Nasjonalt senter for
samhandling og telemedisin
NST

Project report

The Myhealth@age project in Tromsø

An evaluation of the first research cycle

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Title:	**The Myhealth@age project in Tromsø**
NST-report:	13-2010
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ISBN:	978-82-8242-022-8
Date:	2010-06-28
Number of pages:	30
Keywords:	Participatory design, Living Lab, telecare, myhealth@age
Summary:	This text reports on the first evaluation cykle of the Myhealth@age project at The Tromsø test site, taking place from January 2008 to February 2009. The Myhealth@age project aims at developing a user-validated mobile device containing services for enhancing personal safety, for personal health monitoring, as well as for social networking and includes partners from Northern Ireland, Norway and Sweden. We organised focus groups of elderly people and professional health workers during the spring of 2008, and performed need assessments in the period June 2008 to February 2009. The evaluation focused mainly on user friendliness and usefulness of the services proposed.
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Summary

The Myhealth@age project is a three year research- and development initiative within the Northern Periphery Program with partners from Northern Ireland, Norway and Sweden. The objective is to develop a user-validated mobile device containing services for enhancing personal safety, for personal health monitoring, as well as for social networking. The target group is senior citizens of the Northern periphery of Europe (i.e. persons 55 years old and above). The project is implemented as a research and development process with three iterations or cycles based on the living lab approach, where the first iteration involves a needs assessment among elderly people and professional health workers at the three test sites.

According to the senior citizens participating in the Myhealth@age in Tromsø, the greatest advantage of a mobile alarm system was increased personal safety while moving around outside their private homes. For the professionals, the potential reduction of interventions on the basis of false alarms seemed to be the main benefit of a mobile alarm system. During our discussions with the users it was emphasised that tactile icons in combination with picture icons are preferable. The focus group underlined that the alarmdevice should be as easy to handle as possible and that the level of functionality should be optional. The seniors in Tromsø evaluated the alarm system as useful mainly because an alarm could be detected outside their private homes. The mobile alarm system was considered useful by our professional informants mainly because of a potential reduction in false alarms, and because the contact with the clients would be eased.

We organised focus groups of elderly people and professional health workers during the spring of 2008, and performed need assessments in the period June 2008 to February 2009. The evaluation focused mainly on user friendliness and usefulness of the services proposed. We used a method with triangulation of semi-structured interviews and observations involving in total 17 persons.

Usually, the users of the type engaged in the Myhealth@age are considered as codesigners within the Living Lab frame of reference, and democratic considerations seem to be at the heart of this approach to technological innovations. But even if the Myhealth@age project initially attempted to invite the informants as codesigners, mainly because of practicalities the users gradually entered roles as respondents or mediators of everyday knowledge. In Tromsø the Living Lab approach tended to produce a surplus of data, which could not easily be fed back to the technologists. As we went along, we had to modify our strategy of user cooperation slightly to prevent a breakdown in the iterations between technologists, the human factor analysis team and the users.

The main recommendations of the human factor analysis team in Tromsø were to allow for personalisation of the health monitoring and social networking facilities. The GPS locating system should only be activated when an alarm is triggered so as to maximise availability of battery power. In connection with the social network facility the GPS locator should be easy to switch on and off. The communication between the fall sensor and the alarm central needs to be further tested. The interface of the health monitoring facility is evaluated as applicable by the seniors in Tromsø, but the communication between GPs and their clients should be subjected to further testing. Optional strategies for financing of the equipment and the running of it should be available as soon as possible.

Contents

1. Introduction

The Myhealth@age project is a three year research- and development initiative within the Northern Periphery Program with partners from Northern Ireland, Norway and Sweden. The total budget is 1,6 million Euros. The objective of the Myhealth@age is to develop a user-validated mobile device containing services for enhancing personal safety, for personal health monitoring, as well as for social networking. A fall sensor is an integral part of the system. The target group is senior citizens of the Northern periphery of Europe (i.e. persons 55 years old and above). Research within the project is carried out by technical- and human factor analysis research teams in Belfast, Lulea, and Tromsø. The project is implemented as a research and development process with three iterations or cycles based on the Living Lab approach (www.ami-communities.eu), where the first iteration involves a needs assessment among elderly people and professional health workers at the three test sites in Northern Ireland, Norway and Sweden. The same three iterations were carried out at all of the test sites: the first research cycle consisted of a human factor analysis and a needs assessment, which established the point of offset for the technical developers (January/October 2008). The second iteration implied an evaluation of usefulness and usability of the three main services of the prototype (December 2008/ September 2009). The third research cycle will involve a twelve month field trial focusing on the user friendliness of the system (September 2009/September 2010).

The overall objectives of the Myhealth@age project, according to the project documents, are to improve health, safety and well being for elderly people in the Northern peripheral region of Europe. The Myhealth@age aims at offering the ageing population in the Northern periphery urban and rural areas of Europe improved health, safety and well being through the use of new services and new mobile ICT products. The Myhealth@age applications stimulating social interaction may also improve the quality of life for elderly people who otherwise potentially may become quite isolated. Benefits of the project may be an improvement of the welfare of elderly people and the quality of healthcare services offered by welfare and health organisations.

We organised focus groups of elderly people and professional health workers during the spring of 2008, and performed need assessments and the initial stages of the evaluation in the period June 2008 to February 2009. The evaluation focused mainly on user friendliness and usefulness of the services proposed.

The first Myhealth@age prototype consisted of a mobile telephone with an integrated fall sensor, a GPS locating system, as well as software enabling transfer of personal health information and social networking. The fall sensor alarm and GPS locating systems as these were used in Tromsø, communicated with a central alarm server at the University Hospital North- Norway (UNN). The personal health data was communicated to a GP via a web based interface. The social networking facility was based on swarm technology.

This text reports on the human factor analysis of the first iteration of the project at the Tromsø test site, as well as on the first evaluation of the prototype, taking place from May to September 2009 (fig.1.). We organised focus groups of elderly people and professional health workers during the spring of 2008, and performed need assessments in the period June 2008 to February 2009 (cf. deliverables 5.3 and 5.4 of the Myhealth@age project). The user need assessments were based on the presentation of mock-ups describing the proposed services to the users.

The evaluation focused mainly on user friendliness and usefulness of the services proposed, but the overall design was also evaluated and tested for basic functionalities. We used a method with triangulation of semi- structured interviews and observations involving in total 17 persons. We will describe and analyse the user need assessments and evaluation processes in some detail below, and we will emphasise some strong as well as critical aspects of the Living Labs methodology for estimating user needs in connection with development of health service applications on mobile telephones. The need assessments, as understood within the Living Labs frame of reference may be somewhat weakened by its lack of precise conceptualisations of basic categories. We have tried to circumnavigate some of the inherent difficulties of the Living Lab approach by, at least to some extent, focusing on the way different categories of actors make the Myhealth@age prototype intelligible.

