in which the incorporated framework of ideas strengthens this way of working—AI through its appreciative nature, SST through its focus on diverse perspectives as a way to challenge present frames of thought, and needfinding through its focus on understanding users and their needs. The openness

principle therefore is closely related to the empowerment principle that will be discussed in a subsequent section.

In all three projects, the open process is demonstrated by the continuous interactions among the involved stakeholders, with special attention to the users. This mean that multiple stakeholders and perspectives has been one key characteristic of the projects, and is illustrated in the projects with project-teams consisting of people from academia, private companies, public organisations, and potential end-user groups. We included many different stakeholders, both on a project level and on a national level. However, it is unclear if this resulted in a more rapid progress or not, but we can conclude that the process in the CroCoPil project resulted in more concept ideas than anticipated, fourteen instead of nine. In these projects, the process also has been open for adjustments to the specific circumstances for that particular project, and the process has been open to all partners, meaning that each phase has been discussed and elaborated with from different perspectives.

In the SMART project, an additional aim was to develop a technology that could open up for user input into different processes. In that particular project, the aim was to develop an IT service by which the citizens could give their feedback to their municipality, but the technology could function just as well as an input channel for open innovations whereby users could give their feedback on new ideas or suggestions independent of time and location. Related to user communication and open processes, I want to stress that if this type of technology is implemented as a part of the development process in Living Lab contexts, the development process could be more open for random and spontaneous user input.

The third openness instance I have identified is open results. In open innovation, one important factor is the openness of the content produced within innovation processes (Chesbrough and Appleyard 2007). However, this type of openness is not expressed explicitly in the definition of the openness principle for Living Lab. This is an important part of Living Labs, and it should be highlighted within the principles of Living Lab. In the CroCoPil project, all the designed concepts, in the concept design cycle, was open to anyone, both within and outside the project team, since these were published on the project homepage. Hence, the goal was to reach an openness of the results to the society at large.

Realism

Realism is one of the principles that clearly separate Living Lab from traditional systems development as well as other kinds of open cocreation environments, such as Second Life. The principle highlights the necessity to facilitate as realistic use situations and behaviour as possible in order to generate results that are valid for real markets (CoreLabs 2007a).

As the principle suggests realism can exist on many different levels and in relation to many different elements such as contexts, users, use situations, technologies, and partners. All these elements handle reality and realism differently. When it comes to facilitating as realistic use situations as possible two different approaches can be observed, rather easily, in relation to Living Labs. In the first approach, environments

for test and evaluation of products or services are created in ways that are similar to the real world (Markopoulos and Rauterberg 2000), while in the second approach products and services are tested and evaluated in users' real world environments (Feurstein et al. 2008). In the EKC project, the users also were involved in the test and evaluation of the knowledge community in their own context, when they felt for it. Hence, they could create a realistic use situation, and relate to their real-world context. In the EKC project, the users were also involved in the user studies in their own work premises, at the incubator organisation. Hence, good insights into their everyday practice could be reached.

In the CroCoPil project, it was decided that the interviews should be performed in the users' work premises as a means to gain insights into their real-world context. However, even if these premises were part of the real-world working situation of the user groups, it would constitute a limited part of their work since they spend most of their working time out in the field. Common for all end-user groups was that they should be field workers located in remote rural areas. Therefore, it would have been even more authentic if the need generation and evaluation had been carried out there. However, this was considered unpractical due to its situational circumstances such as going by snowmobile into the mountains, and therefore not acted out.

A similar problem to study an actual use situation emerged in the SMART project. Here, understanding the citizens and their interaction with public authorities was difficult, since there was no clear and limited application environment. It would have been possible to observe them in their real-world environment but, considering the limited amount of interaction that most people have with public authorities, this would have required long observation cycles and very patient citizens. An alternative would have been to focus on people visiting public authorities, but this only would generate understanding of single and isolated encounters, and the aim was to gain a systemic view of their relation to these authorities. Hence, the appreciative user study was carried out in traditional ways. To set the users in a real-world mode, a number of scenarios were introduced, and the users were asked to relate to these and reflect on how they thought they would behave in similar situations.

Another important aspect related to the principle of realism, but not specifically addressed by the principle, is the fact that different stakeholders face different realities. This means that what is important and motivating for one stakeholder, in not necessarily important to another stakeholder. For example, as a researcher, the reality can be focused on producing scientific results, while SMEs' reality can be to earn money by developing a new IT system. Different perspectives and views on the reality also are often mentioned reasons for why it is crucial to involve users as well as many different stakeholders in the development process. Instead of trying to understand them, we should let them participate and tell their own stories, and learn from this.

In the projects I have been involved in, the realism aspect is taken one step further with the aim of involving users in the very early stages, since this is where the users can make the strongest contribution to a system by setting the direction for the design. The reality aspect also is considered by focusing on involving real users, not using personas or other user representative theories. In the evaluations of the projects, the aim is to carry out the evaluations in real-life contexts, where the system is implemented and

used by real users in their everyday life. Hence, the endeavor has been to create as authentic use situation for the users as possible. Finally, one aim in the project also has been to create an open climate and, as such, facilitate an understanding of different stakeholders' realities that in turn contribute to trust and continuity. This shows that the key principles are related strongly to each other and that there exists no distinct line between the principles.

Empowerment of users

The key element in the empowerment principle is to base innovations on humans' needs and desires, and to utilise the creative power of user communities (CoreLabs 2007a).

As I expressed in relation to the principle of openness, the users in the different projects I were involved in had influence over the final systems that were designed. Their needs and suggestions were considered seriously and implemented as functions and features in the prototypes and final system. However, as often is the case, they had influence because the partners kept open minds and wanted to base the solution on real user needs rather than on their own predetermined view on what users like.

In the evaluation phase of the CroCoPil project, three concepts were presented to the Swedish user groups. The concepts were discussed in relation to needs and values of the groups. During these discussions, the user groups confirmed that the concepts fulfilled some of their needs, such as needs related to "economy" and "communication." These needs discussions with the users also highlighted generated needs that had not been represented in any concept. Hence, to discuss this and the reasons for their exclusion is also important from an empowerment perspective. In the EKC project, users were involved continuously in the development process; hence, they could follow the process of how their needs and desires were represented in the IT system through its different maturity phases. In all three projects, the starting point for the design has been to gain a thorough understanding of users' situations and their needs; hence, the aim has been to utilise the creative power of user communities.

Empowerment of users also is a key characteristic in the approaches I have applied in the different projects, and this has become visible in different ways. Firstly, users and other stakeholders has been seen as partners in the development process, not just as co-designers that is common in most systems development projects. From the end-user perspective, the position of being a partner inherits the power of choice, this mean that users always can choose if, when, and to what extent they want to participate in the systems development process that I interpret as a very important aspect due to the context in which the Living Lab approach is applied. This means that due to the freedom users have to involve themselves in the process, they also must feel that they are entitled to leave the process when they want to.

Secondly, including potential end-users guarantees participation and facilitates involvement. However, in my perspective, being involved is not enough; it is the actual influence that holds the key to empowerment. This means that to empower users, their needs, and ideas should be clearly traceable in the concepts, prototype, and finished product that are developed in the process. The iterative process in the projects between

phases and between cycles makes it possible for users to judge whether or not their participation and involvement contributed and influenced key deliverables.

Spontaneity

In order to succeed with new innovations it is important to inspire usage, meet personal desires, and contribute to societal and social needs. Here, it becomes important to have the ability to detect, aggregate, and analyse spontaneous user's reactions and ideas over time (CoreLabs 2007a).

In the projects I have been involved in during my research, spontaneity has been carried out in different ways. In the EKC project, spontaneity was an important part of the evaluation of the mock-up, with users encouraged to give their spontaneous feedback on the mock-up in workshops. An example of how spontaneity was reached in the CroCoPil project is the evaluation of the concept "The Seamless Office," and the forthcoming discussion of this concept among reindeer herders in which they at first were relatively passive and silent until they understood the functionality of ArcBob and how it related to their needs. This turned the evaluation session into a spontaneous, dynamic, and highly creative group discussion. Suddenly, the users could give numerous examples of how they would use the seamless office in their work situation and the value this would add. From these discussions, it became possible to generate new ideas and needs. In the SMART project, spontaneity had a somewhat different form regarding the technology being developed in the project that aimed to detect users' reactions and ideas over time. In the projects, spontaneity, and the ability to detect and aggregate spontaneous user reactions, also has been a natural part of the approach to gain a thorough understanding of users' needs as early as possible in the development process.

In the projects, the aim has been to generate and appreciate opportunities that can be developed into new IT solutions; hence, the approach as such has supported spontaneity. I have also used qualitative methods for data collections, which in turn gives room for users' spontaneous expressions and reactions. In addition, by interacting continuously with users, it becomes possible to discern changes in their situations, which can influence their needs of new technological support. In the process of evaluating concepts in the CroCoPil project, the concepts were visualised to the users without any formal presentation. This gave the users the opportunity to interpret the concepts in their own way without being influenced by our intentions. Then, the users were encouraged to present their interpretation to the rest of the group and different interpretations were discussed and related to each other. This approach opens up for spontaneous reactions, and new ideas can be generated in the process.

The spontaneity principle also relates strongly to the principles of openness and empowerment of users. Based on my interpretation of the principles, it becomes hard to support spontaneity if the approach is not open. Following that, I argue that the principle spontaneous might not contribute specifically to the Living Lab approach.

Reflecting on the Principles

When reflecting on the principles, the first thing that comes to mind is the continuity principle. Related to that principle I see it as important to combine both long-term and short-term relationships with partners where the long-term relationships add stability and facilitate trust-building among involved partners. The short-term relationships, on the other hand, should contribute new perspectives and fresh ideas. In this thesis, I emphasise the importance of knowing users' characteristics and to include them according to these characteristics in the development process to gain the best input from the users, and by that future IT system can be created.

Reflecting on the principle of openness stimulates me to acknowledge the centrality of this principle in Living Lab activities. Within Living Lab, the main aspect of openness relates to the process as such being open for feedback from multiple stakeholders. I argue that openness is just as much a mental process whereby the people involved in the process need to be open to what is happening in the process. Reflecting on openness also awakens questions about how the process must be designed to cope with all the input an open process might generate. If anyone can give input, there can be a vast amount of data to handle.

When it comes to the principle of realism, I argue that the definition is rather limited in its description. Relating realism to Checkland's real-world concept (Checkland 1999) means that the "real-world" situation reflects people's interpretation of their current situation. People's interpretations and how they perceive the situation is related to people's worldview, or what they view as important for them; hence, what is viewed as the reality for one person does not necessarily mean the same for another person. For example, in the principle, it is stated that realism is the physical world and not a virtual environment such as Second Life. Based on my interpretation, the physical world is not more realistic than the "virtual" world. People perform just as "real" actions, and have just as "real" goals when they use computers and the Internet as they do when they walk in the street. The users goals in the virtual world might just be unknown to us as observers. But how each activity is performed differs. Thus, in the future, it is most certainly just as important to study, understand, and interact with users in the "virtual" world as in the physical world.

In the definition of the principle empowerment of users, it is asserted that this principle means to base innovations on human needs and desires, and to utilise the power of user communities. As much as I agree with the importance of this, I include more aspects in the empowerment concept, for example, the users' right to have influence on things that affect them, which is one fundamental in the participatory design tradition (Bansler 1989; Bekker and Long 2000; Bergvall-Kåreborn and Ståhlbröst 2008a). Finally, when it comes to spontaneity, I argued above that this principle does not stand on its own; rather, it is dependent on the principle of openness. Hence, I think that it is not a key principle, but should be included in the openness principle. However, I do believe that some things are missing among the principle, for instance, sustainability, i.e. how the process should contribute to create sustainability in terms of contributions to the surrounding society. This is a measure of success for the Living Lab and, as such, it is

highly relevant to consider in the operations. Innovation, or at least creativity, is another aspect I believe that is missing among the principles, as well.

Based on the reflections given above, there is a great need of theorising around the principle's meaning, influence, and relation to understand how they relate and contribute to each other as well as to Living Lab activities as such.

Summing Up

A summary of the results from this discussion is that user involvement processes aiming to understand users' needs face many challenges. In the discussion, I found that users might express themselves differently depending on the role they put themselves in when they interact. I also found that it is a challenging task to encourage users to be creative and give suggestions for design. To deeply understand what users actually express, and why they express themselves like that, I found that their history as well as their dreams is important to understand, since they function as both inspiration and information to the development team. What users express also can be influenced by their habits and experiences that might hamper their solution span. During this research, I also found that there are some identifiable aspects that trigger users to start using a new system and to know, which these are in a particular situation is crucial for system developers. In addition, I also have found that there is something that the users value, especially in their context, and if the future system somehow hinders this, they might not be willing to adopt a new system. Hence, knowing what users value in a particular situation is of utmost importance.

In this thesis, I have acknowledged that viewing users' expressions from different perspectives can give inspiration to different IT systems, since one goal can be met by different means. Hence, knowing the goal the users want to achieve stimulates creativity since the solution is not determined yet. Adding to that, I have observed that needs occur on different levels, such as needs *of* and needs *in* a system, where the needs *of* a system triggers their motivation and use, while needs *in* are related more to requirements and functionality of the system.

Based on the findings and lessons learned during my research, I have generated some practical guidelines. The purpose of my research is to contribute to Living Lab activities by developing a process that guides user involvement and integrates users' needs in the design of future IT-systems when a Living Lab approach is applied. Related to that, the following guidelines are proposed for the support of involving future users of IT-systems with the aim to construct representations of users' needs with a Living Lab approach.

1. Early and continuous participation among all project stakeholders
2. Aim for open inclusion of users, an open process and open results
3. Use data collection approaches that facilitate spontaneous reactions, i.e. open and qualitative method
4. Involve real users in real contexts with real systems

5. Involve different competencies to increase creative solutions and boost user interactions
6. Design an iterative process
7. Identify users' roles
8. Inform users of their freedom to chose and view them as partners
9. Gain insights into user characteristics
10. Apply a storytelling approach and encourage users to express themselves with their own terminology
11. Encourage them to reveal their underlying rationale for their expressions
12. Invite users to reflect on their past situation
13. Initially aim to understand users' needs *of* a system
14. Inspire users' to dream about a desired future state
15. Focus on identifying strengths, opportunities and values
16. Set the users in a real-world mode by using scenarios
17. Gain insights into what users are motivated by in a particular situation and how that motivation takes form in a specific situation
18. Implement activity needs from one user group into another user group with the same context needs
19. Be attentive and open, and reflect critically
20. View user expressions from diverse perspectives
21. Prioritise needs in interaction with users and explain the priorities to the users
22. Translate user expressions into needs and requirements
23. Let the designers design the solution and users inspire the direction
24. Create an authentic use situation in the evaluations

In the forthcoming section, a description of how these guidelines has been incorporated into a methodology supportive of a Living Lab approaches called FormIT is given.

FORMIT – A LIVING LAB METHODOLOGY

Based on the lessons learned from the development projects I have been part of during my research, and the discussions in the former sections, a methodology has been developed to support user involvement with a Living Lab approach in a Living Lab context (Bergvall-Kåreborn et al. 2009; Bergvall-Kåreborn et al. 2008; Ståhlbröst and Bergvall-Kåreborn 2008a, 2008b). This methodology is called FormIT, which refers to the opportunity for users to have influence on future IT-solutions with a formative approach. This section starts by introducing the framework of ideas that is mostly the same as the framework of ideas presented in the project descriptions in chapter 5; this is

followed by a presentation of the characteristics of FormIT and its process, thereafter, the general shape of FormIT is presented.

Framework of Ideas

The basis of FormIT is inspired by three theoretical streams; Soft Systems Thinking (SST), Appreciative Inquiry (AI), and NeedFinding (NF). From the first stream, Soft Systems Thinking (Checkland 1981; Checkland et al. 1990), the assumptions that changes can only occur through changes in mental models is employed. Changing people's mental models means to understand the importance of recognising our interpretations of a situation and that we need to understand both our own, as well as other stakeholders, worldviews to gain a sound understanding of people's actions in the situation we aim to study. In addition, in the SST approach humans are in the centre with the objective to gain empathy for the humans experienced situation. In this approach it is also acknowledged that it is not possible to design a solution that is optimal for all stakeholders, instead the aim is to develop a solution that everyone can accept by having deep insights into the stakeholders worldviews (Checkland 1999).

The second stream, Appreciative Inquiry (Cooperrider and Avital 2004; Cooperrider and Whitney 2005; Cooperrider et al. 2005; Norum 2001), has inspired us to focus on understanding important stakeholders' values and dreams related to how an IT-system can improve and facilitate peoples everyday life and to take that as a starting point for the development cycle. Based on that, the focal point is to define opportunities, related to specific trends, contexts or user groups, and to excavate into the positive and life-generating experiences of people (Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006). Having a focus on opportunities lead to a focus on the factors that gives life in a situation instead of focusing on what is wrong. A focus on problem-solving might lead to a null-sum game in which the situation under study might not be improved (Zemke 1999). The effect from the problem might be reduced, but the cause still can remain, causing new problems to emerge. Hence, what is considered a problem can be solved, but it does not necessarily mean that the situation has been improved and considered as well-functioning. This way of thinking is closely aligned with the philosophy behind SST since it also highlights the importance of people's view on themselves and the surrounding environment in the development situation. Hence, instead of starting the process by searching for problems to solve in a situation, the focus is to identify those aspects that are considered as well-functioning and to use these as a basis for the development of the system (Ackoff 1999).

The third stream, Needfinding, inspired us to focus on needs throughout the whole development process. The needfinding approach finds its origin in a paper by Patnaik and Becker (1999). They argue that the main motivators for the Needfinding approach is that needs are not highly influenced by trends; hence, they are more long lasting. In addition, focusing on needs, instead of solutions, keeps more doors open, which in turn leads to more mature design solutions. The needfinding approach also put emphasis on the importance to see beyond the immediate solvable problem (Patnaik and Becker 1999), which I interpret as not expecting the users to define what kind of solution they want, but instead aiming to understand the underlying rationale for their expressions.

Characteristics of FormIT

Grounded in these three theoretical streams, FormIT enables a focus on possibilities and strengths in the situation under study, which is fundamentally different from traditional problem-solving approaches. In my perspective, appreciating opportunities is the basis for FormIT since in every situation there are many opportunities just waiting to be exploited (Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006). Based on the discussion in the former sections, users have the best opportunity to influence and contribute to the developed system in the early phases of systems design by actually setting the direction for the design, rather than mainly respond to half finished prototypes. Hence, FormIT is designed to emphasise user involvement in the first phase in the concept design cycle; *generate needs of the service,* usually referred to as requirements elicitation/engineering. Given that this phase creates the foundation for the rest of the process, errors here becomes very hard and expensive to correct in later stages (Gupta 2000); hence, it is important to be accurate and open in this phase. Due to the fact that users' needs and requirements usually mature and can change their character as users gain more knowledge and insights into possible solutions it is important to continually reexamine their needs and make sure they correlate to generated requirements.

The FormIT methodology also is designed to be iterative in its character and interactions between users and the development team is an understood prerequisite. This is founded on the idea that knowledge increases through iterative interactions between phases and people with diverse competences and perspectives (Holst 2007; Holst and Mirijamdotter 2006; Mirijamdotter et al. 2006). In this way, knowledge can increase through dialogue between participants and the idea is that the cross-functional interaction enables the processes of taking knowledge from one field to another to gain fresh insights, which then facilitates innovative ideas (Kristensson, Gustafsson, and Archer 2004). This, in turn, increases our qualifications to design IT systems that answer to user needs . Users also construct their needs in social interactions with others (Flynn and Jazi 1998; Ståhlbröst and Holst 2006), hence to stimulate this social construction, interaction among users and developers are crucial. Following that, it becomes important to determine if the constructed needs are valid in an iterative manner where the knowledge about users can increase iteratively. An interactive and iterative process does also support empowerment of users since the users can follow their needs and see how their expressions have influenced the design of the system, as well as building trust and continuity.

Moreover, even if needs are somewhat stable, they are not fixed through time. The existing technologies, solutions, and services available to satisfy different needs are constantly developing. This calls for an interactive and iterative process supporting the expansion and revision of users' needs and the inquiry into new visions and services for satisfying and supporting them .

The FormIT process

The FormIT process can be seen as a spiral in which the focus and shape of the design becomes clearer, while the attention of the evaluation broadens from a focus on concepts and usability aspects to a holistic view on the use of the system; see figure 17

below. This is illustrated by the wider scope in the first cycle, and then the scope becomes more and more focused due to the advancement of the systems development.

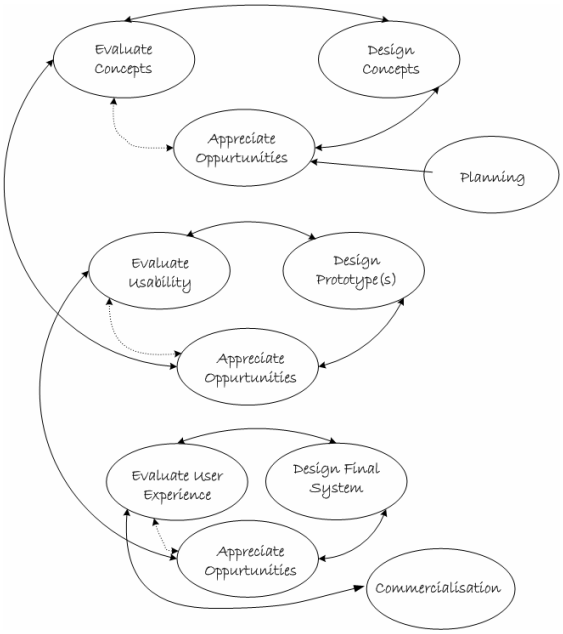


Figure 16: The FormIT Process

In this process three phases – Appreciate Opportunities, Design, and Evaluate – are repeated in all of the three iterative cycles; the concept design cycle in the upper part of the figure, prototype design cycle in the middle and the final system design cycle in the bottom of the figure. Besides these three cycles, two additional phases are included in the process; see figure 16 above. The first is planning, seen in the upper right hand corner of the figure, and the second is commercialisation, which is visible in the lower right hand corner of the figure.

Planning stands for planning the intervention as a whole and in this phase is it important to gain as much information as possible about the underlying circumstances for the project, its aim and scope, different perspectives on the project, relevant competencies among the project-team, and the context, constraints and boundaries that needs to be defined and agreed upon. It is important to mix different competencies to stimulate knowledge sharing and an increased understanding of the involved stakeholders' visions. Based on the findings from my research, it is highly important to gain a common perspective of what the purpose of the project is (Ståhlbröst and Bergvall-Kåreborn 2008b; Ståhlbröst, Mirijamdotter, and Bergvall-Kåreborn 2005). This process can be difficult to accomplish since project participants usually want to make contributions to many diverse areas, hence making it hard to decide what to include and

what to exclude in the intervention. Thus, it is important to support a continuous and communicative approach to build trust and confidence between the stakeholders (Ståhlbröst 2006).

The commercialisation phase should be viewed as a separate project in which the aim is to introduce the IT system to a potential buyer and assess its potential on the market. In the following, a short description of each cycle in the figure is given, followed by a description of the character and main activities of each phase. However, since the commercialisation phase is seen as starting a new project it is not described in this thesis.

Cycle 1. Concept Design

Supported by the findings from my research the first cycle of FormIT, concept design has been designed to focus on appreciating opportunities and on generating the basic needs that different stakeholders have *of* the system. This phase should end up in a construction, i.e. a concept, which represents the generated needs from the first step in the cycle. The process of the concept design phase starts by defining the scope for the process, the target-user group and their important characteristics, where these users can be found, and their role in the user involvement process. The needs in focus here are the needs that motive the users to buy and use a particular IT system, i.e., what triggers their motivation. Following the language of Soft Systems Methodology these needs is a part of the "Weltanschauung" (Checkland and Casar 1986) that makes the system meaningful to use, and they may vary and take different forms depending on the stakeholder, the context, and the situation. The challenge in the first cycle thus is to generate needs users consider relevant in relation to the system, and the different expressions they may take.

This process is supported by obtaining a rich picture of different stakeholders and user groups, their behaviour, attitudes, and values by letting the users tell stories about their lives. In these stories, the users should be encouraged to tell stories about their history, their everyday practice, and their dreams of the future to facilitate an opportunity to find users' needs. By applying a storytelling approach, users get the opportunity to express themselves with their own terminology that in turn gives a nuanced picture of their life without forcing users to express themselves with technological terms (Olsson 2004). While the users tell their stories, the interviewer should ask challenging and excavating questions to stimulate the users to express the underlying rationale for their expressions since users underlying rationale increases the development teams understanding of their situation, hence, facilitating them to make informed design decisions.

When the data collection process is finalised, the users' expressions should be analysed and needs should be generated and translated into concepts, and by that, the focus for the work shifts from generating needs to designing concepts. The design of the concepts needs to be detailed enough for the users to understand the basic objective of the system, without having a design of the system to keep more doors open and to avoid premature solutions. After the design is finalised, the focus shifts again, but this time from the design phase to the evaluation phase. The aim of the evaluation of the first cycle is to make sure that the involved stakeholders such as users agree with the basic objectives of the developed concept. This means that the basic objectives and functions of the system should be related to the generated needs of the system to make sure that these are consistent. If not, this cycle needs to be reiterated until such coherence is achieved. The

aim of this evaluation is also to give users the opportunity to codesign the concept according to their needs.

In this thesis, the focus is on the first cycle, the concept design cycle, with special attention on generating relevant user needs, since this has been the main focus in the projects. In the subsequent sections, an overarching view of the two other cycles of FormIT is given merely to show how the process is designed. The third cycle builds on the results from my licentiate thesis, "*Human-Centric Evaluation of Innovation"* (Ståhlbröst 2006), while the second cycle needs more thorough research. However, I have chosen to include it in the process to have a complete process.

