INTRODUCING HEALTH AND WELLBEING TECHNOLOGIES

Final report of the mHealth booster project, 17/12/2014

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INTRODUCTION

Utilisation of mobile technologies plays a key role in developing new solutions for social and health care services. Important factors include emphasising an individual’s self-care, increased use of information technology, and growing demand for services aimed directly at consumers. The mHealth booster project has contributed to promoting the development and introduction of health and wellbeing technology products and services in the Espoo and Vantaa technology development environments, thus allowing company offerings and user needs to meet. The aim of the project was to increase jobs in the mHealth sector and target them to available ICT professionals and to promote and increase the business of mHealth companies.

The mHealth booster project was prepared in cooperation with Culminatum Innovation Oy Ltd. The project began on 1 August 2013 and ended on 31 December 2014. It was funded by the European Social Fund and the Centre for Economic Development, Transport and Environment for Uusimaa. The mHealth booster project has targeted Laurea’s profile and focus areas very well and has supported cooperation with companies and the construction of user-centred environments.

We want to thank the cities of Espoo and Vantaa the participating health and wellbeing technology companies for this valuable collaboration. We also want to thank the Centre for Economic Development, Transport and Environment for Uusimaa for making this project possible. A special thank you goes to the project actors and Laurea’s students for their active development work.

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ABSTRACT

Bringing technology to the social and health care as well as to the public sector is the result of collaboration. Bringing together technology companies and users, equipment trials and various pilots have all been part of the mHealth booster project. The use of information technology in health care, self-care, and in services for the elderly is a trend and will create ever more jobs for skilled ICT people.

The objective of the mHealth booster project was to research, develop, plan and produce development environments that utilise well-being technology, and also to evaluate the opportunities generated by the environments to promote health and well-being of people, and to support coping at home. The intention was to create meeting places where companies could test and demonstrate their products directly to users in real-life environments. The objective of the project was to promote the establishment of well-being technology products and services to support people's well-being, rehabilitation, coping at home, and life management. In addition, the aim was to increase the technology skills, and to generate knowledge about the application of technology-based solutions.

The activities of the project are grouped under three areas: Experts, Companies and Development Environments. The Experts area aimed at focusing ICT professionals on the rapidly growing well-being sector. The Companies were targeted to be active actors and product developers for whom the project provided opportunities to meet with the end users. The Development Environments were meeting places where different players could try out the solutions. Piloted environments were technology demonstration points in Soukka Service Center and Tapiola Health Center in Espoo, the Technology Library at Tikkuura Library in Vantaa, and a mobile application for young people.

The project was based on action research in which new information and activities were produced in the different stages of the project together with the participants. The participants in the project were clients, experts from social and health care and youth services sectors as well as from education, companies and students. There were altogether 75 elderly people, 29 experts and 15 young people who participated in the research. Interviews were used to map the benefits of technology in managing everyday life, the understanding of actors' and users' experiences with the equipment as an aide to well-being, as well as the impact of development environments on the development of technology.

The development environments piloted in the mHealth booster project have proven to be useful in providing guidance and advice. The companies have gained concrete benefits from the project both in mapping client needs and in developing skills through training. On the other hand, it is difficult to demonstrate all the potential of the development environments for promoting companies' sales. The exploitation of mobile technology in the social and healthcare, and particularly in the public sector, still requires development. However, the mHealth booster project has enabled the needs of the elderly to be more clearly defined, and has been able to give excellent visibility to well-being technology companies and solutions.

Key words: eHealth, mHealth, well-being technology, coping at home, development environment, user-centred approaches, action research, elderly, young people, user-centred.

INTRODUCTION

As a result of the ongoing structural change in the ICT industry, the number of people entering the Uusimaa labour market is higher than in any other region of the country. With regard to extending the careers of these professionals and ensuring the conditions for growth in the region, it is of utmost importance to rapidly focus that competence to support new growth.

The global health and health wellbeing market will grow at an annual rate of approximately 6% to a value of more than 15.4 billion euros by 2030. Demand is particularly high in the following areas: self-care, use of information technology in health care, and services and solutions aimed at the elderly. Identifying new business opportunities in a fast-growing industry can allow ICT companies to find rapidly increasing demand for their applications and subsequently recruit new employees as growth occurs.

One particular characteristic of the structural change in the ICT industry in the capital area is the fact that people with a wide range of skills become available. The primary challenge is ensuring that the services and products supplied by the companies would meet the demand. Gaining access to the health and wellbeing market also requires knowledge of health care system procurement processes, competitive tendering practices, standardisation requirements, and health care reimbursement and financing models. The small size of companies and narrow service offering also presents challenges to internationalisation, as does the lack of suitable product technology development environments.

1.1 Technology-assisted independent living

Laurea University of Applied Sciences and Aalto University took part in the European JADE project (FP7-REGIONS-2010-1), Joining innovative Approaches for the integration and Development of transnational knowledge clusters polices related to independent living of Elderly. Based on SWOT analyses performed in different countries, it was found out that although a lot of technology innovations are being produced, they are not well utilised in the social and health care sector. These results are similar to the challenges described in the Active and Healthy Ageing 2011 report (JADE 2012).

Reasons for this, that were common to both, included the public sector’s ignorance of the existence of technological solutions, user ignorance concerning technology solutions, a lack of training, and economic factors. The JADE project continued until 2014 and, based on the above-mentioned results, various countries attempted to develop new solutions to increase the use of technology.

Many earlier projects (cf. Laurea’s CaringTV 2005 – 2012) have concluded that increasing social and health care costs are a major challenge to the introduction of technological solutions and eHealth services. On the other hand, municipalities admit that the challenges presented by population ageing require a search for technological solutions. One example of this is the City of Vantaa’s Ageing Policy and Implementation Plan (VRIKU), under which the ‘New technology in use’ service promise working group was established. The working group’s measures specified, for example, that the city will participate in technology development with companies and research and development institutes, and establish a technology library. Both Vantaa and Espoo worked with Laurea and other stakeholders to develop the technology library as a solution for renewing health services and the service structure. The lending expertise of the city libraries was utilized when developing the technology library concept. The aim was to apply action research to pilot a technology library in Vantaa. The project impact study was aimed at proving the importance of the technology library as part of renewed preventive work, an enabler of eHealth solution usage, a factor for increasing recognition of company expertise, and to improve growth possibilities.
1.2 Premises and background for the project

The premises affecting the need for and planning of the project were the growth in the use of information technology in health care, an emphasis on self-care, the increasing demand for services for the elderly, the identified development needs in the business and client competence of health and wellbeing technology companies, and a lack of user-centred technology development environments.

The mHealth industry report (Virta 2012) performed by Culminatum Innovation Oy Ltd in 2011-2012 in Uusimaa identified more than 100 health technology companies in which mobile technology already played a key operational role. The identified companies developed solutions for health care and elderly care service processes, physical activity and health and wellbeing applications and, to an increasing extent, applications to support the self-care of individuals. The Taltioni self-care service platform offered companies a platform for developing globally competitive services.

In Uusimaa, nearly all of the people entering the labour market are trained experts. In addition to ICT, the range of skills possessed by the available professionals is extensive (including HR, marketing and project management).

The report highlighted three central development trends in terms of creating market potential in electronic health care and wellbeing services:

1. A rapidly ageing population 65+
2. Growing interest in health and wellbeing and preventing illness
3. Information system renewals in health and in health care organisations

The challenges of ensuring that supply meets demand were discussed at the ‘Procurement processes for a health care organisation – how do supply and demand meet successfully’ seminar held on 25 September 2012, where deficiencies in integration and procurement skills were identified as development needs in terms of companies’ business expertise. For SMEs, the challenge is the rigidity and slowness of procurement processes, which can in part be eased by dialogue between municipalities and companies.

During the preparation phase of the mHealth booster project, information about business development needs was collected from the following companies: Ekhau Inc., Beddit Ltd, Modz Oy, Aino Active Oy, Tranmeet Ltd, Vivaago Oy, ManiMils Oy, NEARPRENT Oy, Commtabs Oy, Oppili Oy, Extensive Life Oy, and Vitaseis Oy. The following experts were heard during project preparation: Tuula Palmen, Business Oulu (concerning e.g. the structural change in the ICT industry in Oulu and the Avaus project); Terhi Kajaste, Healthtech Finland FiHTA; Topi Hanhela, Health 2.0; Jaakko Talvitie, Digital Health Oy; Culminatum Innovation Oy Ltd management group and experts; Taina Tukkainen, Culminatum Innovation, ‘working group on the structural change in the ICT industry’; Tuomas Teuri, Sitra, Taltioni project; and representatives of different sectors in the capital area cities. In addition, experts from Forum Vierum Helsinki participated in project brainstorming and sharing experiences from similar projects. Greater Helsinki Promotion experts took part in defining the activities and targets of the mHealth network, and VTI experts assisted in performing an industry survey.

Discussions with public and private health care were utilised when planning the project, and establishment events held in Laurea’s focus areas (such as Expertise in Nursing and Coping at Home) highlighted the need for eHealth services.

In October 2012, Culminatum Innovation Oy Ltd and Laurea University of Applied Sciences Ltd applied for funding from the European Social Fund through the Centre for Economic Development, Transport and Environment for Uusimaa. During project negotiations, Culminatum Innovation, which was the main implementer in the original application, and Laurea UAS, which was the sub-implementer, agreed that Laurea University of Applied Sciences would serve as the applicant and implementing organisation for the project. Funding from the Southern Finland regional sections of the ESF Programme for Continental Finland was granted on 7 June 2013, and the project began as a joint project of Laurea’s Otaniemi and Tikkurila units on 1 August 2013.

2 OBJECTIVE AND TASKS

OF THE PROJECT

2.1 Project targets

The mHealth booster project has promoted the establishment of health and wellbeing technology products and services to support people’s health and wellbeing, rehabilitation, coping at home and life management.

The actual target groups of the project are experts who may have become unemployed during the structural change in the ICT industry as well as SMEs and the applicable parts of their personnel. Indirect target groups are professionals in public sector social and health care and education. Technology development environment activities may have also provided the third sector with new solutions and benefits. The people responsible for procurement at participating companies have also benefited from the project.

The project targets were:

• To utilise health and wellbeing technology solutions developed by companies, and to facilitate the demonstration, testing and development of these solutions
• To support the health and wellbeing and independent living of elderly people through technological solutions
• To promote the health and wellbeing of young people and their ability to cope with everyday tasks through technological solutions
• To promote the commercial operations of health and wellbeing technology companies
• To boost the development of business competencies
• To promote employment in the health and wellbeing technology industry, especially for ICT professionals
• To advance the technological competencies of staff and students in a real-life operating environment
• To produce research data on the role of technological solutions

The activities of the project are grouped under three areas: Experts, Companies and Technology development environments. The Experts area of the project has promoted the establishment of health and wellbeing technology products and services to support people’s health and wellbeing. However, skilled workforce is needed for the design of solutions that utilise technologies, and this may become available as a result of the structural change in the ICT industry. One of the project aims has been to focus this expertise on the rapidly growing health and wellbeing industry. The project has provided available professionals with information about open jobs, interaction opportunities with companies that need professionals in the form of recruiting events and a LinkedIn group, and training in social and health care industry skills.