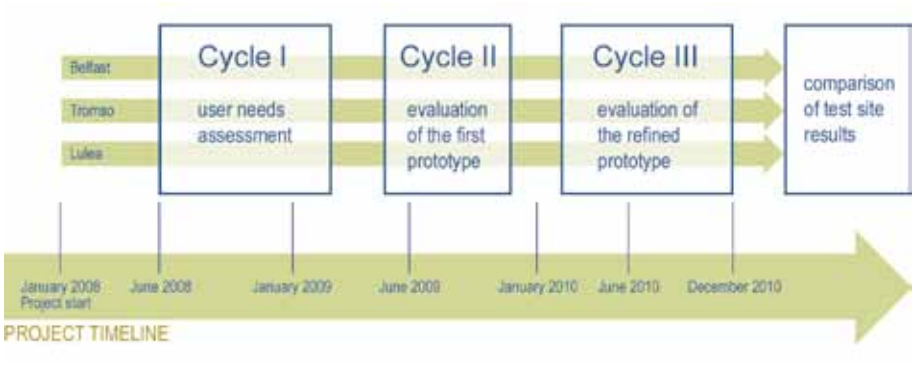

Fig. 1. Timing of activities at the Tromsø test site.
The timing of the project phases may be slightly different at the two other test sites.

This report contains six main chapters. Following the summary and an introduction primarily providing context information, chapter 3 presents the intentions and objectives of the Myhealth@ age project. The organizing of the Myhealth@age at the Tromsø test site is outlined, and the Living Lab approach to the assessments of user needs is presented in some detail. Chapter 4 describes the methods applied investigating user needs, usefulness and usability of the prototype. The results presented in chapter 5 describe the outcomes of the human factors analysis and the initial stage of the evaluation process (sections 5.2 through 5.4). This chapter also describes our experiences applying the Living Labs approach to user needs assessments at the Tromsø test site (section 5.1), as well as the recommendations of the human factors analysis team in Tromsø (section 5.5). The concluding chapter is a brief discussion of the results obtained in Tromsø during the first iteration of the Myhealth@age project, and it provides some notes on the Living Lab's methodology.

2. The Myhealth@age project in Tromsø

2.1 Project aims and organisation

The Myhealth@age project started in January 2008 and will continue throughout 2010. The Myhealth@age aims to provide products and services making it possible for elderly people to feel safer and live a more active and selfsufficient life. According to the Myhealth@age project documents, healthcare and welfare organisations (HWOs) may have problems providing adequate medical and welfare services to the rapidly increasing elderly population, especially in rural and less populated regions. Moreover, these documents suggest that E-health services based on mobile telephones may potentially improve the quality and capacity within the limited resources available to healthcare in Northern Norway. The Myhealth@age project may therefore be important to secure good health and well being for the increasing number of elderly people in the Northern periphery regions of Europe the coming years. The products and services focus on mobile safety alarms, prescribed self treatment and social networks, identified as important by the project management team. The hardware and software facilities will be developed and evaluated through field trials in close cooperation between elderly people, HWO staff, Information and Communications Technology (ICT) companies and research teams in Northern Ireland, Norway, and Sweden. Through dialogues with HWO decision makers, elderly people and the consumers, business models will be developed making it possible to offer the products and services in larger scale after the project has been completed.

According to the project documents, the Myhealth@age may reduce the burden on resources (time and cost) of health and welfare organisations, and efficiently serve the increasing number of elderly people in what is called «the ageing society». Further, the project also aims to provide administrative services for the professionals, making it easier to interact with the elderly people managing appointments, to transfer instructions, get structured feedback regarding medication, health progress etc. This makes it possible to improve the work methods and processes of HWOs. During the project, methods for human factors analysis will be enhanced and evaluated for commercialisation of participatory research results. This is important for the participating Northern periphery companies since the new products and services may generate valuable revenues, making it possible to expand the business operations and expand the staff. After validation of the research methods, they can be applied also in other business segments.

The Myhealth@age project in Tromsø was organised by The Norwegian Center for Integrated Care and Telemedicine (NST) in close collaboration with Tromsø Municipality. The Myhealth@age project team in Tromsø consisted of four persons from NST, two from Tromsø Municipality and one from the University Hospital North-Norway. The project management group organised regular meetings throughout 2008 and 2009, and also participated in weekly overall project development and management telephone conferences with the partners in Northern Ireland and Sweden. During the spring of 2008, the descriptive analytical approach of the human factors analysis was established in collaboration with the partners in Lulea and Belfast. A seminar on these issues was organised in Bjorkliden, North Sweden, in March 2008. It was a presumption for the development

face of the project that a mobile alarm system consisting of a fall sensor connected to a mobile telephone would be developed. The fall sensor and the mobile telephone equipment used in Tromsø would communicate with a central alarm server at UNN. Moreover it was decided to concentrate on additional services in the field of personal health monitoring and social networking linked to the mobile telephone. Obviously, a GPS locating system was integrated with the telephone, so as to be able to locate the person activating the alarm.

The human factors analysis was planned at the seminar in Bjorkliden in the spring of 2008. In accordance with the technical presumptions of the project it was decided to focus on the areas a) personal safety, b) personal health monitoring, and c) social networking. It was decided to start out with a comparatively broad scope, in the sense that the users were supposed to inform the social scientific research teams about their every-day-life experiences related to the three prioritised research areas of the Myhealth@age project. Within each area, the users' needs would be ranked in a three level hierarchy (in the manner of essential needs, less essential needs, and still less essential needs). This procedure would be conducted at each test site, and at a later phase of the project, the users' needs would be ranked jointly across test sites. This joint ranking of users' needs was conducted at a partner seminar organised in Tromsø in September 2008. In turn, the ranked user needs would be the basis for the establishing of technical functional requirements as well as non-functional requirement specifications for the Myhealth@age prototype. However, after the seminar in Tromsø in September 2008, the ranked needs were taken back to our informants in order to secure an agreeable outcome. This quality check was performed through several meetings with seniors in Tromsø from October 2008 to February 2009.

It should at this stage be noted that the Myhealth@age project is a three year innovation, setting strict limits for the human factors analysis, prototyping and evaluation. A too narrow scope on human factors analysis would prevent the project team in having important user information at hand. In other words, the more narrow the scope of the human factors analysis, the more about the design will have to be decided by the technical developers. On the other hand, a too broad start of the human factors analysis risk to produce in excess data which cannot be integrated in the design because of strict time regulations in the project. In Tromsø, the project group strongly emphasise the need for extensive user cooperation in the design and test phases of the Myhealth@age project. However, we sometimes felt that the scope of the user need assessments tended to be too vague, given the concrete project organisation and timing as a context for the investigation. This was partly due to the lack of a precise concept of «needs» within the Living Labs frame of reference (BERGVALL-KAREBORN et al. 2008, STAHLBROST 2008). We will examine this feature of the Myhealth@age project in Tromso in some detail as we og along. It should be fair to state that the development of a healthcare service of the type described here is not a user demand as the development phase starts out. Rather, the design of the Myhealth@age prototype is the result of the technologists' and the social scientists' estimations of the usefulness of current technical innovations. Of course these estimations were extensively verified through conversations with health professionals prior to the Myhealth@age startup in 2008.

2.2 The Myhealth@age project in Tromsø

In the spring of 2008 we organised user focus groups both with elderly people and with professional health workers employed in the primary care of The Tromsø Municipality. The elderly peoples' groups consisted of five persons recruited from the Council of Elderly People in Tromsø. The professionals' group was organised on an ad hoc basis, asking colleagues of the health professionals attending the project management group in Tromsø to participate. The focus group sessions were organised separately for the elderly people and the professionals, three meetings for each group during the spring, summer and early autumn of 2008.

At the first focus group meeting the hardware and alarm systems were concentrated on, showing the informants arbitrarily chosen hardware, and discussing concepts of a mobile alarm system in general with them. During the two next meetings the social networking facility and the health monitoring system were in focus respectively. To be sure, on forehand an application of ethical approval had been submitted and accepted by the national committee on ethics in health care research. Also, the users had signed a personal consent form.

