Caring TV® as a forerunner in developing eHealth and eWelfare services

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K.E. Raij, Caring TV® as a forerunner in developing eHealth and eWelfare services. Geron-technology 2016;15(2):130-145; doi:10.4017/gt.2016.15.3.003.00 Caring TV® as a research and development programme consisted of four different projects during the years 2005–2013. It was led by the author, Director at Laurea University of Applied Sciences in Finland. When the programme began, the development of eHealth and eWelfare services were just beginning. It was an attempt to show how the integration of different competencies can produce new innovations which will be in use in the future. Action research was selected to be used in carrying out the projects because it connects research and actions. The projects proceed by applying earlier research findings resulting in new outcomes. The findings show how eServices can be developed in cooperation with users, in this case elderly people as clients, and care personnel as providers. This article looks at the projects as study units and ends up in building a synthesis of the research findings.

Keywords: eHealth, eWelfare services, digital ageing, digital services, coping at home

Caring TV® was developed at Laurea University of Applied Sciences (Laurea UAS) between 2005 and 2013 in four different projects. It was a research and development programme aiming at creating eHealth services with and for elderly people, and a service concept for producing eHealth services. It entails a two channel interactive TV, on line connections between elderly people living at their own homes, their significant others, health care professionals from public and private sectors, and other stakeholders. The TV was selected because almost everybody in Finland has a TV in their home; it is as familiar as technical equipment. It has its own place in the environment as furniture, and it offers a big screen, which is important especially if the number of participants is high[1].

The demographic changes are well known especially in Finland, which is one of the most rapidly ageing societies in Europe[2]. On the other hand, the UAS legislation presented three tasks to universities of applied sciences, which are pedagogy, regional development and research and development[3]. The integration of these objectives led to the development of project based learning, and later to the Learning by Developing (LbD) action model[4,5], which presupposes networking with a society—its public, private and the third sector organizations. Arranging different workshops and seminars with networking partners became a new practice. The challenges of demographic changes were discussed a lot, as well as the development of new products or services with health care professionals and entrepreneurs interested in developing health technology. In one of the seminars the experts from Laurea, Espoo City and the TDC Song Company met and ended up in discussing the possibilities of video conference technology and what it had to offer for the development of new services for elderly people, who generally like to stay at home as long as possible as it was showed in earlier studies[6].

The idea for Caring TV arose, and research and development work was carried out in four different projects, following each other, funded by the Finnish Funding Agency for Innovation (TEKES) and the European Union (EU). These research projects focused on facilitating living at home by developing new services, and developing new technologies, which allow contacts between clients and health care professionals by using a two-way TV set[7 - 9]. The concepts, which in 2005 were identified to be in line with welfare technology, were health care technology, geron-technology and technical aids, which emphasize user-centeredness and user-friendlessness. It was believed that welfare technology would provide some solutions to the challenge of an ageing population, and would cover some of the needs of elderly care, treatment and communication[10].

Later Caring TV® was assessed as a best case example of how users can be involved in the development process in order for service solutions to be better tailored to user needs, in a study of Health Innovation in the Nordic countries conducted by the Nordic Council of Ministers[11].

FOCUS AND AIM
The pilot work in developing eHealth services was seen as a success story at Laurea. Several reports and articles related to the projects were

published: Coping at Home I and II[12], Home[13], Safe Home[14] and, in co-operation with Turku UAS, Virtual Elderly Care Services on Baltic Islands[15], all of which are used as study material in this article. The project reports led to considering the whole development chain as a research and development programme, which was seen as a forerunner and gave a basis for future development, and for different applications for producing eHealth services in several municipalities. The focus in this article is on two research questions, concerning: (i) How eHealth services with and for elderly people were developed in Caring TV® projects, and (ii) How the eHealth service concept has been created in the projects?

METHODOLOGY & RESULTS

In this study a retrospective case by case analysis[16] is applied as an approach, which means the five projects are considered five different cases. The projects are shortly introduced as study material. The qualitative material, which consists of the final project reports (693 pages), was analysed by applying qualitative content analysis methods[17, 18]. The projects describe clients and other partners, the main challenges, the research interests, the research methods, the development processes and the results.

The research questions in this article are approached by first discussing action research as a research method which enabled real cooperation with elderly people, their significant others, health care professional and other stakeholders, and was selected to be applied in the projects. The discussion will continue by describing shortly the research and development projects as study material and ends up with identifying the focus areas in the development chain as milestones for going forward. This study is meant to show how technology can be developed and used as a tool, and what has been produced for enabling the development of future services leading to the development of participative robotic support.