The Companies area targeted health and wellbeing technology companies that were active product developers and striving to grow their business. The aim of the project was to promote and grow company business, increase business expertise, and assist in bringing together company offerings and user needs. Companies have been provided with access to training in business expertise, tailored coaching, workshops, and other networking possibilities.

The Technology development environments area involved planning and implementing user-centred technology development environments where it was possible to test products and services together with end users, companies and experts. In addition to being used for testing, all of the technology development environments served as places where staff and students who were working with customer groups could obtain training and guidance. The technology development environments piloted during the project were the health and wellbeing kiosk and demonstration points at Soukka Service Centre and the health and wellbeing marketplace demonstration point at Tapiola Health Center in
2. what understanding/expectations/user experiences when coping with everyday tasks? The aim was to implement customer-centred technology development environments in which health and wellbeing companies can test, offer and sell their health and wellbeing technology products and services to customers and experts in an operating environment with the lowest possible threshold. The project collaborated with customers to investigate the user applicability of products and services utilising health and wellbeing technology, as well as cost efficiency from the perspective of selected customer groups, selected services and technology solutions. The applicability of health and wellbeing technology products was assessed with customers, experts and companies in the home environment and the service house environment. The competence of elderly customers, experts and companies were examined from the perspective of needs and new competence.

In particular, the study looked for answers to the following questions:

1. What kind of health and wellbeing technology products and services promote independent living and coping with everyday tasks?
2. What understanding/expectations/user experiences/evaluations do customers, experts, and entrepreneurs have regarding the application of health and wellbeing technology and services to supporting health and wellbeing and coping with everyday tasks?
3. How does the technology development environment affect the development of health and wellbeing technology products and services and customer health and wellbeing and coping at home?
4. What impacts do health and wellbeing technology products and services have on customer health and wellbeing and coping with everyday tasks from the viewpoint of experts' work (cost efficiency), companies' business, and producing competence?

3.1 Action research as a methodological premise

The mHealth booster project was based on action research, in which new information and activities were produced in the different stages of the project together with the participants. Containing pragmatic and sociological elements, action research combines action and research (cf. Cohen & Manion 1980, Heikkinen 2006). Action research is a philosophical approach to researching real and immediate problems. Action research utilises a variety of research methods (Heikkinen 2001). Action research is based on a critical and emancipatory knowledge interest, the aim of which is to develop new activity and achieve change (Kuro 2004). The focus of action research is to achieve change in a certain situation. The objective is not to produce scientific knowledge that can be generalised but to find knowledge that targets a specific situation or purpose and which can be used as the basis for developing a new theory (see Cohen and Manion 1980, 208–227). Action research is suitable for situations in which the goal is to change something and simultaneously increase understanding and knowledge about the activities and the change. Action research is problem-oriented and it can also be described as a critical-reflective research model in which the philosophical approach includes both practice-based and human-centred elements (see Morton-Cooper 2000). The mHealth booster project involved planning and implementing a new type of technology development environments with various participants. These environments gave customers, experts, entrepreneurs, students and researchers the chance to find and create possibilities for coping at home with the help of technology products and solutions. The operating culture is characterised by simultaneous action and research with the goal of achieving immediate, practical benefits from the research. It is situation-linked, participatory and self-monitored and it generally requires cooperation (Heikkinen 2001). Action research focuses on human activities, and the purpose is to develop practices in a better direction. Its objective is to study interaction-based social reality in order to change it and thus change reality, so that it could be researched. In action research, the researcher plays an active role and influences the change (Heikkinen 2006). The mHealth booster project used data collection and material analysis to find factors and problems that prevented elderly people from coping at home, and to find potential new solutions to promote the coping at home.

The principles of action research highlight the following issues: work life orientation, user-orientation, striving for practical development, a starting point of a shared and jointly experienced problem, examining the reliability of key assumptions and challenges, adapting to flexible activity and the possibility of error, accepting that there are no right answers, and validation of all requirements through a precise, verifiable process (Morton-Cooper 2000). According to a summary presented by Heikkinen (2006), action research is an intervention-based, practical, participatory, reflective, and social process. Participatory action research (cf. Creswell 2005) emphasises the importance of the participants' role. People are encouraged and empowered to address issues in order for development to be in their best interests. The research process in action research is such that the research subjects are active participants in the change and research processes, research focuses on practice and is, as a process, cyclical in nature, which means alternating between planning, activities and assessment. In the mHealth booster project, different actors participated in and influenced the process in different phases, thus linking operational planning, implementation and assessment with real situations and events throughout the process.
3.2 Data collection and analysis

3.2.1 Participants

The participants in the project were elderly customers, social and health care and education experts, companies, and students from Laurea University of Applied Sciences. A total of 75 seniors from the Espoo and Vantaa technology development environments took part in the research, 16 men (21.3%) and 59 women (78.7%). The average age in the research group of elderly people was 73.1 years with a standard deviation of 7.7 years. The average age for women was 72.4 years and 75.9 years for men. (Figure 2)

33.3% had completed folk school or comprehensive school, and 30.7% had earned a vocational diploma or completed upper secondary school. 17.3% had completed a bachelor’s degree and 18.7% had completed a master’s degree. 21.3% of the research group lived in a detached house, 61.3% in an apartment building, 13.3% in a terrace house, and 1.3% in a service house. For the majority of the respondents, their significant other was a child (46.7%), followed by a spouse (42.7%), while for the remaining 6.7% it was some other person, such as a friend. The average age of the significant other was 59.9 years with a standard deviation of 14.8 years. 50% of the significant others were men and 50% women. Only eight people in the research group were officially family carers. Three of them had been family carers for less than six months, and the remaining five for more than three years.

The experts (N=21) in the above-mentioned senior participants’ operating environment were also information providers in the research. The experts represented the background operating environments of the customer participants, such as a health department unit, service house, or organisation. In the context of elderly people, the average age of the experts was 51.3 years. All but one of the experts were women. One of the experts had completed a postgraduate degree, six experts had a master’s degree, 14 had a bachelor’s degree or secondary-level diploma. Only one person had less than five years of work experience and all of the others had more than 10 years of work experience.

![Figure 1: The action research cycle in the mHealth booster project](image-url)

![Figure 2: Age distribution of participants by gender](image-url)
3.2.2 Material and its analysis

Both qualitative and quantitative research methods were used to collect the material. In the first phase of data collection, the participants were interviewed to map their expectations and to launch activities in the technology development environments. In addition to standard individual and group interviews, material was collected in workshops, where the participants were actively involved with regard to creating new ideas together. The participants in product testing were interviewed either alone or in pairs at the beginning and at the end of testing. During the testing, the participants were asked to keep a diary and write about their user experiences.

The data collected was analysed in a material-based manner according to qualitative inductive content analysis. The content analysis involved classifying the material and searching for common and differentiating features. Tuomi and Sarajärvi (2009) define material-based content analysis as a three-stage process, in which the material is initially reduced, or simplified, then grouped, and finally abstracted, which means creating theoretical concepts (Tuomi & Sarajärvi 2009, Kynäs & Vanhanen, Silverman 2001, Holloway & Wheeler 1996).

The quantitative material was analysed using the SPSS for Windows software. The material processed with the SPSS program first had to be converted into data matrix format. A data matrix is a two-dimensional table that specifies variables for the columns and marks the measurement results in the rows by statistical unit (see Kananen 2011, 46). A statistical research method for processing the material was used to describe the variables with frequencies, in other words, with direct distributions and percentages. The results were also illustrated in graphic presentations, such as bar diagrams and figures and in tables (see Kankkunen & Vehviläinen 2009, 100, 103).
4 ACTION RESEARCH RESULTS

4.1 Planning of the technology development environments

According to the action research process, data collection in the mHealth booster project took place in stages, with the results of each stage affecting implementation of the next stage. In action research, the iterative process is used to evaluate, correct, develop and change the activities according to the results (see Aaltola & Syrjälä 1999, Kuula 2000, Heikkinen 2001). The first data collection analysis in the project provided a picture of the customers’ current status, key problems, and services used as well as their expectations in relation to the use of health and wellbeing technologies. Data was collected from elderly customers and from experts.

All of the participants were interviewed in the first phase, either individually or as a focus group. The participants were elderly people (N=75) and experts (N=21). The material was analysed using the inductive quantitative method. The material was used to produce a chart illustrating the factors and problems that prevent the elderly from coping at home and related ideas and recommendations for solutions (Figure 4).

Figure 4: The problems of an elderly person
In the planning stage of action research, the companies involved in the mHealth booster project and their products were selected to correspond to identified factors and problems that prevent living at home. Planning and design of the technology development environments was based on practical expectations and requirements that arose in the material. Content planning work for the physical technology development environments provided by the partners began quickly. The technology development environments implemented were the technology demonstration points at the Soukka Service Centre and the demonstration point in conjunction with the existing health and wellbeing marketplace at Tapiola Health Center in Espoo, and the demonstration point and Teknologiainaamo® technology library at Tikkurila Library in Vantaa. A mobile application for young people was implemented in cooperation with the City of Vantaa’s Youth Services. Descriptions of the technology development environments and their activities are presented in the following sub-sections.

The health and wellbeing technology products, services and applications presented at the demonstration points were sought and selected on the basis of content themes identified in the material. For example, the products selected for the technology development environment addressing the theme of loneliness provided a technological solution for a video call service allowing contact between the customer, a family member, and a friend, by means of a user-centred and simple tablet solution. With regard to safety and security solutions, mention can be made of remote systems based on GPS trackers or new generation training poles which provide resistance and promote moving.

Figure 5: The problems of a family carer to an elderly person

Picture 1: Technology development environments
4.2 Technology development environments

The mHealth booster project involved planning and implementing user-centred technology development environments where it was possible to test products and services with end users, companies and experts. In addition to being used for testing, all of the technology development environments served as places where staff and students who were working with customer groups could obtain training and guidance. The project’s technology development environments were located in Tikkurila Library in Vantaa, and in the Soukka Service Centre and Tapiola Health Centre in Espoo.

The technology development environments have been low-threshold demonstration points, where elderly people in the area, their significant others, industry professionals, and people of different ages could learn about and try out new health and wellbeing products and services under the guidance of trained persons. The objective of the technology development environments was to increase awareness of health and wellbeing technology, use electronic solutions to support health and wellbeing, and independent living at home for seniors and their significant others, and to promote user-centred product development of the technology companies. A further goal involved strengthening the customers’ self-care abilities and participation in enhancing their own health and wellbeing, and to support users with regard to developing and deepening their technology skills. People could try out and test the products independently or under guidance with the assistance of Laurea UAS students and project employees.