The needs analysis with the seniors focused on their preferences when it came to hardware with specific configurations of screens and keyboards. Concerning the safety service, we made a comparatively broad assessment of what the users perceived of as risk situations (risking to produce in excess data which could not actually be fed back into the design process), but we did not in fact analyse what the new service meant in terms of reallocations of resources and control for different user categories interacting with the service under development. It may be said that a one sided focus on «needs» potentially would overshadow an accurate description and analysis of changes in power relations between the involved parties. Concerning the health monitoring and social networking facilities, we primarily mapped user preferences, but we did not go in any detail when it came to describing how the users currently resolved the tasks which the Myhealth@age prototype suggested new solutions to.

Initially, an iteration of information in three cycles between the users/ human factors analysis team and the technical developers was planned to take place during the spring, summer and autumn of 2008. Each iteration consisted of the technologists handing a prototype to the users, and the human factors analysis team estimating usability and usefulness, subsequently reporting to the technologists. The basis for the iteration was discussions with the users about mock-ups on paper, i.e. paper screen shots of the menu systems and information flow of the proposed services. However, we learned that the technologists only in part were able to revise the mock-ups in time for the next iteration. Hence, the human factors analysis team sometimes had to meet the users in planned sessions without much new information to bring them. Potentially, this situation might have troubled a smooth collaboration with our informants for the rest of the project, since they were initially invited as codesigners, prior to the human factors analysis. All in all, it turned out to be difficult to illustrate to our informants that their suggestions and initiatives had actually materialised in concrete changes of the mock-ups as the project progressed. As will be described later, the users were not able to influence on the project managements' choice of hardware, and obviously this was commented on during subsequent focus group meetings by our informants. To some extent, this also goes for the services implemented in the first prototype.

Also, we noticed that the users only with difficulty could follow the revisions on paper which actually had taken place, and give relevant feedback of the revisions made by the technologists during the autumn of 2008 and early winter 2009. It seemed necessary for the users to have concrete hardware in their hands to be able to evaluate the prototyping properly. As it turned out, we did not actually have the chosen telephones with some functionality implemented, on the table before the summer of 2009. In other words, the iteration cycle was broken quite early in the project, and the evaluation of applicability and of usefulness was based on only one round of feedback from the users, due to serious project delays. On the other hand, the social scientists at NST were given opportunities of a fair check of the usefulness in the Norwegian context of the services proposed to the users. Of course, the broken iteration cycle and the strict technical presumptions hindered the users' opportunities of acting as codesigners and they entered into a role as respondents or mediators of context information on a design to a large extent determined by the professional designers.

During the summer of 2009 we extended the elderly peoples' user group to 14 persons, and recruited a GP to be able to test the personal health monitoring system realistically. At the moment (mid November 2009), the GP is about to start up the testing of health monitoring with the help of some 5-7 of his clients. This state of affairs leaves insufficient time for feedback on the prototyped health monitoring service to the technical personnel, and a subsequent updating of the prototype by the technologists is not possible. The networking facility of the Myhealth@age is still not operationalised, but the basic menu system is implemented so as to allow for manipulations by the users.

In early summer of 2009 the basic hardware and some of the additional functionalities were ready for testing, and the first evaluation cycle started. The users were given training in the handling of the equipment, and the basic functionality of the alarm and locating systems have been subjected to the first cycle of testing.

The alarm server at UNN could for safety reasons not be integrated with the hospital's conventional equipment and systems. Hence, we set up a separate communication line for the server, and connected it to the internet. The staff at UNN received the alarms during the test period of the Myhealth@age, but due to a overload of incoming conventional alarms, it was suggested by the health professionals to outsource alarm handling to private enterprises in the future.

2.3 Participatory design methods and The Living Lab approach

Participatory design, i.e. designs drawing on user experience, is an approach to design of technologies that in many ways differs from traditional approaches. These traditional approaches imply that technical innovations are carried out by professional designers, without much interference by the users. In Scandinavia though, participatory design methodologies for technical innovations have considerable status. These approaches to prototyping aim at an active involvement of all potential users of the services and devices being developed, trying to estimate user demands and needs while the development still is in progress, and trying to figure out the applicability and usefulness of the innovation to the users themselves.

The literature describes several rationales for user involvement in the design of technology. A technical/ instrumental rationale emphasise on the professional designers own suggestions and ideas, questioning the users about the user friendliness and usefulness of what has been presented to them. In particular, estimation of usefulness is based on an initial problem- recognition and an innovation trying to meet the problem in question. Such an approach emphasise on ways of resolving the problem under consideration prior to the innovation, an how the users make sense of new suggestions (i.e. new technologies) of resolving the job. The designers are the producers of a prototype constructed FOR the users, i.e. on the users' behalf. The users are subjected to a role as respondents in the design process taking place. The idea of involving the users in the design process attempts to secure user acceptance of the devices and services being developed prior to a complete innovation by testing the functionality of the prototype with concrete users in advance of a completed development. Serious mistakes may be avoided, and a cost effective development process may be achieved.

A second approach to participatory design focuses on the way users can alter or change the professional designers' perception of the context in which their innovations are to be applied. Also, the users may alter or change the professionals' initial problem recognition. The users are assigned to a role as mediators of every-day-life experiences from the prototypes application context, which may potentially modify the designers' initial apprehensions about their design. This is not designed BY the users, since the proposed design was presented by the professional designers in the first place, and since the users are not expected to come up with an alternative design which can match the professionals' propositions. Moreover, the users are invited to participate in the design process by the designers, and it is of course the designers who decides which user information is feasible, and which is less so. Applying this approach, the professional designers take the users' needs for granted, in the sense that the prototype is believed to resolve a presupposed user problem. However, the professionals' initial problem recognition may be altered through conversations with the users, and hence, a more applicable and useful design may be the outcome.

A third approach to technical innovations applying user participation, involves a close consideration of democratic principles. In a democratic perspective the rationale behind participatory design methods is that users have the right to take part in and influence on the design process, as they are the people addressed by the technology. The realization of a democratic decision process in technological innovations means that the process should be organised with the professionals and the users as equal partners. The problem addressed by the innovation should in principle belong to the users, and the users take the initiative to resolve that problem. Hence, the users potentially appear as codesigners in the prototyping process. This approximates design WITH the users. Still the professional designers may organise the innovation process and secure a sound scientific basis for the innovation taking place. Moreover, the professionals usually act as guarantors for the innovation, and see to it that a functional prototype is presented at the end of the project.

The power relations within the three models for conducting technology design processes are different. The relationship designer/ respondent is asymmetrical, establishing the designer as the producers of solutions on the users' behalf. Also, the designer/ mediator relation is a asymmetrical one, but it leaves more responsibility to the users for the production of a prototype fitting into the context where it is meant to be applied. The democratic approach attempts to establish a symmetrical relationship between the designers and the users, and in this approach the codesigner/codesigner partnership tries to leave significant aspects of decision-making within

the innovation process to the users themselves. In particular a broad investigation of user needs is presumed to establish a partnership with the users during the prototyping process. At a theoretical level though, a partnership presupposes that the involved parties also have the same problem recognition as the prototyping sets out, which may sometimes not be the case.