Cycle 2. Prototype Design

The second cycle, *prototype design*, starts with the process of identifying stakeholders' needs *in* the service. That is, when using a service, what needs are then important for the users. As in the first iteration, this is done through a variety of data gathering methods, such as interviews and observations. The challenge in this second iteration is to separate between needs *of* the service and needs *in* the service. One way of doing this is to keep the concept design, with key needs related to it, visible for the users during the data collection activities, so it is possible to relate to these during the discussions. When the data collection no longer generates new insights and findings, the focus again shifts to the design phase. However, in the second cycle the design of the system broadens to include basic functions, work flows, and interfaces. The prototype that has been designed in this cycle needs to be detailed enough for the users to understand and be able to experience how the final service will look and feel. This leads us to the evaluation that is centred on usability aspects in the second iteration. This includes questions and analyses concerning how easy the service is to learn, and, how effective and enjoyable it is to use, from the user's perspective. Hence, the evaluation is focused on the interaction between the user and the service. It is not limited to the user interface, even though this plays an important role in how the user experiences the interaction.

Cycle 3. Final Systems Design

The third cycle, *final systems design*, starts by analysing the results from the usability evaluation in order to generate changes in the needs *of* and *in* the service. Small changes and adjustments in the needs are quite common, especially in relation to the needs *in* the service, as the system develops and users' understanding of structure, content, workflow, and interface deepens. Based on these changes, changes in the design of the system also take place, as well as general development work to finalise the service as a whole. When this is done, the last evaluation phase takes place and now the evaluation is focused on user experience of the finished service. User experiences goals can be both positive and negative, for example enjoyable or frustrating. They are primarily subjective qualities and concern how a system feels to a user. They differ from more objective usability goals in that they are concerned with how users experience an interactive service from their perspective, rather than assessing how useful or productive a system is from its own perspective (Sharp et al. 2007)

The Basic Shape

In the FormIT methodology, three basic phases constitute the fundamental flow of the iterations in FormIT – Appreciating Opportunities, Design, and Evaluate; see figure 17 below. This figure illustrates how these three phases are interrelated to each other and that they influence each-other as their paths are crossed. The brown kernel in the middle, illustrates the system that is going to be developed on the basis of this process.

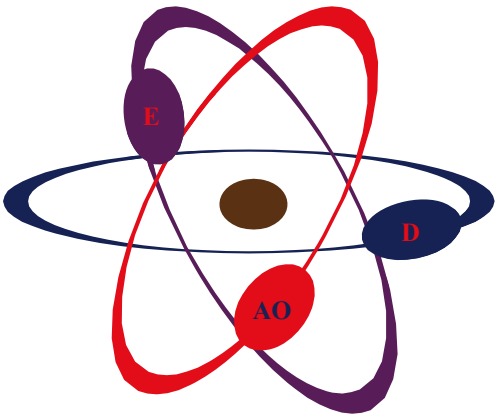


Figure 17: The Basic Shape of FormIT

The three phases are iterated in each of the cycles in the process until the material has reached satiation, meaning that when few new and innovative themes are discussed and brought to the table, it is time to move into the next phase of the process.

Phase 1. Appreciate Opportunities (AO)

The Appreciate Opportunities phase is the process of generating and understanding users' needs in situations where people carry out, for them, meaningful activities with the objective to improve the situation as a whole. In this phase, it is important to separate between requirements, which are related to a solution or artifact, and user needs that are subjectively experienced, and context dependent. As this phase sets the boundaries for what is possible to generate from the process, it is important to facilitate openness in terms of a having an open process, keeping an open mind, being open with the results, and openly including relevant stakeholders.

In this phase, the starting point is to design the team that should be involved. It is important to include different competencies; hence, this should be considered and designed according to relevant competencies for the specific project. The users who should be involved in the process should be representative of the future intended end-user and they should be involved in their natural environment as far as that is possible. When the users are contacted, they also should be informed about their freedom to participate or not, as well as the expectations for their involvement. When that is

finalised, a number of need generating sessions with the focus of identifying strengths and best practices by stimulating user participants to provide rich and appreciative narratives about past and present situations can be held (Holst and Ståhlbröst 2006; Ståhlbröst and Holst 2006). In these narratives, it is important to invite users to start with appreciating "what has been" and "what is," as well as to dream about the future and "what might be," to gain deep insights into the goals the users aims to achieve, what they value in their situation, as well as their present dreams of a positive future.

To support the users to narrate about their dreams about a positive future and to help users to expand their perspectives and activate their unaware needs, I have found that stimulus material in terms of scenarios can be used. In this process, it is important to be attentive to the influence the stimuli material can have on users' expressions and perspectives. Hence, stimuli should be introduced when insights into users' spontaneous expressions has been reached, and when the ongoing conversation stagnate. From the stories about their history, their everyday life, and their dreams, needs can be generated and prioritised.

In the process of generating and prioritising needs, I have found that using a framework to support the process of analysing users' expressions facilitate finding needs hidden in other needs. Here, it is important to search for situated needs since these give insights into implications for design. The endeavor to generate needs also should emphasise clustering needs in different ways to support creativity and innovativeness among the development team members. It is important to highlight the generated needs from different perspectives since different underlying rationales behind users' needs ends up in different IT solutions.

This phase is carried out in all of the three different cycles in the FormIT process, but with slightly different foci. In the first cycle, the aim is to gain insight into the different basic and motivational needs that different stakeholders have *of* the service. In this phase, the objective is to use different methods to facilitate users to tell rich stories about their earlier, present, and future desired situation. In the second cycle (prototype design), the focus is to generate needs *in* the systems, while in the last cycle (final systems design) the aim is to fine-tune the generated needs both *of* and *in* the system while relating to real-world experiences.

In addition, in the first cycle, the appreciating opportunities phase is a separate activity, while in the second and the third iteration, the evaluation and the appreciating opportunities activities can be combined into the same intervention with the users, although they still constitute separate phases in the process model. This separation is due to the necessity to ensure that user needs are the driving force of the development of the design throughout the whole process.

After obtaining a rich picture of different stakeholders and user groups, their behaviour, attitudes, and values in the first phase the needs are translated into concepts. As a result, the focus for the work shifts from the Appreciating Opportunities phase to the Design phase. Hence, the findings from the need generating activity form the basis for design in the next phase.

Phase 2. Design (D)

In this phase, the focus is to design and develop innovative concepts/services on the basis of the identified needs and requirement from the earlier phase. Based on our research, we have found that, to ensure that the final solution answers to users' needs and not merely reflect what is technically possible, a close interaction between needfinders and developers is needed. This does not mean that the needfinder should be included in all the stages of development, but that the cooperation should build on mutual communication around the designed solution. The aim is to ensure that the gained knowledge from earlier stages is guaranteed to be included and considered in the final design.

The known needs, as well as identified strengths and dreams, form the basis for the vision of the system that takes form here. Usually, a basic idea of the future solution has started to take form, hence the idea will be elaborated on and expressed both textually, in the form of key concepts, and pictorially, in the form of user stories, scenarios, or mock-ups of the system. In this phase, it is important to acknowledge the difference between *existence* and *potentials*, i.e., between what *actually* exists and what *could* exist (Löwgren and Stolterman 2004b). In this process, it is central to clarify the roles and expectations in the project whereby the designers are responsible for the design, and the generated needs from the users function as an inspirational source.

In FormIT, this phase have different forms, different focus and use different methods dependent on where in the process the design is. In the first cycle of FormIT, the design is focused on designing concepts and in the second cycle, the focus is to design prototypes with a functioning and designed interface. In the third cycle, the focus is to design the product or service as a whole with the amount of functionalities that needs to be implemented to give the users a reasonable view of the system. The design phase is therefore a balance act between *what is* and *what could be*.

The design phase is also the most innovative phase in the concept design cycle since this is where all collected data is clustered in different ways and viewed from different perspectives with the aim to construct concepts that represents users' needs. Therefore, cooperation between different stakeholders is important to ensure that knowledge is shared both across and within competence areas. The challenge here is to convince the systems developers and technical engineers to consider the list of prioritised needs as a starting point for the vision and then the functional requirements and technical specifications. Since many developers and engineers are unfamiliar with this way of working, they often want to skip this part and go directly to the requirements and specifications, which is the focus for the second cycle of the FormIT model, the prototype design. Hence, to ensure that the final solution answers to users' needs and not merely reflect what is technically possible, a close interaction between people with different competences and different focus on the development process is needed to ensure that everybody tries to keep an open mind.

In design processes, it is important to gain an understanding of the design situation as early as possible, and to understand that the design process is an ongoing process in which knowledge increases through its iterations. Hence, in this process, it is important to realise that one kernel activity is to continuously reformulate the design ideas and problem definitions as more understanding of users and their situations are gained.

Phase 3. Evaluation (E)

The third phase in the basic process of FormIT is the evaluation phase. In FormIT, the role of evaluations is to make sure that a sound understanding of user needs occur throughout the whole development process. In the FormIT approach, evaluations are carried out in all three cycles of the development process. In the concept design cycle, the evaluation focus is on how well the constructed concept ideas answer to users' needs of the system from an overarching perspective, not going in to details about functionalities and requirements. In the prototype design cycle, the evaluations can be concerned with usability aspects where the focus is to gain understanding of how well the system relates to users' needs *in* the designed solution. In the last phase of the development process, the focus is to define how user experience that their needs both *of* and *in* the system are represented.

In the evaluation phase, users are invited and encouraged to give their impressions of the system that has been constructed to represent their needs. In this process, the evaluation is also a combination of evaluation and a generation of new and unexplored needs, or modification of needs. Hence, users value the concepts or mock-ups, or test and evaluate prototypes, dependent on in which cycle of the development process they are involved in. In this way, the iteration can start again by redesigning concepts or prototypes in relation to modified or new needs and requirements. The process of valuing concepts and boost the on-going discussion can be facilitated by introducing representations of needs constructed to fulfill needs for a different user group. Here it is important that the user-groups have the same context need so that the users can relate to the concept and become inspired to form it to fit into their activities and context. When the constructed system is considered as representative of the users' needs, it is implemented into its intended context.

In a Living Lab context, user tests are done in a real-world context and this includes some aspects that need to be handled. These aspects are related to the contexts in which the service being developed is aimed to contribute to. Users response to a system can be influenced by how well it merges into their context and their activities (Karat and Karat 2003; Perrin 2002; Sharp et al. 2007). For example, letting a user evaluate a mobile marketing service for a store they never visit might influence their overall opinion of the service. Even things not directly linked to the system can influence the users' experiences of using the IT system. Relating back to the example of mobile marketing given above, the service as such might function well and answer to the users' needs, but when the user visits the store the cashier there is unwelcoming which can lead to that the user become angry and dismisses the system as well as the shop. Hence, to identify and consider aspects in the expected context, and how these might influence the forthcoming test situation, becomes important when planning the process as a whole (Ståhlbröst 2006).

When a Living Lab approach is applied in the evaluations, tests are carried out outside a laboratory setting, where the evaluation situation can not be supervised and observed, put high demands on the test designer to create as authentic usage situation as possible during the period of test (Ståhlbröst 2006). In this process it is important to create as authentic usage situation as possible. This requires a deep understanding of the users' everyday situation as well as their needs relevant in that situation that can be generated from the users' stories in the first phase. Here, users' needs are important to incorporate in the

design of the evaluation to increase the probability that users actually use the service during the test period.

The creation of an actual use situation also means creating actions that encourage users to change their frames of reference and to include a new behaviour and a new usage situation, such as storing data on a PDA instead of drawing on a map with a pencil. This aspect is central in evaluations in a real life context since users, according to Nielsen (2003), have a natural inertia to change their behaviour. Due to that, a true picture about users' probability to actually buy, or use, the system when it is introduced into the market is impossible to gain during a short period of test. Dealing with new systems also means to deal with uncertainty, it is therefore important to remember that it sometimes can take years for a new system to have an actual impact on users' behaviour or attitudes (Ståhlbröst 2006). One important aspect in evaluations in FormIT is to learn from failures, as well as from successes. This means that the result from each evaluation needs to be analysed to contribute to understand the evaluation results.

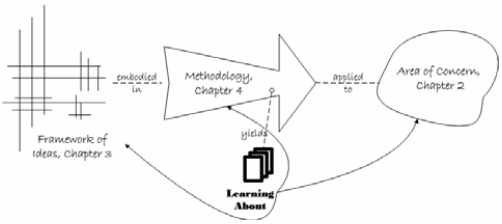
Reflecting on FormIT

At a first glance the structure and content of the methodology as such is rather traditional for information systems development. However, I argue that there are some aspects that offer a different view, such as the focus on opportunities, users, and needs. Firstly, FormIT is based on soft systems thinking and within that approach, the focus is usually to define and understand a situation that is experienced as problematical among the persons involved. Here, Ackoff (1999) is one exception with his idealized design in which the aim is to focus on the opportunities and strengths is a situation. However, Ackoff focus on designing well-functioning organizations rather than IT-systems, and he does not focus on understanding users and their needs. Hence, FormIT offers a different view on the situation being studied by its emphasis on opportunities and strengths.

FormIT also focus on defining and separating between concepts such as needs, requirement, functions, dreams, and values with the aim to stimulate the development process. Within the IT-development area, the aim is often to understand users' needs and requirements and to design system based on that. However, the concepts are often mixed up, and there are no clear descriptions on how to go from unstructured user data, which include users' needs, to systems requirements. By starting the process by focusing on users' needs instead of systems requirements, the developers can be more creative and innovative since the final solution is not determined yet.

In addition, FormIT take a step towards user involvement with voluntary users that are scattered in the society, in their role as private persons. Involving users has a long tradition within the participatory design approach, but the focus for methods within this approach is usually on involving users within an organization and on how the organization can benefit from the new IT-system (Bødker, Kensing, and Simonsen 2004). Here, FormIT goes one step further and aims to support user involvement processes where the use of the system is totally voluntary. FormIT aims also to support user evaluations carried out in users' real-world settings with all the opportunities and threats that are included in that context. In addition, in FormIT the users are involved from the very beginning of the process where no system exist, or perhaps not even an

idea of a system. Instead, users are involved to give inspiration to the development team and to let them influence the strand in IT-development.



Chapter 8

FINAL REMARKS

In this section, I put forward the findings from my research. I start by repeating the objective and the purpose of my research, and then present a description of how the findings have been generated. Finally, there is an illustration of the findings related to user involvement and the key principles of Living Lab activities.

Founded on the need of more knowledge about how a user-centred development process can be supported when a Living Lab approach is applied, the focus of my research is to gain more knowledge about how voluntary user involvement processes can be supported in Living Lab contexts when the aim is to develop IT-systems based on users' needs. More specifically, my purpose is to contribute to Living Lab activities by developing a process that guides user involvement and integrates users' needs in the design of future IT-systems when a Living Lab approach is applied. These processes face many challenges that have been elaborated on in this thesis. The FormIT methodology that is the result of my research contributes to the process of collecting, generating, and constructing representations of users' needs of new IT-solutions in their role as private and voluntary users and by that the weaknesses of existing methods for need-based IT development is reduced. My research objective has been to develop a set of guidelines that could facilitate user involvement with a Living Lab approach and which contribute to fulfil the key-principles of Living lab activities. The guidelines are presented in the forthcoming sections.

In short, the main lessons learned from my research are related to the three overarching themes for the research; user involvement, grappling with user needs, and Living Labs. The first set of lessons is related to user involvement processes and the lessons concern user characteristics, user roles, when and how they should be involved. The second set of lessons is related to grappling with user needs which is divided into two clusters, collecting user data, and generating and understanding user needs. The lessons in collecting users data concerns encouraging users, understanding the social context, and situation. The lessons in generating and understanding user needs concerns user motivation, the importance of understanding different perspectives and levels on user needs. The third set of lessons is related to the key-principles of Living Labs. Here I

found that continuity needs to be reached both among partners and in the development process, openness occur in three different instances, realism means to involve real persons in their everyday context in authentic use situation, empowerment of users mean that the users should have the freedom to choose and actually influence, and spontaneity is dependent on openness.

To make the findings from this thesis comprehensible and applicable in Living Lab contexts, I have chosen to cluster the guidelines I have generated into ten universal themes which all starts with the letter "I". These ten "I"s describe the main contributions to the process of collecting, generating, and representing voluntary users' needs with a Living Lab approach, and has been generated by openly analysing and clustering the findings into guidelines, the "I"s. These are; *Identify, Inform Interact, Iterate, Influence, Involve, Inspire, Integrate, Illuminate,* and *Implement.* These ten "I:s", are all verbs that describe actions, processes and course of events. Thinking and expressing the findings in terms of actions is inspired by the modelling process in Soft Systems Methodology, where each activity should be expressed with verbs in imperative to stimulate action and change (Checkland 1999). Since the aim of my research is to stimulate actions in user involvement processes, I viewed this approach as suitable for my purpose.

While reading the ten "I's," it is vital to keep the FormIT methodology in mind, since the findings stem from its process. However, I have chosen not to repeat the methodological approach as such; instead, I aim to view the findings from an alternate perspective in which I relate the findings to the inherent characteristics of the "I." In addition, related to each "I," a description is given of how the relevant Living Lab key principles take form in this specific activity. It is important to note here that I have related the principles that adds to the conclusion, which means that all principles are not relevant for all "I:s". As a reminder, the key-principles are Continuity, Openness, Realism, Empowerment of users, and Spontaneity.'s." The ten "I's" can be viewed as a compression of the FormIT methodology into ten guiding concepts that can be applied in development processes when the aim is to apply a Living Lab approach. The starting point for the presentation of the conclusions is the concept *Identify*.

Identify: During my research, I have found that highly relevant to identify users' individual characteristics to understand them in depth since the user community is one crucial asset for the Living Lab environment, but it includes the risk that the community is biased. The data-base with presumptive users makes it possible for the Living Lab to get in contact with persons representing different user groups. However, one difficulty with this kind of user communities is to gain a mixture that is representative of the surrounding society. I suspect that the users involved in these communities have a tendency to be biased towards technically mature and curious people who like to have influence on societal changes. In addition, as the Living Lab approach suggests, users are involved as private persons, not as employees at a specific organisation. This approach makes it relevant to clarify in which role they are involved, is it as a customer, a citizen, a user or as a patient, since their role has influence on what they express as relevant. Hence, identifying users' characteristics and roles is relevant in user involvement processes carried out with a Living Lab approach.

Relating this concept to the key principles reveals that the most relevant for the realism principle where the aim of user involvement is to gain as real picture about their situation as possible, and if the community is biased, the data collected gets influenced and as such, it does not represent a real picture. Hence, to ensure that the data is representative for a group of users, their characteristics need to be identified and clarified.

Inform: In this thesis, I have shown that in Living Lab activities, users are involved as partners, not just as containers of information from which their needs can be extracted. Instead, users are invited to involve themselves in all the phases of the development process, but with slightly different roles and responsibilities. With that approach, I have found that it is important to inform the involved users about their role, our expectations on their involvement, and their freedom to choose if they want to be involved in the development process.

I interpret information as being closely aligned with openness. Here it becomes important to be honest and open to the users. In addition, by informing them about their freedom of choice the users has the power to determine to what extent they wish to involve themselves.

Interact: In this thesis, I have shown that interaction is an important factor to consider in the process of understanding users' needs with a Living Lab approach. In this context, interaction has two meanings: it is the interaction among different competencies, and it is the technology that should support interaction among stakeholders. The interaction among different competencies also has two dimensions: it is the interaction within the development team, and it is the interaction with partners outside the development team, such as users and authorities. When it comes to interaction among different competencies in the development team, I have shown that this approach enables gaining fresh insights and facilitates innovative thinking by providing different perspectives of users' expressions. In this process, I have shown that it is important to focus on generating user needs instead of identifying systems requirements since user needs stimulates creative thinking within the development team, which in turn makes it possible to innovate. This mental alteration also is imperative to accomplish in Living Lab activities since users have difficulties to express systems requirements, but as they interact with other competencies their knowledge grows and their ability to express themselves becomes stimulated. In the process of interaction, both within the team and outside, is it vital the involved parties have an open mind to what the users express to enable them to feel empowered.

Interaction among the Living Lab stakeholders such as academia, authorities, users, and companies also facilitates innovation by the different perspectives each stakeholder brings to the development process. Here, it is important to note that the interaction with different stakeholders also needs to have a mixture of stable and flexible partners to interact with, so the stable partners can contribute to continuity, while the more flexible stakeholders contributes with fresh insights and new ideas. Interaction among the involved stakeholders also facilitates building trust since they get to know each other during the process.

Related to support for interaction, I have found that one central aspect for user interaction in Living Labs is the technological support for the process. For example, in Botnia is the user community with its 6,500 test pilots, one important part since it makes is fairly easy to access potential users. Developing technological support that facilitate interaction between users and other Living Lab partners could also support spontaneity since users can interact and give their ideas when they emerge instead of being forced to wait for the Living Lab environment to initiate the communication. Hence, interaction on the users' terms would facilitate both spontaneity and empowerment of users since they would have the ability to determine when and if they wish to interact with the Living Lab. In addition, having adequate technological support for interaction would also facilitate an open process in which the users could contribute whenever they are motivated to do so.

In sum, interaction in user involvement processes has two dimensions: it is the interaction between different competencies, and it is the technological support for interaction. The interaction among different competencies facilitate creative thinking by exploring divergent perspectives, and interaction by means of technology contributes to empowering users, facilitate openness, and assists spontaneous input that are core principles of Living Lab activities.

Iterate: In the earlier chapters in this thesis, I have illustrated the importance of iterations in the process of understanding users' needs when a Living Lab approach is applied. The iterative process has several purposes, one, to increase the development team's understanding of the users' situations, and two, to facilitate building users' knowledge about possible solutions and diverse perspectives, and three to value the design decisions throughout the process. By their increased knowledge, the stakeholders become better at communicating and the iterative process make it possible for the stakeholders to get a more nuanced way of expressing themselves as both their level of awareness of the relevant needs, and their level of knowledge about possible solutions increases as they become more informed.

When relating the iterative process to the principles, I found that openness could be supported if the involved stakeholders keep an open mind and aim to gain new perspectives in each of the iterations. In addition, by an iterative approach, it becomes possible to detect spontaneous reactions and ideas over time which is a prerequisite for Living Lab operations. In Living Labs, one important factor is the empowerment of users; here I have shown that by iterating users get empowered since they are offered the possibility to influence how their needs are prioritised and thus, they can influence the final solution to build on their real needs. In addition, by an iterative approach, users can follow how their expressions are being represented in the presented design, from an immature concept to a full-fledged IT system, which in turn contribute to empowering users. In this thesis, I also have shown that an iterative process can facilitate a feeling of continuity where users are involved on several different occasions and hence, they can become more comfortable with contributing to the process.

Consequently, an iterative process facilitates knowledge building and sharing that in turn contributes to empowerment of users; it offers an ability to detect spontaneous reactions, and it facilitates continuity in the process. However, one prerequisite for this

is that the involved stakeholders strive for openness, both on an individual level and as a process.

Involve: During my research, one basic approach has been to involve users in the development of new technological solutions. Here, I have shown that it is important to involve users in the early stages of the development process to help the users to feel that they are really involved in, not merely attend, the process. However, the users involved in Living Lab activities are voluntary users and, as such, we need to understand what motivates the users to involve themselves in systems development processes. What is their driving force for involvement? Involvement also concerns issues such as who should be involved, where should they be involved, when should they be involved, and how should they be involved?

In processes for involvement in Living Lab activities, realism is one focal point. This means that the aim should be to include real users with real experiences based on their everyday practices. This means that the involved users should not be represented by personas or theories about users' behaviour and expectations; rather, they should be involved and plead their own cause, as it is important to talk to users to understand the goals they are aiming to achieve. This does not mean that theories and other existing knowledge about particular user groups, their needs and requirements should be ignored or excluded, but rather that they always must be supplemented, verified, and updated with the users' experiences relevant for the particular situation in focus.

Involvement also is closely aligned with users' actual influence on the developed system. If the users involve themselves and then find that they have not influenced anything, they probably will become less motivated to be involved in the future. Hence, their actual influence can influence their willingness for involvement. By involving users in the process, it can also contribute to both spontaneity and continuity since when the users feel that they are continuously involved, they can gain trust and thus, they can become more willing to reveal their spontaneous reactions that in turn contributes to innovations.

To conclude, users should be involved early on in the process to make it possible for them to feel involved. Here, it is important to note the difference of being involved and attend in the process. In these involvement processes should "real" user representatives be involved to assist spontaneity and continuity.

Influence: In this thesis, I have come to the conclusion that influence in user involvement process has two different meanings; firstly, the users' ability to influence the final solution, and secondly, the influence the inspirational tools might have on users' expressions. Users' influence on the final solution means that users can influence the development if they are involved early on in the process where they can actually have influence on the development of new technological solutions instead of merely giving feedback on determined systems. Here, to ensure that users feel that they have influence, their needs should be used as a foundation for the designed system. The other meaning of influence, which I have shown in this thesis, is that when users are exposed to stimuli material their expressions and visions become influenced to some extent. Hence, the possible influence of every stimulus applied in user involvement processes needs to be considered strongly and discussed in the development team to ensure that

the influence it might have on users' frames of reference is understood fully to prevent false design decisions.

Following that, influence based on users' influenced expressions lessens users' empowerment since what they express is restrained by the stimulus material the development team has presented to them. However, having actual influence contributes to empowering users, which in turn can create a positive spiral where the users motivation to influence increases as they experience that they actually can.