Among others, the products presented in the technology development environments came from the following areas of life:

- Housing safety and security
- Functional ability, physical activity and nutrition
- Health monitoring and self-care
- Communication and social health and wellbeing

Demonstration of the technologies offered in the technology development environments and guidance was implemented as so-called low-threshold counselling. The objective of technology development environment counselling was to be as customer-oriented, unhurried and as easily accessible as possible for the visitors. Salmela and Matilainen (2007) emphasise that a key factor when counselling elderly people is to consider the person as an expert on his or her own life and their ability to take in information. The same observations are also important when presenting the technologies and providing guidance. It has been a good idea to think about how to describe technologies in an understandable way and how much information to provide at one time. When providing information, it has also been useful to consider only the essential matters so that they don’t become confused with each other (see Salmela & Matilainen 2007, 230–231).

Sintonen (2008) states that the ability of seniors to adopt new technologies varies according to factors like age and health. Salmela and Matilainen continue by saying that counselling has to take individual needs and ways of providing guidance into account. Since the trust of the elderly is earn at the first meeting, the presenter should concentrate on this meeting in order to ensure successful counselling (Salmela & Matilainen 2007, 230–231). Listening to the custo-mers, understanding their needs and sufficient product information in the environments also makes it possible to have successful encounters and counselling sessions with different senior visitors.

4.2.1 Soukka Service Centre (health and wellbeing kiosk)

The first technology development environment in Espoo was established in the Soukka Service Centre, which has good public transportation connections. The pleasant facilities at the centre provide possibilities for many types of activity arranged by the City of Espoo’s Elderly Care Department, Adult Education Centre, Library, and Sports and Exercise departments, as well as pension organisations and private actors. Visitors to the centre can participate in group activities and structured physical activities, do handicrafts independently or in a group, and have lunch at the Rinkeli lunch restaurant on weekdays. Many events, ranging from concerts and dances to various health and wellbeing events, are also held at the centre (Soukka Service Centre 2014). The home-like service centre section contains 22 flats. The number of visitors to the centre ranges from about 100 to 200 per day.

A point suitable as a health and wellbeing technology development environment was planned in cooperation with the City of Espoo’s Elderly Care service house unit. An empty kiosk-type space in the entrance lobby to Soukka Service Centre was selected as the technology demonstration point and coordination centre for activities. It was called the Health and wellbeing Kiosk. Planning and implementation had to consider the age of the building and its capacity for new technology. For example, in the beginning of the project the centre did not have wireless internet.

The opening ceremony for the Soukka Health and wellbeing Kiosk was held on 21 January 2014. The event included a welcome speech from the City of Espoo, an introduction to the available health and wellbeing technology solutions and the companies involved, and the exchange of ideas concerning the opportunities provided by the new activities and health and wellbeing technology. The event gained media visibility on, for example, YLE Radio Suomi.

After the opening ceremony, the Health and wellbeing Kiosk was open four days a week from 9 am to 3 pm on Mondays to Thursdays. At the request of the service centre and its customers, a small café was also opened to accompany the technology presentation activities. The café was open from Tuesdays to Thursdays during spring 2014. Laurea’s Service Business students were responsible for planning, implementation and running of the café. In February, Soukka Health and wellbeing Kiosk started the demo visits for the service centre’s own senior and daily activity groups. A variety of stakeholders— from representatives of organisations to international visitor groups— also visited the environment. Cooperation with the building staff and volunteers was fruitful and led to many new demo presentation visits. During the spring, the Soukka Service Centre technology development environment was open from the opening ceremony in January 2014 until mid-June. In May 2014, customer recruiting began for user tests of devices that became available for the summer period. A total of 14 seniors were found via the Soukka collaboration network, and product testing was implemented with them. All in all, 20 Espoo seniors and significant others
were involved in the user study. After the summer break, the Health and wellbeing Kiosk reopened on 1 September 2014. Demo visits to various events continued actively in the autumn. Activities also went on the road with the Library car Täkt and at the Invention Week held at Sello Library on a pilot basis. The Health and wellbeing Kiosk closed its door at the end of November. It had more than 1,400 visitors.

4.2.2 Health and Wellbeing Marketplace at Taipiola Health Center

Espoo’s second technology development environment was the Health and Wellbeing Marketplace at Taipiola Health Center. The center is located beside the WeeGee Exhibition Centre in Espoo, and has excellent transportation links. The Health and Wellbeing Marketplace is located in the light yard of the health centre, where since 2012 Laurea’s physiotherapy students have provided visitors of different ages and fitness levels with new ways of being physically active and managing their health. This was a natural environment for a health and wellbeing technology demonstration point to support the existing physical activity guidance. Planning of the technology development environment began in cooperation with experts from Espoo’s health center unit.

The opening ceremony for the Health and Wellbeing Marketplace was held at Taipiola Health Center on 28 January 2014. Visitors learned about products and services to support safety and security, communications and social health and wellbeing, health monitoring and self-care, and functional ability and physical activities. Participants also had the opportunity to measure their grip strength and body composition at a health and wellbeing point set up by the physiotherapy students. A name competition for the Veloped outdoor walker was held in the spring by the product’s importer Turvallinen Kotti oy.

During spring 2014, the Health and Wellbeing Marketplace demonstration point was open from 8:30 am to 2:30 pm on Mondays to Thursdays. The point was closed from June until August. Since the health center visitor numbers were found to be highest first in the morning, a decision was made to open the Health and Wellbeing Marketplace one hour earlier in autumn 2014. From the beginning of September on, the environment was open four days a week from 8 am to 2 pm. In autumn 2014, Laurea’s physiotherapy students were closely involved in Health and Wellbeing Marketplace activities, as they continued to present the technologies, run exercise sessions, and perform a variety of health and wellbeing measurements for visitors of different ages.

Groups ranging from a peer group for family carers to the staff of an assistive device unit also visited the environment. A total of 69 demo visits and visits to different local events via presentation activities took place in Espoo. Upon request, people also left the demonstration points and went to customers’ homes to talk about the products and provide training in their use. A total of 14 home visits were made. The Health and Wellbeing Marketplace closed in November. All in all, more than 1,200 people visited the demonstration point at the Health and Wellbeing Marketplace.

In terms of the Espoo technology development environment, the challenge was the unchanging nature of visitor base at Soukka Service Centre and the difficulty in attracting busy customers at Taipiola Health Center to the open marketplace-like demonstration point. On the other hand, the strengths were a diverse collaboration network, supplementary activities implemented by students at the points (e.g., structured physical activity, café), and the formation of a rather extensive senior network.

4.2.3 Teknologialainamo*

Tikkurila Library has a fairly central location near the Tikkurila train and bus station. In 2012, Tikkurila Library had a total of 419,251 visitors, which is approximately 35,000 monthly. In 2013, the adult section of the library averaged some 19,000 visitors per month, while the music and media departments had nearly 5,000 monthly visitors. In terms of traffic, the library has been an excellent site for the technology library.

Since 19 March 2013, Tikkurila Library has been the site of a demonstration point for Helsinki City Library’s ‘Tomorrow’s Everyday Life’ project. The demonstration point was an unstaffed, so-called cold presentation point, where various health and wellbeing products and applications were on display. It was a natural step to add technology library activities to this demonstration point. The technology library was established at Tikkurila Library because this also allowed utilisation of the library’s lending logistics competence. Its activities were implemented in cooperation with the City of Vantaa’s Services for the Elderly and Libraries department.

The technology library opened officially and lending began at the end of February 2014, with activities continuing until mid-June. After the summer break, activities began at the beginning of September and continued until the end of November. In the spring, the technology library was open every weekday so that staff was present from noon to 7 pm on Mondays and from noon to 5 pm on Tuesdays through Fridays. The Friday opening hours were shortened by two hours in late spring, because the number of library visitors clearly decreased towards the end of the week. In autumn, the opening hours were adjusted slightly based on experiences gained from activities in the spring. In autumn, the technology library was open from noon to 7 pm on Mondays and Tuesdays and from noon to 5 pm on Wednesdays and Thursdays. In the autumn the technology library was closed on Fridays.

A key starting point for the technology library was the lending activities for products and related services implemented in cooperation with the Tikkurila Library. In practice, the lending and return activities were handled by the library’s music and media department professionals, while the technology library staff was responsible for inspecting the returned devices and collecting feedback. Laurea UAS students from different disciplines worked together with the project staff to disseminate expertise related to the operation and the use of the devices. The students were also prepared to visit the borrowers’ homes if guidance in using the borrowed product was required in the home environment. The technology library reached more than 1,500 people during the February–November period.

Available for lending were Microlife blood pressure monitors, Addoz medication clock, BungyPump training poles, a Loc Finder safe-
challenge was the fact that Vantaa is a large area and the elderly in particular do not go to the other side of the city to visit different libraries. On the other hand, the strengths were successful cooperation with the library, which has provided a lot of new possibilities like lending activities, new marketing channels, and the chance to take the activities to the mobile library.

4.2.4 Summary of technology development environment implementation

The project employees and IT experts were responsible for practical activities in the Espoo and Vantaa technology development environments. Laurea UAS students from different fields also played an important role in presentation activities at the technology development environments. All in all, more than 200 students worked in the technology development environments and at senior events during spring and autumn 2014. More than 400 students worked on the project in the period between September 2013 and September 2014.

Visitor statistics

Depending on the month, the visitor numbers for the technology development environments varied from a little less than 100 to more than 300. In total, the three technology development environments attracted more than 4,200 visitors while they were open. These figures do not include those who attended the demo visits. However, in terms of reaching customers and disseminating awareness, it was important to participate in different events and address groups. The following table (Table 1) shows how visitor numbers are divided among the environments during different months.

<table>
<thead>
<tr>
<th>Month</th>
<th>Soukka</th>
<th>Tapiola</th>
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<tbody>
<tr>
<td>January</td>
<td>197</td>
<td>239</td>
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<tr>
<td>February</td>
<td>145</td>
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<td>March</td>
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<td>April</td>
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<td>176</td>
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<td>May</td>
<td>177</td>
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<td>148</td>
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<td>Total</td>
<td>1438</td>
<td>1255</td>
<td>1561</td>
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Table 1: Visitor statistics in the Espoo and Vantaa technology development environments

Furthermore, the technology library was introduced around the City of Vantaa in pop up events and senior events. Six such events were arranged during the spring. The activities really got started in the autumn, when a total of 24 events were held during that period. These events were arranged at meetings of senior associations, at City of Vantaa day group activities, and at evenings for family carers, or senior groups run by the city. Along with these events, seven groups visited the technology library at Tikkurila Library. Activities were taken to other Vantaa libraries during the autumn, with nursing students arranging 14 small-scale pop up events at libraries around the city. The products were also presented in Tikkurila Library’s two mobile libraries. A total of eight mobile library trips were made during the autumn.