User empowerment is often an explicit presumption for applying a democratic perspective on technical innovations. Within the field of healthcare, client empowerment involves participation in the shaping of services as well as enhancing the clients access to those services at a community level. But even if user participation at a project level may contribute to enhanced user influence at the level of society, it should be noted that the relationships between the levels of technical innovations and a level of community are complex ones, and that democratic rights at a level of community do not follow from user participation within restricted projects.

3. Methods

3.1 Prototyping with the users

At a practical level participatory design in the form of the Living Lab approach has been an integral part of the Myhealth@age project in Tromsø. Triangulation of semistructured interviews and observations within focus groups of seniors and professional health workers have been the backbone of the applied methods. It may be generally stated though, that we have been more focused on our informants' apprehensions of «problems», as well as the informants' reasoning about solutions to those problems than what in a strict sense is required from a needs assessment within a Living Lab frame of reference (STAHLBROST op.cit.).

User forums were applied during the user needs analysis in an early stage of the project. The result from the user needs analysis was used as an input for the user needs design meetings. The researchers presented needs identified and mapped during the foregoing user needs identification process, and discussed how the needs could be transformed into the design of applications and services. The meetings and the discussions enabled the gathering of qualitative insights from the users and the users could respond to suggestions made by the other members of the team. To evaluate the functionality and technical performance of the prototype, the users (seniors and healthcare professionals) have tested the products together with the project team.

The human factors analysis was based on focus group meetings with the users (elderly persons 55 years old and above) and health professionals working in the municipal home care service and at the alarm center of the University Hospital North Norway (UNN). The professional personell worked as nurses and nurses' assistants. All of the professionals were familiar with a stationary alarm installed in the sleeping rooms of their clients and connected to the alarm center at UNN by an analogous telephone line. Among the professionals, an increasing rate of false alarms were considered a problem. In many cases, potentially false alarms could not be checked out without

personal inspection, since the clients often were out of reach of their landphone. Hence, it was believed among the professionals that a mobile alarm system would ease the contact with the clients, and reduce the number of false alarms because such alarms could be checked out simply by calling the client's cell telephone.

We organised 3 focus group meetings with the professionals in the period June to December 2008, based on mock-ups and arbitrarily chosen hardware. The project team suggested to use a Sony Ericsson type XPERIA telephone with a hard keyboard and a 3 by 2 inch touch screen. The telephone was equipped with an integrated GPS. The project team suggested two additional services implemented in connection with the alarm: a personal health monitoring system and software facilitating social networking based on swarms.

The professionals noted that a hard keyboard probably was essential for the operation of the equipment, since many elderly people might have problems using the touch screen. The professionals supported the project-teams proposals, and had no objections to the choice of hardware. They advised us, though, to make the fall sensor as small as possible, and to test out the health monitoring system in collaboration with a GP. According to the professional users of the Myhealth@age prototype, a realistic testing of the system implied surveillance of traffic between real patients and their doctor, and required that the Myhealth@age prototype at least to some extent was integrated with a doctor's regular journal applications.

Regarding the social networking system, the professional users suggested that it could be used so as to ease the burden on the alarm center at UNN by directing the alarm to the clients family or neighbours in the first round after activation. Subsequently, the alarm would be routed to the alarm center at UNN if none of the persons in the clients vicinity responded to the alarm received. However, due to project delays, this possibility regarding the social networking facility, is not likely to be tested in Tromsø.

In retrospect it should be recalled that the planning of the Myhealth@age project to a large extent built on a project idea proposed by Swedish health workers some years back (ANDERSSON 2006). The Norwegian professionals had but a few, if any, suggestions for alternatives to the proposed design of The Myhealth@age prototype. However, our professional informants provided important information about the adequacy of the overall design of the prototype in a Norwegian context. They regarded the prototype as useful within a Norwegian work situation.

In general it may be said that our informants served as check posts to a predetermined design, more than as codesigners in an open construction process. The hardware components were drawn from shelf by the project management group, and alternatives suggested by the users (taken into account the need for specific keyboards and displays) were rejected on the grounds of a nonfunctional requirement at the technologists' side of the table: only telephones with the Windows Mobile operating system could be handled within the project.

3.2 The needs assessments

During the focus group sessions with the seniors in Tromsø (spring and summer 2008), we initially took on a rather broad perspective on the user need assessments, asking our informants about situations in which they felt unsafe or in danger. We tried to map risk situations as perceived by our informants themselves, to better be able to understand the functional requirements of our users. This procedure resulted in lengthy descriptions of the users' expressed needs in general, and we felt sometimes that this produced in excess data which could not easily be fed back into the prototyping process. Hence, during late 2008 we slightly modified our strategy, and tried to investigate the users' opinions on the overall functioning of each concrete service under development. Also, we were discussing with the users if they needed alternative options on specific menus related to a given service or if the data flow needed to be modified in any particular manner. In other words, we tried to be as design specific as possible, and we tried to evaluate the usefulness of the prototype to our informants as accurately as possible. At this stage of the project, it seemed clear that the technologists could not incorporate all of the suggestions our users presented to them, and hence the users' competence could best be utilised if they were subjected to roles as mediators of contextual information, or as respondents to the prototype presented to them.

Our design specific inquiry implied collecting users' responses to and modification of the human factor analysis team's problem descriptions. This focus on the resolving of specific «problems» is not an inherent aspect of a needs assessment, but it functions so as to allow a close consideration of the prototype under development, and the job it is expected to perform. Actually we discussed in detail a use case established for the Myhealth@age project in 2007 as the basis for our discussions with the users (the use case is given in appendix 1 of this report).

After our initial focus group sessions with seniors and professionals (May to September 2008), we ranked the user needs on a three step scale within each of the three service areas together with the users. Subsequently the research team made a cross-site ranking on the basis of the site specific rankings made previously. This cross-site ranking of user needs was transformed into a draft functional requirements specification by the technologists of the Myhealth@age project. At the turn of the year 2008 we brought the technical functional requirements back to our informants and discussed the requirements in some length with them. However, it was still up to the technologists to determine if suggested modifications by the users were technically feasible or not. In February 2009 the final version of the functional requirements specification was returned from the human factors analysis team (workpackage 2 of the project) to the technologists (workpackage 3).

The focus group meetings usually lasted for 2-3 hours. The sessions were electronically recorded, and a summary in writing was made immediately afterwards. Initially we followed the recipe given in deliverable 2.1 of the project, but as we went along we had to assign the role of a mediator or a respondent to our informants more than that of a codesigner. This shift took place from October/November 2008.

As a part of the needs inquiry a «cultural probe» was carried out. Each of our 6 senior informants were equipped with a camera and a notebook, and asked to make a photo in situations where their safety seemed to be challenged, or as an alternative, to make a photo whenever they felt especially secure. The informants were also asked to make a note in their notebook in connection

with each of the photos. It may be noted that this investigation represent a broad perspective on user needs assessment. The aim is to map the users' own perceptions of risk situations, more than to determine their opinions about the usefulness of the Myhealth@age prototype. We received 15-30 photos from each of the participants. In short, the photos seem to document «risk-for-fall» situations, for example obstacles to safe walking indoors as well as outdoors. Dangerous stairs, rugged terrain, obstacles to moving about, and so forth were all illustrated in our photo collection. The pictures seemed to document seniors with needs of leading an active life, but also with needs of being rescued if something went wrong. This experiment was carried out in the period July/ August 2008. It turned out though, that we were not able to extract data from this probe which would strengthen our design in any specific way. A cross-site analysis of the data has not yet been performed.