When influence is related to the principle of openness, my findings show that openness has three different meanings in Living Lab activities namely; process, mind, and result. Here, I find that to support stakeholder influence, the process as such needs to be open to make it possible to receive spontaneous and continuous input to new ideas and solutions. I also found that to make it possible for users to have influence over the design, an open mind among the development team is needed. When it comes to influence and open results, this is a way for the Living Lab to make it possible for the surrounding society to influence the development of new systems. The open results also contribute to sustainability in terms of giving some results back to the surrounding society.

Summing up, influence in user involvement processes has two different meanings, it is the influence the users should have on the design, and it is the influence that different stimuli material can have on the users' expressions. To facilitate influence, it is important to have an open mind and an open process, and to distribute the results from the involvement processes openly.

Inspire: I have found that inspiration is relevant in two processes in systems development activities: firstly, in the user involvement process where the users should be inspired to let go of their status quo, and secondly, in the design process where the developers should be inspired expand their solution horizon. In the user involvement process, the users should be inspired to express themselves with their own terms to generate as rich data as possible from which their needs can be generated. The users also should be inspired to tell stories about their situations and the goals they aim to achieve in their everyday life. In addition, to make it possible for the users to expand their solutions span and become inspired, I have shown that stimuli can be used to trigger the users' motivations and reveal their needs. To make it possible to inspire developers, the users also should be inspired to dream about a desired future state and to describe this state. From a development perspective, I have shown that the developers can be inspired to think creatively by elaborating with user data from different perspectives. In addition, using the users' expressions of their dreams as inspirational tools, not a definite truth, can inspire the development team.

Inspiring users to express themselves with their own terminology also contributes to the principle of realism, since it makes it possible for the users to express the situation from how they really perceives it, not how they believe they are expected to express themselves. In this thesis, I have shown that the results from one context can be implemented into another context if the context needs are similar, and by this approach users becomes inspired to elevate their perspective, which in turn opens up for new solutions. Hence, implementing a familiar surprise in a different group's real-world

context facilitate creative thinking and expand their boundaries. Here, the principle realism can become negatively influenced by the inspiration. Hence, it is important to note that the development team should reflect upon how they can convert users' dreams into real solutions, thus realism is reached. Inspiration is also facilitated by users' spontaneous reactions that give inspiration to the development team.

To conclude, inspiration is important in two processes in systems development activities when a Living Lab approach is applied; hence, in this process, both the users and the developers need to be inspired. In the process of inspiring, it is the principle of realism that is most affected, firstly, by the influence inspiration can have on users' views of their experienced reality, and secondly, due to the developers need to develop systems that function in reality being inspired by users.

Illuminate: In this thesis, I have shown the importance of excavating into user stories to illuminate relevant aspects from different perspectives in the situation under study. One central point in this process, when a Living Lab approach is applied, is to create an open climate in which the users feel comfortable to reveal their thoughts and illuminate opportunities they experience in their context. By this approach, insights about users' need of a system increases as well as the understanding of their perceived reality and the underlying rationale for their expressions. This sort of understanding is vital in order to design systems that users will feel motivated to use in a specific situation. Hence, by encouraging users to tell rich stories that illuminate vital aspects about their current life situation makes it becomes possible to design the implementation of the system according to their situation and thus, an authentic use situation can be facilitated, which is an important principle in Living Labs.

Based on my interpretation of illumination, this is strongly related to the principle of openness, since if those involved are not open and willing to express themselves, it becomes impossible to illuminate important aspects. Here, continuity can support the openness principle given that continuity builds trust, hence the users become more comfortable in expressing their thoughts and dreams.

Thus, to make it possible to illuminate different perspective and relevant insights it is vital that the process support openness and build on continuous interactions among those involved to build trust.

Integrate: To integrate means two things when a Living Lab approach is applied. Firstly, representations of users' needs should be integrated in the design to increase the chance that the final systems will provide an added value for the users. Secondly, when the design (in all its varied maturity levels) is introduced to the users, it should be integrated in their real-world context based on the knowledge gained in the interaction process. By this approach, understanding of how the IT system fits into the users' context and habits can be gained and based on that can informed design decisions be made.

Hence, to integrate means to have proper insight into how users' perceive their everyday situation. This means that the realism principle is the most apparent in this process. Here, realism is reached since the system is integrated in the users' everyday

context in an integrative manner to ensure that the users get a vision of how the system would function if it were a real system.

Implement: One focal point in Living Lab approaches is to implement and test the results from the user involvement processes in the users' perceived real-world environment. The main aspect in this approach is to create as authentic use situation as possible for the users to make it possible to get their spontaneous input on how they perceive the implemented system. The design of this authentic situation should be supported by the deep knowledge about users' needs that has been gained during the process. I have also found that when a new system is implemented into users' context it is important to be open and attentive to what is happening during this process. People in general have inertia to change their behaviour; hence they must be encouraged and reminded to use the implemented system on a regular basis.

Implementing a system in real-world contexts inherits the difficulty to observe users' use and behaviour while using the system, hence the influence of contextual issues needs to be considered and discussed. In addition, when the system is implemented into the users' natural environment, they can also feel more comfortable and relaxed while they test the system in contrast to controlled laboratory setting where every thing the user attempt to do is scrutinised and recorded. This does not mean that laboratory observations are inadequate in all situations rather it means that these tests and observations should be complemented with a real-world use perspective. Implementing a system in the users' real world context require also that the Living Lab environment feel that they can trust that the users' attitudes towards the system mirror their perceived experience.

Relating the implement concept to the key-principles of Living Lab activities, I found that all of them are relevant. Starting with the principle realism, this is the foundation for the whole implementation process that should be done in real-world settings, that is in the systems intended context. Here it is vital that the implementation interfere as little as possible with the users' situation since users have inertia to change their behaviour. By creating as "real" use situations as possible, users also can feel more relaxed since they are not treated as observable objects; hence, they are empowered to do as they please without being forced into something. Letting the users use a system in their own context also require that the Living Lab can trust them, which can be facilitated by continuous involvement where the Living Lab gets to know the users. In the implementation process the principle openness also becomes an important aspect since those involved in the implementation process needs to have an open mind and observe what is happening with the implementation. In addition, openness in the implementation process requires an open process in which users can give their continuous and spontaneous input regarding the implemented system.

To conclude, the implementation process concerns all Living Lab key principles. Here, it is important that the implementation happen in a real-world context, with connection to real-world use situations. The realism principle empower users to have the power to determine what they want to do, which in turn requires continuity with the aim to build trust among involved parties. In addition, openness is relevant in two ways in implementations, first it is important that the Living Lab has an open mind and are attentive to what is happening during the implementation, and second, the process as

such needs to be open to make it possible for users to give their spontaneous input about their attitudes and experiences from using the implemented system.

Key-Principles Re-visited – Concluding Remarks (at last)

In the preceding section, I presented ten guidelines I have found as important to incorporate in Living Lab approaches to facilitate the fulfilment of the key-principles of Living Lab approaches. I related these guidelines to the key-principles of Living Lab operations and found that some of the principles were more salient than other principles were. Firstly, I found that the principles empowerment of users, realism, and openness are the three principles that are most outstanding in the processes of user involvement in Living Lab approaches. Of course, it is not a surprising discovery that empowerment of users is an apparent principle since this is one of the foundations for my research. In addition, I interpret the principles openness and realism as those two that actually distinguishes the Living Lab approach from ordinary user involvement processes, hence, their appearance confirm that the approach I have developed and applied during my research are Living Lab oriented.

Based on the final remarks given in the previous section I have found that the 10 guidelines should be used as a means to accomplish the key-principles of Living Lab approaches. I found that interact, iterate and involve contributes to continuity through its focus on building relationships and trust. Continuity, on the other hand, contributes to the guideline implement since the users involved in the implementation phase needs to be trustworthy and this is facilitated by long-term relationships.

Viewing the openness principle as an open process it is supported by the guidelines interact and iterate since these guidelines facilitate partner feedback throughout the process. Openness also means to be honest and open with the involved partners, hence the guideline, inform contributes to the fulfilment of this principle. In addition, viewing openness as a mental process keeping an open mind the guidelines influence, illuminate, and implement come into focus through their emphasis on encouraging involved partners to have an open mind and trust the data and the process.

The principle realism on the other hand is supported by the guidelines interact, involve, influence, inspire, integrate, and implement through these guidelines focus on collecting user data, generating user needs, and understanding users' perceptions of their everyday life and using that as a base for the future IT-solution.

The guidelines I have identified, as contributors to empowerment of users are identify, interact, iterate, involve, influence, and integrate. These guidelines inherit the perspective that users, with their different characteristics, are important and so are their perceptions and expressions. Hence, these should guide the development process of the future IT-solution. The implement guideline supports the empowerment principle by its focus on users' own free will to use the implemented system in their everyday life.

Finally, the spontaneity principle that is supported most by the openness principle. Hence, if the Living Lab approach does not support openness, the process cannot support spontaneity. However, viewing spontaneity as a key-principle the guidelines

iterate and inspire contributes due to their focus on keeping all doors open and not focus on premature solutions.

When grappling with the principles as such, I can discern some relations and dependencies among them that have not been discussed in any previous Living Lab research, see figure 18.

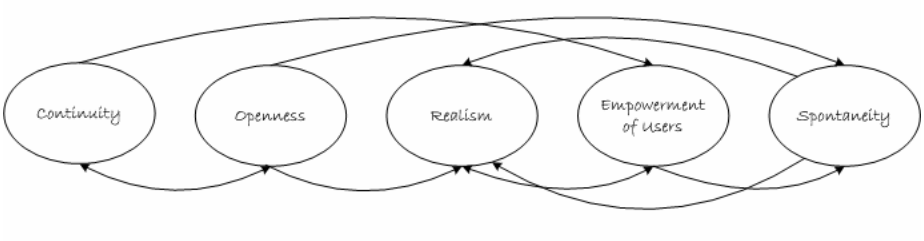


Figure 18. The Inter-Relation among Key Principles

In this illustration, a depiction of how I interpret the relations is given. Important to note here is that this is founded upon my reflections, and has not been researched in detail. I argue that the principle continuity facilitate openness since the involved stakeholders get to know each other However, to stimulate openness the stakeholders should be involved continuously. In addition, I view the principle of openness to have influence over if spontaneity is possible or not. Based on my understanding, I see that it becomes harsh to reach spontaneity if the process does not support openness.

FUTURE RESEARCH

During my research, I have identified some aspects that I believe are important to do more research about. These aspects are related to the need of technological support for user interaction, and to facilitate an open user involvement process. I have also identified a need of more research on the Living Lab approach and the Living Lab milieu to increase the collected knowledge about this concept.

Related to the need of technological support for user involvement I have recognised that in the future, we need to develop tools to support distributed user involvement if we want to involve users as private persons and on their premises. In addition, as our research area and many research projects globalises, and as our intentions are to understand the reality of the users, methods and technological devices to support this process needs to be developed, and its influence on the user involvement approaches needs to be researched.

When it comes to understanding the user, I have acknowledged that there is a need of more research about users' different characteristics and what kind of characteristics users should have to best contribute to the different processes of systems development. This means that in the early stages of systems development it might be important that users are creative, innovative and open for new solutions and they might need good insights into current technology. In the latter stages other characteristics becomes more

relevant such as being critical or being able to determine the business potential for the system. These are all aspects that I consider as important parts to do more research about in the future.

Furthermore, even though user involvement has been a prerequisite for several years we are not facing a shift in the degrees of user involvement going from design for and with users towards design by users. This alteration demand totally different methods and approaches. In addition, with this approach, technology needs to be developed to support these processes in a significant manner.

Regarding the Living Lab approach and Living Lab milieus, there are several aspects that need to be researched and understood if the concept should have a sound scientific foundation and become able to grow. One thing I believe needs more research is the key principles. At the moment, these principles are derived empirically, but these need to be underpinned theoretically and elaborated upon. Related to that, I want to highlight the importance of more research into the processes of Living Lab and how that approach can be incorporated in organisational processes. Another aspect I consider as relevant here is the openness of the process, how can we design processes to be open, and how we should handle the data generated from these open processes. In Living Labs, the aim also is to develop innovations in open and user driven approaches; here, I find it important to do more research on how these processes can be achieved by means of technology and approaches such as crowdsourcing, web 2.0, and open innovation. If those approaches are applied in Living Labs and systems development, I see a need to gain insights into the characteristics of users who choose to involve themselves in these processes, and the driving force behind these processes.

Finally, I believe that it would be fruitful to do more research on the relationship among the key principles of Living Lab approaches. To develop sustainable methods and approaches for user involvement processes in the Living Lab milieu, I view it as important to understand how the principles affect and support each other as well as knowing how these principles take form in different situations.

LAST REFLECTION FINALLY!

REFLECTING ON THE RESEARCH AND LEARNING PROCESS

To conclude and close the cover paper in this thesis, I present some reflections on the research and learning process that I have undertaken during my years as a doctoral student. First of all, my ambition in writing this thesis has been to describe work, procedures, and decisions as detailed as possible to make it possible for the reader to understand the process and the background and how the analysis has been made, and from that being able to judge if my interpretations are reasonable. To reflect over a process that really has not ended yet is a demanding task, since not enough time has passed to give me the distance required to be able to critically reflect on my process. However, I will try my best and present those reflections I determine as relevant at this point in time.

– Final Remarks -

During my years as a doctoral student, I have been involved in several multidisciplinary projects, and in this thesis I have selected three of these projects to form the basis for my research. The process of working together with people with different backgrounds and expectations has deepened my insights about my research area, Living Lab approaches to user involvement in development processes. All the collected knowledge and learning experiences that I have gained in these projects cannot be explained and discussed easily in a thesis. There are so many things I have learned that go beyond the scope of this thesis.

The first thing that comes to mind when I start to reflect is the difficulty of studying a phenomena, Living Lab, that is constantly developing as the research continues. When I started my research, the focus for the Living Lab environment I have been connected to was mainly on tests of mobile services, but as time went on, the focus altered and involved users in the early phases of the development process. Here, I am not certain if it is my research that has caused this alteration, or if it is due to environmental influences. Having an action research approach makes me hope that my research has an actual impact on the Living Labs focus.

Another thing I have experienced during my research is the challenge of conducting both project work and research at the same time. This situation put high demands on me as a researcher to be aware of my role in the present activities and to keep the research in focus while performing project activities. I have aimed to handle this by reflecting constantly on the process that has been described in this thesis.

When it comes to selecting projects to form the basis for this thesis, I have selected them on the basis of my ability to influence the user involvement process, their focus on generating users' needs and their focus on involving voluntary users. Here, I could have chosen to include more projects, but as the presented projects represented the base from which most learning experiences were gained, I considered these as most relevant and interesting.

If I had the chance to do it again, would I do anything differently? Yes, I would. This does not mean that I would like to change the things that I have done, but rather I would have complemented them with others. For example, I would have liked to accomplish user-driven processes where the users determine what they want to develop and then develop it. Following this kind of process and learning from it really would have contributed to my research, since the vision of Living Labs is to facilitate these kinds of processes. In addition, I would have liked to complement the data collection process by using technological support for user interaction, to make it possible for the users to choose when, where, and with what they like to contribute. Even though this has not been possible in the projects I have been involved in because of the limitations of the projects, I believe that the research and development process would have gained from such an approach. Furthermore, the methodologies I have used in the project have been rather traditional in their scope and design. I view this as a strength, due to its stable research foundation. However, I would have liked to complement these more traditional methods with, for example, blogging, digital storytelling, or crowdsourcing.

Finally, what can one learn from my lessons? Well, I believe that it is time to modernise our methods and tools for user involvement processes, and that we let the users sit in the

driver's seat instead of just following along. In the area of systems development for users who are scattered in the environment, it is vital that we, as ICT researchers and developers, start to involve users on their premises. I also hope that my thesis has made it clear that we need to take users' needs into serious account when we design systems for the future and for private users. In addition, I hope that people who apply Living Lab approaches, or people who design Living Lab environments, use the findings from my research as an inspirational tool to support their design of both the environment and the methods applied.

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Paper I

Enriching the Process of Appreciating Needs with Storytelling

Holst Marita and Ståhlbröst Anna

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Enriching the Process of Appreciating Needs with Storytelling

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Abstract: This paper explicates the possibility to enrich the process of appreciating needs with storytelling. In this way we are able to identify needs and, thus, facilitate the design process of a viable community for knowledge-sharing and creation across boundaries among young entrepreneurs. The specific situation which the design of a knowledge community constitute is discussed and the usefulness of our approach is thereafter valued in relation to the challenges of creating a viable community constructed from participants' identified needs and interests.

Keywords: Communities-of-practice, Entrepreneurial Knowledge Community, Storytelling, Needfinding, Traditional Information Systems Design Methods

THIS PAPER REPORTS on a research project within the context of recent initiatives taken to implement Information Technology (IT) solutions to support entrepreneurial knowledge-creation in Europe. The project intends to create learning opportunities with technology-enabled, sustainable formal and informal information exchange and knowledge-creation activities. The objective is to further innovative thinking and entrepreneurial activity, acknowledging the importance of continuous sustainable innovative knowledge-sharing among entrepreneurs. Hence, the main aim of the project is to stimulate the entrepreneurial spirit, knowledge-creation and business opportunities by usage of modern technology in an entrepreneurial way across boundaries. The starting point for proposing a design for a European Entrepreneurial Knowledge Community (EKC) assumes the enabling presence of Information and Communication Technology (ICT) supportive of knowledge production. Hence, the virtual knowledge community space will be supportive of efficient and robust strategies to share, create and use knowledge and thereby stimulate expression of the entrepreneurial spirit, knowledge-building, and business innovation throughout Europe.

Knowledge-creation conditions in a virtual community space, we believe, requires sufficient dialogue for 'rapport building' followed by data conversion (into information and knowledge) and experience-sharing (Holst and Mirijamdotter, 2004; Huang and Newell, 2003; Newell, Robertson, Scarbrough, and Swan, 2002; Swan, Newell, Scarbrough, and Hislop, 1999). It follows that the community design must offer an enabling situated context for communication, interaction and 'sense making' among virtual community participants (Holst, 2004; Mirijamdotter, Somerville, and Holst, 2005). Such an enabling context, based on identified needs, attempts to replicate the 'naturally occurring' circumstances prompting development of communities-of-practice (Brown and Duguid, 1991; Lave and Wenger, 1991). addressing the complexity of creating an EKC, our research assumptions acknowledge as a beginning point that in order to design a viable community; we must identify and understand the needs of the intended community's stakeholders. As the literature attests, if results don't meet users needs, socio-technical communication systems will not be accepted or used (Magnusson, 2003; Preece, Rogers, and Sharp, 2002; von Hippel, 2001). It is, therefore, important to understand how a system will be used and what kind of activities it should support and for whom the system is designed (Mirijamdotter et. al., 2005; Preece et. al., 2002).

To deeply understand users' needs, however, is not an easy task (Dahlbom, 2003; Magnusson, 2003; Newman and Lamming, 1995; Preece et. al., 2002). Because 'real world' systems needs can be difficult to detect, uncovering needs requires an organized – and inventive - research effort (Patnaik and Becker, 1999). The project revealed limitations in the traditional information systems design (ISD) methods and thus, encouraged us to investigate new innovative methods which could better support the process of finding stakeholder needs (Ståhlbröst, Mirijamdotter, and Bergvall-Kåreborn, 2005). To elicit these needs we began by obtaining a rich qualitative picture of today's user – including the role of IT in knowledge-creation processes, using needfinding (Patnaik and Becker, 1999) and narrative inquiry (Dodge, Ospina, and Foldy, 2005; Ospina and Dodge, 2005).

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Needfinding is a market research approach, aiming to contribute to the finding of needs and includes a four-stage process; frame and prepare, watch and record, ask and record and, finally, interpret and reframe (Patnaik and Becker, 1999). As we see it, these steps are part of almost any inquiry and Patnaik and Becker does not give any detailed guidance of how to proceed in each step, for example, who to observe or what to ask. Hence, the purpose of this paper is to enrich needfinding with storytelling since observations of non-existing (future) situations with still not developed technology are difficult (impossible) to perform. At the same time the suggested method answers to limitations in traditional Information systems design methods. Thereby we contribute to and enable the design of viable, virtual communities.

The paper is structured as follows: first we introduce the theoretical context of communities-of-practise which inspire our design efforts; moreover, the complexity of boundary-crossing knowledge sharing is outlined here. Thereafter, limitations in traditional information systems design methods are discussed. This leads to the case and case methodology which thereafter is presented in more detail. The suggested needfinding methodology used is described. Following this, we discuss the chosen approach and relate it to the identified limitations of traditional information systems design methodologies. Finally, we present our conclusions and indicate future work.

Positioning the Creation of a Knowledge Community

To appreciate the special difficulties when designing communities, we build on communities-of-practice, known to exemplify successful networks for sharing, using and creating knowledge fruitfully in an autonomous way (Brown and Duguid, 1991, 1998; Lave and Wenger, 1991). Communities-of-practice are formed spontaneously out of members' interest and needs, suggesting the importance – when creating intentional communities – of identifying the shared needs and interests necessary to 'glue' participants' together through 'rapport building' interactions. These interactions should enable the important maintaining and sustaining of trust and caring (McDermott, 1999a). Communication and collaboration strategies are required to cross boundaries in any knowledge community – and this is compounded by the distributed nature of entrepreneurial environments which are further challenged by the added pressures for 'making it'.

The underlying concept of communities-of-practice was introduced by Lave and Wenger (1991), when they observed that learning is an intrinsic aspect of these highly participatory information and knowledge intensive relationships. These relationships evolve formal and informal communication and relationship building and sustaining processes. Communities-of-practice provide an environment in which the members share, construct, and learn together (Kling and Hara, 2002). The power of communities to create knowledge is underscored by McDermott who says, "Ironically, when we look at our experience, the heart of knowledge is not the great body of stuff we learn, not even what the individual thinks, but a community in discourse, sharing ideas" (McDermott, 1999b p. 110).

Until rather recently, people have spent their entire working life within a community of professional, disciplinary, or trade colleagues. Within this context, they have naturally developed their know-how and managed their daily activities. Knowledge has 'naturally and easily' been created, shared, used and transferred within the community, passing on from one generation to the next and, thereby maintained, even as know-how has evolved with time. In contrast, work today increasingly occurs across geopolitical, cultural, and disciplinary boundaries in dynamically changing distributed organisations (Ford and Chan, 2003; Holst, Mirijamdotter, Bergvall-Kåreborn, and Oskarsson, 2004; Huang and Newell, 2003). Present day Knowledge communities, which drive knowledge exchange and feed knowledge-creation initiation and sustainability, are becoming increasingly virtual. To become viable, newly constituted communities require a shared context for collaboration on boundary-crossing business possibilities, as we know from other industries (Fahey and Prusak, 1998; Ford and Chan, 2003; Holst, 2004; Holst and Mirijamdotter, 2004). At the same time, establishing – much less maintaining – relationships is appreciably more difficult among entrepreneurs because, unlike workers in traditional firms, they lack the organizational infrastructure which facilitates easy horizontal and vertical communication, information capture and organization, and knowledge production and transfer.

Young entrepreneurs often work in solitude, lacking possibilities to create a community. At the same time, their productivity depends on creating a community sufficient for exchange of ideas and insights and, ultimately, knowledge through enabled collaboration across boundaries of place and time and discipline. Here the literature about communities-of-practice is not particularly helpful, as it typically focuses on work and knowledge-sharing within a community of people from the same discipline or trade or with common roles, who meet and learn from each other (Brown and Duguid, 1991, 1998; Kling and Hara, 2002; Lave and Wenger, 1991). Still, communities-of-practice serves as inspiration – and suggested desirable outcomes – for the intentionally created communities about which we write.

The accentuated demands surrounding creation of a shared context for virtual knowledge production activities requires robust strategies for supporting entrepreneurial knowledge workers. In this paper, therefore, we take the conventional definition of communities-of-practice, which grow autonomously from participants' interests, as the inspirational idea in our creation of knowledge communities designed and created.

Critique of Traditional Information Systems Design Methodologies

Many ISD methods are based on the life-cycle model. This model is well suited for identifying structured requirements but has shown limitations for other situations, for example, when it comes to handling human activity systems (Kendall and Kendall, 2002). The shortcomings of the life-cycle model have led to an exploration of more flexible methods such as evolutionary development and iterative application development. When designing a virtual knowledge community we have found that the most significant limitation is that the life-cycle approach ignores the identification of needs and assumes that users can specify system requirements with reasonable completeness before the design begins. However, users are often not aware of, or cannot articulate, their requirements until a system is in use (Vidgen, Avison, Wood, and Wood-Harper, 2004). Moreover, requirements are not fixed, they change over time, while needs are more stable and can be met with different requirements or solutions, for example the need to store computer data (Patnaik and Becker 1999). This need is more stable than solutions, such as punch cards, magnetic tape or 5 ¼" floppy disks, or a requirement such as storage capacity of a certain amount of data. Requirements are statements related to a specific product (Preece et al 2002) while needs are on an overarching level where the solution is not given and different requirements can meet the needs (Ericson and Ståhlbröst, 2005). Another dilemma with traditional information systems design methods that are available today – even though they may be both flexible and iterative – is their focus on systems development for support of organisations. This becomes a problem when the intended users don't have a definite organisational belonging. Moreover, in an organisation the use of the system is usually mandatory, which means that the user cannot choose another system. In a virtual community the usage of the system is voluntary. Hence, if a virtual community is to become relevant and thus, viable it requires a design based on identified needs. Virtual communities need to be likable for its users, as their satisfaction is key for success.

Traditionally, requirements have been gathered through interviews, questionnaires and observations of work practices in information systems design and these methods are still recommended (e.g. Preece et. al., 2002). Two problems with this have been identified. First, as communities are based on needs of its members, we need to identify needs and not requirements. Hence, the community should be designed in ways which motivate the user to participate and to contribute to the community. The fact that the traditional information systems design methods focus on an organisational context in which the intended system will be implemented lead to other problems as well. These methods assume that you know who the intended users are, and can observe the work practices the system should support. This is not easily achieved when designing a virtual knowledge community.