The challenges of the technology library were the location of the demonstration point in the immediate vicinity of the library’s periodicals room, and the fact that the visitors were, to a certain extent, usually the same people. Another challenge was the fact that Vantaa is a large area and the elderly in particular do not go to the other side of the city to visit different libraries. On the other hand, the strengths were successful cooperation with the library, which has provided a lot of new possibilities like lending activities, new marketing channels, and the chance to take the activities to the mobile library.

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4.3 User tests from the perspective of the elderly

Health and wellbeing technology products, services and applications developed by selected companies were utilised during planning and implementation of the technology development environments. The products and services were chosen on the basis of content themes identified from the material. For example, the products selected for the theme of loneliness provide an online video link for interaction between the customer and significant other. An existing, easy-to-use tablet solution and program suitable for the activities were used as the product. Remote systems based on GPS trackers were selected to enhance safety and security. A new type of training poles that provide resistance were selected to increase motivation to be physically active and maintain muscle strength. A vital signs monitoring system installed on the bed and a new kind of blood pressure monitor were used for health monitoring (Photo 2). The selected products made it possible for elderly customers, their significant others and experts to become familiar with and test new health and wellbeing technology products and solutions, and to update their technological competence. From the company standpoint, the technology development environments offered a meeting point for the companies’ products, and for dialogue and development between the customers and experts. The user study emphasised the systematic examination and refining of personal experience and user’s participation in the product development process. User information refers to information obtained about the user experience of a single user or group, the features, properties, forms and aesthetics of a product or service. The situation, relationship with other people or items, and earlier experiences also make it possible to obtain user information for research and product development (Hyysalo 2006; 2009). User information is traditionally examined via the experiences, visions and assumptions of the planners. Today, participative cooperation is increasingly done with the actual users, in which case new ideas are created in a joint process. Qualitative research methods are often applied in a user study. In addition to traditional individual and group interviews, observation and participatory observation, data can be collected by means of descriptions, stories, videotaping, photographs, and drawings. In a user study, observation means monitoring the user’s activities in his or her own environment, which provides information about the user, his or her activities in the usage environment, and information about the details of product or service usage. Information about usability research is analysed, utilised, and it can be illustrated using models and prototypes. Information that has already been published is also sought when collecting and organising user information (Hyysalo 2006).

The mHealth booster project applied a user study when examining products and services that utilise health and wellbeing technology in the technology development environments, and in home environments. During this process, the information providers and actors were both customers (N=75) and experts as individuals (N=21) and as groups (N=5). User experiences were examined through case research. Different data collection methods were used to obtain user experiences from the elderly, their significant others, and experts with regard to health and wellbeing technology products. The initial interviews were conducted as individual interviews and group interviews. Written product feedback (N=153) was collected from people who had, either alone or in a group, become familiar with the technology development environment activities and products.

Furthermore, the project demonstration points were closed during the summer, and at that time the presentation devices were available for longer-term user tests. The product testers were elderly people (N=21). The testers were interviewed as individuals and in pairs. During the testing, they were asked to keep a diary about their experiences. The tested products were selected to correspond to the themes identified from the material, which were loneliness, safety and security, health and wellbeing, self-care, and physical activity. Ten different technology products were tested. Social interaction and communication products were tested by means of a program installed on a tablet computer. Training poles that used resistance were selected to promote movement, a medication clock and vital signs monitoring system installed on the bed were tested for self-care, as well as trackers used to increase safety and security. The testing period averaged eight weeks. Analysis of the feedback mainly focused on product usability and operation, which corresponded to Hyysalo’s (2006) worlds of functionality and product. The participants in product testing examined and provided feedback on product use in everyday situations, social interaction and product functionality, their strengths and weaknesses, and made development proposals.

Factors that promoted or prevented the use of health and wellbeing technology were extracted from the material and classified. Based on product testing, feedback and assessment, the following factors promoted use:

- A sense of security
- Ease of use
- Successful product design
- A feature that enhanced health and wellbeing

The sense of security increased in everyday situations where, for example, a safety wristband was tested. Important factors during implementation of the safety wristband were instruction and guidance, during which the customer’s questions were answered and resolved on an individual basis. In this case, the elderly person’s interest in and, in particular, commitment to product testing contributed to increasing safety and security. A safety wristband even seemed to increase dependence on the product. The following comments were made by an elderly person with Alzheimer’s disease and his/her significant other concerning the safety wristband test and its importance in everyday life.

“I could say that for me...of course, it’s not very nice to only consider things from my own perspective, but in any case, it’s mostly peace of mind...concerning whether he’ll go somewhere or just disappear from home...”

“It’s probably easy to use because...the device only has two buttons, one to see the clock and the other to make this emergency call. For the user, it’s...let’s say that a single button...or in the future it would be one button...but in this case, two buttons is already pretty good...”

The ease of use and simplicity of the product were factors that clearly promoted introduction of the technology. In this case, instruction, guidance and planning both in the technology development environment and in the elderly person’s home increased satisfaction with the
product. The availability of technical support was an important factor in product implementation. Successful product design and appearance had a positive impact on product use in everyday situations. For example, product size and design, and its functional integration reinforced the acceptance of the product as part of an elderly person's everyday life and active use. The fact that the product is self-directed and learns things about its user's behavior and profile reinforced the success of user-centered design. A product to support self-care, such as a new blood pressure monitor and its alarm function was perceived as a factor that increases safety and security. With regard to products that reduce loneliness or enhance safety and security, increasing interaction, the possibility for movement and reduced dependence on other people enhanced health and wellbeing to a certain extent.

The factors that prevented use were:
- Difficult to use product functions
- Insufficient product support
- High price
- Incomplete nature of the product

Complicated features or features that interfered with product functionality, such as buttons that were too small, prevented or hindered use of a technical product. Insufficient instruction, guidance, support and maintenance were factors that had a negative impact on product introduction, motivation, and commitment. Similarly, a functional lack of clarity, fault situation, failure to work, or product size can prevent product use in the initial phase.

As a factor preventing usage, high price was for some products a greater barrier than the actual benefits of the product. In the case of some products, the service, for example, reception of alarms and the related further measures, were either found to be deficient, were not available to private persons at all, or the integrated service was too expensive.

4.3.1 Results of user tests

An elderly person's lack of safety and security, and the related products and solutions were the biggest challenge throughout the project processes. The physical safety and security of the home, an elderly person's independent and spontaneous movement, and the sense of overall security were the greatest challenges. Various reminder functions and alarms play a major role when integrating safety and security, and health and wellbeing technology. Safety-related products were found to be useful, for example, to facilitate moving outside the home due to the alarm features of the product. In some cases, technical failures or design-related factors such as buttons that were too small or the size of the product were weaknesses in these products, leading to the perception that product-related technical support and guidance was insufficient. The majority of feedback focused on areas like tracking, or were associated with implementation of a certain function, such as medicinal treatment. The GPS trackers and related products and services attracted the interest of the elderly people and their significant others. With regard to safety and security, two different products based on GPS tracking were tested during the project.

"I thought the size was good...not too big...not too heavy...and it was made of a material that was easy to hold on to..."

"Well, the fact that it doesn't have...you don't have to press little letters and numbers separately and it's probably enough to have these four...were there four or five options but of course it's important to have the card with you to know which number to use."

With regard to the immobility of elderly people, the following themes were identified from the material:
- maintaining and improving balance and muscle strength
- repetitive everyday physical activity
- individual guidance and motivation
- activating exercise programmes

The interview subjects requested planning and implementing technology for elderly people, including large info boards and television screens would make it possible to introduce online bulletins and guides and interactive programmes. For example, the training poles that the related further measures were found to be deficient, were not available to private persons at all, or the integrated service was too expensive.

4.3.2 Summary of product testing

The physical safety and security of the home, an elderly person's independent and spontaneous wellbeing to a certain extent.

The benefits of the product. In the case of some products, the service, for example, reception of alarms and the related further measures, were either found to be deficient, were not available to private persons at all, or the integrated service was too expensive.

"This is a big challenge and very important. My mother-in-law likes to go to the cottage alone and also into the forest, and we never know what might happen. I can remember many times when we drove 200 kilometres to check on her and the situation...a security phone connection would have made things easier."

In some testing cases, the product did not meet expectations, but at the same time testers became interested in and acquired another safety-enhancing product. Customers and experts were particularly interested in products and solutions that enhance home or personal safety and security. The fourth large theme was weakened or deteriorating health, health and wellbeing, and fitness. Assessment of the products and services in this context category requires longer testing and trials. For example, the mHealth booster project tested a new type of blood pressure monitor that collected information, and a monitor that was installed on the bed. Both products attracted a lot of interest and desire to purchase for the home environment. One of the products was tested for nearly four months with an elderly person living at a service house, so that the family members were responsible for the monitoring information and responding to it. The product worked well functionally and met the targets. However, in many ways the trials and testing demonstrated the challenges and even problems associated with the product, as testing was carried out in a service house setting and the monitoring information was sent to the family members. The roles of the family members in monitoring and on the other hand the responsibility of the service house staff were unclear. All in all, the testing process raised several ethical questions.

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The benefits of the product. In the case of some products, the service, for example, reception of alarms and the related further measures, were either found to be deficient, were not available to private persons at all, or the integrated service was too expensive.
movement, and the sense of overall security were important factors in terms of safety and security. Products and solutions related to an elderly person’s safety and security proved to be important and interesting in terms of everyday functional ability and living at home. Various reminder functions and alarms play a major role when integrating safety and security, and health and wellbeing technology. GPS-based products and the related services proved to be important to the elderly person and to their significant others. The majority of the questions answered in the technology development environments concerned safety and security matters and safety-related plans, and associated products were mapped out on an individual basis. Various experts, such as memory counsellors and professionals who provide guidance on assistive devices were particularly interested in health and wellbeing technology products, and especially about in the services to enhance safety and security. According to both customers and experts, the communal solutions that the online video call service and software for maintaining and promoting social relationships made possible were the most interesting solutions and attracted the most attention. When summarising the product testing, it can be said that the elderly people involved in the user study are active and enthusiastic product testers, as well as honest and open when providing feedback. They are intensely committed to the testing. Feedback on the product assessments focused on usability, functionality and technical features, and also on product and service integration.

4.4 Assessment results from the perspective of experts

Experts from different fields and with different job descriptions took part in the different stages of action research during the mHealth booster project. The experts were involved in initial mapping, in assessment as the project progressed, and in the final assessment. The experts played an important role in implementing and developing project activities. The role of the customers, understanding their voice and challenges, availability and targeting of the health and wellbeing technology products, services and applications, and assessment of the expectations presented by the experts and competence were key content areas in the experts’ material.

Based on an analysis of the material, the following themes were produced: ethical questions, guidance and advice, and challenges. (Figure 6)

The expert’s competence was mainly analysed in relation to technology. Technology competence includes an understanding of technology and awareness of technology products, and the need for and necessity of new types of services. Technology awareness comprises the supply, availability and applicability of health and wellbeing technology products for customer use in different operating environments, the expert’s own use, and for the change in work and activities. In terms of content, the assessment emphasised awareness and understanding of technology and its applicability even to the extent of lacking competence or need to update the competence. The opportunities that health and wellbeing technology products provide for developing work and activities were combined with service planning and production.