In general it may be noted that the time spent with our informants is fairly short, all in all amounting to a few hours. The focus group meetings are not intended to capture «the users own perspective» in the anthropological meaning of the term. Rather, focus group meetings simply may yield informants' straight forward descriptions of everyday life situations, and it is up to the researchers to interpret what has been presented to them as accurately as possible. The cultural probe may be taken as an attempt to get hold of our informants own perceptions of risk situations. But it leaves the ethnographically oriented scientist with some crucial problems of interpretation: since she has not been in the situations photographed (or NOT photographed) herself, she cannot be reasonably sure about what her informant is trying to depict. Anthropology requires fieldwork, and the ethnographer is likely to be focused on the informants' situational understanding and problem recognition within the context of everyday life (BERKAAK and RUUD 1992).

A particular theme was much debated during our meetings: could the alarm also serve as a protection against robbery in the streets? However, as this seems more of a logistic problem than a design matter, we will not follow those questions in any length here. But it should be mentioned as well, that this debate illustrates some of the cultural differences between Scandinavia and Northern Ireland. Northern Ireland is more urban than the northern parts of Scandinavia, and hence the users in North-Norway and North-Sweden focus more on usefulness of the Myhealth@ age services in connection with outdoors activity than was the case in Northern Ireland. Moreover, the distribution of mobile phone technologies seems more dense in Scandinavia than in Northern Ireland. Even if the detection of cultural differences was the premise for full prototyping at three different test sites, we have not so far made any systematic analysis of such differences within the Myhealth@age project.

3.3 Evaluation of usability

During the spring, summer, and early autumn of 2008, 4 design meetings were conducted together with our 5 seniors. The users were introduced to the Sony Ericsson XPERIA X1 (www.sonyericsson.com/x1), and two of the Myhealth@age services, i.e. the safety alarm facility and the personal health monitoring system. A users' manual for the Myhealth@age services was distributed together with the hardware. The social networking facility is still not ready for testing in Tromsø.

The focus group meetings were organised as open interview sessions, discussing the hardware, the screen interface, and the Myhealth@age services with the users. A semistructured questionnaire was used to investigate the userfriendliness of each of the Myhealth@age components. Each of the meetings lasted for 2-3 hours, and a brief report was written by the scientific staff immediately after each group session.

Prior to the focus group meetings, a technical acceptance test was conducted by the scientific team at NST and two of the seniors. This test also included the alarm server at UNN. We tested passive as well as manual activation of the alarm, and the functionality of the health monitoring system. The telephone and the alarm server communicated as intended, and were tested for approximately 3 weeks. The alarm and health monitoring facilities were then subjected to user validation.

The evaluation of overall, as well as service specific usability is still somewhat premature since but a few of the seniors have had the opportunity to selfsufficient use of the Myhealth@age services. Also, we lack traffic data of the communication between clients and their GP due to delays in the development of the health monitoring service.

During the autumn of 2009 it has been agreed in the project consortium that rather than to fully evaluate all the services at each test site, Tromsø should focus on the alarm facility, while Lulea should concentrate on the health monitoring system, and Belfast on the social networking facility.

3.4 Evaluation of usefulness

Our estimation of usefulness of the overall system as well as of the specific services of a) safety functionality, b) personal health monitoring and c) social networking was performed using information from professional users as well as from their clients, i.e. our group of informants of senior citizens. We based our evaluation on mock-ups on paper, discussed in detail during our focus group meetings, and on a restricted number of trials with the hardware prototype carried out together with our senior informants during the autumn of 2009.

The focus meeting sessions were started by an outline of the specific service in question by the human factors analysis team, and a description of one or more use cases. Then we had the professionals to describe their experiences with similar cases. Finally, we focused on the question «How useful do you think this service will be for you/ your client?». We arranged the suggestions from the informants on a five step lickert scale. We checked if the informants wanted to add or subtract functionality from the system.

The focus group meetings for the seniors were organised in much the same way as for the professionals. We preferred to organise separate sessions for the two categories of informants, so as to minimise their mutual influence of one another.

The seniors were asked to describe their personal experiences regarding cases of the same type as the use cases described by the research team to the senior informants. Also, we checked the seniors' estimation of usefulness in their current everyday life situation.

4. Results

4.1 The evaluation process

The Myhealth@age project has been planned and implemented using lines of reasoning of the Living Lab approach (see the Living Lab Roadmap 2007- 2010). In essence, the Living Labs approach to technological innovations in the field of ICT, involves a way of organising project stakeholders so as to achieve a collaborative environment for codesign. Usually, the users of the type engaged in the Myhealth@age are considered as codesigners within the Living Lab frame of reference, and democratic considerations seem to be at the heart of this approach to technological innovations. But even if the Myhealth@age project initially attempted to invite the informants as codesigners, mainly because of practicalities the users gradually entered roles as respondents or mediators of everyday knowledge. The assessed user needs could not easily be fed back in to the design process taking place.

First of all, the iteration cycles of the Myhealth@age were broken, and hence technical updating of the prototypes on the basis of user feedback was not taking place as expected. But the scientific personell of the Myhealth@age project were still able to utilise user knowledge in the form of response from our informants on the basis of the first hardware prototype during the summer and autumn of 2009.

Also, the user need assessments among professional health workers and seniors in Tromsø constituted a fair check on the usefulness of the design being proposed. The users primarily served as mediators of information about the context in which The Myhealth@age services were to be implemented, rather than as codesigners. The main reason for this may be the strict technical frame of the project which presupposed a specific hardware and software platform for the prototype. The project failed to provide the users with necessary material for decision-making at the informants side of the table: when the hardware was selected, the users were provided only with photographs, and during the first 18 months of the project, only paper mock-ups served as the basis for user evaluations of the Myhealth@age services. As it turned out, the technologists did not take into account the users' preferences when it came to hardware, and they opted for the Ericsson XPERIA X1.

It is, according to the Myhealth@age version of the Living Lab approach, a presumption for the need assessments among the elderly people that the researcher at least to some extent is able to recognise the users' problems as perceived by the users themselves. However, such a broad scope on user need assessments probably requires anthropological fieldwork in the form of participatory observations over a prolonged period of time, which would exceed the resources available to the Myhealth@age project. Our organisation of focus groups and triangulation of semi structured interviews and observations (during focus group sessions) represents an approximation to the users' own perspectives on the design presented to them. But this method does not offer any deeper insight into the users' own problem recognition in their everyday living. As far as the users' own understanding of features of everyday life is the target for investigation, a shift in methods is required: such an investigation requires extensive individual interviewing and/ or lengthy participatory observations. In the Myhealth@age project in Tromsø, we only did personal interviewing to obtain context data (previous experience with technology, family situation, work

experience and so forth), but as our project proceeded, we tried to engage our informants as respondents to the concrete designs presented to them, asking if the proposed services seemed useful to them. Alternatively, we were eager to find out if the users saw any objections in what we proposed to them.

4.2 The users' needs

While the Norwegian professionals stressed the need for easy contact with their clients, the elderly persons themselves focused on the opportunities for an active life. According to the senior citizens, the greatest advantage of a mobile alarm system, was increased personal safety while moving around outside their private homes. For the professionals, the potential reduction of interventions on the basis of false alarms seemed to be the main purpose of a mobile alarm system, even if also the professionals appreciated the opportunities of increased mobility the alarm meant to the senior citizens.