Action research as an enabler

In the Caring TV® projects the aim was to produce services and products with and for elderly people, as well as with social and health care professionals, which led to select action research to be applied. By giving space for action and research it enables producing new knowledge as well as activities together with all the actors. Based on Cohen & Manion[19] and Heikkinen[20], action research has its roots in social sciences and pragmatism. It is seen more as a philosophical approach for studying human problems including practice – and human centeredness, which enables the integration of different methods.

According to Kyrö[22], action research is based on the critical and emancipatory interest of knowledge aiming to generate a change by developing new ways of action. As Cohen & Manion[19] point out, the purpose is not in producing new scientific knowledge that can be generalized, but in discovering knowledge, which can be used and applied purposefully in a certain context. The newly discovered knowledge can lead to developing a new theory. Action research studies social realities based on interaction for being able to renew it, and changes reality to be further studied. Additionally, a researcher has an active role as a change agent[20]. Participative action research, as Creswell[22] named it, emphasizes the roles of participants. All partners are encouraged and empowered to be actively involved in processes for their own good.

The actors, in the projects, were elderly people staying at their own homes, their significant others, health care professionals, researchers and developers from Laurea UAS, and partners from technology companies. Study material was collected from elderly people and their significant others, and other participants by using different methods such as: interviews, focus group interviews in physical and virtual environments, workshops and questionnaires, in which feedback and development targets were asked. In action research, actors have an active role in formulating problems together with researchers, developers, clients, and other partners. During the research processes methods were also developed and renewed to better enable the discovering of user knowledge. (*Figure 1*).

In the Caring TV® projects the concepts of a human being, existing as a holistic being, as well as the concept of environment were defined for enabling the development of client centred participative programmes as well as a virtual environment allowing contacting other people at home. Although the TV was familiar to all clients, and only a camera and a touch screen were brought to homes as new technical things, it still demanded training programmes for the use of TV.

Additionally, using your own TV in a different way and acting in front of the TV demanded training sessions. Laurea students, supervised by their teachers, prepared participative programmes, based on careful data analyses and had a coacher's and facilitator's role as well as guider's and carer's role in the shared programmes. Material was collected all the time, for improving and developing programmes, and impact research was included from the beginning in four of the projects, which will be presented in the following chapters.
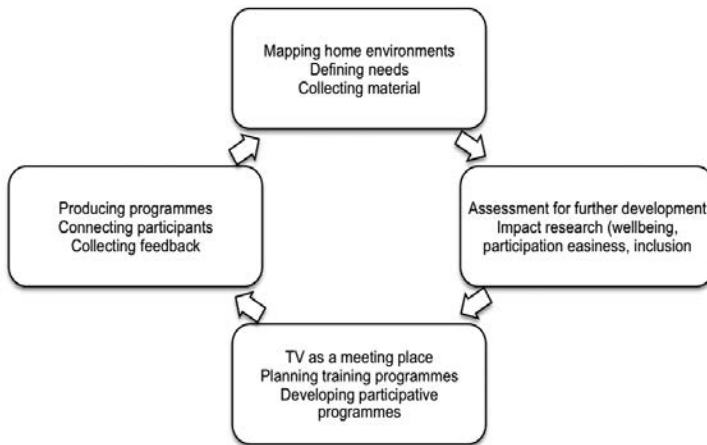
Figure 1. The action research cycle in the Caring TV® programmes

The projects as study materials
Coping at home
The main target of the projects was to investigate and develop processes and services for promoting staying at home. It was seen to be in line with the National Knowledge Society Strategy for 2007-2015[23], in which investment in everyday innovations and in contents and services was emphasized for making everyday life easier for people and organizations.

The first two projects Coping at Home I and II were started in 2005 and financed by The Finnish Funding Agency for Technology and Innovation (TEKES). In these projects[12], the target groups were formed by family care givers (n=25, 14 women and 11 men) ending up at 21 family care givers because of the death or institutionalization of the care receiver or the care giver's own state of health. The aims of the research were to examine the perceptions of family care givers regarding their ability to cope at home and their expectations regarding welfare technology, to identify different user groups, to evaluate the benefits received from the Caring TV concept by family care givers and care providers, and to evaluate the benefits from participating in product development. Focus group interviews and participatory observation were used for collecting material. Four dialogue meetings were carried out in 2006-2007, reaching 166 people, family care givers about 50%, students 20%, business representatives 10%, representatives of the city 10% and senior lecturers 10%). The analysis of focus group interviews as well as individual speeches led to the development of both technology and content production toward participative programmes.