Even in methods for developing web-applications there is, to a large extent, still a focus on requirements instead of needs and also an ambition to understand the organisational context of the intended system (e.g. Donnelly, 2001). Even though there is some literature recognizing the importance of a clear view of user needs, expectations, capabilities, tasks, goals and the circumstances for the system to be used (Fitzgerald, Russo, and Stolterman, 2002; Preece et. al., 2002) these authors do not give any guidance about how to identify and understand the concept of needs (Ericson and Ståhlbröst, 2005).

Moreover, in traditional ISD it is assumed that you should develop a tool which enables the work within an organisation. But a virtual community is not a tool for work; it is a medium for interaction and communication. It is therefore necessary to find an approach which enables the identification and understanding of user needs – in order to create a viable and relevant community. Research on more or less successful initiatives employing information technology (IT) solutions for community creation (e.g. Erickson and Kellogg, 2003; Hayes and Walsham, 2001; Kling and Hara, 2002) have emphasized technology-enabled support of social interactions. From this starting point, we apply 'needfinding' to identify technology-enabled communication needs among young entrepreneurs engaged – or potentially engaged - in knowledge-sharing.

The Entrepreneurial Knowledge Community Case

Stakeholders in the EKC case are incubators from France, Italy, Poland and Sweden, young entrepreneurs in ages between 18-30 who are beneficiaries of the incubators in these countries, Web designers from Finland and researchers from Sweden. The researchers offer methods for and preform data collection

and analysis in the project while web-designers build the prototype of the EKC. Incubators and young entrepreneurs offer their experiences and will finally be the beneficiaries and users of the EKC. The relation between incubators and young entrepreneurs is characterised by incubators with the function of identifying and assisting young entrepreneurs to establish profitable business ideas. Usually the incubator helps the young entrepreneurs by offering office space, technological competence and networking contacts with financiers and other professionals. Through coaching, the young entrepreneur can develop his or her business experience and become viable under 'the wings' of the incubator organisation. Specific assistance varies depending on the situation, branch or country of the entrepreneur. Usually future young entrepreneurs are identified for incubator status through universities' referrals or through competitions on the 'best business idea of the year'. Each year a small number of young entrepreneurs – "the best and the brightest" - are chosen to receive the services of the incubator.

Appreciating Needs

The process of identifying needs is difficult since people usually are not aware of available possible solutions. Consequently, merely asking people about their needs is insufficient for identifying needs (Hyysalo, 2003; Salovaara, 2004). Moreover, needs could be difficult to articulate and explicate since people are often acclimated to their problems and find ways of 'working around' difficulties and barriers. One way to identify needs is to study current or past behaviour (Preece et al 2002). This approach is also in line with appreciative design, a method for organisational intervention where the starting point is a search for the best of 'what is' (Norum, 2001). Suitable methods for appreciating needs include observations and interviews. But, as we discussed, observations is not an option in our case.

Hence, narrative inquiry (Dodge et. al., 2005; Ospina and Dodge, 2005) where the focus is on storytelling is used. Since needs represent the goals that users find important to achieve in their life and their work - and needs satisfaction strategies are the means by which goals can be reached (Salovaara, 2004), understanding individuals' needs, including their intensity levels, are important to needs fulfilment by systems design efforts. Therefore, our research effort focuses on needs as a contribution to the planning process in both the short and long term because needs endure longer than any specific solution. A focus on needs also functions as a way to avoid a 'too early' limitation of possibilities in the design phase. Through the identification of needs a 'roadmap' is provided and, therefore, ensuring the possibility to prioritize among identified needs according to Patnaik and Becker (1999).

Our applied research approach is based in 'soft' systems thinking as reflected in Soft Systems Methodology (SSM) (Checkland, 1981, 2000; Checkland and Scholes, 1990) which leads to a focus on the whole instead of just the parts of a future knowledge community. This approach complies with basic ideas of appreciating needs - that users' needs become visible and comprehensible within a richly textured context. Therefore, we conducted open ended appreciating needs interviews inspired by usage of a storytelling approach. In this way, we obtained rich stories about incubators and entrepreneurs' contexts and knowledge processes as well as an understanding of their needs to communicate, use, and share information and knowledge. The interview process began with one-to-one telephone interviews of four representatives from incubator organisations in France, Italy, Poland and Sweden.

The interviews took between 60-70 minutes in time. Interview questions focused on issues of interaction and communication as a way to share knowledge and use of IT between the incubator and the entrepreneur, as well as clarifying differences among incubator organisations. The respondents were encouraged to talk both about 'what is' and 'what might be', i.e. a focus on both the present and the future, as related to technology-enabled information exchange and knowledge-creation in their community. In keeping with the storytelling construct (Dodge et. al., 2005; Ospina and Dodge, 2005), questions were formulated in such ways that respondents would tell their stories and thereby reveal deep knowledge about their experiences, from which we could identify needs. Results from these interviews provided an understanding of organisational context and, within this context, incubator needs in relation to the design of the virtual community.

Following the same storytelling-inspired needfinding approach as in the interviews with incubators; one focus-group interview with 3-6 young entrepreneurs in each country were conducted. All needfinders used the same questions and method-guidelines which had been designed by us and presented in a report and discussed in a group-telephone meeting before the actual interviews took place. The interviews ranged from 50-90 minutes, and it was young entrepreneurs connected to the incubators that participated. Focus-groups are useful for creating interactive communication among newly constituted conversation groups who share characteristics of interest (Bloor, Frankland, Thomas, and Robson, 2001; Wibeck, 2000). The method is especially suitable in investigating people's views or attitudes on a certain phenomena – in this case, knowledge-creation.

Group interviews also generate broader and deeper ideas and views than can be achieved through one-to-one interviews. In our study, the interviews began with questions, formulated to stimulate narratives about the entrepreneurs' organisation, their daily activities and daily work. Thereafter, participants were asked a number of questions about their use of and benefit from ICT. Once group rapport was established, questions were asked about communication and knowledge-sharing within the entrepreneurs' organisations, between entrepreneurs, and between incubators and entrepreneurs. We also found that focus group interviews created a dynamic discussion which revealed rich stories. Moreover, participants related their narratives to each others and in this way they validated each others statements or gave different perspectives on the issue discussed.

Data from all interviews were then transcribed and translated into English. We analysed them all in terms of vertical and horizontal measures (Thomsson, 2002) related to needs. In the vertical analysis, each interview was analysed individually as a way to identify both implicitly and explicitly stated needs. Thereafter, identified needs in all interviews were compared and clustered into categories and themes in the horizontal analysis. Our purpose was not to identify differences between the different countries or organisations; rather, we intended to identify the common and shared needs.

In the project an iterative approach was taken in which appreciating needs is the first step. When needs had been identified the next step in the process was activated. Here a discussion and analysis on the identified needs was made. In this process both designers and researchers interacted with the material and each others trying to find a way to proceed. Next step in this project was to design a mockup and present it to the stakeholders in the project. The reactions on the mockup were then analysed and the results from this analysis creates the basis for the design of the prototype. Finally, the prototype was used by stakeholders for some time, during which it will be evaluated against identified needs in an interactive fashion as a way to further the design of the virtual knowledge community. Reports on these activities will follow.

Discussion of the Chosen Approach

Our starting point was that the planned community should be based on identified needs and stakeholder participation. Our proposition was that this gives opportunities for creating a viable and 'alive' knowledge community and an increased motivation to participate and contribute to the community and thereby create and share knowledge. Hence, our approach acknowledge that we must identify and understand the needs of the intended community's stakeholders as discussed by e.g. (Dahlbom, 2003; Magnusson, 2003; Patnaik and Becker, 1999).

We used storytelling to enrich needfinding because we believed that stories contain knowledge that is richer than the results achieved from surveys or interviews. Using storytelling for the organized approach of appreciating needs has given positive and encouraging results. Our approach and aim is confirmed by results in the project. The following highlights express findings from using storytelling and appreciating needs in the challenge to find input to the design process of creating a viable virtual entrepreneurial knowledge community space.

We have found that storytelling provide understanding about local knowledge and unique contexts, thereby revealing deep insights into human circumstances. Hence, storytelling methodologies facilitate 'finding meaning' in the stories people tell and are especially suitable for understanding social events according to Dodge et al (2005) and Ospina and Dodge (2005). I our case we focused on information exchange and knowledge-creation and transfer. We found that storytelling offers the added benefits of enriching frames of references. We also found that stories explicate the underlying assumptions that guide our actions, which is especially important here since communities are shaped by situated circumstances.

As we discussed earlier there are several reasons for identifying and understanding the needs of future users when designing a virtual community. To address the first problem; that a community is not an organisational system that the users are forced to use, but based on the free will to participate and contribute to the community. We found that appreciating needs through storytelling made it possible to increase the important level of motivation through the creation of a strong relation to user needs.

Having communities-of-practice as inspiration for design leads to consequences as a community-of-practice is situated. Therefore, also the designed community should be based on situated needs and interests. We have found that the chosen strategy creates situated user participation already from the start-up-phase leading to motivation to take part and to contribute to the community among future users and beneficiaries. Moreover, the chosen approach takes the design from a focus on technology and what possibilities IT offers, through the focus on social interaction to the next level – needs. Thus, appreciating needs through storytelling give a rich understanding of the situated needs, enabling a design of a viable knowledge community corresponding to a community-of-practice.

In terms of methodology to identify needs it is recommended that interviews and observations

should be used. Again, this is a problem when designing a virtual community. As we argued earlier, this recommendation is based on the idea that it is an organisational system that is being created. Hence, the users and the user-situation are known – you can observe the user in its present work – the users are gathered in one place, while, when designing a virtual community the actual user usually is unknown. The 'true' future user is, in our case, unknown and therefore, we chose to interview a segment of the intended target-group of users. To clarify, in our case, the future user group is heterogenous and spread all over Europe in numerous of different organisations. Observations were therefore impossible to perform. To be able to identify and understand the intended users' needs, storytelling was found to be a relevant and valuable method.

The narrative inquiry approach gave rich stories which included rich information and offered understanding of the local knowledge and unique context for young entrepreneurs. The richness that the stories offer made it possible to identify needs and to see new things. Hence, our study indicates that focusing on storytelling is an adequate alternative for observations. Appreciating needs through storytelling enabled us to discover and understand differences and similarities in needs among participants. Thus, rich stories assisted us in finding meaning and understanding shared processes as well as needs related to those processes.

In answer to the critique of traditional ISD inspired methods, where it is assumed that a user can express system requirements, we suggested a appreciating needs approach instead. We have found that a focus on needs when designing a virtual knowledge community leads to more creative and innovative processes and, furthermore, more relevant systems. The lesson learned is related to the fact that when focusing on requirements the technical solution is given, while the focus on needs is more overarching and, thereby, many different solutions are possible. In our case the solution is also given – a virtual knowledge community – but, the ambition was to fill the community with functions answering to identified needs. Hence, the functions available within the community were not decided on beforehand and our approach enables and facilitates a more innovative approach when designing.

The strategy to focus on the whole, combined with a focus on needs, helped us to be creative and innovative, thereby, avoiding narrowing down on details and premature design ideas. The stories gave inspiration and expanded the area of what can be considered possible in a designed virtual knowledge community space. The identified needs and interest areas descends from activities that occur today, but they are also based on dreams of what a virtual community might offer. Our study indicates that the grounding in today's activities is a well functioning way to identify needs. However, to create something new, dreams of the future are necessary to identify needs that important to consider in the design. Consequently, we learned that through the encouraging of narratives about 'what is' and 'what might be' participants shared their experiences in rich ways leading to a focus on future possibilities instead of on what problems they wanted to solve. Hence, the change in focus from problem solving to needs and possibilities took place logically. Thus, focusing on present positive experiences and future dreams through narratives enables the identification of possibilities in the future design.

There are, as expected, drawbacks in obtaining such a rich material. Understanding the whole material and analysing it takes time, which is a shortcoming, as time usually is a scarce resource. However, our experiences indicate that appreciating needs through storytelling is less resource demanding than observations, the frequently recommended method for understanding the user situation. Another drawback is, that neither needfinding, nor narrative inquiry, as methods gives any guidance on which needs to choose to focus on and to implement in the future designed community. In contrast with Patnaik and Becker (1999) who argue that needfinding give guidance to how to prioritise needs, our experience is that there is nothing in the method itself that facilitates the prioritising of identified needs. In fact, the method does not give any guidance on how to identify needs eihter; it is only a method for gathering needs.

Conclusions and Further Work

In this paper our aim was to enrich needfinding with a storytelling approach, answering to identified limitations in traditional ISD methods. Thereby we contribute to and enable the design of viable, virtual communities. We intended to develop useful methods for obtaining a rich picture of today's use of IT among intended users of a community. Needs in relation to knowledge-sharing and creation in a virtual knowledge community were focused. From our study we draw conclusions on two different levels. Firstly, theoretically and methodologically, conclusions are drawn on the usefulness of our approach. Secondly, practically, conclusions are drawn from the consequences of the usage of our approach in practice.

We have found that appreciating needs through storytelling give a rich understanding of the situated needs, thereby enabling a design of a viable virtual knowledge community corresponding to a community-of-practice. The chosen approach enabled us to discover and understand differences and similarit-

ies in needs among participants since, storytelling assisted us in 'finding meaning' and understanding shared processes as well as needs related to those processes.

We have found that a focus on needs when designing a virtual knowledge community leads to more creative and innovative processes and, furthermore, relevant systems. Hence, we found that storytelling offers the added benefits of enriching frames of references. Moreover, the change in focus from problem solving to needs finding took place logically, as focusing on present positive experiences and future dreams enabled the identification of possibilities in the future design.

Our study indicates that the inclusion of users in the creation of a virtual community already from the start creates commitment and motivation to contribute to a community. Hence, appreciating needs through storytelling made it possible to increase the important level of motivation through enabling the creation of a strong relation to user needs.

Our experiences indicate that the suggested appreciating needs strategy is less resource demanding than observations, the frequently recommended method for understanding users. Hence, our study indicates that focusing on storytelling is an adequate alternative for observations.

We have found that explicit focus on needs lead to implications for the design. The drawback is that there is no guidance for which needs to prioritise. Further research is, therefore, needed to address issues on how to prioritise needs to address in the design as well as whose needs to focus on.

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Paper II

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Appreciating Needs for Innovative IT Design

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Abstract: To identify user needs has become increasingly important as new interaction technology (IT) and services become available continuously and the use of interaction technologies such as, for example, internet or mobile phones have grown to be ubiquitous, influencing leisure as well as work. Therefore, new interaction technologies must offer added value for the user or the products or services will stay unused since most of them are optional to use. To increase the possibility for actual use, a responsive process for discovery of needs among users should become a natural part in design and development of innovative interaction technologies. But, the process of identifying user needs is complicated because the needs are situated in the user's context and are experienced by the user as a perceived lack of satisfying solutions. The purpose of this paper is to present a method for identifying and operationalising needs that are difficult to articulate, i.e. tacit needs, and needs that are easy to articulate, i.e. explicit needs, in design processes. Appreciating Needs (AN) is an interpretative approach where the study of people aims to identify unmet needs and it is to some extent a paradoxical activity, since what is sought for is a circumstance where something is missing. Our method has its basis in the underlying ideas of Needfinding and is inspired by Appreciative Design. In our method, rich stories/narratives about the intended users' situation are generated and these stories give a rich understanding of their context. From this understanding, needs are appreciated and operationalised in innovative design of new technical solutions. Hence, with a focus on discovering users' needs early on, we involve users throughout the design process, leading to perpetual and persistent user-centred systems.

Keywords: Needs, Innovation, Needfinding, User-centered, Interaction Technology, Formative Process, Appreciate, Design

THE PROCESS OF developing new products or services, includes three inescapable facts, it is risky, expensive and time-consuming (Jobber, 1998). One way to overcome some risks is to involve users. It has shown valuable even though it can be experienced as expensive and time-consuming (Benyon, Turner, and Turner, 2005). It is also increasingly recognised that the success-rate of new products is strongly dependent on the quality of the opportunity-identifying-processes in product development practice (Van Kleef, van Trijp, and Luning, 2005).

Adding to that, today Interaction Technology (IT) (Wiberg, 2005) should support both work and leisure interactions, and this sets high demands on IT-systems since usage of them oftentimes are voluntary (Holst and Ståhlbröst, 2005). Hence, if IT does not give added value to users it will stay unused, and expected profit runs risk at being lost. Products that give an added value have, therefore, become increasingly important as new IT have grown to be ubiquitous. Hence, it is important to learn about user needs early on because this knowledge increases the possibility for product success (Benyon et al., 2005; Dahlbom, 2003; Magnusson, 2003; Newman and Lamming, 1995; Preece, Rogers, and Sharp, 2002; Van Kleef et al., 2005; von Hippel, 2001). In fact, the basic formula for product success is quite simple – see a user need, fill a user need (Northway, 2000).

Traditionally, market research-methods have been used to investigate people's needs. These methods can be useful when it comes to quantifying users' preferences but are not helpful when it comes to discovering needs that cannot be articulated easily. As a way to contribute to these drawbacks, methods inspired by anthropology and sociology have been used (Kankainen and Oulasvirta, 2003). However, these methods provide a great amount of data but fail to expose opportunities. Hence, they merely help to describe the context under study (Kankainen and Oulasvirta, 2003; Patnaik and Becker, 1999). Needfinding is a market research approach, aiming to contribute to the identified drawbacks with the methods used in market research for finding needs (Patnaik and Becker, 1999). This method includes a four-stage process; frame and prepare, watch and record, ask and record and, finally, interpret and reframe. As we see it these steps are part of almost any inquiry and Patnaik and Becker does not give any detailed guidance of how to proceed in each step, for example, who to observe or what to ask. Further, the study of current and past behaviour is a sufficient way to find user needs according to Preece et al (2002); but, still no guidelines for how to proceed in that process or what to look for are given.

In earlier studies, we have identified limitations in traditional information-systems design methods, such as, their focus on design for organisational

support and the identification of requirements, not needs (Ericson and Ståhlbröst, 2005; Holst and Ståhlbröst, 2005). Another problem we identified with traditional information-systems design-methods is that many of them focus on identifying and solving problems in a specific situation (e.g. Gupta, 2000; Kendall and Kendall, 2002; Löwgren and Stolterman, 2004; Preece et al., 2002). Hence, these methods are suitable for identifying and framing problems, but they can also limit what is seen (Vidgen, Avison, Wood, and Wood-Harper, 2004). The problem-solving focus is also, according to Zemke (1999), a null-sum game that directs the focus on what is wrong instead of focusing on the potentials inherent in a situation.

Taking the above into account together with experiences from earlier IT-development projects led to a situation where we found it necessary to develop a method which enable appreciation of situated user needs from a perspective of opportunities (Ericson and Ståhlbröst, 2005; Holst and Ståhlbröst, 2005; Ståhlbröst, Mirijamdotter, and Bergvall-Kåreborn, 2005).

This paper contributes with methods supporting processes of appreciating user needs in design-processes, in particular processes for creating innovative IT-products and services. The suggested method gives special attention to the opportunities embedded in a situation. Thus, the purpose of this paper is to present and reflect upon a method which we call Appreciating Needs (AN). In the following, we argue for the necessity to gain a thorough understanding of users' situations, needs, and values in processes of innovation. After that, a presentation of the perspectives inspiring the Appreciating Needs Method is given, followed by the method itself. Thereafter empirical examples are presented with descriptions and considerations from the method in use. Finally, reflections and conclusions are given.

The Necessity to Appreciate Needs and Opportunities

There are many benefits with a focus on user needs in innovation-processes. A focus on needs helps developers, or innovators, to avoid too early limitations of possibilities and, therefore, keeps more doors open. User needs are also opportunities waiting to be discovered, not guesses at the future (Patnaik and Becker, 1999). Moreover, needs are long-lasting and can be met with different requirements or solutions, while requirements are more unstable and can be influenced by trends that change over time and are strongly associated to a specific product (Patnaik and Becker, 1999). For example, the need to store data is more stable than specific solutions, such as punch cards, magnetic tape or 5 ¼" floppy disks, memory-sticks, or a requirement such as a certain amount of storage-capacity.

It is, however, not a straightforward process to identify user needs since needs and requirements are intertwined concept and needs can have many different forms and appears at different levels (Preece et al., 2002). The identification of needs and establishment of requirements is therefore a difficult task to perform (Benyon et al., 2005; Preece et al., 2002). A literature study of the concept 'needs' has also shown that the concept oftentimes are mixed up with, requirements, wants, desires or experiences (Ericson and Ståhlbröst, 2005). A requirement is a statement about an intended product that specifies *what* it should do (Benyon et al., 2005; Preece et al., 2002; Vidgen et al., 2004) and requirements arise from a broad understanding of user needs. This indicates that a distinction between needs and requirements exists.

It is not always possible for users to express precisely what they need, it is possible that they only have a feeling that something is missing. Thus, needs can be expressed as a perceived lack of something and this something has to be recognised and articulated by someone, the needfinder. A process of finding needs can therefore be described as a paradoxical activity, since what is sought for is a circumstance where something is missing (Faste, 1987). Consequently, the approach to ask users, straight up, what their needs are is insufficient since most people find it difficult to articulate and explicate their needs. One reason for this is that people are often not aware of potentials and possibilities they have or what kind of solutions that might be available (Hyysalo, 2003; Salovaara, 2004). This makes the process of appreciating user needs difficult. Moreover, many users might have needs they are not aware of and this complicates their ability to express what they really need even more (Van Kleef et al., 2005). In addition, users might also become acclimated to obstacles in their environment and find alternative ways to perform their tasks and this affects their awareness and possibility to express what they need (Patnaik and Becker, 1999).

Perspective of Appreciating Needs

Appreciating Needs is an inquiry-process that aims to support creation of innovative IT-systems. Appreciating Needs is based on experiences from various research and development projects, teaching and from discussions with colleagues (Bergvall-Kåreborn, Ståhlbröst, Holst, and Mirijamdotter, 2006; Ericson and Ståhlbröst, 2005; Holst and Ståhlbröst, 2005; Ståhlbröst, 2004; Ståhlbröst et al., 2005). The method is easy to understand and use by different people and it is applicable to different IT-

development projects, since it is easily adapted to situational circumstances. Appreciating Needs give a thorough understanding of users' situations, from which innovative and creative development and design can follow.

The Appreciating Needs method, is inspired by three streams; Soft Systems Thinking, Needfinding and Appreciative Design (Bergvall-Kåreborn et al., 2006). The first stream, Soft Systems Thinking (Checkland and Holwell, 1998; Checkland and Scholes, 1990) form our basic values such as; changes can only occur through changes in mental models, we aspire to interpret and understand a situation, we strive for iterative interactions with users and we are open, and responsive, aiming to understand and consider different worldviews among users during the development process. The second stream, Needfinding (Patnaik and Becker, 1999), inspire us to encounter user needs during these processes while the third stream, Appreciative Design (Norum, 2001), encourage us to focus on life-giving factors in the situation, searching for the best of 'what is'.

Traditional problem-solving approaches start with the identification of what is interpreted as problems. Analyses of the causes of the problems are made, possible solutions are suggested, and finally a plan for implementation is created. In these cases, problems might be solved, but does it really contribute to making the situations better? According to Shepherd (2001) the predisposition to look for what is wrong is so deeply embedded that we are not even aware that we are doing it. Problems call for solutions, while opportunities invite us to meet those (Adams et al. 2004), so, searching for positive experiences and past successes to build on, gives positive effects, and encourages a changed perspective (Norum, 2001). The appreciating needs method enables the struggle with identification of needs, appreciated through interaction and iteration with intended users of the IT-system. To appreciate means three things; (1) a way of knowing and valuing the best in life, (2) a way of being and maintaining a positive stance, and (3) a way to increase in value (Cooperrider and Avital, 2004). In our perspective, identifying opportunities is part of the process of appreciating needs since needs are opportunities waiting to be exploited. The appreciating needs method enable a focus on possibilities and strength in the situation under study and this is fundamentally different from traditional problem-solving approaches.

Hence, the method is iterative, and interaction with users is an assumed prerequisite. The idea is that knowledge increases through iterative interactions between phases and people with diverse competences and perspectives. In this way knowledge increases through dialogue between participants. The cross-functional interaction enables the processes of taking knowledge from one field to another to gain fresh insights, which then facilitates innovative ideas. The shared understanding of the situation informs and enriches the learning processes and thus facilitate changes in perspective and lead towards innovative design-processes (Holst and Mirijamdotter, 2006). This, in turn, increases our qualifications to design IT-systems which answer to user needs.

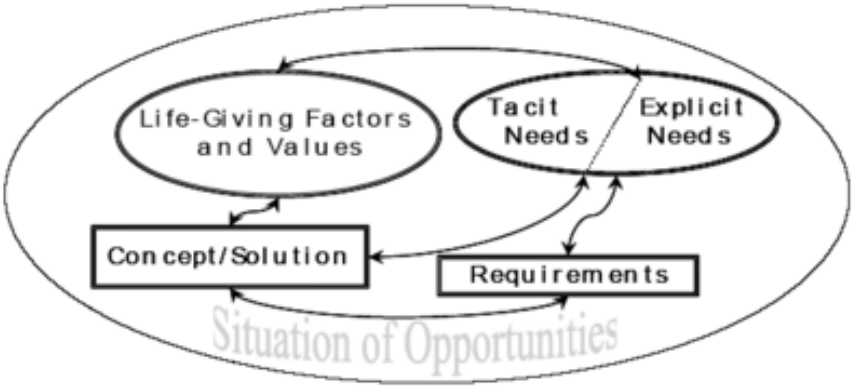

Figure 1: The Appreciative Needs Perspective of a Needfinding Situation

In our perspective the processes of inquiry starts in situations full of opportunities, see figure 1. Hence, there is always something good and something bad in every situation, and we choose to focus on the good and functioning (Cooperrider and Avital, 2004; Norum, 2001). Consequently, a search for life-giving factors or values in a situation is incorporated in the method. Identified life-giving factors and values are then incorporated into the process of innovation. From an understanding of the situation and its values, we search for needs that are difficult to express, i.e. tacit needs, as well as needs that are easy to express, i.e. explicit needs. Tacit needs must be understood and transformed into explicit needs to make them actionable. The explicated needs can then be translated into requirements, functions, and solutions.