The Myhealth@age project presumes an integrated safety alarm sized as a conventional mobile telephone (or slightly larger) equipped with a touchscreen, picture icons/tactile icons suitable for a menu-driven application control system. As far as possible all functionalities should be integrated in a single mobile device, which may be individually adapted with respect to number of functions and sensors. During our discussions with the users it was emphasised from the seniors that tactile icons in combination with picture icons are preferable. The target group for the Myhealth@age project is seniors +55 years of age- but relatively fit both physically and mentally. Tentatively, it was suggested in the focus group meetings that declining health may prohibit efficient use of a menudriven system requiring considerable amounts of input from the users. The focus group emphasised that the alarmdevice should be as easy to handle as possible and that the level of functionality should be optional, taking into consideration the health status of any particular user. Mr. O.: «I think we should make it simple by measuring declining health on a scale from 1-10, 10 being the maximum. If a person measures 10, then only three functions should be available. If a person measures 5, they may be able to make phone calls and write SMSs as well». There was some discussion concerning if the fallsensor should be placed in the mobile device, or in a clocklike device always attached to the user. Mr. O.: «Imagine if I had a small telephone and decided to have a shower and undressed in my room. Where should I place the phone then? Or if I had to use the bathroom and the phone started ringing in the living-room and I were naked?» The seniors also noted that the cover of the mobile should not be of metal but made up of some other material not getting hot while using the equipment. The device should be slightly larger than the smallest mobile telephones which may easily fall out of the users hand. The focus group was interested to know how the equipment and its use is supposed to be funded. At this stage we had no clear answer to give them.

The safety alarm should be able to detect any fall situation without the users interference. The users evaluated a clock-like device attached to the users body as useful. The GPS should passively determine the location of any fall situation. Should allow for an active user tracing facility with optional third party observation possibilities. The focus group was positive to the idea of organising a network of neighbours/family/volunteers ready for intervention in the case of any emergency situation. Smarthome surveillance: Passive detection of open door/ windows evaluated as useful. Control of electric installations according to specific user needs evaluated as useful in the focus

group. Life style and health monitoring: In general the focus group seemed positive to passive monitoring of any relevant health parameter whenever sickness occur (for example blood pressure, blood sugar, heart rate etc.). Such data may be linked to health records and presumes close cooperation with a GP. Also parameters related to lifestyle may be monitored passively and actively. Level physical activity, body weight, and calory intake may potentially be measured routinely, and is considered useful by the focus group. Specific services should be linked to personal needs.

The GPS allows for a tracing facility which may enhance opportunities for social contact. The tracing facility should be actively started, and organise interested parties in groups. In general the focus group seemed to consider a social networking service as useful.

4.3 Usability

The focus group of elderly people responded to the hardware in much the same way as the professionals. In addition, the elderly people suggested that the mobile device should be made of a plastic material rather than of metal, so as to prevent it from getting too hot when used. It was also noted by the seniors that sound output in connection with the operation of the touch screen and the hard keyboard, probably would increase the accessibility especially for persons with reduced vision. The elderly people emphasised that the alarm system should be applicable also in situations of outdoors activities (which of course also was a presumption for the design in the first place).

In general, the Scandinavian seniors seem to focus more on applicability of the Myhealth@age prototype in connection with outdoors activities than their peers living in Northern Ireland. Basically the Scandinavian seniors' focus requires a longer reach of the system than would be necessary in a strictly urban setting, and also challenged the battery capacity of the current prototype.
In Scandinavia the safety concerns of elderly people seem to be primarily on sudden illness, accidents or getting lost, whereas in Northern Ireland insults, robbery, burglary and alike seemed a realistic possibility.

The elderly people were in general positive to the suggested health monitoring system. It turned out difficult, however, to have any clear suggestions on their part, since they could not try out the facilities in practice.

Also, the general opinion about the social networking application was positive among the elderly persons. They stressed, though, the need for self sufficiently to be able to select persons' access to the tracing system, and even to be able to turn off this application whenever necessary. The users did not express any immediate reluctance to the idea of letting family or neighbours receive the alarm when first activated. It is, however, required to test such a service in practice over a period of time, and to extend the user panel considerably to be able to estimate the users' opinion in these matters with anything like certainty. It should be emphasised that the users' primary concern with regards to the social networking facility, was their opportunity to locate and meet friends -say for instance in connection with a city tour- by means of this application. But since the service was not ready for implementation within the first evaluation cycle, no decisive suggestions can be given regarding its usability or usefulness to the senior citizens participating in the project in Tromsø.

During the autumn of 2008 and early 2009, the Ericsson XPERIA X1 was opted for by the project management team as the basic hardware device of the Myhealth@age project. However, the users in Tromsø did not try out the telephone at this stage, and hence they did not contribute to the choice of hardware. The users in Tromsø were presented with pictures of the telephone in question and arbitrarily chosen telephones during the spring of 2009. The seniors in Tromsø underlined that as small as possible a smartphone with a hard keyboard, and a readable screen, should be chosen as the platform for the Myhealth@age system. The users in Tromsø found the Ericsson XPERIA X1 a little too heavy, and the keyboard panel not always easy to use. The informants also complained that although the Myhealth@age facilities under testing were applicable, the overall functionality (like calling, the handling of the address book, and sending/receiving SMS) was too complicated on the XPERIA X1. Similar results were also obtained in Belfast (see draft deliverable 5.3, where the users actually opted for the Samsung Omnia (omnia.samsungmobile.com)), and even ranked the Apple I-Phone ahead of the XPERIA X1. For technical reasons though, the Myhealth@age project management decided on the Ericsson XPERIA X1. The Ericsson XPERIA was selected for prototyping, but in Tromsø our informants sometimes complained about the complexity of the overall functionality of this device. It seems likely that such difficulties would appear even bigger in Northern Ireland.

The users in Tromsø found the touch screen on the XPERIA X1 applicable, but seemed to prefer to use the hard keyboard. They also noted that sound output in connection with the operation of the telephone would increase the accessibility to the services implemented.

The results showed that the mobile device was considered userfriendly and easy to use, even though there were divided opinions about the userfriendliness of different components of the system, as well as about aspects of the overall design. The basic interaction with the touch screen was questioned by some of the participants, however most of the participants found the design of the screen with the size, icons, and texts of the user interface appropriate both for the alarm and the health monitoring application. The observations indicated that information was easier to understand and react on when picture, sound and text messages were combined. The many steps which had to be performed in some functions were to some extent confusing to the seniors.

4.4 Usefulness

The mobile alarm system was considered useful by our professional informants mainly because of a potential reduction in false alarms, and because the contact with the clients would be eased. Also, the professionals estimated a benefit on the part of their clients due to increased opportunities of outdoors activities. The professionals underlined that an application of the social networking facility to reroute alarms to the clients' close persons, should be tested.

The seniors in Tromsø evaluated the alarm system as useful mainly because an alarm could be detected outside their private homes. Hence, the alarm would support more activity on their part and increase their feeling of safety whenever performing outdoors activities.

The health monitoring system was considered useful by the seniors, and they expressed no objections to active or passive monitoring of any relevant health parameter. However, successful monitoring of personal health data seems to presume active feedback from a GP. Traffic data of communications between clients and their GPs has not yet been collected in Tromsø.