<table>
<thead>
<tr>
<th>PRODUCT GROUP</th>
<th>Products</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY PRODUCTS</td>
<td>tracking safety button, safety wristband, security phone, GPS locators</td>
<td>The best feedback related to design suggestions for improvement e.g. size and symbols</td>
</tr>
<tr>
<td>PRODUCTS FOR SOCIAL CONTACT</td>
<td>video phone, musical games</td>
<td>positive feedback related to usability and contacting</td>
</tr>
<tr>
<td>HOME SECURITY</td>
<td>stove guard, stove alarm</td>
<td>the most useful product, affordable security, greatest desire to buy</td>
</tr>
<tr>
<td>PRODUCTS PROMOTING MOVING</td>
<td>walking poles with built-in suspension system, outdoor walker</td>
<td>motivates to move, improves availability</td>
</tr>
<tr>
<td>HEALTH AND WELLBEING MONITORING DEVICES</td>
<td>blood pressure monitor with detection of atrial fibrillation, vital signs monitoring system, medication clock with reminder</td>
<td>products are ready in use, need for security service, need for longer testing, large size, unfuctioning sections</td>
</tr>
</tbody>
</table>
4.5 Health and wellbeing technology to support young people in managing everyday life

External life management includes social background, in other words, the importance of family in a young person’s life, coping with school, and a status in the labour market. Factors that are part of internal life management include young person’s self-concept, which, when negative, can cause repetitive feelings of failure and poor self-esteem. Negative experiences and accumulating problems that progress in stages and are related to external and internal life management areas affect a person throughout their lives, and can lead to social exclusion. The most integral part of a person is their sociability, which defines that person’s significance in the eyes of others, and through them. Various social links, such as work, education, family, and friends play a key role in relation to the process of integrating young people into society. The social support provided can promote the health and wellbeing of young people, commit them to activities, reinforce their resources, identify their strengths, provide the chance to be heard, and help them build a tailored with regard to making choices in life (Veivo & Vihlppola 1998, 47, 52–53).

Paju and Vehviläinen (2001, 68–71) state that nearly all solutions for exclusion problems are associated with life management. According to Roos (1987), young people have to learn the very basic skills as methods of life management if they did not obtain them at home. Problems with life management occur when a young person does not have the patience to remain at school or work, or he/she does not have the discipline needed to adjust payment capacity to income. Issues related to how a young person copes with everyday life, such as daily rhythm and time management, financial management, and nutrition, health, hygiene and tidiness, are concrete matters related to external life management. Some young people have life management challenges in several areas of life, while others only need guidance regarding only one or a few matters. Life management is a concept in which one of the extremes can be seen as social exclusion. According to Helme and Karisto (1992), social exclusion is a concept that brings together different social problems. According to Sipilä (1982), social exclusion refers to weak bonds between an individual and the society. Social exclusion should above all be viewed as a process that moves from life management towards exclusion (Aaltonen, Ojann, Vilhenen & Wén 2007, 360–362).

Preventing a young person from becoming socially excluded is a matter of encouraging a young person towards a life based on independence and full social participation. The functionality of basic social services and sufficiency of social support systems are key factors in minimising the risks of exclusion (Kuozeahl & Vitanen 1999, 5).

4.5.1 Premises and process of the Nuorten kaupunki (Young People’s city) project

The second technology development environment of mHealth booster project in the City of Vantaa was Laurea’s multidisciplinary Young People’s City project (2012–), which develops new operating methods for supporting important transition phases for children and young people. The target group is young people who need help promoting their health and wellbeing and skills to cope with everyday life. The pilot involved cooperation with mobile application companies to implement a mobile service concept that takes into account the needs, situation and thoughts of young people. The aim in the development environment was to create a service package of different applications. Young people and employees from the City of Vantaa’s Youth Services unit were involved in the piloting development process. Development of the mobile applications and services was handled by the companies involved, which provided mental health and wellbeing exercises, musical puzzles, a treasure hunt to promote physical activity, and a health and wellbeing coaching in the form of internet and mobile application services. (Figure 7)

According to the phases of action research, the Young People’s City project collected user-centered experiences throughout the project development process by means of interviews and questionnaires. A total of 13 focus groups were held for three groups of people, mainly young workers, and for companies from December 2013 to October 2014. All in all, 38 young people, 11 youth workers and 4 company representatives took part in the focus groups. During the initial phase, initial interviews were conducted for the participants by focus group and information collected from young people (N=15) and youth workers (N=8) by means of a
for all target groups were held in September–October to collect user experiences regarding testing of the different applications and services, and the whole development process. The assessment material for the young people, youth workers and companies in the Young People’s City project was: 1) initial focus group interviews and the initial questionnaire from pre-information forms, and 2) final focus group interviews and a feedback survey to map user experiences.

4.5.2 Results from the perspective of the young

A total of fifteen young people (N=15) participated in the young people’s focus groups. In terms of family background, the majority of the young belonged to a core family. With regard to education, the young were attending or had completed comprehensive school, and two of them were in general upper secondary/vocational education. With regard to studies or work in their current life situation, the young men-

questionnaire. The young commented on their opinions of their own health status, need for services and expectations of health and wellbeing technology services, while the youth workers assessed the health status of the young people, service needs, and expectations of health and wellbeing technology services from the employee perspective. Based on the results of the initial phase, cooperation with companies began with the building of a package of internet and mobile applications and services.

Together with their counsellors, the young had the opportunity to test a range of games and applications designed to promote health and wellbeing in everyday life. One of the applications selected for test use was a treasure hunt that encouraged the young to be active outdoors in the form of a good-natured competition with their group. The goal was to find virtual treasures hidden in the local area to score points, and to collect virtual currency in the game. A musical puzzle designed to support communal activities gave the youngsters the opportunity to flex their memory muscles and practice musical and social skills. The health and wellbeing programme introduced the young and their counsellors to mind relaxation exercises designed to relieve stress, improve mood, and revitalise life. In a health and wellbeing coaching session, group counsellors acted as coaches, using the online application to give the young tasks which were tailored to their personal circumstances and designed to promote life management and health and wellbeing skills.

Use of mobile applications and services was aimed at encouraging the young to be independent and active and to offer the youth workers new health and wellbeing technology services for their work. The testing phase lasted from May to October 2014. The final interviews...
toned having a summer job, studying at a vocational college, being unemployed, or starting in trial work. The young perceived their health as good, and several reported that they had no motivation with regard to studying. In the initial interviews, the young described their perception of personal health and well-being, with physical health falling somewhere on some variation of the "ok – reasonable – excellent" scale. Psychological health was viewed as reasonable. The young felt that their social relationships also varied, the majority of them had friends while a few didn't really have friends at all. The young believed that their independent coping and need for support were met by the support offered by their parents and the individual or group guidance available at the Youth Guidance and Support Centres. In terms of the services they required, the young indicated that they use online portals and guides in addition to personal guidance. They considered easy access, location, speed, and ease of use to be important criteria when using a service. Challenges related to meetings and contact between the young and their significant others occurred in conjunction with subscription changes (prepaid). Another challenge was the difficulty in finding concrete and reliable information on the internet. The young were critical in a positive way about information available on the internet. A few of them mentioned the opinion that online services can contribute to exclusion. The fact that the young needed a sense of community and valued the importance of face-to-face encounters was highlighted. The young made very diverse use of internet services, either for using online services or for information acquisition. Social media and online gaming were also in active use. On the other hand, a few of the young reported that they do not use electronic communications channels or services at all, and would rather handle their business with the service provider in person. Different services that were mentioned included online portals and guides (on the topics of studies, everyday management, living, basic services, and alcohol). They considered content available by means of photos to be the best method. The coaching was considered a useful channel for obtaining information. The program was perceived as easy to use. The health and wellbeing coaching provided useful information and it was easy to use the program. (Young person 5)

The young also found a tested musical puzzle, which involved recognising a song in a quiz or actually playing it, to be a refreshing change in group activities. The development proposals made by the young regarding the music game suggested more of their type of music (pop, rock, rap, etc.), and the possibility to use their favourite music to build a quiz or puzzle with other group members.

The music game was fun. (Young person 7)

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The music game was fun. (Young person 7)

The young considered it positive that they were given the opportunity to participate in a project to develop health and wellbeing technology services and applications, that especially wanted to hear about the opinions, expectations, thoughts and requests of young people on what would be a functional option from their viewpoint.

I think it’s nice that our opinions are taken into account. (Young person 1)

In the product testing, the young tested a treasure hunt, which received a lot of positive comments. They also provided development proposals concerning the game's technical solutions and visual look. The fact that the game was in English was considered to be a good motivating factor for playing. The young wanted the points awarded for finding the treasure to be available in some other format, such as a concrete prize. Good-natured competition against each other was considered fun. It was enjoyable to play with or against their own counsellors, which contributed to building a sense of community in the group.

The dart was impossible to control, but otherwise it was a really easy treasure hunt, quite fun. (Young person 3)

The treasure hunt is a good way to get children and young people moving! (Young person 4)

Also a relaxation exercise application was tested. The relaxation exercises were very popular among the young, with the applicable elements remaining a part of permanent group activities.

The relaxation exercise felt pretty cool! (Young person 2)

The young also tried a health and wellbeing coaching application, in which they were given tasks related to their personal circumstances according to the group activity themes. The young provided feedback on the tasks in writing or by attaching photos. They considered content offered by means of photos to be the best method. The coaching was considered a useful channel for obtaining information. The program was perceived as easy to use. The health and wellbeing coaching provided useful information and it was easy to use the program. (Young person 5)

The young also found a tested musical puzzle, which involved recognising a song in a quiz or actually playing it, to be a refreshing change in group activities. The development proposals made by the young regarding the music game suggested more of their type of music (pop, rock, rap, etc.), and the possibility to use their favourite music to build a quiz or puzzle with other group members.

The music game was fun. (Young person 7)

The music game was good for developing memory and a musical ear. (Young person 8)

4.3 Results from the perspective of youth workers

Eight youth workers (N=8) took part in the focus groups. In terms of education, the youth workers had a vocational / general secondary school diploma (4), a bachelor’s degree (3) and a master's degree (1). The job titles / positions mentioned were special youth worker, youth counsellor, project manager, project employee, project employee/counsellor, and nurse.