In addition, the understanding of a situation does not only elicit tacit needs, the user can also communicate what they need, i.e. *requirements* in some cases. Users might also know exactly how they need, or want something to work, thus, they can express *functions* and/or *solutions* specifically. In the process of appreciating needs, all these aspects are considered and acknowledged, but due to the fact that most difficulties arise when trying to express and find tacit needs we focus on that part.

The Appreciating Needs Method

In this section, we give an overview of the Appreciating Needs method as a whole. The method consists of three iterative phases; Discovery and Dream, Design and Develop, and, Decide and Disseminate, see figure 2. Users are involved in two of the phases, Discovery and Dream and, Decide and Dissemination. In the phase Design and Develop users are not directly involved, but they influence the design.

In the first phase, we strive to find the best of "what is", and dream of "what could be" (Cooperrider and Avital, 2004; Norum, 2001) based on rich narratives (Holst and Ståhlbröst, 2005) from user interaction aiming to learn about life-giving factors, needs, and dreams in the situation. After analysis of the narratives, needs can be appreciated, categorized and prioritized. Thereafter, the next phase of the process is activated; Design and Develop.

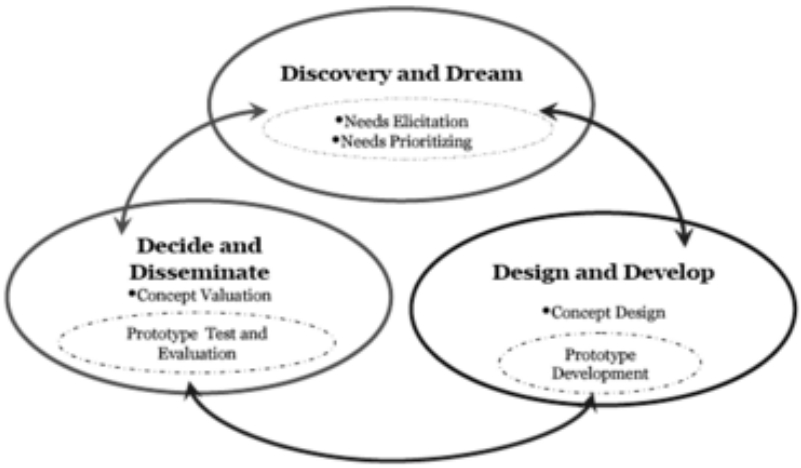

Figure 2: Process for Appreciating Needs

In this phase, the development of concepts and/or solutions is focused. The suggested concepts are based on the categorisation and prioritising from phase one, focusing on 'what can be'. In this phase designers and needfinders co-develop concepts with the aim to make them easy to respond to for users. Thereafter, users value the concepts in phase three, Decide and Disseminate, with a focus on 'what will be'. At this stage user needs may be changed or refined, the iteration can start again, and this contributes to re-designing the concepts according to their needs. The results from this analysis form the basis for the design of a prototype that is tested in its real context and evaluated by users with a formative focus, meaning that the evaluation results should influence the final product that can be disseminated. In this paper, we give a deeper presentation and reflection of the first phase of our method, Discovery and Dream, with special attention to the process of Needs Elicitation. This is because this is one of the most difficult and underdeveloped phases in innovation processes.

Empirical Examples

In this section we present the suggested method in the context of two empirical examples. We begin with the situation of opportunities and thereafter we focus on the discovery and dream phase as it developed in the two projects.

The Situations of Opportunities

In two research and development projects we tested and modified the appreciating needs method. The Entrepreneurial Knowledge Community Project (EKC), aimed to develop tools for knowledge sharing and creation among young entrepreneurs. The Cross Boarder Cooperation Pilot network project (CroCoPil), aimed to develop products, and tools supportive for fieldwork in rural areas. Both projects aim to develop innovative IT-systems based on user needs. The basic process has been to identify, analyze and operationalise needs in these contexts. In the EKC-project we have iterated through all the stages of the method once and are now facing the final evaluation. In the CroCoPil-project, we are at the stage of designing concepts for users' valuation. In the following, a more comprehensive description of the projects is presented.

The Entrepreneurial Knowledge Community Project

In the EKC-project the aim was to develop a virtual knowledge community for young entrepreneurs in Europe. The design of the community space should be based on an understanding of the young entrepreneurs' behaviour, needs and demands. The main object of the project was to stimulate the entrepreneurial spirit, knowledge-building and business opportunities by usage of modern technology in an entrepreneurial way. The idea was that a mixture of experiences in usage of different existing technologies for learning among young entrepreneurs created an important input for the design of a community space. Thus, the purpose with the EKC project was to create a community space in which knowledge could be shared, created and used in rich and efficient ways. To be able to do that, it was important to, as a first step; obtain a rich picture of the entrepreneurs' use of IT today as well as their future needs and wishes of IT as support for these knowledge processes. The process of obtaining this picture was managed in the first part of the project in which we were mostly involved. Thereby, we obtained the opportunity to develop and test our method within the realms of the project.

The Cross Boarder Cooperation Pilot Networks Project

The CroCoPil-project is ongoing and situated in the northern parts of Finland, Sweden, and Norway. The starting point in this project is a number of new technologies that are under development in research and business. The intention with these technologies is to improve internet access in rural areas and for field work. The purpose of the project is to facilitate the development of these new access-technologies within internet and distance spanning technologies as well as increase possibilities for users to find internet access independent of location. An additional aim with the project is to create meetings between users, researchers and technicians.

In the project users are identified as people who have the main part of their work-practices in the field. We focus on reindeer-herders, the police, homecare-assistants, tourist-guides, and rangers monitoring the rural areas. Expected results from the project are; forums where users can meet and discuss and learn from each others, an expert network for our regions IT-competence within mobile internet, world leading knowledge about internet access and distance spanning technologies, a user-centred toolbox for internet access, and a portfolio with product-concepts for the world market. The portfolio should be designed from rich knowledge about user needs and we are mainly involved in this part.

Discovery and Dream – Needs Elicitation and Needs Prioritizing

After the creation of a shared vision within each project, the first step is to find user needs. At this stage, we want to gain as much understanding as

possible of the users' current situation. Therefore, we aim for a rich picture and explicitly search for what works well today. The aim is to encourage users to describe and explain their situation with a focus on positive experiences. During this process we mainly use focus-group interviews as data-collection method. Focus-groups are useful for creating interactive communication among newly constituted conversation groups who share characteristics of interest (Bloor, Frankland, Thomas, and Robson, 2001; Wibeck, 2000). Focus-group interviews are especially appropriate in studies of people's views or attitudes on a certain phenomena. Interviews in groups also generate a broader scale of ideas and views than what can be reached in traditional one-to-one interviews (Wibeck, 2000). An additional reason for using focus-group interviews is to create a situation, in which participants can validate and discuss each others perspectives and experiences. At least three focus-groups with homogenous and, to some extent, existing groups consisting of 4-6 participants each are performed in each needs elicitation process. This strategy is in line with guiding principles for focus-group interviews (Wibeck, 2000).

Discovery and Dreams in the EKC Project

Within the EKC-project our focus was to gain a picture as rich as possible about how young entrepreneurs share and create knowledge today, in their work. We also wanted to learn about how they use IT, not only for sharing knowledge, but also in their every day practice. In this phase the focal point was to find, describe and explain the best of "what is". That is, to generate knowledge that increase the realms of what is possible through questions that are posed as an invitation and evoke storytelling about peak experiences (Norum, 2001). We did not only want them to give rich narratives about their experiences, we also asked entrepreneurs to motivate and explain *why* they do things in certain ways or why they chose certain technologies for different situations and purposes. This process was completed in four focus-group interviews with 3-6 entrepreneurs in each group and the interviews ranged from 50-90 minutes. The focus-groups were conducted in four different countries; France, Poland, Italy and Sweden by different needfinders, i.e. one per country. All needfinders used the same questions and method-guidelines which were designed by us and presented in a report and discussed in a group-telephone meeting before the actual interviews took place.

All narratives were translated into English and analysed. Through the analysis patterns were identified, revealing that the data could be trusted, even though some differences between countries occurred. Some of the variations depended on culture, and some were related to differences in interpretation of the method and questions among needfinders. However, overall the analysis enabled identification of entrepreneurial needs. The overarching needs were related to knowledge about how to start a business, support when started, a need to share experiences and knowledge with other entrepreneurs and e-mentoring. The entrepreneurs also expressed requirements and functions such as being able to record virtual seminars or have access to other entrepreneurs' success-stories. They also wanted to be able to share knowledge internationally, nationally and regionally. Hence, they needed to share knowledge and experiences about their situation as entrepreneurs, not specifically within their own branch.

During the analysis of the data, we became aware of that we needed more information about what the users expect, want, and dream about their future situation and of future technological solutions. We had asked questions about their future dreams, but the answers to that were taciturn. We also learned that in order to build on strengths in their situations we needed to ask questions about what they value in their situation.

Discovery and Dreams in the CroCoPil Project

As a response to our learning insights from the EKC-project, we refined the method and as a result we spent more time on teaching, discussing and analyzing the method with the needfinders in the CroCoPil project before performing the interviews. This enabled the data-collection, as each needfinder could feel rather comfortable with the method. We continued to use focus-group interviews as data-collection method; this did however turn out to be impossible in some cases. Consequently, three focus-group interviews in Sweden, one focus-group and two pair-interviews in Norway and eight individual interviews in Finland were performed by needfinders.

In line with lessons learned in the EKC project we had developed the way questions were asked. We still encouraged storytelling but we also encouraged explanations and examples of what works well with the existing technologies to a higher degree. Moreover, questions about what they value most in their work and work-practices were asked. Hence, in this project we focused more on finding life-giving factors and what users' value most in their situation. We also wanted increased knowledge about how they view their future situation and, therefore, many questions were asked about their perspectives of the future. The idea was to dream about "what could be". The basis in the dream-phase is to be innovative

about how to enrich what works well today into supplemented solutions in a near-by future. One way to stimulate users to fantasize, is to ´give´ them three wishes that they imagine has been implemented in their context, and thereafter ask them to describe their future situation (Norum, 2001).

All focus-group interviews were transcribed verbatim and thereafter analysed and categorised according to values, needs, requirements, functions, solutions and dreams. The analysis showed patterns which were related to their working conditions in the rural areas. For example, what they value most is the opportunity to work out-doors. They had extensive safety needs due to their aloneness out in the field and the low or non-existing net-coverage for mobile-phones. They also expressed needs of robust technology and artefacts. These needs are related to their working conditions as well as the need or opportunities to have access to the society even when they are working in the field. Requirements that were expressed explicitly were, for example, Internet access in the field and monitor equipment for their reindeer-herds. A function that was mentioned was radio-transmitters on the reindeers, while a dream was virtual fences. These examples show different levels of values, needs, requirements, functions and dreams. It was not a straightforward process to draw a line between these concepts since needs, requirements, functions, solutions, dreams, and values exists at many levels.

Reflections and Conclusions

We aspire to develop a light-weight method that is fast, easy to understand and use in different development contexts by different people and yet being able to find needs and to understand the essence of the situation under study. The results and response on our method, from the projects, is encouraging. The two development processes, have confirmed that the processes of appreciating user needs is a complex task. This is partly due to the difficulty of expressing needs for the users and partly due to the complicatedness of understanding and eliciting them. This is especially true when it comes to tacit or unknown needs. The aim with our method is to contribute to this process and our experiences indicate that it does. The appreciating needs method focus on what users actually need or want instead of focusing on what technology can offer.

First of all, appreciating needs focus on storytelling, meaning that the users do not need to be able to express their needs instead they tell rich narratives of their activities and experiences. Our findings show that needs can be appreciated from users' stories. We have chosen this approach because we believed that stories contain knowledge richer than results achieved from surveys or structured interviews. Moreover, we have found that storytelling is an adequate alternative for observations. Appreciating needs is therefore less time-consuming and easier to perform compared to observations. Furthermore, observations of non-existing (future) situations with still not developed technology are difficult (impossible) to perform. Hence, the storytelling approach provides understanding about local knowledge and unique contexts, thereby revealing deep insights of the situations.

We learned that stories about 'what is' and 'what might be' facilitated participants to share experiences in rich ways leading to a focus on future possibilities instead of on problems they wanted to solve. In their explanations of future situations, things they do not want are discovered, giving indications about what they see as working in an unsatisfactory way today. This can be seen as problem identification, but with a focus on possibilities instead of problems, suggesting a positive future.

Our studies indicate that needs are stable to some degree, but they are not fixed through time. This calls for an interactive and iterative process, supporting the expansion and revision of users needs as they become aware of what might be possible. Furthermore, we found that the grounding in today's activities is a well functioning way to identify needs. However, to create something new, dreams of the future are essential information sources. However, we found that dreams of the future can be difficult to express because users easily get stuck in today's problems and what is technologically possible today according to their knowledge. It is therefore important to help users to look beyond what is possible today and to dream of the perfect future. Consequently, the questions asked are of outmost importance as they set the boundaries for what can be found and designed. The questions asked are, hence, fundamental as innovations often stem from creative questions that challenge conventional forms (Avital and Carlo, 2004).

We have also found that users need to explain why they do thing in a certain way or why they choose to use a certain technology and from their explanations, needs can be elucidated and understood. This indicates the importance of using why-questions as a way to find needs and values. Furthermore, our studies indicate that users are not always interested in how the technology functions; they merely want some kind of technological support. In relation to this, we have found that values are of outmost importance to take into consideration during the design-process because an IT-system colliding, or decreasing values or life-giving factors in a situation, are not likely to be used. Thus, the values must be clearly understood.

Our studies confirms that requirements can be interpreted as statements that are related to a specific product, as other authors have recognised (Benyon et al., 2005; Preece et al., 2002; Vidgen et al., 2004). Adding to that, we found that needs are on an overarching level where the solution is not given and different requirements and functions can meet these needs. During the analysing and categorising processes we discovered that needs are related to an understanding of *why* users want or need to do something. Requirements are related to *what* the users want or need to do and functions are strongly related to *how* they want to do it.

We want to highlight that in processes of innovation the creativity is the design-teams responsibility. Meaning that, with the needs and values in mind, a creative, innovative, and interactive process can take place and the outcome from these processes can be introduced to users. The users can be active as co-designers to some extent, but they are not the ones creating their own solutions. Hence, their role is to tell their stories in the first phase and in the third phase, they value design ideas, concepts, and prototypes and thereby the users acquire the opportunity to expand their own needs horizon.

Finally, our studies have indicated that the appreciating needs method contribute to processes of knowledge-sharing, creation, and use through its iterative and interactive approach. These knowledge processes exists between needfinders, users and designers contributing to a continuous learning process. This is not the focus for this paper, but it is an inherent aspect of the appreciating needs method. Further studies of that aspect are important to conduct for an increased understanding of the learning processes in a innovation project.

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Paper III:

User Expressions Translated to Requirement

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User Expresssions Translated to Requirements

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Abstract; *Grounding the development of mobile and ubiquitous services on actual needs and behaviors of users, rather than on designers intuition, is a well established tradition today. However, gathering data about users in different contexts usually result in large amounts of data that have to be analyzed and translated into requirements. This is a crucial process in the development cycle and its outcome is usually very dependent on the preconceptions of the developers or researchers. Despite this strong element of subjective influence the translation process is seldom made transparent. Nor are the user needs related to psychological discussions and existing taxonomies. The aim of this paper is, therefore, to contribute to the field by presenting a process for translating user expressions to needs and later to requirements using Reiss taxonomy of human needs as a theoretical base. Using this translation process we were able to identify two hierarchical levels of needs: needs of a service and needs in the service. The process also made it possible for us to see needs hidden in general expressions and to reformulate them accordingly. Further, it generated a clear traceability from user expressions to requirements, and finally, confirmed the importance of focusing on, and understanding, the situated needs of users.*

Keywords User Needs • Mobile services • e-government • User Involvement • Motivators

1. Introduction

As the pressure for innovation is greater than ever, and the numbers of services linked to mandatory use in mobile, ubiquitous, or pervasive contexts are increasing, it is possible to discern a growing interest among researchers in understanding users' needs, preferences, and everyday behavior. Following Oulasvirta (2005), "innovation, development, and evaluation of design ideas cannot be based only on the designer's intuitions but must be grounded in users' actual needs and behaviors" (p. 60).

Some more specific and often mentioned benefits with a need driven approach to product and service development is that human needs last longer then any specific

solution and can be met with many different products or services (Patnaik and Becker 1999; Kankainen and Oulasvirta 2003; Ericson and Ståhlbröst 2005; Bergvall-Kåreborn, Holst, and Ståhlbröst 2007); human needs are opportunities waiting to be explored, not guesses at the future; (Patnaik and Becker 1999; Kankainen and Oulasvirta 2003); human needs provide a roadmap for organisational development (Kankainen and Oulasvirta 2003; Patnaik and Becker 1999); discovering needs is beneficial for innovating new design idea. (Kankainen and Oulasvirta 2003); finding needs offer product developers a different dynamic for understanding customers (Tiitta 2003; Patnaik and Becker 1999); the empirical data on which needs are identified and interpreted is valuable in later stages such as user interface design. (Kankainen and Oulasvirta 2003).

In order to obtain a rich picture of different user groups and contexts many studies use some type of user centered approach together with data gathering methods inspired by anthropology and sociology (Kankainen and Oulasvirta 2003; Kankainen, Tiitta, and Rantanen 2003; Kaasinen 2003; Holtzblatt 2005; Ha, Jung, and Oh 2006; Esbjörnsson, Juhlin, and Östergren 2004; Tiitta 2003). The gathered data is then consolidated and used to drive requirements definition and invention of new products and services.

However, despite the crucial role of this consolidation and translation process, from both a research and a development perspective, it is often given very limited space in many articles. When it comes to guidance on how needs can be elicited, classified, and translated there are few detailed guidelines given within existing literature. Few authors use any particular taxonomy to classify and analyse needs, instead, needs are classified and analysed from a common sense point of view. This can be seen in studies by, for example, Titta (2003); Kaasinen (2003); Kankainen and Oulasvirta (2003); and Oulasvirta (2004).

Kankainen and Oulasvirta (2003) focus on mobile and ubiquitous computing and they identify a number of needs among diverse user groups. The context is everyday activities that occur when people move through places occupied by other people and/or technological devises. No particular taxonomy was employed to classify the needs, instead "needs and motivations driving the behaviour described in a narrative were approached from a 'common sense' point of view" (p. 460). The categories constitute the technical solutions that the needfinding resulted in, but the translation from need to solution is not made transparent in the article. In later writings Oulasvirta (2004) categorises the identified needs into three types: personal needs, navigational and cognitive needs, and, socially determined needs. Here, the needs also seem to be categorized using a common sense approach because no taxonomy is presented. Further, not all of the examples given are stated in the form of needs. Examining the given examples of personal needs, some are stated as concerns, such as a concern of losing control over owns money when paying, or sharing costs, in public places. Others indicate a need but are not clearly communicated as such; for instance the expression that moving around certain places triggered memories or opinions that were considered worth preserving for the study subjects. The same is true for the navigational and socially determined needs

Tiitta (2003) focuses on identifying everyday motivational needs concerning communication and mobility of elderly people. He uses narratives, constructed from citations from the participants, and contextual design methods to analyse the narratives in order to find user needs. A key question in the analysis is "why is he or she doing or

saying this?". Through an iterative process, phenomena with similar motivational needs were then clustered together in the same category. This resulted in the identification of 20 motivational needs and the following categories: group coherence, utility and experience, easy travelling, and security. As with Kankainen and Oulasvirta, the needs seem to be categorized using a common sense approach because no taxonomy is given.

However, Oulasvirta (2005) is not unaware of these problems. Instead, he argues that the concept of user need is inflated by divergent definitions and uses. He also points to the weak linkage between the needfinding notion in HCI and related discussions and typologies in modern psychology. According to Oulasvirta, this is problematic since attributing needs to users is not a straight forward process and since categorisations of user data are inherently laden with the preconceptions of the researcher and therefore need to be based on sound scientific theories and methods. Finally, he argues that the notion of user needs is almost entirely individualistic, and, as such, does not address emergent needs that pertain to groups and organisations of users.

The above examples indicate the need for greater clarity in what a need can be and how we can elicit, analyse, categorise and translate needs into requirements, if we want to harvest the benefits that a need-driven development approach can generate. Hence, the aim of this paper is to contribute to the field by presenting a method for translating user expressions to needs and later to requirements. The method include a framework based on psychological motivators and is illustrated through a project case study focused on increasing citizens' involvement in municipality matters. Our part in the project was to elicit and translate citizens' needs related to communication with local authorities, particularly concerning suggestions for improving society and alarm dysfunctional state of affairs, into system requirements.

In the following Reiss' framework of psychological motivators is explained, followed by a presentation of the case. Thereafter follows an illustration of our translation process based on three user expressions. Finally, the paper ends with some final remarks and reflections on the findings.

2. Relating user needs to a psychological framework

The concept of needs is closely related to the concept of motivation, as can be seen in Herzberg, Mausner, and Snyderman (1959); Madsen (1970); Maslow (1954); and Schein (1970). Motive is generally defined as something that stimulates, or drives, an individual to act in a certain way, and the motive is usually a need or a desire of some kind. Due to this close relation between the two concepts they are often used almost synonymously in the literature, see for example Maslow (1954).

Within the IS field the concept of needs is used in a wide variety of ways as was illustrated in the introduction. In this article we do not clearly separate between related concepts such as needs, motives, or desires. Instead we view all of these concepts as underlying rationalities that motivates people and as such triggers behaviour as well as drives the requirement specification. We do, however, make a clear distinction between needs and requirements, and propose that needs are used in relation to humans and requirements are used in relation to solutions, products and services. Separating clearly between needs and requirements is also supported by Sharp, Rogers, and Preece (2007).

Further, we aim to address the weaknesses related to the concept confusion, identified by Oulasvirta (2005), by presenting and applying Reiss' and Havercamps' (Reiss 2004) psychological theory of human motivators. Their theory has been developed, and continuously validated, in studies starting in 1995, and it is, according to Reiss (2001) one of the first scientific studies of this range that is based on what people value the most. The aim with Reiss and Havercamps' studies is to understand what people experience as meaningful behaviour, or what motivates them to act (Reiss 2004). Their studies ended up in a framework consisting of 16 basic desires, or motives (Reiss 2000) and according to their theory, nearly all meaningful human behaviour is motivated by some compound variation of the 16 basic desires, or motives, see table one below (Reiss 2004, 2001).

Each of Reiss's 16 basic desires is an end motive. This means that the motive is desired for its own sake, intrinsically, and is based on the individual's purpose for why s/he acts in a certain way (Reiss 2004, 2005). The idea of end motives started with Aristotle who divided motives into ends and means (Reiss 2000). End motives are things people enjoy for their own sake, whereas means are the methods for satisfying these end motives. The means are the steps on the way, whereas the end is the final step. The number of means that can be used to reach the end is only limited by fantasy, while the end is genetically limited (Reiss 2001).

Many activities that people do are aimed at satisfying some of these 16 motives (Reiss 2004). The 16 motives are satisfied by meaningful behaviour and this is usually what is sought after in relationships, careers, families, sports and spirituality (Reiss 2001). We feel secure, for example, when we are in an environment with the degree of stability and order we like. We experience love when we spend time with our children and satisfy the desire for family. The satisfaction of each basic desire gives rise to a different joy, so we go through life trying to experience sixteen different types of intrinsically valued feelings. Soon after we satisfy a basic desire, the joy dissipates and the desire reasserts itself. Therefore, we seek activities that make possible repeated satisfactions of our basic desires (Reiss 2005, 2004).

Each basic desire is a continuum between two extremes, indicating the strong versus the weak variations of that desire. Individuals aim for different points along each continuum; that is, we seek to experience different intensities and frequencies of each of the sixteen desires (Reiss 2005). From this follows that these 16 motives direct almost everything humans do and they constitute the foundation on which humans become individuals. Every individual experience some motivators, but the strength of each motivator is very individual. This implies that what motivates one person might not motivate another person.

When it comes to peoples prioritising the sixteen basic desires, one size does not fit all. Although everyone is motivated by each basic desire, we are not motivated to the same extent (Reiss 2005). Hence, human motivation is fundamentally multifaceted. Following that, the sixteen desires cannot be reduced further into super categories such as pleasure versus pain or intrinsic versus extrinsic motivation. In addition, the sixteen basic desires are largely unrelated to each other (Reiss 2005). A person being highly motivated of getting power does not necessarily get motivated by reaching a high level of status.

Motives are also the reasons why people are willing to do things on a voluntary basis (Reiss 2004). In the context of IT-development, this becomes important, since

knowing what motivates users to use a product or service becomes central, especially when the product or service is aimed at private and mandatory use.