The social networking facility was on a general basis evaluated as useful by the seniors in Tromsø. This facility has not been tested in the field yet, and the service should be subjected to further trials. It should be noted that the evaluations of the social networking facility by the seniors and by the professionals were based on somewhat different presumptions. The seniors would primarily use the technology for locating family and friends, while the professionals primarily seem to value the opportunities of rerouting the alarms to parties external to the public health care. A rerouting of alarms involves a redistribution of responsibilities from public health care to other interested parties, and such an operation calls for closer practical, ethical, legal and political considerations. The alarm system as such, on the other hand does not involve any redistribution of responsibility or control, since it only extends an already existing service. On these grounds the mobile alarm system of the Myhealth@age project is considered feasible for implementation.

4.5 Recommendations

The main recommendations of the human factor analysis team in Tromsø were to allow for personalisation of the health monitoring and social networking facilities. The GPS locating system should only be activated when an alarm is triggered so as to maximise availability of battery power. In connection with the social network facility the GPS locator should be easy to switch on and off.

The communication between the fall sensor and the alarm central needs to be further tested. The interface of the health monitoring facility is evaluated as applicable by the seniors in Tromsø, but the communication between GPs and their clients should be subjected to further testing.

Optional strategies for financing of the equipment and the running of it should be available as soon as possible.

5. Discussion

The Myhealth@age project seems to have been successful in the construction of a creative environment for technical innovations. An international, multidisciplinary network has been established, consisting of business partners, technologists and social scientists. Applying this environment to carry out an innovation process framed by the Living Lab approach has however, been challenging to the project organisation. First of all the timing of the work tasks of work packages 2, 3, 4 and 5 has proven to be difficult to plan at a practical level. It turned out that the engineers of work packages 3 and 4 were not able to make use of all of the inputs from work

packages 1 and 5 as quickly as required to meet the iterative scheme of the Living Lab approach. Serious delays within work packages 3 and 4 broke a smooth iteration between the users/ human factors analysis team and the technical developers. Apart from being cost inefficient, a broken iteration cycle causes internal tensions within the project, and potentially the interaction with users (invited as codesigners) may be seriously hampered. The focus group meetings had to be planned well in advance of carrying out the actual iteration. The coordination between different categories of personell within the Myhealth@age project, as well as with the users, demands a fixed meeting schedule several months in advance of actually performing the planned activities. This mounts up to a fairly complex control structure within an international project covering several test sites, where accurate timing is crucial for a successful operation. In the worst case important parties withdraw entirely from the cooperations taking place if the project schedule can not be met properly. At the test site in Tromsø, the professional as well as the senior users expressed some concern about continued partaking in the first phases of the Myhealth@age project, when it turned out that our prototype could not be updated as expected. It seems reasonable to suggest that a focus of the resources within the Myhealth@age in the initial stages of the project to only one test site would have strengthened the prototyping process. This would probably have increased our chances of producing a working hardware prototype quickly enough, and prototyping at several test sites could then have been started at a later stage of the project. As it turned out, testing at several test sites simultaneously from start on were too complicated, and slowed down the development process considerably. Our aim was to detect potential cultural differences across test sites at an early stage of the Myhealth@age, but in fact we were not able to feed the relevant data in this respect back into the developmental process.

Since the Myhealth@age prototype is supposed to be established on the basis of user needs, a fairly long period of time was set aside for the user needs assessment at the start up of the project. However, a fairly strict technical framework for the Myhealth@age project (pre-determined hardware and a fixed set of services to be developed) was slightly undercommunicated to the project team as a whole, and to the users in particular. The initial assignment of user informants to a role as codesigners is both time- and resource demanding, and may be questioned as a strategy to the extent that the information generated can not properly be fed back into the innovation process. The staff within work packages 3 and 4 were not able to update the Myhealth@age mock-ups as quickly as the iteration cycle with the human factor analysis team required. Taken into account the fairly strict technical frames of the Myhealth@age project, it may be suggested that the tasks within work packages 3 and 4 should have started prior to the user needs assessment (wp2). Possibly, within the running of the total project, this would have left a shorter time span for the completion of the needs assessment, but this seems less of a problem since the personell of work packages 3 and 4 could not utilise properly the information gathered within work packages 2 and 5 anyway. A somewhat tighter perspective on the user needs assessment from start on, would have allowed a much quicker completion of workpackage 2 than was initially planned within the Myhealth@age project. As it turned out we had to re-assign our informants to roles as respondents or mediators as we approached the turn of 2008. The risk was that the senior users started to consider themselves as alibis for a pre-determined design instead of as codesigners. In Tromsø this did not actually happen, since we slightly modified our strategy in time.

All in all the senior users at the Tromsø test site may have had too little material as a basis for the decision-making regarding usefulness. Not only were the evaluations of hardware based on photographs, but their estimation of usefulness of the Myhealth services was initially linked to paper mock-ups and oral outlines by the human factor analysis team. Being unable to manipulate hardware with dummy functionalities installed, the users had to rely on paper drawings when judging what the Myhealth@age project team presented to them. It seemed difficult for the users to fully interpret the mock-ups on paper, and updates made by the staff of work packages 3 and 4 could not easily be followed by our senior informants. On the other hand, the evaluations of usability made during the autumn of 2008 applying a hardware prototype, seemed to yield fairly precise data for our concrete user collection. Our user group was small though, and consisted of fairly young persons compared with population figures for seniors 55 years and older in Troms county.

The seniors in Tromsø found the soft keyboard of the Ericsson XPERIA X1 applicable, even if they seem to prefer to use the hard keyboard of the XPERIA X1. It seems fair to estimate though, that slightly older people than represented in our user panel would face serious difficulties trying to operate the soft keyboard. Moreover, it was noted by our seniors that some of the Myhealth@age functionalities required comparatively big amounts of data input from the users, and this was considered a problem by our informants. This difficulty is likely to increase as one moves from the comparatively young seniors to the oldest ones.

The personal health monitoring service of The Myhealth@age project involves a constant surveillance of health parameters for a selection of Norwegian citizens. It may be noted that a service of this type means a very much closer focus on personal health care than was possible a few years ago. In 1950 a handful of GPs were available in Northern Norway, but today clients with say for instance chronical illnesses may be monitored on significant health parameters continuously. From a professional health worker's point of view this shift in the availability of health care may mean enhanced services at a reduced cost. But it may also mean that the average citizen focuses more on the availability of (public) health care services and treatment than on his and her responsibility for personal health. Such processes of alienation (see for instance A.G. Ekeland's doctoral dissertation) in the field of health management may easily be neglected all together, and can not be analysed in any detail here. The seniors in Tromsø had no principle objections to a quite intensive logging of personal health data and to share these data with health professionals.

At a theoretical level, the needs assessment of the Living Lab approach may be questioned for it's emphasize on the category «needs». The term is difficult to define precisely, and from a social scientific point of view it cannot be evaluated precisely. An alternative would be to focus more on the users' own problem-recognition, and how these challenges best could be resolved. The writings of Carl May (newcastle.academia.edu/CarlMay) suggest in detail alternatives to the Living Lab methodology on this point. In the context of the Myhealth@age project, a slight shift in methodology would probably have yielded a feedback of more design-relevant data from work package 2 to the technologists.