During the initial interviews, the youth workers presented experiences of a customer group’s health and wellbeing, which illustrated the different challenges faced by the young. The young who went to the youth centre were mainly well off, but they were subject to accumulating concerns about studies, work, relationships, appearance, personality, intoxicants, and risk behaviour. One of the challenges was considered to be that so-called "grey area young" that as a youth worker in their field could be a challenge for the young. Challenges to maintaining contact were considered to be the youth workers’ busy schedule and growing numbers of customers, which led to a feeling of inadequacy among employees. One of the challenges in communication was seen at the frequently changing phone numbers of the young. The youth workers used many services offered by the municipality and third sector. Among others, the following were mentioned in the answers: Social, health care and youth services, child protection services, housing services, crisis emergency support, school psychologist services, Kela, TE offices, schools, clubs offering recreational activities, the police, parish, youth centre, Irti Huumeisa ry (Free from Drugs). The youth workers also highlighted finding information quickly and continuous updating of information as important topics. A particular characteristic was the fact that the young have a lot of networks, with a single young person having as many as eight different authorities present in his/her life. The common expectations and hopes for services emphasised coordinated case management and enhancement of mutual information, and combining the information systems of different authorities so that all the bodies involved in a young person’s support networks could have access to the same information and opportunities to help. One proposal presented involved creating open online profiles for each young person, which would allow all of the network actors to help and support an individual young person in real time and on a needs-oriented manner.

The challenge for the young is often the fact that they need a lot of support with managing everyday life, and they are still practising how to organise everyday tasks by themselves. Technology applications, online games and electronic calendars were viewed as an electronic calendar working on the phone, which would use reminders to communicate about progress in everyday tasks. The youth workers have a concrete need for support to promote young people’s health and wellbeing and coping with everyday tasks. This would activate and motivate and commit the young to responsible behaviour.
The results of the final employee interviews concerning product testing were rich and provided a lot of perspectives. The pilot was considered good because it enabled the development of various health and wellbeing technologies. In particular, the applications could be beneficial to young people with no previous work experience or vocational education. Cooperation with the youth workers is important, because they understand the needs of the young involved in group and workshop activities. In the feedback of the application tests, some of the respondents found the training provided before testing to be sufficient and very beneficial, while others would have liked more detailed training. On the other hand, the youth workers mentioned that in a longer testing period the applications would have resulted in a more functional package. The functional elements were considered to be the visual look of the health and wellbeing coaching, in which the possibility for young people to comment by means of photos proved to be a very good option.

"It was great that we could give feedback on health and wellbeing coaching in this photo format. It doesn't always have to be in writing." (Youth worker 1)

"The visual look for health and wellbeing coaching was functional and commenting with photos was a good idea." (Youth worker 2)

As a development proposal, the youth workers suggested that the usability of the coaching would improve if SMS messages were used in real-time. In order to achieve an ideal use of the coaching, the program should be used by a young person who is already motivated and who has an existing guidance contact. The coaching could also be more successful with girls over the age of 17. All in all, the coaching was seen as a good tool for investigative youth work, and it was easy to implement.

"I see the coaching as a preventive measure if it's being considered for school health and student health care, when medical examinations are being performed and reveal some challenges." (Youth worker 5)

"Health and wellbeing coaching would be a good tool for investigative youth work, longer-term guidance contacts in special youth work, school psychologist work." (Youth worker 2)

"The relaxation exercises were implemented and will be used in the future as well, and tailored to the group. The relaxation segment was considered particularly useful, and the young people were very committed to these exercises. The youth workers were delighted to have obtained such a useful tool.

"The relaxation exercises were tried and have remained a part of our group activities." (Youth worker 4)

The treasure hunt was considered an excellent way of activating young people to get exercise. Several of the youth workers reported that they also got “hooked” on the game during testing. The gaming and good-natured competition that took place as part of group activities increased group spirit and the sense of community.

"I somehow thought that the competition in the treasure hunt seemed like a kind of communal thing." (Youth worker 2)

"Well, personally I liked the treasure hunt a lot! It was really fun and we got to hide the treasures ourselves too." (Youth worker 3)

The youth workers also considered the musical quizzes interesting but wanted to see music that was more suitable for young people, and more diverse. The idea of supporting communal activities through musical games was considered a good idea if the range of music genres was expanded in the future. At best, it was seen as supplementing group activities, with the emphasis on providing the young with a pleasant alternative way of spending time.

"The musical puzzles and treasure hunt have a social and group-bonding effect and they are easy to implement. On the other hand, the health and wellbeing coaching requires more in-depth knowledge of the young person. Now we have two different tools and it's good to have both." (Youth worker 5)

"We tried out the relaxation exercises and will certainly tailor them for the group and use them in the future as well. The treasure hunt was great activation for the young and supported communal activities. The musical games were interesting. Using games to support communal activities would be a great thing." (Youth worker 7)

"The relaxation exercises were good. We got a good tool. The treasure hunt was a fine way to get people moving, I got hooked. The musical games were a great way to spend time." (Youth worker 8)

4.5.4 Conclusions, good practises and ideas for further development

The basis for the project was to build an internet and mobile service package to promote the health and wellbeing and life management of young people by means of a user-centred development process in cooperation with young people, youth workers and the companies involved (Figure 9). The aim in the technology development environment was to take the needs, life situation and thoughts of the young into consideration, and to provide the youth services employees with a service package of applications that would allow them to provide multifaceted and interactive support for the young as they cope with everyday life. Initial interviews mapped the health and wellbeing level of the young and the youth workers and their expectations. Based on this information, four companies collaborated to build services and apps that promote health and wellbeing for product testing with the young and the youth workers. The entrepreneurs and the youth workers took part in a joint final interview, which reviewed individual development proposals for all the applications included in the project and collected feedback. The experiences were positive but more time, technical support and a more interactive communications channel were needed for implementing, learning about, and testing the applications. Some of the applications became established as part of the group activities programme. If the required devices, apps and programs would be integrated into youth work, they would provide added value to the existing work methods and communications channels. A
pro-development attitude and more time would also be needed for developing the youth work and the technology solutions. In the opinion of entrepreneurs, the mHealth booster project was a good way to open up dialogue with the target group and operators in the field. The entrepreneurs felt a strong need to do some good with their inventions, and to obtain real feedback on them. They saw being able to tailor their own product for the young people’s target group as a reason to get involved. The user experiences collected from the young and the youth workers were necessary for developing their products. However, all of the companies involved were small start-ups, with limited resources to get involved. The fact that they could not test the service in the ideal manner with the young people was perceived as a challenge. The development proposals made by the entrepreneurs mentioned that discussion between the user groups and entrepreneurs should be improved in the future. Thus development work would progress in the desired direction. The entrepreneurs would also have liked closer cooperation with project actors, process specification and, especially, written feedback. During the project, the entrepreneurs made good contacts, for example, with other service providers and consultants. They intended to produce services together in the future as well. The entrepreneurs began immediately work on the development proposals and will inform end users of the changes made for future use.

All in all, the presentation and testing of new and different services and applications with new customer groups can be highlighted as a good practice arising from the project. During the development process, the customer groups receive important information and experience, but the companies also obtain feedback and the chance to develop the product for a new customer group. Ideas for further development could be the development of a “calendar application”, longer testing of the applications, and research on their longer term impacts. The youth workers would like to have technology tools that support a sense of community, and which would improve the possibilities for interaction and impact. The young felt strongly that their opinions had meaning and they considered it important to be included in these kinds of projects. Playing together was perceived as a factor that builds a sense of community. At best, online gaming can be a social activity, offering opportunities to join communities and meet new people (Kojo 2011, 40–41).

When asked about their interest in taking the pilot to the next stage, all of the young and youth workers showed enthusiasm. When the development proposals were taken into account, all of the four applications that were tested were seen as very promising tools and work methods in the future as well, supporting the work being done to promote the health and wellbeing and life management of young people. All of the participants felt that there was a call and need for further development ideas.

5 MHEALTH BOOSTER AS A PROMOTER OF BUSINESS

5.1 Mapping the competence and labour needs of companies

Laurea UAS Business management students Minna-Maria Mäkäräinen and Erika Tarvainen carried out a survey of the companies’ competence and labour needs as part of the mHealth booster project. The survey primarily collected information about the type of additional competence and labour needed by companies in the health and wellbeing technology sector. The companies’ interest in expanding their networks and opinions about which kind of training events would best suit them were also surveyed. Information was also collected about the companies’ products and activities in order to obtain sufficient background information. The survey was carried out in the form of phone interviews in winter 2014. A total of 35 companies that offer health and wellbeing technology products and related services participated in the survey. This group also included companies offering care services. The objective of the mapping process was to compile information about the needs of companies in the health and wellbeing technology and care sector in order to offer them properly targeted training and other events, for example, to recruit ICT professionals.

Main results

Based on the results, introduction and actual use of the products in the project is, for the most part, easy. Usage generally only requires basic...
computer, internet, smartphone or tablet skills. Customer-specific tailoring of the products is possible for 89% of the products. The tailoring possibilities included personal information, colour and interface. Many of the products in the project are produced with the help from other companies and subcontractors, or those are needed to maintain the product. The results demonstrate that the company needs mainly lie in the areas of marketing, internationalisation, product development, customer relationship management, financing, and strategy competence. The areas in which company staff most required training to increase their competence are marketing, internationalisation and legal matters. Networking and competitive tendering/public procurement were also identified as themes for which companies hoped to gain more competence through training. The greatest need for training related to social and health care sector lies in the areas of social and health care administration and decision-making, understanding public procurement decision-making, identifying problems that product development should focus on, and understanding target group activities/competence requirements. These four areas accounted for nearly 70% of the responses to the question “In which areas of social and health care does your company need additional training?” (Figure 10). The companies’ different target groups for development were divided quite equally. Product and service development and marketing were the biggest development targets by a few percentage points.

Planning the training concept for companies utilised the survey of competence and labour needs as well as the objectives of the mHealth booster project and other summaries done during the project. The results of mapping demonstrate that company needs mainly lie in the areas of marketing, internationalisation, product development, customer relationship management, financing and strategy competence. The areas in which company staff most required training to increase their competence were marketing, internationalisation and legal matters. Networking and competitive tendering/public procurement were also identified as themes for which companies hoped to gain more competence through training. Another important target group that was identified by companies was training related to social and health care sector, mainly in the areas of social and health care administration and decision-making. Understandings of governmental decision-making, identifying problems that product development should focus on, and understanding target group activities/competence requirements.

All in all, nine training events were held between May and November 2014 on the following topics:

- Legal matters
- Digital marketing
- Financing and networking
- “Human technology for elderly people”
- Promoting internationalisation and export
- Health and social care administration and decision-making / Flexible municipal manager
- Patents and IP rights, competitive tendering
- Strategy competence & product development for new products
- “Everything you ever wanted to know about taxation”

Laurea UAS experts and experts from the corporate world and municipal sectors planned and lectured at the training events. The events were open to entrepreneurs as well as unemployed job seekers in the ICT sector and Laurea UAS students. A total of 324 people took part in the training events, for an average of 40 people/event. As the training progressed, it was discovered that on-site participation was challenging for entrepreneurs, and the final lectures were considered so that the entrepreneurs could become familiar with the content at a later time. Furthermore, nearly all of the lecture material was published on the project website after each event.