Motivator	Motive	Intrinsic Feeling
Power	Desire to influence (including leadership)	Efficacy
Curiosity	Desire for knowledge	Wonder
Independence	Desire to be autonomous	Freedom
Status	Desire for social standing (including desire for attention)	Self-importance
Social contact	Desire for peer companionship (including desire to play)	Fun
Vengeance	Desire to get even (including desire to win)	Vindication
Honor	Desire to obey a traditional moral code	Loyalty
Idealism	Desire to improve society (including altruism, justice)	Compassion
Physical exercise	Desire to exercise muscles	Vitality
Romance	Desire for sex (including courting)	Lust
Family	Desire to raise own children	Love
Order	Desire to organize (including desire for ritual)	Stability
Eating	Desire to eat	Satiation (avoidance of hunger)
Acceptance	Desire for approval	Self-confidence
Tranquility	Desire to avoid anxiety, fear	Safe, relaxed
Saving	Desire to collect, value of frugality	Ownership

Table 1: Motivators (after Reiss 2004)

In our study, we have used motivators as a tool for eliciting and analysing the data gathered in the focus group interviews within the SMART project.

3. The SMART Project

The SMART project is one of many EU-projects aimed to increase citizen involvement in municipality matters through the use of information and communication technology (ICT). In SMART this is done by exploring the concept of "reaction media", allowing individuals to engage and take active part in the development and improvement of their municipality. More specifically, we wanted to develop a mobile and context aware services that facilitated the communication between citizens and the municipality. In addition, this service should stimulate the citizens to give suggestions and opinions for how they want the municipality to develop, and, to alert or alarm identified risks or dangers in their environment.

The development of these services was carried out in an interactive manner in cooperation between citizens, companies, and official authorities. To facilitate a participatory approach the project is set in a Living Lab context. The foundation of Living Labs is the involvement of four different stakeholders in innovation processes; government, companies, researchers and end-user representatives. The aim is to, in close cooperation between involved stakeholders, facilitate innovation, and develop products and services that users really need and that are designed to fit their life pattern and preferences. During this development process, the products and services are also tested by end-users in their real-world environments. Since the Living Lab activities can go on 24/7 this means that users can test a product or service in their private context in real usage situations and from the perspective of the different roles they shift between during a day: citizen, parent, sport fan, patient, student, or employee. Hence the users gain understanding of a new product or service function and how it fits into their usage context (Eriksson, Niitamo, and Kulkki 2005; Mirijamdotter, Ståhlbröst, Sällström, Niitamo, and Kulkki 2007; Ståhlbröst 2006). With this approach, the innovation system becomes human-centric, in contrast to technology-centric.

3.1 Field Inquiry

To gain understanding of the potential users and their behaviours, needs, and context we used scenario based focus group interviews as the main data-collection method in the project. Focus groups stimulate the creation of interactive communication among newly constituted conversation groups that share characteristics of interest (Bloor, Frankland, Thomas, and Robson 2001; Wibeck 2000) and are especially appropriate for studying people's views or attitudes about a certain phenomenon. They generate a broader scale of ideas and views compared to traditional one-on-one interviews (Wibeck 2000) and create a situation in which participants can validate and discuss each others' perspectives and experiences. In the interviews we also often use scenarios (Bodker, Kensing, and Simonsen 2004; Bødker 2000; Carroll 2000) as stimuli. Scenarios can be used in two different ways: either scenarios can be presented to the users in order to help them get started in their process, or one can ask the users to describe a scenario. In this study, six focus group interviews were carried out with participants selected from the Living Lab community. The focus of the interviews was to discuss citizen's experiences and thoughts related to communication with municipalities and governments.

In each focus group, the aim was to stimulate the citizens to talk as much as possible with each other. The stimuli material we used in these focus groups was scenarios related to communication with authorities, alarm, and suggestions for improvement of society. The focus group discussion went on, and whenever the discussion stopped, we introduced a new theme or question. These focus group interviews lasted between one to two hours. Three of the focus groups were carried out with citizens from a larger city and three groups were carried out with citizens from smaller cities. The reason for this approach was an interest to investigate if the citizen's communication with local authorities differed between large and small cities. In this study, we could not identify any differences in their communication patterns with local authorities between large and small cities; hence, the results from the interviews will be presented as a whole.

4. Translating User Expressions to Requirements

In this section we start by giving a brief overview of the main needs elicited in the process of translating user expressions to requirements. These needs can be separated in two hierarchical levels. The first is related to user needs *of* the service as such and the second is related to needs *in* the service.

User needs of the service gives an indication of what the citizens consider important in their lives and what motivates them to interact with public authorities. These are idealism, power, status, acceptance, curiosity, and tranquility. Looking at needs that have influenced the design of the implemented system most, and as such is included in the system, are saving, order, and independence.

We also see a difference between the motivators that are important for a citizen to leave a suggestion compared to communicating an alarm. For suggestions, it is mainly idealism power, status, acceptance, while alarm is strongly related to the motivator tranquility and idealism. Curiosity on the other hand is related to receiving information, rather than provide information.

In the following three different user expressions are analyzed and translated to requirements. First, the expression is interpreted from a common sense point of view, thereafter it is analyzed with the help of the framework. This approach makes it possible to appreciate the benefits of the framework. Finally, we report the requirements that the analyses resulted in.

Expression 1

In a discussion on how the citizens viewed the opportunity to be actively involved by communicating suggestions and alarms to authorities, and how important this was to them, one citizen said:

> "You need to feel that you are *involved* and have the *power* of your own life; that is important".

This represents a clearly defined need statement expressing possible motives or underlying rationales that would stimulate and enthuse this citizen to use the service. Focusing on the key word "power" in the sentence "you need to feel that you …have

the power of your own life" we at first related this to the need of *power*. However, analysing the text against Reiss' framework we quickly realised that the citizen talked about power related to the possibility of having influence over one's own life, rather than having influence over other people and their lives. This made us shift our classification of the text from the need of power, to the need of independence, and the desire to be autonomous and the intrinsic feeling of freedom.

Interpreted this way the expression resulted in requirements such as giving the citizens: the freedom to enter any kind of suggestion or alarm without restriction to certain labels or categories; the freedom to judge the importance of the suggestion or alarm; the freedom to send a suggestion or alarm independent of place and time; and the freedom to use different mediums for communicating with the municipality, such as a stationary phone, mobile phone, or the webb. However, on a more fundamental level these requirements do not address the need of independence and autonomy related to the citizens own lives. Instead, they are limited to creating a feeling of freedom when using the system.

The meaning of "you need to feel that you are involved" was harder to interpret since we easily could relate it to many different needs. Some of these were *status* and the desire for social standing and attention; *social contact* and a desire for peer companionship; and *idealism* and the desire to improve society.

When we analysed this first part of the sentence from the perspective of these different needs we realised that different interpretations lead to quite different requirements and sometimes even different functions within the service. Interpreting the expression as a need for *status* resulted in requirements of displaying the name of the person giving the suggestion in order to make people and their contribution visible to the community. Interpreting the expression as a need for *social contact* important requirements were possibilities for users to discuss their own as well as others' suggestions´. Interpreting it as a need for *idealism* brought forth requirements such as indicators that show how the suggestion is or has been handled similar to the "follow the package". It also resulted in requirements that the receiver of the suggestion could comment on the benefits of the suggestion from a municipality perspective and inform whether or not the suggestion was planned to be implemented and the reasons for this.

Expression 2

In our discussion about reporting suggestions for improvement one citizen said:

> "If I am to pick up the phone and give a suggestion for improvement in society, I can not be hindered by whether I have money on my cash card or not. If there are no hinders, then I would make the call."

This expression does not express a direct user need but rather a condition that the service should fulfil for this person to report suggestions for improvement to the municipality. Further, even though the condition or requirement posed by the citizen on the service is quite clear (it cannot require money on cash cards) it was hard for us to relate the expression to a need. The need that we started to elaborate with was *saving,* with its value of frugality, since one possible interpretation of the underlying rational behind the expression "money on cash card" could be an unwillingness to pay for the call.

We also saw a link between the need for saving and the expression "If there are no hinders, then I would make the call". However, here, the expression was not related to monetary aspects, but rather to *saving* time through a smooth and easy process. Here, we found a lack in Reiss' framework since the need for a smooth process, or, more generally expressed, the feeling of efficiency is not present within the motivator saving.

In our discussions around the above expression, shifting our focus between the context of the expression, the expression as a whole, and separate sentences and words in the expression, it became clear that just because users express requirements related to a service this does not mean that they have an actual need for the service. This dualism can be seen is the expression "If there are no hinders, then I would make the call". On one hand this indicates an efficiency requirement that the service needs to fulfil for the citizen to use it. On the other hand "no hindrance" also indicates that the citizen sees little or no use for the service, since s/he is not willing to make any efforts to communicate the suggestion.

Based on this expression and our interpretation of its underlying rational we added the requirement that the service should be free of charge, since such a requirement would assurance a smooth and easy process as well as address the economic issue. Other possible solutions that do not require money on a cash card could to use a collect call number, or to bill the citizen for the call. However, none of these solutions was chosen since the motivation for using the service was interpreted as quite low among some of the citizens.

Expression 3

In relation to the functionality of any future solution for citizen involvement one of the citizen said:

> "I just want to pick up my phone, make a short video recording, add a voice message and then just send it away".

This expression does not either directly express a need, but rather a preferred process or work flow. It also gives a clear indication of desired requirements that the system should fulfil. Based on the expression we added the requirement that the final system should support the use of different types of data, such as video recordings, voice messages and pictures.

Further, using Reiss framework to analyse the expression expressed by the citizen we saw two possible interpretations. Firstly, from a saving perspective a smooth process is desired since it is related to frugal use of time. Secondly, from the perspective of order a smooth and clearly defined process is desired since it is linked to a feeling of stability. However, analysing the text from both perspectives we realised that the word "just" had a key importance and was the determining factor for why we choose to se the expression as an expression for saving rather than order. Hence, in this way one need (order) become the means for achieving another need (saving).

In traditional requirements engineering an expression as the above, clearly expressing requirements, is usually not elaborated with further. Hence, the above expression would result in requirements that support mobile video recording and voice message. Relating the expression to the framework made us reflect further on its meaning and this resulted in additional requirements related to time efficiency through

easy of use. For example, the log-in procedure became focused on creating a log-in procedure with as few steps as possible and on overarching level the focus on saving made us prioritise ease of use and speed over aesthetics in the interface.

5. Final remarks and reflections on the findings

Based on the trends and weaknesses found in present literature related to user needs this paper aimed to contribute to the field by presenting a method for translating user expressions to needs and later to requirements. This process was illustrated using a case study focused on increasing citizens' involvement in municipality matters.

One of the most important benefits with using a framework for analyzing user expressions and translating them to requirements was the discussion and reflection it generated. Through these discussions and reflections, the importance of separating needs into two hierarchical levels or categories crystallized: The first is related to needs *of* the service, i.e. what motivates a user to buy and use a product or service. User needs of the service gives an indication of what the citizens consider important in their lives and what motivates them to interact with public authorities. The second is related to needs *in* the service, that is, when using a service, what needs are then important for the users. In our study, typical needs of the service were idealism, power, status, acceptance, curiosity and tranquility, while typical needs in the service, influencing the design of the implemented system most are saving, order, and independence.

The translation process from user expressions to requirements generated interesting debate on what constitutes a needs and what the meaning of an expression might be. It also illustrated that users do always express clearly stated needs. Rather, their contributions include a mix of needs, suggestions, conditions, and problems. Due to this the analysis and interpretation of user expressions becomes very important. Here, the framework helps to avoid a translation and categorisation process only driven by the preconceptions of the researcher by providing scientifically sound theories on user needs. Documenting the translation process also provided a clear pattern of traceability between expressions, needs, and requirements.

Further, we are to harvest the potential benefits of a need finding approach it is therefore crucial that we are able to identify the needs and translate them into relevant requirements and solutions. In this process, the applied framework made it possible for us to see needs hidden in general expressions and to reformulate these accordingly. However, the general weakness of frameworks is applicable also to Reiss's framework. That is, using a framework to support the analysis of needs there is always a risk of forcing a need into a predetermined box. This might hinder the development of new types of needs, hence, the analyst need to be attentive and open to this.

The analysis also confirmed that expressions of motivators are situated; that is, they are individual, and arise based on the situated reality in which the individual takes part in a certain context and at a certain point of time. Hence, from a design perspective, it is the situated needs and motives that give the direction or design implication, not the motivators as such. Further, the analyses demonstrated that interpreting the expressions from different motivators generated different requirements and as such resulted in different services.

Finally, the analysis has generated interesting ideas for new possible requirements or functions of the developed product or service.

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Paper IV:

Creating a New Leverage Point for Information Systems Development

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CREATING A NEW LEVERAGE POINT FOR INFORMATION SYSTEMS DEVELOPMENT

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ABSTRACT

We present a new approach that shifts the leverage point of information systems development from problem orientation to opportunity development. Our approach, entitled FormIT, employs a careful focus on enhanced user involvement, concentrating on users as human beings, and attention to users' needs as opposed to system requirements. As theoretical and methodological foundations, we build on the 4-D cycle model of Appreciative Inquiry and current research on needfinding. Our field experience demonstrates that FormIT shifts the systems development process from being reactive to being proactive, and in turn, enables a smoother implementation of inevitable change, particularly radical change. Moreover, FormIT stimulates the generation of rich local knowledge and helps reveal deep insights into the development process and the overall organization.

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INTRODUCTION

The information systems (IS) discipline is experiencing almost revolutionary changes as information technology (IT) and IS are becoming ubiquitous, expanding their borders geographically, socially and functionally, and blurring traditional boundaries between work practices and everyday life. In the increasingly competitive and fast-paced business environment, product and service innovations are undoubtedly the keys to survival for many companies. However, developing new services or products is usually seen as risky, expensive, and time consuming (Jobber, 1998), and the majority of methods available within IS development focus on solving problems rather than stimulating creativity and innovation (Fitzgerald, Russo, & Stolterman, 2002).

To reduce the risk of developing products and services that are not bought or used, while still stimulating creativity and innovation in the development process, we propose strong user involvement and a shift from problem solving to opportunity development. The merits of user participation have been widely discussed and supported (e.g. Benyon, Turner, & Turner, 2005), and it can be traced to or beyond the coining of the "Scandinavian tradition" (Bansler, 1989a, 1989b). In this paper, we take user participation a step further by concentrating on users as human beings and by focusing on users' needs as opposed to system requirements.

When it comes to innovation and opportunity development, it is increasingly recognized that the success rate of new products depends strongly on the quality of the opportunity-identifying practices of product development (Van Kleef, van Trijp, & Luning, 2005). Despite this recognition and the critique raised against a strong problem orientation (Fitzgerald et al., 2002), most of the methods within IS development still emphasize problem identification, problem analysis, and problem solving instead of opportunity identification, analysis, and realization. This is seen in numerous course books on systems analysis and design (Alan, Wixom, & Roth, 2005; Marakas, 2005; Shelly, Cashman, & Rosenblatt, 2005; Whitten & Bentley, 2006). The danger of focusing heavily on problems is that it risks eliminating an unwanted situation without necessarily attaining a desired situation. It also runs the risk of keeping the stakeholders and participants in the prevailing mode of thinking, rather than helping them develop new and innovative ideas and mindsets (Bergvall-Kåreborn, 2006). When following an innovative approach, change is viewed as a creative way to form a new context, and there is no need to focus on problems; opportunities and possibilities are in focus instead (Fitzgerald et al., 2002).

In this paper, we present a new way forward for developing IS that has been developed and tested in a number of different contexts. We call our approach FormIT, and our theoretical base in this endeavor is twofold: To elicit user needs, we use an approach called needfinding (Patnaik & Becker, 1999), and to bring attention to users as human beings and guide opportunity development, we use Appreciative Inquiry (AI) (Cooperrider, Whitney, & Stavros, 2005). Below, an introduction to AI focusing on the 4-D cycle model is given followed by a presentation of needfinding and how it differs from requirement specification. Then we present our method, FormIT, and an illustration of its use in a project aimed at developing innovative IS for supporting work practices. Thereafter, some lessons are outlined, from using AI in combination with needfinding to ground the user needs development effort and stimulate the development of new and innovative IT products and services. The paper concludes with some final remarks.

APPRECIATIVE INQUIRY

Appreciative Inquiry (Cooperrider & Avital, 2004; Cooperrider, Barrett, & Srivastva, 1995; Cooperrider & Whitney, 2005) is an approach for organizational development. The approach is based on a search for positive experiences and builds on the strengths of individuals and organizations. The focus on organizational development is taken from a broad perspective and includes a wide variety of application areas ranging from large international corporations such as British Airways to organized communities or networks such as the United Religions Initiatives (Cooperrider & Whitney, 2005). In the words of Cooperrider and Avital (2004), "Appreciative Inquiry is a constructive inquiry process that searches for everything that 'gives life' to organizations, communities, and larger human systems when they are most alive, effective, creative and healthy in their interconnected ecology of relationships" (p. xii). With this paper, we hope to broaden the scope of the method further by bringing it into the field of IS – a field very closely related to organizational development.

By focusing on the positive in organizations and situations, AI offers an alternative view that breaks down the general predisposition of people to look for what is wrong. It also breaks down the long and established tradition of problem identification and problem solving within IS development. This predisposition is often so deeply embedded that we are not even aware of it. Hence, instead of looking for problems to solve in a situation, AI analyzes what works well and uses this as a basis for design.

To highlight the design aspect present in AI studies, Norum (2001) renames the method *Appreciative Design*; at least this is our interpretation, since she does not give any explanation for the name shift. However, we find this name shift positive since it centers attention on the formative dimension present in IS development.

Viewing AI as a design process puts focus on the 4-D cycle (Cooperrider & Whitney, 2005; Norum, 2001), which is an iterative process model consisting of four phases: discovery, dream, design, and destiny. The process starts with the discovery phase where as many stakeholders as possible are engaged in articulating past and present strengths and best practices. The core of this phase is to disclose positive capacity, i.e. disclose what gives life to individuals and organizations when they are at their best. This is done through *appreciative interviews* (Cooperrider & Whitney, 2005; Cooperrider et al., 2005) and workshops where people both discover and share the best of "what is" and build new relationships throughout the organization. The questions are positive and communicated in ways that inspire the stakeholders to narrate their experiences. The questions asked in this phase are fundamental, as innovations often stem from creative questions that challenge conventional forms (Avital & Carlo, 2004).

When questions about the current situation have been asked, the next phase is entered. In the dream phase, focus is on envisioning a positive future, a "what might be." The aim is to understand the factors that are positive today and take this as the starting point toward the future. How can what works well today be developed into even better solutions in the future? Factors that were identified in the first phase are challenged, and the core group can envision what might be.

The third phase is the design phase and is grounded in what was identified in the first two phases. Here, the future design is created based on ideas of "what should be." This phase focuses on taking the positive and developing it even further through redesign. Finally, in the fourth phase, focus is on "what will be" and on strengthening the affirmative capability of the whole system through empowerment, cooperation, and co-creation. The change process has already started, and the new design is valued. Thereafter, the whole process begins again with the discovery phase, identifying what works well with the new design and how it can be improved.

NEEDFINDING

In a market where the use of IT has become ubiquitous as it extends its geographical, social, and functional borders, we need to accept that users

represent a highly diverse group (Fitzgerald et al., 2002; Preece, Rogers, & Sharp, 2002). In fact, the concept of *user* can often be used synonymously with *human*, as indicated by the *human-centric* concept, which is being used increasingly in IT development projects. The expansion of products and services for private use also emphasizes voluntary usage patterns and compels us to focus on the diverse needs of different users. The literature also confirms that if a product or service does not meet the needs of users, it will not be accepted or used by them (Magnusson, 2003; Preece et al., 2002; von Hippel, 2001).

We argue that the traditional approach of relying on user participation and user involvement (Barki & Hartwick, 1989), where the designer queries the users for system requirements or feedback on unfinished projects, is not sufficient to guide systems design and development. We need to move beyond this narrow view and find the underlying needs of the users. The user needs endure longer than any IT solution, and therefore, focusing on these needs can help developers to avoid a premature convergence that limits the range of possible designs (Patnaik & Becker, 1999). A focus on needs also provides a less risky development strategy compared to planning around different prophecies of what tomorrow holds. Despite a growing recognition of the importance of understanding user needs (Fitzgerald et al., 2002; Preece et al., 2002), few authors give any guidelines suggesting how this can be accomplished. Instead, the literature indicates great confusion when it comes to distinguishing between concepts such as needs, wants, desires, and requirements (Ericson & Ståhlbröst, 2005). This confusion is understandable based on the lack of definitions and the close relationships between the concepts; needs and requirements are often intertwined concepts, and needs can have many different forms and appear at different levels (Preece et al., 2002). Both reasons point to the necessity of defining the concepts more carefully.

Following Patnaik and Becker (1999), needs are long lasting and can be met with different requirements or solutions, while requirements are more unstable and can be influenced by trends that change over time. Requirements are also strongly associated with a specific product; more precisely, a requirement is a statement about an intended product that specifies *what* it should do (Benyon et al., 2005; Preece et al., 2002; Vidgen, Avison, Wood, & Wood-Harper, 2004) and arises from a broad understanding of user needs (Preece et al., 2002). The relation between the needs and requirements concepts resembles that of means and ends, as far as requirements are formed on the basis of needs in the same way that means are defined in relation to a certain end. For example, the need to

store data is more stable than specific solutions such as punch cards, magnetic tape, floppy disks, and memory sticks or a requirement such as a certain amount of storage capacity. Hence, a focus on needs keeps more doors open and avoids a premature closure of the creative and innovative phase.

However, the identification of needs and the establishment of requirements is not an easy, straightforward process (Benyon et al., 2005; Preece et al., 2002) since most users find it difficult to articulate and explain their needs (Holst & Ståhlbröst, 2005a, 2005b; Ståhlbröst & Holst, 2006). One reason for this is that people often are not aware of available solutions and possibilities (Hyysalo, 2003; Salovaara, 2004). Moreover, users might have needs they are not aware of; sometimes they experience a feeling of lacking something rather than needing something (Van Kleef et al., 2005). A process of finding needs can therefore be described as a paradoxical activity, since what is sought is sometimes a circumstance where something is missing (Faste, 1987). Either way, this something has to be recognized and articulated by someone, presumably a needfinder of some sort. Additionally, users sometimes become acclimated to obstacles in their environment and find alternative ways to perform their tasks, and this affects their awareness and possibility of expressing what they need (Patnaik & Becker, 1999). Consequently, the approach of directly asking users what their needs are is insufficient.

As needs can be difficult to detect, uncovering needs reliably requires an organized research effort. Unfortunately, there is no method available yet to guide such an effort. Traditionally, market research methods have been used to investigate people's needs. These methods can be useful when it comes to quantifying users' preferences but are not helpful when it comes to discovering needs that cannot be easily articulated. As a way to contribute to these drawbacks, methods inspired by anthropology and sociology have been used (Kankainen & Oulasvirta, 2003). These methods provide a great amount of data, but fail to expose opportunities. Hence, they merely help to describe the context under study (Kankainen & Oulasvirta, 2003; Patnaik & Becker, 1999). The only guidelines to be found related to IT/IS product development originate from Patnaik and Becker (1999) and aim to contribute to the identified drawbacks with the methods used in market research for finding needs. They can be summarized in these eight points (Patnaik & Becker, 1999):

- Look for needs rather than specific solutions
- Make research and design seamless

- Go to the customer's environment
- Look beyond the immediate solvable problem
- Let the customer set the agenda
- Collect eclectic forms of data
- Make findings tangible and prescriptive, using drawings, photos, or videos
- Iterate and refine the findings

However, these guidelines are very generally described and do not go into any detail as to what should count as a need, how needs are identified and prioritized, and how needs generate product innovation practically.

A NEW WAY FORWARD: FORMIT

FormIT, our approach to IS development, aims to stimulate the creation of a new leverage point for systems development. This leverage point is based on the positive and life-generating experiences and needs of users and other stakeholders. To do this we use AI to focus attention on users as human beings and to guide opportunity development. We also complement AI with needfinding to enable appreciation of user needs. In our perspective, identifying opportunities is the basis for appreciating needs, since needs are opportunities waiting to be exploited. In this way, FormIT enables a focus on possibilities and strengths in the situation under study, and this is fundamentally different from traditional problem-solving approaches.

More specifically, we use the 4-D cycle model of AI as our basic process and incorporate needfinding into the first phase of the model. However, instead of using the original four phases of the 4-D model, we combine phases and offer a revised model with three phases as follows: discover and dream, design and develop, and dare and disseminate (Fig. 1). We have done this to illustrate that the development process consists of three main steps separated in time and involving different stakeholders or roles. Users are involved in two of the phases: discover and dream, and dare and disseminate. In the design and develop phase, users are not directly involved, but they can function as co-designers influencing the design.

This paper focuses on the early parts of a design process and the first phase of our model, where the conditions for the remaining process are set, and where the shift from problems to opportunities and from requirements to needs starts. However, in order to provide the reader a holistic view of the model, all phases will be described and illustrated in the subsequent text and sections.

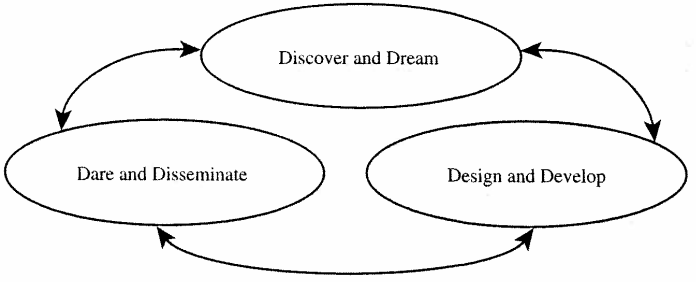

Fig. 1. The FormIT Process.

The Three Phases of the FormIT Model

As in traditional AI, the process of inquiry starts in situations full of opportunities. In discover and dream, the first phase, we start by identifying strengths and best practices by stimulating users to provide rich and appreciative narratives about past and present situations. Here, it is important to include strengths related to both work practices and IT usage. Based on these narratives the users are then asked to shift focus from appreciating "what has been" and "what is" to dreaming about the future and "what might be." From the stories of best practice and the dreams and wishes of the users, needs are identified, categorized, and prioritized. The main challenge in relation to discovery is usually to help people alter their mental frame of mind from a problem perspective to an affirmative perspective, and to make them talk about what works well instead of what is unsatisfactory. When it comes to dreaming about the future, the challenge is to help people let go of the status quo and to look beyond their present knowledge of currently existing technological possibilities.