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Appendix 1

END-USER SCENARIO

2007-10-12

1 (4) MyHealth@Age

END-USER SCENARIO - HOW MYHEALTH@AGE

CAN BE USED BY ELDERLY PEOPLE:

The following scenario describe how the Myhealth@Age products and services can be used in the daily life. It has been developed by elderly people from elderly people organizations together with employees from healthcare and welfare organizations. My name is Anna, I am 77, and live alone in my house since my late husband passed away three years ago. We used be very active together, mostly taking long walks in the countryside, regardless of the weather. Now a days I have become used to take these walks in solitude. However, having suffered a broken arm from a bad fall the previous year, I have now felt reluctant to venture outside on my own. I am also suffering from high blood pressure and a bit over weight and a bad shoulder. Together with my son and the community care centre, I have agreed to have my home equipped with supporting technology which is intended to help ageing persons, like myself, in our daily life, in a pervasive manner. Figure: Visualization of how a conceptual user interface could look like for a smart phone connected wirelessly to wearable alarm button, fall sensor, step meter and examples of diagnose equipment. During the Myhealth@Age project, the portal interface to the different functions will be improved. Other kind of smart phones, more easy to use for elderly people, will be used at the field trials. Applications that don't depend on mobility will also be provided through web-interface to ordinary computers making it even easier to use them by elderly people when they are at home or visiting friends.

END-USER SCENARIO

2007-10-12

2 (4) MyHealth@Age

The system includes a number of interacting applications and communication technologies which can support me being active and mobile throughout the day and help me to enhance my quality of life and feelings of safety. The system has been tailored to meet identified needs for me, the main areas being isolation, inactivity, medical well-being and feeling of safety. I always start my day with a cup of steaming tea on my living-room sofa. After that I go to the bathroom and I measure my weight (every morning, according to doctors order) and this registrants changes over time and interact with the system in my house. The data is stored and interact with the HWO. Should my weight changes my PG can see that in my record. Now, since I have gain some weight over the

last week ? after having had little exercise due to an early snowfall which forced me to be careful and stay home. This also might affect my high blood pressure. The mobile device also measures the blood pressure once a day according to doctor's recommendation. So far it is a bit high but still at an acceptable level. This result is also interacting with the HWO. My mobile terminal is also connected to the Pharmacy so my medication is updated after my doctor's subscriptions and it is easy to get my medicine delivered directly to my home. I very much like that The Myhealth@Age system reminds me of when I shall take my medicine. I open my communication page in my mobile terminal. I use that function on the mobile device to maintain my social contacts and social network, which is very important to me. I have friends both close by and far way. The page informs me that two of my friends are free this morning and would appreciate a walk and a chat. I decide to ask them to take the riverside walk and then I contact them. They are then dynamically joined in a videoconference session, where we chat until we have decided about all the practicalities. On the way to the riverside walk, I use the mobile terminal to locate my friends that also have this mobile system and to inform the closest friend that we will soon meet. Returning from the walk, I am called by my house doctor, who wants to discuss my weight and blood pressure. I inform him that I feel tired after lunch more than I use to and we decide to invite a specialist. Using the dynamic group tool, a specialist is invited together with a physiotherapist. We decide adding a small exercise programme as a prescribe receipt. It will be sent to my system. I can start training according to the instruction and training program first thing tomorrow. My physiotherapist will join me in an e-meeting as a videoconference on the system and help me get started. We decide to meet at 9 o'clock. I also have a special training program from the specialist physiotherapist from the hospital. That program is for my frozen shoulder. I make the training once a day in the morning and the result is good, the pain is less and mobility increased for me. I slowly loose a bit weight and blood pressure value stabilizing using the system for supporting my daily life; I have increased my activity while decreasing my sense of isolation. One day I take a walk on me own. I have an alarm in the system that I use and it works both out door and indoor. It does also function as an alarm for buglers, which I appreciate very much. I take the mobile device with me and go out in the nice weather although I feel a bit unstable when I start to walk. After 15 minutes walk I fall down and loose consciousness. Not aware of the situation the mobile device that has a fall sensor detects the fall and triggers an automatic alarm. The alarm goes to the alarm centre and connection to the personnel that can assist me and they goes into action. I have also decided together with my neighbour, that the alarm will be connected to them as well as we are helping each other always. The mobile device starts the GPS and the personnel can see that a fall alarm has triggered from me and they can also see were I am. The personnel go out and drive to me and comes to me rescue. When they arrive I have waken up but is still on the ground. They help me up and help me to my home. I feel fine and I get to rest on the sofa. I have had a blood presser-fall and that caused the fall when I went for the walk.

END-USER SCENARIO

2007-10-12

3 (4) MyHealth@Age

SCENARIO - HEALTH AND WELFARE ORGANISATIONS (HWO)

Anna's automatic alarm goes also to her closest friend Lars that lives near by. It is easy for him to be of assistance since he lives very close and he has help her before when she was in need for assistance. But this week he is not at home so the alarm is rerouted directly to the alarm central at the Welfare organisations. The mobile alarm is integrated with the existing alarm central and information needed about Anna is required. The personnel can see that it is an automatic fall alarm detected and positions were Anna is. The personnel gets in contact with Anna via the mobile alarm and see is telling them that she has fallen while out walking but is ok and she can not get up. She needs help. The personnel at the central scanned the area and they can see that there is personnel just close by. They contact this group and they goes and help Anna. They located her via the locator that is integrated in the mobile alarm system and the personnel also have a locater so they can see that they are getting closer. They find Anna after 5 minutes and help her up and home. They also report back to the alarm central that mission completed. Many alarms at the alarm central is social alarms which requires a lot of time for the personnel because those that triggers the alarm needs someone to talk to. The personnel can see in the alarm statistic that Anna's alarm has decreased the two latest months since she started to use the social support network service. Anna has cancelled the home help service twice and when the personnel ask why Anna says that she feels able to the cleaning herself. She has become more mobile since she has been out walking with the support by the mobile alarm. Changes that Anna or the HWO does in their scheme of visits and bookings go in both ways and is updated quickly, the communication between patient and HWO as improved. There is much less of ex. missing appointment, long phone queues, unnecessary visits (and also changes in schedules updated) and more efficient use of both their time is one of the benefits of using the system. The house doctor calls Anna he wants to discuss her weight and blood presser because he as been alerted by Myhealth@age system that her blood presser and weight has reached an unhealthy level. Anna explains to the doctor that she feels tired and he decide to contact a specialist. Using the dynamic group tool, a specialist is invited together with a physiotherapist. They decide adding a small exercise programme as a prescribe receipt. It will be sent to Anna's system and she can start training according to the instruction and training program first thing tomorrow. Instead of having Anna to travel to the physiotherapist the physiotherapist will join her in a emeeting as a video conference on the system and help her get started. They decide to meet at 9 o'clock. Anna also have a special training program from the specialist physiotherapist from the hospital. That program is for her frozen shoulder. She makes the training once a day in the morning and the result is good, the pain is less and mobility increased. Once every month she meets with the physiotherapist in a e-meeting using the system in a follow up session and she sees how Anna make the training and adjust movements and program if needed. In The Myhealth@age system a personalized reminder is one of the many functionalities. The medication that Anna needs to take every day, the system reminds her to take. Information about when it is take and so on is logged in the system as well. This reminding of and when to take the medicine was previously done by the home help services, that had to make visits to Anna every day for this special task.

She can also take prescribed test at home by her self in the self treat functions, so that reduces a lot of visits to the health care centre. This also save time for the health care centre since the patient can take some tests done by them. Once Anna had a bad cut on her ankle and during the healing process she could take photos of the wound and send it to the health care centre as doctors suggested. This photo goes into her record and for the doctor to make judgment of further treatment and visit was not needed. This self treat service reduces a lot of work previously done by the HWO, and also empower the patient.