Feedback on the training was collected by means of written forms that were distributed and collected at the end of each event. Positive feedback was received concerning the diversity, interactive nature and positive atmosphere of the lectures, and the broad-based competence of the lecturers. The lectures presented a wide range of company examples, and this was appreciated. The participants gained a lot of new information, which was in part presented in a stimulating and challenging manner intended to create new models for thinking. There was particular appreciation for the practical topics that addressed public procurements, patents, and IP rights. In addition to the training events, the companies involved in the project were offered company-specific coaching sessions at no charge. They had the chance to book two-hour targeted coaching sessions about the topic of their choice with the expert they requested. The company-specific coaching sessions were carried out by both the lecturers in the training package and experts from Stompwell Oy.

5.3 Results of the company survey

According to the feedback from companies (N=19), both the demonstration activities in the technology development environments and the training and coaching for companies arranged by the project proved to be quite successful in terms of promoting their business and increasing business competence. Company feedback on the training was positive, with some two-thirds of respondents who participating in training assessing them as very good or good. It was difficult to show the impact of the activities on business growth in such a short time, but 40% of responding companies felt that the activities had a very good or good effect on increasing visibility of their product, while 27% believed that they reached new customers very well or well. However, only 13% perceived an increase in demand for products during piloting, and only 7% of the respondents reported growth in sales due to the project. All in all, more than 62% of respondents felt that they received support and benefits very well or well, and half of the respondents felt that the needs of their companies were taken into consideration. Half of the responding companies were also satisfied with student cooperation. Development of the companies’ competence is analysed in more detail in the next section.

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“The project had good, high and important objectives, which all have not been reached yet, more information and marketing, and better organisation is still needed.”

“Many good things have happened thanks to the project.”

“Very interesting new way to approach potential customers and students.”

“Work effort, consulting, copying, and belief in the possibilities. The best and most concrete project that we have been involved in!”

“The project allowed me to make a lot of new contacts, the benefits of which are not all concrete yet.”

“We have learnt a lot about our target customer group’s real needs, and we can develop our product to better meet those needs.”
6 MHEALTH BOOSTER AS A DEVELOPER OF COMPETENCE

The competence development that was the objective of the mHealth booster project is examined from the perspectives of the students, the customers and the entrepreneurs. A customer is defined as a technology development environment visitor, who is interested in technological solutions and their testing. Entrepreneurs are partners involved in the project, who have brought their own technological solutions to the technology development environments for testing and further development on a user-centred basis. The students are Laurea UAS students of social services and health care, and business management.

Laurea students

For Laurea students, the mHealth booster project has provided a learning environment that complies with the Learning by Developing action model (see Raji 2013). The students participated in activities at the technology development environments in Espoo and Vantaa by becoming so familiar with the operation and features of the technological solutions presented there that they were able to serve as guides and advisers. The students were also involved in all events that presented the technology development environments on a broader scale, as proven by the pop-up events and mobile library pilots. At the same time, their competence related to technology use and developing the technological solutions has improved, which is considered important with regard to the challenges of work in the future. Sufficient technology competence on the part of staff promotes the introduction of technological solutions.

Table 3 summarises the credits earned by the students. The students completed a total of 628.5 credits in the Espoo technology development environments, with 180 credits in the form of theses. The same numbers for Vantaa were a total of 642 credits, with 60 completed as theses. Students from other units completed 473 study credits in the Espoo and Vantaa technology development environments. All in all, 1743.5 credits were completed in the different technology development environments during the project, which is a significant achievement when considering Laurea’s different learning environments. Eight theses were completed during the project.

The first assessment methods when analysing the competence acquired by students in the technology development environments are various learning tasks, which were completed as follows:

- memorandums on events related to the technology development environments (N=45)
- workshop reports (N=4)
- placement reports and various study unit reports (N=41)
- various bulletins (N=4)
- videos made for companies (N=11)
- reports and posters related to service innovations (N=11)
- learning diaries (N=9)
- company training sessions and survey reports made for companies (N=44)

Interviews of customers and different actors, and their transcription with reports also describe the progress of the students’ learning work. The senior lecturers responsible for the various study units containing the learning tasks described and assessed the competences in relation to the targets, after which the students received their credits.

The second method of assessment involved mapping the competence acquired by students by means of feedback collected from the students (N=34). Table 4 shows the students’ own perception of the importance of the technology development environments, organised according to the emphasis on the reference.

Table 4: Technology development environments as learning environments based on students’ conceptions

<table>
<thead>
<tr>
<th>Competence</th>
<th>Context description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and wellbeing</td>
<td>new devices and the use of technology</td>
</tr>
<tr>
<td>Technology competence</td>
<td>instruction of new devices</td>
</tr>
<tr>
<td></td>
<td>encouragement for catching new things</td>
</tr>
<tr>
<td></td>
<td>identification of new applications</td>
</tr>
<tr>
<td></td>
<td>support for coping at home by using technology</td>
</tr>
<tr>
<td></td>
<td>the development of technology based solutions</td>
</tr>
<tr>
<td>Marketing competence</td>
<td>customer service and guiding</td>
</tr>
<tr>
<td></td>
<td>organizing pop-up events</td>
</tr>
<tr>
<td></td>
<td>preparing advertisements</td>
</tr>
<tr>
<td></td>
<td>preparing presentations &amp; posters</td>
</tr>
<tr>
<td></td>
<td>preparing videos</td>
</tr>
<tr>
<td>Interaction competence</td>
<td>meeting different age groups</td>
</tr>
<tr>
<td></td>
<td>meeting groups</td>
</tr>
<tr>
<td></td>
<td>identification of the needs of target groups</td>
</tr>
<tr>
<td></td>
<td>user centeredness</td>
</tr>
<tr>
<td></td>
<td>social communication</td>
</tr>
<tr>
<td>Business competence</td>
<td>making a business plan</td>
</tr>
<tr>
<td></td>
<td>mapping enterprises’ experiences</td>
</tr>
<tr>
<td></td>
<td>deepening entrepreneurship</td>
</tr>
<tr>
<td></td>
<td>mapping enterprises</td>
</tr>
<tr>
<td>Presentation competence</td>
<td>taking the target audience into account</td>
</tr>
<tr>
<td></td>
<td>clarity and understandability of the message</td>
</tr>
<tr>
<td></td>
<td>taking responsibility</td>
</tr>
<tr>
<td>Project competence</td>
<td>project work as a learning method</td>
</tr>
<tr>
<td></td>
<td>the different phases of a project work</td>
</tr>
<tr>
<td></td>
<td>project management</td>
</tr>
</tbody>
</table>
As the table shows, health and wellbeing technology competence is most emphasised, which was also the objective of the project. However, other competence related to interaction and working together with different users and with the companies involved in the project was also achieved in the technology development environments. The impact of the technology development environments on competence development is evident in those students' views which show their attitude towards the possibilities of health and wellbeing technology solutions. When asking how technology can promote a person’s health and wellbeing, the student responses demonstrate a positive attitude.

"Reservedness towards technology decreased, and was replaced by the courage to accept and try new things."

"I can see some of the devices working well to support home care."

"...new solutions to improve health and wellbeing"

"Learned to see nursing and health care in a completely new way when looking at it from the perspective of this technology or application platform."

After the project work ended, the students’ (N=34) opinions concerning the possibilities of health and wellbeing technology were compiled in Figure 11.

In summary, it can be said that the majority of students considered the learning environment to be an important one that brought together users, different experts and entrepreneurs. Competence enablers were the technological solutions presented, for which the students received guidance concerning use and usage possibilities so that they could in turn guide and advise different users. The entrepreneur’s perspective allowed the students to examine technological solutions as saleable products and as business. The technology development environments made various encounters possible, and the resulting challenges this presented allowed the students to deepen their interaction competence.

Users

For users, the technology development environments offered the opportunity to learn, under guidance and independently, about different technology products and services that particularly respond to their experiences of deteriorating health and fitness, loneliness, lack of safety and security, and low level of physical activity. These are considered to be factors that promote or complicate coping at home. The summarised written feedback (N=542) on the products and the interviews, based on diary entries, of the people that tested the products (N=22) during the summer show that the competence enabled by the technology development environments can be identified according to Table 5.

Based on their experiences, the users participating in the project hoped that the technological solutions would be developed to enable independent coping at home by increasing self-care competence.

Table 5: Competences with their contents identified by the users

<table>
<thead>
<tr>
<th>Competence</th>
<th>Context description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and wellbeing technology competence</td>
<td>usability of devices, applicability in one’s own life, device design, experiential meaning of devices, devices improving the quality of life, availability and the price of devices</td>
</tr>
<tr>
<td>Communication competence</td>
<td>improving social inclusion, widening social interactions, expanding one’s own life circle, deepening the meaning of interactions</td>
</tr>
<tr>
<td>Self-care competence</td>
<td>controlling and monitoring one’s own health status, enhancing physical activity, developing pharmacological treatment, the meaning of monitoring vital functions, strengthening self-care capabilities</td>
</tr>
<tr>
<td>Safety and security competence</td>
<td>monitoring vital functions increases freedom, the meaning of positioning, getting help, enabling coping at home</td>
</tr>
</tbody>
</table>
7 DISCUSSION

7.1 Ethical issues

All activities in the mHealth booster project were governed by research ethics instructions and practices. Research permits were requested from the City of Espoo and City of Vantaa in accordance with good scientific practice. The people participating in the project were mainly private customers living at home, and elderly people living in service houses and their significant others, as well as experts working in the social and health care sector and education department of both cities. As participants, the elderly people were, both as individuals and groups, ethically challenging, vulnerable and sensitive subjects. As a result, the ethical issues were handled very carefully and the rights of the participants protected. All participants in the research were asked to provide informed consent. Prior to providing their consent, the purpose of the research and the rights of the participants were explained in detail (ETENE 2010). Special care and sensitivity was shown when collecting information during testing and research situations. Each actor taking part in the project committed to the project and confirmed its non-disclosure obligation. Ethical and legal rights were ensured in different phases of the project so that no damage was done to the people participating in the project during any part of the project (see Leino-Kilpi & Tuomaala 1989, Bandman & Bandman 1995, Holloway & Wheeler 1996, Vehviläinen-Julkunen 1997, Topo 2007). The research material was carefully stored during the process and will be destroyed when the project ends in December 2014. The research results will be reported and documented in a final report, and published at the final project seminar. The project documents will be stored in compliance with the instructions of the funding body.

7.2 Reliability analysis

Reliability has been analysed during the project process from the perspective of action research, material analysis, and results. In action research, the reliability analysis focuses on different project phases, its data collection, and the active and authentic cooperation with the participating customers, groups, experts and different actors promoted continuity of activities during the project. With regard to the qualitative content analysis of the data collection material, truthfulness, equivalence and transferability in the reliability analysis were essential throughout the project and action research. The material analysis is based on the recorded and transcribed materials. The results of the material analysis were continuously taken into account in different phases of the action research as the project moved forward. Authentic quotes were also used when reporting the results (for example, Burns & Grove 1997, Holstein & Gubrium 1997, Nieminen 1997.), making it possible to demonstrate the consistency of the results in relation to the material. Content reliability is supported by the fact that, during the project, the participating customers and experts were actively involved in activities and in various project working groups. The data collected as feedback and assessments was utilised immediately during the project. All impacts of the project, especially cost impacts, could not be proven or verified due to the short project duration.