To stimulate these mental changes, we use focus group interviews as the main data-collection method. Focus groups stimulate the creation of interactive communication among newly constituted conversation groups that share characteristics of interest (Bloor, Frankland, Thomas, & Robson, 2001; Wibeck, 2000) and are especially appropriate for studying people's views or attitudes about a certain phenomenon. They generate a broader scale of ideas and views compared to traditional one-on-one interviews (Wibeck, 2000) and create a situation in which participants can validate and discuss each others' perspectives and experiences. In the interviews, we also often use scenarios (Bødker, Kensing, & Simonsen, 2004; Bødker, 2000; Carroll, 2000) as stimuli. Scenarios can be used in two different ways: Either scenarios can be presented to the users in order to help them get started in their process, or one can ask the users to describe a scenario.

Conducting the appreciative interviews of the discovery phase and the envisioning of the dream phase at one single meeting with a user group has two main benefits. First, it reduces the risk of losing users between the phases as one often does when they are conducted at two separate meetings. This is especially relevant when developing new and innovative products or services for voluntary and private use, since these potential users seldom have an organizational belonging that can stimulate or put pressure on their involvement or participation. Instead, their involvement is often stimulated by a general curiosity, a technological interest, or an interest in the specific domain where the product or service is to function. However, even in more traditional IS projects within organizational contexts, it can be difficult to involve users in the development process and keep them involved throughout the process. Secondly, it saves both time and money. This is becoming increasingly important as the pressure to shorten product development life cycles is escalating and the demand for efficiency and low prices is growing. Conducting the discovery and dream phase close in time does not contradict with traditional AI; these phases are often conducted on the same day or on two successive days.

The reason for naming our second phase *design and develop*, instead of only calling it *design*, is that the concepts are intertwined within the IS discipline. Despite this, they also represent two levels of the development process. Here, design is related to the overall shaping of the vision, form, or concept of a product and service, while develop refers to the creation of a detailed and operational prototype or artifact.

A list of prioritized needs, as well as identified strengths and dreams, form the basis for the vision of the information system that takes form in phase two. The basic shape of the vision has already taken form in phase one, but in phase two the vision is elaborated on and expressed both textually, in the form of key concepts, and pictorially, in the form of user stories, scenarios, or mock-ups of the system. As the process iterates through the model, the key concepts and pictorial expressions of the system are developed into prototypes and, later, a finished system. The challenge here is to convince the systems developers and technical engineers to consider the list of prioritized needs as a starting point for the vision and then consider the functional requirements and technical specifications. Since many developers and engineers are unfamiliar with this way of working, they often want to skip this part and go directly to the requirements and specifications.

In dare and disseminate, the third and final phase, users value concepts or mock-ups, or test and evaluate prototypes, depending on the progression of the development process. In this way, the iteration can start again by redesigning concepts or prototypes in relation to modified or new needs and requirements. When the information system is fully developed, it is disseminated (implemented) into its intended context. For the development project to be successful, ownership of the system must be handed over to and accepted by the users. The users also need to change their traditional way of working and acting if a long-lasting and substantial change is to occur.

While we like the spirit of the fourth phase in AI, i.e. giving AI away to everyone and then stepping back and allowing the transformation to emerge (Cooperrider & Whitney, 2005), we argue that *destiny* does not symbolize this aspiration. After reading the citation from William James that "Man alone is the architect of his destiny" (in Cooperrider & Whitney, 2005, p. 34), we understand the idea behind the name. However, the name can easily be misinterpreted and instead can give the opposite impression that it is destiny rather then human devotion and decisiveness that forms the future. Therefore, we have renamed this phase to dare and disseminate. Dare is meant to remind us that we need to have the courage to challenge our traditional routines and ways of thinking, both on a personal and on an organizational level, if we want our dreams to come true. Disseminate represents the distribution of concepts, prototypes, or finished artifacts after they have been tested, and evaluated. It also refers to the dissemination of the ownership of the change to everyone involved in the situation. In cases concerning the development of a general IT product or service, dare and disseminate can represent the decision to market the product or not.

Iterations and Interaction

Our approach is iterative, and interaction with users is an assumed prerequisite. The idea is that knowledge increases through iterative interactions between phases and between people with diverse competencies and perspectives. In this way, knowledge increases through dialogues between participants. This cross-functional interaction enables the processes of taking knowledge from one field to another to gain fresh insights, which then facilitates innovative ideas. The shared understanding of the situation informs and enriches the learning processes, thus facilitating changes in perspective and leading toward innovative design processes

(Holst & Mirijamdotter, 2006). This, in turn, increases the possibility of designing IT systems that fulfil user needs.

The iteration of the phases is shown in Fig. 1 as arrows moving clockwise from left to right. The development process usually starts in the discover and dream phase, moves to design and develop, and ends in the dare and disseminate phase. After the first cycle is completed, a second and sometimes third cycle is carried out. The multiple circles through the model facilitate user participation throughout the development process as the product or service matures after each cycle. There may only be concepts or mock-ups to value in the first cycle, while in the second, a prototype might be developed, and in the third cycle, the information system is complete and ready to be disseminated. Also, as the information system develops and users become more knowledgeable of technical potentials and possibilities, their ability to express how they want their needs to be fulfilled increases. Thus, discussions with users move from focusing on needs to a focus on requirements for each cycle through the model. In this sense, our process differs from traditional AI processes where a new circle through the model usually indicates a new project.

The arrows moving counterclockwise from right to left in Fig. 1 symbolize an occasional need to move backward in the model in order to manage the task. For example, before it is possible to complete the prototype, more information about user needs might be required. Or, when testing or evaluating the prototype, errors might be detected that need to be corrected before the test and evaluation can be completed. Hence, the bidirectional arrows point to the interdependency between the three phases, where each phase affects and is affected by the other two as one moves back and forth in the model.

THE CROCOPIL PROJECT

In this section, we illustrate how FormIT was used in the context of IS development. We draw specifically on the case of the Cross Border Cooperation Pilot Network Project (CroCoPil) that aimed at developing innovative IS for supporting work practices by improving Internet access in rural areas and designing systems to support fieldwork. This project was situated in the northern parts of Finland, Sweden, and Norway, and the user groups involved were reindeer herders, rangers, tourist guides, as well as police officers and homecare assistants responsible for large and sparsely populated areas. Even though the illustration is based on the CroCoPil

project, it is representative of many other projects in which we used the method.

CroCoPil is an international project funded by the EU with the dual purposes of developing systems that improve the situation of users while producing new research findings. To manage this dual situation, we chose an action research approach for the study, since action research means that one enters a real-world situation with the aim of both improving it and acquiring knowledge (Baskerville & Wood-Harper, 1998, 1996; Checkland & Holwell, 1997, 1998; Hult & Lennung, 1980; Susman, 1983).

Action research is also an established method within social sciences, including IS, and is thought to produce highly relevant results because it is grounded in practical action and aims to solve immediate problem situations while informing theory (Baskerville, 1999; Baskerville & Pries-Heje, 1999; Baskerville & Wood-Harper, 1998; Rönnerman, 2004; Starrin & Holmer, 1993). Thus, it represents a process of interaction between theory and practice that helps participants discover new ways of seeing and designing their actions (Jönsson, 1991; Rönnerman, 2004), which matches our study very well. When it comes to research regarding systems development methodologies, Baskerville and Wood-Harper (1996) even argue that "action research is one of the few valid research approaches that researchers can legitimately employ to study the effects of specific alterations in systems development methodologies" (p. 240).

An Illustration of FormIT

When planning the design of the CroCoPil project with partners from the different countries, it became clear that many of the developers were not used to our way of working. This resulted in some resistance among a few of the system developers and technical specialists when it came to engaging users in the design and development process and focusing on appreciating what works well in a situation and dreaming of a new positive future focused on identifying user needs. To overcome this resistance, we opened up the discussion and let everybody talk about their concerns and make suggestions. We also stressed our positive experiences from working with the method as well as the benefits discussed in theory. These discussions led to some modifications of the method, such as reducing the number of user groups to be interviewed, allowing for smaller focus groups than recommended by the theory, and in some cases even allowing individual interviews.

When all partners had agreed to use the method, we entered the first phase: discover and dream. Here, we encouraged storytelling about strengths and best practices in their present situation by asking them what they valued most in their work and work practices. We also encouraged them to explain and give examples of what worked well with the existing technologies they used. After this, we asked users questions related to how they viewed their future situation. To stimulate the users and help them alter their mental frame of mind from a problem perspective to an affirmative perspective and help them look beyond "what is" and fantasize about "what might be," we presented scenarios and used Norum's (2001) method of offering the users three wishes and then asking them to describe how the situation looks after their wishes have been implemented.

The energy generated by focusing on strengths, dreams, and possibilities was noticeable as soon as the users began to shift their mental focus from present problems and existing IT solutions to strengths and visions. One of the most interesting and innovative ideas expressed by the reindeer herders was the dream of a virtual fence, expressing a need to easily be able to change the form and geographical location of fences. They also expressed a need to keep track of their herds as well as individual reindeer. Possible services or functions discussed in relation to this need were Internet access in the field and monitoring equipment such as radio transmitters on the reindeers.

For the rangers, the most explicitly expressed need was related to safety due to their isolation when out in the field and the low or nonexistent mobile phone coverage in this area. This eventually resulted in a strong development focus on robust technology and artifacts, placing the variety and sophistication of the services in the second room.

The overarching value for all groups was the opportunity to work outdoors, and their dream was to be able to perform all their work tasks in the field, going to the office to meet colleagues rather than doing paperwork. Through their stories, they also expressed a need for social contact and the need to feel like a citizen or member of society even when they were working in the field for a few weeks. One suggested service linked to these needs was to have access to community services and information, both globally and locally. The examples above show different levels of values, dreams, needs, functions, and requirements. It was not a straightforward process to draw a line between these concepts since they existed at many levels. Despite this difficulty, the benefits of a needs analysis clearly outweighed the difficulties, since the analyses highlighted long-term needs and underlying values.

From the first phase, a summary of the findings from the appreciative interviews was presented to the project partners. The summary was clustered into four categories: values, user needs, suggested services, and functional requirements, based on statements from the users. This presentation or report represented the handover from phase one to phase two. Based on the findings in the report, the developers now started to design concepts and visualizations of possible IS. Here, the challenge was to keep the spirit of the first phase alive when faced with the operational, everyday limitations of the development work, such as short deadlines, limited budgets, and current technologies. These limitations had a tendency to direct the development work toward clearly expressed and easily generated solutions instead of stimulating the developers to analyze the sometimes elusive user needs and form innovative systems from these needs.

The developers and specialists sometimes had a hard time understanding the benefits of this process and the importance of differentiating between needs and requirements. Often, they already had a picture of what they wanted to develop before the needfinding activity occurred and the results were reported. When this happened – when the developers did not consider the stated user needs and instead focused on statements related to solutions and requirements or focused on their own pre-defined vision – the users were not satisfied with the product presented and tested in phase three. Instead, the user evaluation indicated that their needs had not been met with the system, and they requested that the prototype should be modified accordingly.

This, however, together with the personal experiences of the developers and technicians regarding the process, resulted in a changed mental perspective among skeptical systems developers and technical specialists. They became positive to this way of working and felt it helped them develop their ideas and services in new and innovative ways. They also said that they had developed good, close relationships with the users, which resulted in better cooperation and user involvement throughout the development process.

LESSONS LEARNED

The lessons learned from using FormIT in the CroCoPil project can be structured under two subheadings. The first focuses on the users as appreciative storytellers and the second focuses on the needs that the positive lens helped to reveal.

Users as Appreciative Storytellers

In the CroCoPil project, the users were shown to be very good storytellers, and by using an appreciative storytelling approach for data collection, we were able to obtain rich situated knowledge compared to survey or structured interview data. While Patnaik and Becker (1999) recommend observations for needfinding, observation of nonexistent (future) situations with yet to be developed technology, as in the CroCoPil project, are difficult or impossible to perform. In such situations, storytelling can constitute a more resource-effective alternative for observations by providing understanding about local knowledge and unique contexts, thereby revealing deep insights into the situations.

The appreciative interviews and the subsequent analysis of data revealed how deeply embedded the problem-solving approach is among people. Through the project, we learned that appreciating strengths and dreaming of the future was difficult for most users because they were stuck in present problems and in their knowledge of currently existing technological possibilities. Thus, it was often not enough to encourage the users to merely discover strengths and dream about the future. Instead, we needed to help users look beyond what is possible today and dream of the perfect future. To stimulate this shift in focus, we used scenarios as stimuli in two different ways: Sometimes we presented scenarios for the users in order to help them get started in their process, and other times we asked users to describe a scenario to us. Supporting current literature on AI (Cooperrider et al., 2005), we found that when users shifted their style of talking, from answering interview questions to telling stories or making up scenarios, it was easier for them to let go of problems and constraints related to "what is."

Another effective way that helped the users shift focus from "what is" to "what might be" was to use Norum's (2001) method of offering the users three wishes and then asking them to describe how the situation looks after their wishes have been implemented. This proved more effective than the sleep scenario (Cooperrider et al., 2005) where the users were asked to dream that it is 2010 or 2015 and they just woke from a long sleep realizing that the world is just as they always hoped and dreamed it would be. The boundaries and restrictions that these three wishes constitute seemed to offer a "safer," more familiar situation or intermediate position from which the users could later enter into the mode of describing how things would be after their wishes were implemented. This taught us to not give up, but rather continue to stimulate and encourage the users to shift focus.

Using focus group interviews instead of individual interviews also proved very valuable. Through these group discussions, users became inspired and stimulated each other to go beyond their own frame of mind by developing ideas generated by others. This resulted in a very fruitful and interesting snowball effect, which helped all group members participate actively during the discussion. We also found that appreciative storytelling and focus group interviews had a very positive effect on the user group and the ideas they generated.

When reflecting on the process as a whole from the perspective of different stakeholders and roles, we realized that it was important to modify the traditional role of the users. We found that they were good storytellers, but they often had difficulties expressing needs and requirements. In the narratives, the dreams, needs, requirements, etc. of users are all intertwined and need to be separated and analyzed by needfinders or system developers. Based on this fact, we argue that the role of the user is to tell appreciative stories that disclose their needs, both as users of a certain technology or information system and as human beings with certain ideals and values. From these stories, it is the design team's role to develop concepts, mock-ups, or prototypes that incorporate the needs of the users. Hence, the innovative and creative process, or jump from need to vision, is the design team's responsibility. This does not mean that users cannot participate in this work; it is meant as a clarification of the different knowledge assets held by different roles and where their responsibilities lie. Clarifying knowledge assets and responsibilities is especially important in projects where the users are seen as co-designers to some extent.

Identifying User Needs Through a Positive and Life-Generating Lens

Our experiences from the CroCoPil project showed that when users were asked to tell appreciative narratives related to their work practices and IT usage, focusing on past, present, and future situations instead of present problems and existing IT solutions, positive energy was generated in the group. This atmosphere combined with the focus group interview technique also stimulated the users to generate innovative ideas and visions.

We also learned that telling stories about "what is" and "what might be" facilitated the sharing of experiences in rich ways, leading to a focus on future possibilities instead of problems they wanted to solve. In their explanations of future situations, things they did not want were discovered, giving indications about what they saw as working in an unsatisfactory way

today. This can be seen as problem identification but with a focus on possibilities instead of problems, suggesting a positive future.

Focusing on narratives instead of asking specific questions about needs and requirements also made it possible for the users to talk about and discuss their situation and dreams independent of any technical solution or artifact. When analyzing the narratives, we also observed that users talked about their needs in relation to particular situations and usually independent of a specific solution or artifact. This was not the case with requirements. Requirements were always discussed in relation to an IT artifact, service, or function. When the users were unable to visualize an artifact or service, they were also unable to discuss its requirements. Hence, needs were found to be contextually situated, while requirements were product or service situated. We also found it valuable to go a step further and inquire about the rationality behind how things were currently done or how their dreams revealed themselves. This was done by probing the values and motivators of the users. From this, we learned that we could never ask too many "why" questions.

On a methodological level, changing focus from requirements to needs also made the development process shift focus from "systemically feasible and culturally desirable" to "culturally feasible and systemically desirable" (Checkland, 2000). Thus, instead of focusing on requirements and what is technically feasible, the narratives, containing rich contextual data, resulted in a focus on what was regarded as meaningful to the users within their specific cultures.

However, our study shows that it is not a straightforward process to draw a line between concepts such as visions, dreams, values, needs, functions, and requirements, and that these concepts, as well as the relations between them, need to be further clarified. Following the needfinding theory (Patnaik & Becker, 1999), needs exist on an overarching level where the solution or vision is not given and where many different requirements and functions can meet the same set of needs. Through the project, we were able to take this description a step further by arguing that needs are related to a specific situation and an understanding of *why* users want or need something. Systems requirements specify *what* the users want or need, and functional requirements are strongly related to *how* they want these to look or work.

Moreover, even if the needs are somewhat stable, they are not fixed through time. The existing technologies, solutions, and services available to satisfy different needs are constantly developing. This calls for an interactive and iterative process supporting the expansion and revision of users' needs and the inquiry into new visions and services for satisfying and supporting them.

FINAL REMARKS

The aim of this paper is to introduce FormIT, a new approach to IS development that builds on AI combined with needfinding. The approach grounds the development effort in user needs and stimulates a positive development process of innovative IT products and services.

FormIT focuses on appreciative storytelling with the purpose of identifying user needs. Compared to traditional methods of information system development, FormIT places users in a somewhat different role. Instead of expecting them to have the technical competence often needed to be able to express system requirements clearly, we ask them to tell stories based on their own experiences of their present situation and their dreams for the future. Our findings show that needs can be appreciated from users' stories, and it is the responsibility of the designer to elicit these needs and provide visions, alternative solutions, and related requirements. In this way, FormIT clearly distinguishes the difference between user and designer competencies.

Shifting focus from problem identification to opportunity analysis results in a shift from a reactive approach (waiting for problems to occur and then finding ways to solve them) to a proactive approach (constantly asking how we want things to be and then working toward achieving this dream). It could also form a mix between an incremental and a radical approach since it builds on what exists but tries to create something new and innovative using this as a base. Because it builds on what users define as existing and positive, radical changes are expected to be accepted more easily and implemented with fewer problems.

Since needs are more stable and long lasting compared to specific solutions and requirements, system development based on needs can also provide a long-term vision for the development work where it is possible to concentrate on certain needs and focus attention on continuously developing improved products for these needs. We also found that IT systems that do not incorporate needs, values, or life-giving factors to users remain unused. This strengthened the importance of focusing on what is regarded as meaningful for users within their specific cultures. In FormIT, this was accomplished by changing the development process from "systemically feasible and culturally desirable" to "culturally feasible and systemically desirable."

Finally, this paper constitutes the first step of what we hope will be a long journey toward establishing a new leverage point for IS development – a leverage point that builds on the strengths and positive experiences of users and shifts focus from problem orientation to opportunity development, a leverage point that sees users as human beings and focuses on what users actually need or want instead of focusing on what technology can offer.

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Paper V:

Concept Design with a Living Lab Approach

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Concept Design with a Living Lab Approach

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Abstract

Living Labs is a rather new research area and phenomena that introduces new ways of managing innovation processes. The underlying idea is that people's ideas, experiences, and knowledge, as well as their daily needs of support from products, services, or applications, should be the starting point in innovation. This paper illuminates experiences and accumulated knowledge to the area of concept design in an innovation process within a Living Lab. FormIT, a methodology developed for innovation processes within Living Labs is introduced through an illustration of how it has been utilised in a case. The experiences and the method are related to characteristics of Living Labs, and the paper closes with some concluding remarks in relation to concept design in a Living Lab.

1. Background and Introduction

All over Europe, a new type of innovation milieu is emerging, called Living Labs. The rationale behind these new milieus are to open company boundaries toward their environment and harvest creative ideas and work capabilities existing among different stakeholder groups, such as customers, competitors, providers, and the public in general. As such, it is similar in its approach to different open methodologies, e.g., open innovation [1, 2], crowdsourcing [3, 4] and involving lead users [5, 6].

In more detail, a Living Lab is a gathering of public–private partnerships in which businesses, researchers, authorities, and citizens work together for the creation, validation, and test of new services, business ideas, markets, and technologies in real-life contexts. The purpose of a Living Lab is to create a shared arena in which digital services, processes, and new ways of working can be developed and tested with user representatives and researchers. Hence, a Living Lab is an environment in which people and technology are gathered and in which the everyday context and user needs stimulate and challenge both research and development, since authorities and citizens take active part in the innovation process.

Since Living Labs is a rather new research area and phenomena, the amount of supporting theories for understanding the concept is limited. Further, though there exist a plethora of methodologies, methods, and tools used in individual emerging as well as mature Living Labs, there is a lack of systematic analyses and reflection on their suitability in different contexts and situations [7]. The methodological choices often are based on habit and familiarity rather than on best practice in the field. Thus, Feurstein et al. [7] argue for a structuring of the approaches used in Living Labs in order to gain an overview of what is used and to what extent. While we agree that this is interesting, we argue that it is even more important to reflect on how the methodology and methods used reflect the spirit of the Living Labs approach.

The aim of the paper is to contribute with experiences and accumulated knowledge to the area of concept design in a Living Lab milieu. More precisely, the purpose is to present a methodology called FormIT [8, 9] and to reflect on its suitability in a Living Lab milieu and how it harmonies with Living Labs characteristics. In this paper, we focus on the concept design phase of the methodology, since the foundation of failure often seems to be established at the very beginning, even if it is not recognised until the end of the development process [10]. Hence, this is where the conditions for the remaining processes are set. Moreover, it is here we can shift perspective from problems to opportunities and from requirements to needs [8, 9].

In the following, we present the concept Living Lab and its key principles. Subsequently, we introduce FormIT, followed by a description of our research method and the case used to illustrate the living practise of FormIT. Thereafter, we discuss and reflect on FormIT's suitability related to Living Labs. The paper ends with some concluding remarks.

2. Living Labs

Living Lab started to emerge in the beginning of 2000 [11] and the focus initially was to test new technologies in home-like constructed environments. Since then, the concept has grown, and today one precondition in Living Lab activities is that they are situated in a real-world context. During the design of the concept, Living Labs has been defined as an environment [12, 13], as a methodology [14], and as a system [15]. We do not see these three definitions as contradictory but rather as complementary

perspectives. Depending on which perspective one takes, certain themes come into focus. With the environment perspective, objects such as technological platform and user communities come to the forefront. With the methodology perspective, processes such as data transfers and methods for user involvement are highlighted. The system perspective puts focus on the relation between the Living Lab as a whole and its interdependent parts. In this paper, we focus on the methodological perspective of Living Labs.

The concept of Living Lab can be interpreted and used as a human-centric research and development approach whereby ICT innovations are cocreated, tested, and evaluated in open, collaborative, multi-contextual real-world settings. Additionally, the Living Lab approach not only focuses on involving users in the development processes, it also strives to facilitate the interaction among other relevant stakeholders, such as academia and research organisations, SMEs, business industry, civic sector, ICT professionals, and public partners.

Since Living Labs are a rather new phenomena that emerge in such diverse areas as ICT-development, health services, and rural development, it is a hard concept to define and describe. Due to this, different suggestions for key elements and characteristic have been suggested. See for example [7, 14, 16]. We have chosen the five key principles stemming from the CORELabs project, since it is grounded on a study that is based on the views of ten involved Living Labs [15].

- *Continuity*: This principle is important since good cross-border collaboration, which strengthens creativity and innovation, builds on trust, and this takes time to build up.
- *Openness*: The innovation process should be as open as possible, since the gathering of many perspectives and bringing enough power to achieve rapid progress is important. The open process also makes it possible to support the process of user-driven innovation, including users wherever they are and whoever they are.
- *Realism*: To generate results that are valid for real markets, it is necessary to facilitate as realistic use situations and behavior as possible. This principle also is relevant since focusing on real users, in real-life situations is what distinguishes Living Labs from other kinds of open cocreation environments such as Second Life.
- *Empowerment of users*: The engagement of users is fundamental in order to bring innovation processes in a desired direction, based on the humans' needs and desires. Living Labs efficiency is based on the creative power of user communities; hence, it becomes important to motivate and empower the users to engage in these processes.
- *Spontaneity*: In order to succeed with new innovations, it is important to inspire usage, meet personal desires, and fit and contribute to societal and social needs. Here, it becomes important to have the ability to detect, aggregate, and analyse spontaneous users' reactions and ideas over time.

In comparing Living Labs to traditional systems development, we can identify a number of differences and a few similarities. In relation to continuity, both Living Labs and systems development believes that good cross-border collaboration takes time to build up. Therefore, we do not see a clear difference between Living Labs and systems development in this aspect.

When it comes to openness, the two approaches differ more significantly. Here, Living Labs is influenced strongly by "open innovation" [1] and, as such, Living Labs believes strongly that organisations should combine internal and external ideas into the development process. Systems development often takes the opposite approach, limiting the number of inflows into the development process, with the argument that it becomes too complex and expensive to involve all stakeholders.

Perhaps the difference between the two approaches becomes clearest in relation to the concept realism. In Living Labs, the approach is for real-world contexts, real users, and real use situations [12]. This means that users are involved in their own private contexts all day round. Hence, when a Living Lab approach is applied, the aim is to create as authentic use situations as possible. In traditional user involvement processes, users can be asked to use a system or device in a so-called field study. In these processes, the user is requested to use the device in a context in which the researcher, or developer, can observe users' actions and how the technology impacts them [17]; hence, the use situation is not fully authentic.