7.3 Results analysis

The technology development environments piloted during the mHealth booster project and their activities demonstrated their benefit and
necessity, from the perspective of both project research and transferability of results. Especially with regard to elderly customers, the project results for guidance and advisory work development and process proved the importance and need for technology products for both public actors and private entrepreneurs. It is notable that both elderly customers and young customers can become familiar with, test and acquire health and wellbeing technology products and solutions and receive expert guidance and advice in a reliable and safe environment. The objective of the project was to promote and grow the business of the cooperating companies and to increase business competence. The results show that the potential of technology development environments as a promoter of business have not yet been fully utilised. Challenges included the difficulty of verifying the realised results and the short project duration. However, many of the companies felt that the project provided them with concrete benefits, for example, in the forms of training, reaching customers, and competence development. The benefits that the student projects and theses produced for companies were also greatly appreciated. As a result, continuation of company collaboration and further development of the technology development environments to reach their full potential is seen important. In addition, the long-term cooperation between universities and companies is seen as significant to the future of the entire area. Rather than ethics, Ikonen (2013) uses the concept of responsibility and emphasises the importance of awareness and understanding alongside policy decision. He believes that the foundation of technology must always lie in caring, serving life and humanity, replacing deficiencies, improving safety and security, and embracing fairness, equality and the choice and dignity of the individual. Health and wellbeing technology must be accepted from the point of view of maturity, responsibility and ethics. It must also be remembered that the savings and economy resulting from the technology products and services constitute the responsibility towards society and its members that Ikonen calls for.

Economical and cost-efficient solutions can even promote the health, wellbeing and independent coping of different age groups. Action research and user-centred approaches and methods promote and enable the implementation of technological solutions and their application in cooperation with other actors, in which case the voice of the users and their participation with respect to the new product or method will become strongly apparent. Heiskanen, Hyvönen, Repo and Saastamoinen (2007) emphasise the importance of users in product development in their technology report, in which a literature review and pilots confirm the role of users in both research and product development. Rask’s (2010) report on research policy and its possibilities in society also emphasises that user requirements and expectations are an important part of the process. The mHealth booster project was implemented on the basis of action research, using participatory and user-centred methods. Many actors in different operating environments tested their health and wellbeing technology products and developed a new operating method or a service that integrates with the needs and challenges of different customer groups. This activity in the mHealth booster project corresponds to the activities of Ranti and Kivikangas (2011), which was user-centred, took place in real-life situations, and involved a broad ecosystem of actors. The fact that some of the products and services tested in the technology development environments eventually became part of the end-users’ everyday work can be considered as one of the project’s successes.

Other results of the mHealth booster project were feedback and assessments of the companies’ products and services, which were based on the trials and tests. All product feedback went directly to the appropriate companies to support their product development. Technology-related guidance, instruction and support, and its content and methods are a core issue when transferring health and wellbeing technology to the customers and the experts. The participation of users when developing improvements, and even new services, is of utmost importance. According to Heiskanen et al. (2007), user expertise related to health and wellbeing feedback produce a response for developing the benefit and comfort of products, and new ideas for the companies and other actors. Raaapana & Melkas (2009) also state that product and service usage can also be more productive if the products and services are considered appealing. Customers and different actors must clearly be aware of what needs the technology can meet. The functionality of technology and the related services is a socially significant issue when digital services and products are being developed.

The European Innovation Union focuses in the ageing theme in active and healthy ageing (The European Innovation Partnership on Active and Healthy Ageing). The objective of the programme is to enable citizens to lead healthy, active and independent lives while ageing, to improve the sustainability and efficiency of social and health care systems, and to boost and improve the competitiveness of the markets for innovative products and services, responding to the ageing challenge at both EU and global level, thus creating new opportunities for businesses (Active and Healthy Ageing 2012). The objectives in the mHealth booster project and the project activities met the content targets of the Innovation programme. During the project, a new network-like business model in the health and wellbeing technology context was discussed many times, but business model was not produced due to the short duration of the project.

7.4 Future challenges

The mHealth booster project implemented low-threshold health and wellbeing technology demonstration points as close to the customer as possible, providing a place to become familiar with the products in a flexible manner. Guidance and advice both in the technology development environments and in home environments are fundamental requirements for technology usage and tailored solutions. The guidance and advisory process begins right from the first encounter, continues during the user experience, and then as assessment after an agreed period of time. Technical support is also important in order to make the product or service to be beneficial to the customer. The future challenges continue to involve getting closer to people and more extensive dissemination of the project’s good practices, such as the presentation, guidance and handbooks to the related health and wellbeing technologies that was implemented in the technology development environments to both customers and experts.

As technology develops, health and wellbeing technology products are also changing and developing in line with technology and user experiences. Systematic data collection about the experiences and feedback of users and experts enables product development. Health and wellbeing technology testing and trial activities in real environments and situations with the right people and groups will require good cooperation and the desire for joint planning also in the future. Another challenge will be to further research and develop new, integrable physical and virtual services. In terms of competence, technology company and closely related customer competence will, in the future, require a new and agile learning culture, flexible teaching programmes and methods in a digital environment. In his research, Vesterinen (2011, 56–57) also highlights senior work competence and eServices in health and wellbeing counselling as an important future development area in social and health care education.

In the coming years, ageing is the biggest social and economic challenge in different European countries, affecting policies on many levels and in different sectors. By 2025, more than 20% of the population will be over the age of 65 and the number of people over 80 will increase quickly (Active and Healthy Ageing 2012). The rapid development of health and wellbeing technology and its use to support coping at home, in health monitoring, and in promoting health and wellbeing will contribute to meeting these challenges in an effective manner.

In the future, it will be useful to plan and implement an international research project on the possibilities and impacts of promoting health and wellbeing in cooperation with the various actors involved in the mHealth booster project.

Developing the technology development environments

The technology development environment activities should in the future be expanded to new operating environments in Espoo and Vantaa. It is also important for the different actors to expand the operating model and increase awareness throughout the Uusimaa region and nationally. This would also apply to businesses in the companies and their products into the environments. Development of the activities is also closely linked to increasing other activities taking place at the demonstration points, for example, by means of various theme days where companies could also be involved. The so-called cold point method could also be tested in the environments. This means that the point of interest would only be on days when the staff is present, while on the other days the devices would on display so that visitors could become familiar with them on their own.
Development of activities in the technology development environments is closely linked to concrete measures aimed at enhancing the effectiveness of communications and marketing, such as increasing contact with the target groups, new communications materials, and by implementing virtual versions of the technology development environments. The technology development environments could also have computers, which would include a virtual version of the environment and pages with additional information about the services and applications displayed.

One form of developing technology development environment activities is a concrete expansion of lending activities with regard to devices and the number of lending points. This is also closely linked to an increase in the work effort of the library staff, in order to quickly get the returned devices back into circulation.

Student competence
In the future, student competence should be ensured and guaranteed by several actors. Product training and induction related to the technology development environments should be of higher quality and more detailed, but the student counsellors and other teachers also have to take responsibility for student competence, for example, with regard to customer work and meeting the customer. In the future, an increasing number of students from several different fields of study should be steadily integrated into the technology development environments and their activities on an equal basis. This will prevent small student efforts of a few hours, which, once more effort should also be put into cooperation between the students and the companies, because this provides the companies with different benefits than what are gained from demonstrative activities in the technology development environments. At the same time, the students obtain concrete knowledge of company operations.

Company competence
During the project, the companies received diverse support for their business. The companies’ products, services and applications were presented in the technology development environments and at seniors’ events as well as at other events in Espoo and Vantaa and other parts of the Uusimaa region. Customer feedback was also gathered on the products and forwarded to the companies. Company trainings were also organised, with topics based on the themes suggested by the companies. The project also organised a variety of events, into which the companies were invited to present their operations and to network.

In the future, there should be a more detailed review and agreement concerning the impacts of technology development environment activities on company operations. The same process was applied to determining the requirements that technology development environment have for the companies, so that the activities are as natural and beneficial as possible for all. Co-operation between companies and students in the form of projects and theses should be increased, as it provides companies with concrete benefits and new perspectives and ideas, as well as product development that targets their specific needs.

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Personal consents

APPENDIX 1
Companies which participated in the project activities

Aaria Family Oy
Active Life Village Oy
Addoz Oy
Aino Health Management
Aksulli Oy
Ahola Consulting Oy
ArcticCare Technologies Oy
Beddit Oy
BiSafe Oy
Blue Lake Communications Oy
BPS Consulting Finland Oy
BRIIM
CommTabs Oy
Culminatum Innovation Oy Ltd
Digital Living Finland
DRA Consulting Oy
Ebsolut Oy
EDIS Pia Laurila Oy
Elisa Oyj
Elsi Technologies Oy
Emfit Oy
Emtele Oy
Evondos Oy
Extensive Life Oy
Falck Oy
FastROI Oy
Fenno Medical Oy
Finnabinova
Forum Virium Helsinki
Fotracon Yhtiöt Oy
Greenday Promotions Oy
HeadSted Oy
Health Revolution Ltd
Helpmeans Terveysturva Oy
HJP-Lukuteline Oy
Home Instead Seniorihoiva
House & LifeMgt Suomi Oy
Innohome Ltd
Innovamo Oy
Invalidiliiton Asumispalvelut Oy
IsCom Oy
Kaukomarkkinat Oy
Liike4k Oy
Lingua Care Oy
LivLiv Solutions Oy
Ludus Helsinki Oy
Lumi Interactive Oy
Mariefors Open Oy
MealTracker
Medixine Oy
Menumat Oy
Microsoft
Mirasys Oy
Mobile Wellness Solutions Oy
Modz Oy
Movendos Oy
Mubik Entertainment Oy
myHealthway Oy
Netpresence Oy
Niitty-Nummern hoitokoti Oy
Odosoft Oy
Oppilfi Oy
Oppimaa Oy
Optiikkaja Junurinen Oy
Oy Anglo-Nordic Ab
Pieni piri Oy
Planetboard Oy
Playground Finland
Practitec Oy
Pro Dosis Oy
Prodmann Oy
ProSanté
Regenero Consulting
Relaxbirth Oy
Safera Oy
Seniortek Oy
Sentina Oy
Sisko-palvelut
SmartVisio Oy
Sovera Oyj
Stompwell Oy
Suomen Apu-Tuote Oy
TerveysOperaattori Oy
Traxmeet Oy
Tunstall Oy
Turvallinen Koti Oy
Veropalvelu Sofia Oy
VideoVisit Oy
Vivago Oy
Wellbookers Oy
Wellness Foundry Holding Oy
Your Turn Concept