Whether there is a difference between the two approaches when it comes to empowerment is more difficult to judge. The reason for this is that there are a number of user involvement methodologies [18] that all can be argued as rather traditional but that differ greatly among each other. Despite this, it still is possible to discern a difference in the argumentation for user involvement between Living Labs and these traditional user involvement methodologies. Within Living Labs, all involved stakeholders, even end users, are seen as partners. In systems development end users seldom are seen as partners but rather as actors, even though their organisation might be viewed as partners.

Finally, in relation to the last key principle, spontaneity, we do not find any apparent differences. Instead, we have identified an important difference between the two approaches that cannot be linked to the key principles. This is the relation to academia. In Living Labs, most activities are carries out in close relation to academia, while this often is not the case within most systems development projects. By this, Living Labs has the possibility to research both more theoretical and more practical matters. More precisely, research is carried out within the Living Labs environment, while in systems development it is carried out by academia in relation to a company, if at all.

3. FormIT – an Illustration of a Living Lab Methodology

In this section, we present the framework of ideas and characteristics of FormIT before we introduce the general shape of FormIT in order to give a holistic view of the methodology. The kernel of this paper is concept design, and this part of FormIT therefore will be presented in more detail through an illustration of a case later in this paper.

3.1. Framework of Ideas

FormIT is inspired by three theoretical streams: Soft Systems Thinking, Appreciative Inquiry, and NeedFinding. From the first stream, Soft Systems Thinking [19, 20], the assumption that changes can occur only through changes in mental models is utilised. This implies that we need to understand both our own as well as other stakeholders' worldviews, and we need to be clear about our interpretations and the base on which they are made. The second stream, Appreciative Inquiry [21-24], has encouraged us to start the development cycle by identifying different stakeholders' dreams and visions of how IT can improve and support the lives of people. This includes a focus on opportunities, related to specific trends, contexts, or user groups, and on the positive and life-generating experiences of people [25, 26].

This way of thinking is aligned closely with the philosophy behind soft systems thinking, since it also highlights the importance of people's thoughts about themselves and the world around in a design situation. Hence, instead of starting the process by searching for problems to solve in a situation, we identify what works well and use this as a basis for design.

The third stream, NeedFinding, has two different inspirational sources. The NeedFinding concept, as such, and its motivation finds its origin in a paper by Patnaik and Becker [27]. Patnaik and Becker argue that the main motivators for the NeedFinding approach are that needs are not influenced highly by trends; hence, they are more long lasting. The needs generation process, on the other hand, is inspired by Kankainen and Oulasvirta [28] and Tiitta [29]. These authors inspire us to focus on user needs throughout the development process, and to use these as a foundation for the requirement specification.

3.2. Characteristics of FormIT

Grounded in these three theoretical streams, FormIT enables a focus on possibilities and strengths in the situation under study; which is fundamentally different from traditional problem-solving approaches. In our perspective, identifying opportunities is the basis for appreciating needs since needs are opportunities waiting to be exploited [25, 26]. Hence, FormIT strongly stresses the importance of the first phase in the concept design cycle, usually referred to as analyses or requirements engineering. Since this phase creates the foundation for the rest of the process, errors here becomes very hard and expensive to correct in later stages. This also is the phase in which users can make the strongest contributions by actually setting the direction for the design, rather than mainly responding to (half finished) prototypes. Since users' needs and requirements can change as users gain more knowledge and insights into possible solutions, it is important to reexamine their needs continually and make sure they correlate to given requirements.

In accordance, the FormIT method is iterative and interaction with users is an understood prerequisite. The idea is that knowledge increases through iterative interactions between phases and people with diverse competences and perspectives [30, 31]. In this way, knowledge increases through dialogue among participants. The idea is that the cross-functional interaction enables the processes of taking knowledge from one field to another to gain fresh insights, which then facilitates innovative ideas. The shared understanding of the situation that evolves in this process informs and enriches the learning processes and thus facilitates changes in perspective and lead towards innovative design processes. This, in turn, increases our qualifications to design IT systems that answer to user needs [26].

3.3. General Shape of FormIT

The FormIT process can be seen as a spiral in which the focus and shape of the design becomes clearer, while the attention of the evaluation broadens from a focus on concepts and usability aspects to a holistic view on the use of the system; see figure 1.

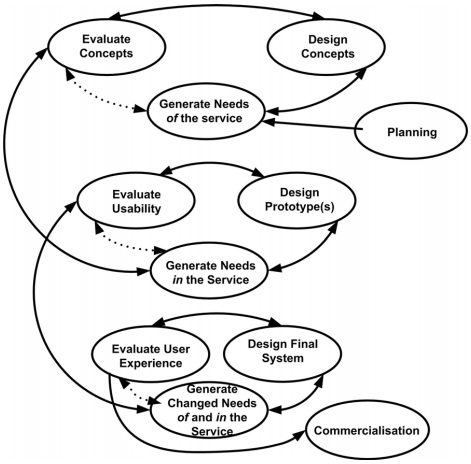

Figure 1. The FormIT Process for Systems Development

In this process three phases – Generate Needs, Design, and Evaluate – are repeated in three iterative cycles. The first cycle is called Concept Design, the second Prototype Design, and the third Final System

Design. The name of the cycle indicates the expected output of each cycle. Besides these three cycles, two additional phases are included in the figure. The first is planning, seen in the upper right hand corner of the figure, and the second is commercialisation. Focus of this paper is concept design, which is managed in the first cycle, illustrated in the upper level of figure 1.

4. Research Method

In this study, we have chosen an action research approach. Action research means that one enters a real-world situation with the aim of both improving it and creating knowledge [32, 33]. This fits well with the dual role we have had in this study. Our responsibility was to identify opportunities that could improve the situation for users in remote rural areas as well as to develop FormIT further through reflection on our experiences of applying the methodology in this particular situation. Action research also is a well suited methodology for the Living Lab, since both approaches emphasise interaction between theory and practice, involve many different stakeholders with distinct roles relevant in the situation, and highlight the importance of constant reflection in order to follow wherever the situation leads.

Action research also is an established method within social sciences, including information systems [34, 35], and is thought to produce highly relevant results because it is grounded in practical action and aims to solve immediate problem situations while informing theory. Baskerville and Wood-Harper [34] even argue that "action research is one of the few valid research approaches that researchers can legitimately employ to study the effects of specific alterations in systems development methodologies" (p. 240).

The data gathering that took place in the case is mainly a part of the aim of improving the situation. As such, it will be integrated and reported in the Case section. The research part is our reflection on how suitable FormIT is within a Living Lab approach. It therefore will be presented in the discussion.

5. Case

The case in focus for this paper is called Cross Border Cooperative Pilots (CroCoPil). CroCoPil was an Interreg IIIA NORTH project with partners from northern Norway, Sweden, and Finland. The project had its background in the new technologies that are evolving and build on dynamic and mobile structures rather than fixed infrastructures. Among these technologies, we find high speed wireless networks, delay tolerant networking, peer-to-peer networking, digitalisation of mobile phone systems, and possibly new satellite systems. Together with this shifting technology management from fixed to dynamic and mobile connectivity, a potential appears for rural and remote areas to become involved and to take a lead in forming the new technologies and the requirements that they are to meet.

The overall objective of the CroCoPil-project was to apply user needs as a basis for technology development, adaptation, and evaluation in order to create services that could reduce the digital divide between rural and urban areas, create cross-border business opportunities between the northern parts of Finland, Sweden, and Norway and establish cross border cooperation in several other fields.

In the following, the case will be illustrated and integrated with a more detailed description of the planning phase and the phases contained in the first cycle of FormIT, focused on concept design.

5.1. Planning.

The planning phase of FormIT includes deciding on the overall project team and discussing such issues as the purpose of the project, the specifics of the context, important constraints and relevant methodologies, and methods for the project as a whole. This is important since it facilitates the creation of common perspectives as well as understanding differences in values around these issues [36, 37]. This process can be difficult to accomplish since project participants usually have different opinions and want to make contributions to many different areas.

In CroCoPil, the overall project team comprised people from all three countries, including participants from academia, private companies, public organisations, and potential end-user groups. Common for all end-user groups was that they should be field workers located in remote rural areas. The more detailed definition and grouping of end users was done in the concept design cycle. In the planning phase, it was decided to perform the interviews in the users' work premises.

The methodology was decided to be FormIT, since this has been developed especially for Living Lab milieus and e-services. Since the methodology was not known to all participants, educational workshops were provided and a semi-detailed guideline for the concept design cycle was distributed to all relevant participants in the three countries.

5.2. Phase 1. Generate Needs.

In the first phase of Concept Design, we start by designing the team. When the team has been designed, a number of need generating sessions are held, with the focus of identifying strengths and best practices by stimulating user participants to provide rich and appreciative narratives about past and present situations [25, 26]. Based on these narratives, the users then are asked to shift focus from appreciating "what has been" and "what is" to dreaming about the future and "what might be." From the stories of best practice and the dreams and wishes of the users, needs are generated and prioritised. The main challenge in the Generate Needs phase usually is to help people alter their mental frame of mind from a problem perspective to an affirmative perspective, and to make them talk about what works well instead of what is

unsatisfactory. When it comes to dreaming about the future, the challenge is to help people let go of the status quo and look beyond their present knowledge of currently existing technological possibilities [8, 9].

In CroCoPil, the team in each country consisted of researchers, system developers, and user participants from private companies and pubic authorities.

Following the FormIT methodology, need generating sessions were held in all three countries. Four focus group interviews, two pair interviews, and two individual phone interviews were performed (three focus group interviews in Sweden with reindeer herders, rangers, and tourist companies, two pair interviews in Norway with police and rangers and one focus group interview with reindeer herders, and finally, two individual phone interviews in Finland with tourist companies and home care assistants). To sum up, 24 persons (three women) ages 35–60, contributed with their narratives. The interviews lasted 1½–2½ hours, and one moderator and one assistant from the research group led each interview, with exception of the phone interviews, which were performed as one-to-one interviews. All interviews, except the phone interviews, were conducted in the user's own environment.

The results from the interviews were transcribed and analysed. We used a method for analysis that takes it through two phases, a vertical and a horizontal analysis [38]. No themes were decided on beforehand; instead, we searched for statements that indicate a need. This type of analysis often is called open analysis or qualitative analysis. In the vertical analysis, each interview is analysed individually as a way to generate needs. Thereafter, the generated needs in all interviews are compared and clustered into themes in the horizontal analysis.

The analysis showed that some overall needs were shared by all groups, e.g., communication and safety, while there were significant differences in needs between groups and countries when we analysed the needs in more detail.

A good example of an overall need is to be able to communicate, as part of their job (or privately), even though they are far out in the wilderness; this was shared among all respondents. In these rural areas, there is very poor connectivity for mobile phones and no Internet access. Participants described situations in which they kept several different communication tools, such as NMT, GSM and satellite telephones. As the work of all these groups keep them out for days or weeks, they all need to communicate both with colleagues and with their families. Another related shared need is that the communication tool must be small, easy to carry, stable for coldness, water, and bumpy travel, while battery capacity must be large.

As mentioned above, if we look more into detail, communication needs differed significantly between groups and countries. For example, reindeer herders needed to be able to communicate continuously in real time during their work coordinating the reindeer herd. Tourist guides had quite different communication needs. E-mail was their main communication line with potential customers. Otherwise, they wanted to keep the wilderness silent, quite in contradiction to the other user groups. The reason for this was that they did not want their customers to have connectivity, since the silence was part of their product. The rangers usually work alone and need to take notes of what they observe and what they do as they travel across their working area. Hence, they need to send in reports, and also to communicate with colleagues regularly.

After obtaining a rich picture of different stakeholders or user groups, their behaviour, attitudes, and values in the first phase, the needs are translated into concepts. As a result, the focus for the work shifts from the Generate Needs phase to the Design phase. Hence, the findings from the need generating[1] form the basis for concept design in the next phase. More details of phase 2 are found in the next section.

5.3. Phase 2. Design Concepts

The design phase is the most innovative phase in the concept design cycle, since this is where all collected data is clustered in different ways and seen from different perspectives in order to construct innovative and relevant concepts. Therefore, cooperation between different stakeholders is important to ensure that knowledge is shared both across and within competence areas. Since many developers and engineers are unfamiliar with this way of working, they often want to skip this part and go directly to the requirements and specifications, the second cycle of the FormIT model. We have found, however, that to ensure that the final solution responds to users' needs and doesn't merely reflect what is technically possible; a close interaction between people with different competences and different focuses on the development process is needed.

Hence, in this phase, the focus is to design and develop innovative service concepts on the basis of the generated needs and requirements from the earlier phase. At this point, the generated needs, as well as identified strengths and dreams, form the basis for the vision of the service/s that take form. The ideas can be elaborated on and expressed both textually, in the form of key concepts, personas, or scenarios, and pictorially, in the form of visual scenarios (rich pictures), or mock-ups of the system/s. The concepts need to be detailed enough for the users to understand the basic objective and functions of the future solution.

In the second phase of CroCoPil, concepts were designed within each participating country but based on the need generating data from all countries. People from all participating groups of the national project teams held several virtual and physical meetings in which the results from phase 1 were discussed. From the discussions, several concepts evolved, meeting user needs. In meetings, sketches, figures, or models were

1. In this phase, the safety needs, communication possibilities, exchange of experiences, mobility (independence), monitor and control (order), knowledge sharing, social contact, coordination, freedom (being out in the nature) and economy (effectiveness, efficiency) were identified.

presented and discussed as ways to modify and design the concepts. Finally, 14 concepts[2] were designed, and from these three were chosen for evaluation in the third phase. As an illustration of a concept designed in the CroCoPil project, Seamless Office is outlined in the following.

Figure 2. Seamless Office

The Seamless Office concept was constructed as a rich picture [19, 20]; see figure 2. This concept was designed mainly to represent the rangers' need of wireless transfer of data while out in the field. They needed to store all their collected data immediate in the database. The dream was to have a clear screen when coming back to the office after some days out in the field, thus being able to decrease their office time.

The idea of Seamless Office was to gather many functions in one gadget, to make it possible to store data in the device, and to be able to send the data by means of wireless networks over the Internet directly from the field, or merely connect it to the computer and transfer the data when in office.

To illustrate the concept, we used the PDA ArcBob, since it answered to the clearly outspoken needs of a robust and "multi-talented" gadget. ArcBob is a lightweight and advanced PDA with many functions, such as phone, GPS, calculator, and with a socket fitting the snowmobile, making it possible to charge the battery. To this were added the functionalities of, e.g., interactive maps and database connections.

In relation to project as a whole, there also were needs that were not met by any of the 14 concepts developed. For example, the need to have continuous real-time communication around the reindeer herd was not met by any of the suggested concepts. Neither was the safety need pervasive in the different concepts, even though it was a frequently mentioned need. This was due to technological constraints at the time. In the next section we will illustrate the process of evaluating concepts with users.

5.4. Phase 3. Evaluate Concepts.

In the third phase of FormIT, users are invited and encouraged to give their impressions of a concept that has been constructed to represent their needs. In this process, the evaluation is combined with the aim to generate new and unexplored needs, or to modify needs. This is an important part of FormIT, since the aim is to create a final solution with functionality that represents the generated user needs.

In the concept evaluation in CroCoPil, we returned to the Swedish users (reindeer herders (seven men) and tourist companies (one woman) and rangers (two men) whom we met in the first phase), and evaluated the chosen three concepts in focus group interviews. Since only one tourist company representative and two rangers could participate, they were interviewed together at the hotel owned by the tourist company. The rangers worked in the same area so they were acquainted with each other. The evaluation comprised focus group interviews that took about 1½ hours and had the aim to discuss and test the concepts that had been chosen for evaluation (GeoBlog, Seamless Office and HomeCare Diary). The concepts were presented as a scenario, a Rich Picture, and a use-case, i.e., as visual narratives.

The interviews were designed so that the groups were introduced to the concept in the form of, e.g., a scenario. They then were asked to respond spontaneously. When the discussion was finished, we discussed how the concept was related to needs generated in phase 1. Thereafter, the next concept was introduced.

We continue with the Seamless Office as an example. This concept was designed based mainly on the rangers' need of data storage and wireless transfer of data while out in the field. The most intense reactions on this concept came from the reindeer herders who could visualise new ways of working.

One example of this is that planning and preparing for building new reindeer herd fences could be done ahead. Instead of doing the entire job in the summer, they envisioned how they could plan and prepare a major part of their work during winter. Using snowmobiles, they could mark the area that should be fenced and at the same time calculate the circumference of the fence and where the poles should be placed. Using the GPS coordinates, they could identify where to leave piles of poles; then, in the summer, they only had to do the actual building of the fence. Additionally, they could calculate things such as the number of poles needed and the cost of the fence.

The reaction among reindeer herders was interesting because the first need generating interview had not identified these dreams to rearrange work between seasons. Here, we learned a lot more about

2. Home Care Diary, Online Service Warehouse, Travel Diary, GeoBlog, Seamless Office, Specialised Field Device, Ad Hoc Relay Stations (ad hoc networks), Extending Sensing (sensor), Delayed e-mail and web-access, Information Packets, Calculation Application, Webb Meeting Place, Webb School, Interactive Map.

their work and needs at the same time as they learned about new opportunities. Hence, we acknowledge the significance a mock-up or scenario could have to fuel the discussions, as well as the importance of an iterative and interactive process.

Rangers also were positive; this answered to their needs. A good map and you just click on the screen and write your information and save it. It also would be possible to save data about their route, facilitating their work.

When we discussed needs in relation to this concept, participating reindeer herders found it interesting to see how the concept opened up the discussion about coordination of work. They saw many new ways to do their work with the help of technology. It was found that the concept also answered to the need of economy, communication, mobility, and knowledge sharing. After the evaluation meetings, data from the interviews were compiled in the same way as in phase 1.

In FormIT, the focus shifts again, this time from the evaluation phase of the first cycle to generate needs in the next cycle. However, this work will be part of another paper. In this paper, we now will discuss the lessons learned from the whole first cycle of FormIT. A lot was learned from the CroCoPil project, both when it comes to reactions on the concepts and in relation to methods for concept design processes in a Living Lab.

6. Discussion

In this section, we discuss FormIT characteristics in relation to the five key principles of Living Labs. Examples and illustrations are given from the CroCoPil project.

6.1. Continuity

The principle of continuity highlights the importance of good cross-border collaboration that builds on trust, since it strengthens creativity and innovation. However, trust takes time to build up.

In FormIT, the continuity principle is inherent in many different ways. The most visible is the flow from needs and concept to prototypes and finished products. Here, the iterative process strengthens this continuity through a constant interaction back and forth between phases and cycles. We therefore argue that continuity within a Living Lab methodology is just as important as the continuity between collaborative partners.

In the CroCoPil case, we decided to include and cooperate with the same user group throughout the concept design cycle. From a continuity perspective, this is very important in order to verify the relevance of the designed concepts and their relation to the needs of the user group. Additionally, in concept design, understanding, and to some extent constructing, needs is a crucial activity, since a service or a product that does not meet user needs will not succeed in the market [39].

6.2. Openness

The principle of openness emphasises that the innovation process should be as open as possible. The idea is that multiple perspectives bring power to the development process and achieve rapid progress. The openness supports the process of user-driven innovation.

Open inclusion of multiple stakeholders and perspectives is a key characteristic of FormIT and is illustrated in CroCoPil, where the teams consisted of people from academia, private companies, public organisations, and potential end-user groups. We included many different stakeholders, both on the project level and on the national level. It is unclear if this resulted in a more rapid progress or not. We can conclude, however, that the process resulted in more concept ideas than anticipated, fourteen instead of nine.

In relation to the last part of the principle, that inclusion of many different stakeholder perspectives supports the process of user-driven innovation, we want to raise a word of warning. It is important to recognise that inclusion of multiple stakeholders does not guarantee a user-driven innovation process. Of course, this depends on the definition taken and, here, numerous diverse definitions exist [40].

We take a somewhat radical view by arguing that the use of the concept should be delimited to processes in which the users actually take the lead and drive the innovation process forward. This radical view is necessary for the concept to bring an air of innovation into the field of IS innovation, since user participation has such a long tradition within this field, especially within the Nordic countries [41, 42].

Hence, we argue that user-driven innovation needs to be aligned with the concept “design-by users,” and that we should not include concepts such as “design-with” or “design for users” here [43]. If we want a concept that brings all user involvement concepts under the same umbrella, we suggest the user-centric concept. By differentiating clearly between general concepts of user participation and concepts that want to take user participation one step further, we have the opportunity for critical reflection both in relation to the concepts and their use.

If we scrutinise FormIT critically, we see that while we strive for user-driven innovation, we have not reached this position yet. In the CroCoPil project, we adapted a user-centric approach based on the principle of design with users. This also seem to be the maturity level among many Living Lab projects [44].

One important element in open innovation is the openness of the content produced within innovation processes [2]. This type of openness, however, is not expressed explicitly in the definition of the openness principle for Living Lab. We believe that this is an important part and therefore should be highlighted within the principles of Living Lab. In FormIT, we strive for this type of openness as far as possible; in CroCoPil, all concepts designed in the concept design

cycle were open to anyone, both within and outside the project team, since they were published on the project home page.

6.3. Realism

Realism is one of the principles that clearly separate Living Lab from traditional systems development, as well as other kinds of open cocreation environments, such as Second Life. The principle highlights the necessity to facilitate realistic use situations and behaviour as possible in order to generate results that are valid for real markets.

As the principle suggests, realism can exist on many different levels and in relation to many different elements, such as contexts, users, use situations, technologies, and needs.

When it comes to facilitating realistic use situations as possible, two different approaches can be observed, rather easily, in relation to Living Labs. In the first approach, environments for testing and evaluation of products or services are created in ways that are similar to the real world [11]; in the second approach, products and services are tested and evaluated in users real world environments [44].

FormIT takes the realism aspect one step further with the aim of involving users already in the concept design cycle, since this is where the conditions for the remaining processes are set. It is here that users can make the strongest contribution to a product or service by setting the direction for the design, rather than merely responding to prototypes in a test.

This is illustrated in the CroCoPil case, in which it was decided to perform the interviews in the users' work premises. Even if these premises were part of the real-world working situation of the user-groups, they constituted a limited part of their work since they spent most of their working time out in the field. Common for all end-user groups was that they should be field workers located in remote rural areas. So, it would have been even more authentic if the need generation and evaluation had been carried out there. However, this was considered impractical and therefore not acted out.

6.4. Empowerment of Users

The key element in the empowerment principle is to base innovations on humans' needs and desires, and to utilise the creative power of user communities.

Empowerment of users also is a key characteristic in FormIT and is visible in many different ways. Firstly, users and other stakeholders are seen as partners in the innovation process, not just as codesigners, which is common in most systems development projects. Inherent in being a partner, from an end-user perspective, is the power of choice. They always can choose if, when, and to what extent they want to participate.

Secondly, including potential end users guarantees participation and facilitates involvement. However, in our view, influence is the key to empowerment, that is, if user needs and ideas can be traceable in the concepts, prototype, and finished product. FormIT's iterative process between phases and between cycles makes it possible for users to judge whether their participation and involvement contributed to and influenced key deliverables.

In the evaluation phase of CroCoPil, three concepts were presented to the Swedish user groups. The concepts were discussed in relation to needs and values of the groups. During these discussions, the user groups confirmed that the concepts fulfilled some of their needs, such as needs related to "economy" and "communication." It also highlights generated needs that have not been represented in any concept. To discuss this and the reasons for their exclusion also is important from an empowerment perspective.

6.5. Spontaneity

In order to succeed with new innovations, it is important to inspire usage, meet personal desires, and contribute to societal and social needs as outlined in the spontaneity principle. Here, it becomes important to have the ability to detect, aggregate, and analyse spontaneous users' reactions and ideas over time.

When evaluating concepts in FormIT, the concepts are visualised for the users without any formal presentation. This gives the users the chance to interpret the concepts in their own way without being influenced by our intentions. Then the users present their interpretation to the rest of the group and different interpretations are discussed and related to each other. This allows spontaneous reactions and new ideas to be generated.

When evaluating the concept "The Seamless Office," the discussion among reindeer herders first was relatively passive and silent until they understood the functionality of ArcBob and how it related to their needs. This turned the evaluation session into a spontaneous, dynamic, and highly creative group discussion. Suddenly, the users could give numerous examples of how they would use the seamless office in their work situation and the value this would add. From these discussions, we also could generate new ideas and needs.

7. Concluding Remarks

In this paper, we have presented a methodology called FormIT and reflected on its suitability to the Living Lab approach, aiming to contribute to concept design in this area with experiences and accumulated knowledge.

We find that the Form-IT methodology and its concept design cycle fits very well with the basic idea of Living Labs. The methodology stresses user involvement in real world contexts. However, we find that there still is much work to be done before the concept design process truly meets the vision of taking place utterly in the users' real world contexts throughout the whole innovation process, as well as being truly user-driven.

In line with Living Lab characteristics, FormIT also strongly emphasises the importance of grounding the concepts in the needs and desires of users. In FormIT, the whole concept design cycle builds on user needs through constant iterations between the three phases in the cycle. Furthermore, the learning perspective inherent in FormIT fits well with the Living Labs characteristic of including many different stakeholders from academic, public, and private organisations together with end users.

Finally, some important issues have been identified for the continuing development of FormIT: firstly, to develop FormIT into a methodology that supports our view on user-driven innovation in better ways; secondly, to develop methods and tools that make it possible to capture users' spontaneous ideas and reactions on changes in, for example, their contexts, technology, and activities; and thirdly, to enable further user participation based on their own initiative, which in turn would lead to a stronger relation to their real world situation and empower the users, since they are in control of the situation.

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