Technology proved to be more challenging than many tests in test labs showed. Connecting the living lab methodology[24, 25] with carrying out the projects ensured the application of technology in a proper way, and additionally the development of technology at real homes with real clients. At home it was necessary that all the other technologies in use were taken into account, and the availability of technical assistance was ensured. We noticed that many clients were willing to participate in developing technology further based on their earlier experiences in working life. They felt important in respect to their expertise. A good example was the development of a touch screen with three different buttons; one for contacting a private service producer, one for participating in an interactive programme, and one for chatting with the others.

There was technology suspiciousness to be identified in the beginning but more among health care professionals than among elderly people, who seemed to be curious and interested in having a main role in the project. Connecting people through video conference technology was naturally one of the main goals but further development consisted of the development of a platform, which enabled monitoring clients' health status. Different measurement tools were applied in the built platform e.g. blood pressure, blood sugar, weight, temperature, and pain measuring. During the second year, the measurement tool for identifying the role of physical workload in elderly family care givers' lives was developed together with the partner university. It enabled getting a deeper understanding of how elderly people live at their own homes. Connecting family care givers with a doctor was begun and showed to be worth continuing.

Additionally, the central findings resulted in widening the understanding of what acting as a family care giver means[12]. In developing the services in cooperation with family care givers, four groups were identified: active users, silent users, occasional users and transferors[26], who quit active use when the technology did not function well or due to a sudden change in their own life situation or that of a significant other. However, a number of them returned as active users after a short absence in a new life situation. Differences between women and men were not identified.

The identified user groups led to recommend the identification of different users and the development of various services for different clients by

Figure 2. Preparing the meeting place with the clients for producing participative programmes

showing what client centeredness really means. The family care giver perceptions of their life situation led to identify as the main categories; unsafe, action competence, participation, and work of the private family care giver, which included the heavy work load and loneliness as an inexperienced care provider. Caring TV was seen to promote the family carers, to enhance safe and security, to promote action competence and to enable participation. The concept built in cooperation with family care givers was described to include interactive guidance and support services, participative TV programmes, and technology-based services at home as Piirainen and Sarekoski[12] showed.

The projects also showed a lack of competence in developing and implementing eServices. Meeting a client through a TV screen and acting as an actor in a TV challenged Laurea teachers and students as well as care producers. It could be seen that new interaction skills were needed, which led to organising training programmes for the students and teachers who were involved in developing and producing eServices, in cooperation with a Finnish national TV channel (Mainos TV). The training was experienced to increase self-confidence and develop new interaction skills for better contacting long distance clients. (*Figure 2*).

Looking for new digital solutions
The second project, Going Home, in 2006-2008, funded by the European Regional Development Fund, widened Laurea's research and development work geographically, and by bringing new partners in the project increased the number and quality of clients. Going Home consisted of three different sub projects: (i) Home care clinic, (ii) Going home in Lappeenranta (a small town in the eastern part of Finland), and (iii) Southwest Finland's going Home (DIGAME = Digital services to support living at home). The purpose was to investigate, develop and produce participative,

interactive programmes with and for older adults with a high risk of illness living at home or in a service centre[13].

The project aimed to produce new knowledge for developing supportive and guiding services for elderly people discharged from a hospital and for their significant others. Feedback was collected from seniors (n=93; average age 81,2, women 59 and men 34), and experts representing health care professionals (n=36; average age 44,5, women 34 and men 2). The new partner organizations (n=5) joined the consortium, which added the number of clients and health care providers as well as researchers. The research material was collected through individual interviews from the people, whereas focus group interviews[27] were used among personnel. Content analyses[28] organized the material by producing main categories as well as subcategories. Findings, showed by Lehto[13], are presented in short following the subprojects.

The Home Care Clinic for the Elderly identified the main problems as related to:
(i) Loneliness and insecurity,
(ii) Sleeping,
(iii) Hygiene,
(iv) Nutrition,
(v) Moving,
(vi) Physical capacity,
(vii) Pharmacological treatment,
(viii) Caring actions,
(ix) Use of newly required equipment,
(x) Frustration and unwillingness, and
(xi) Obstacles in the environment.

These identified problems led to the development of programmes related to: promoting mental health, supporting daily activities, enhancing moving and rehabilitation, facilitating self-care, increasing participation and inclusion, and guiding to promote a safe and secure environment. Based on the analyses of the collected material, the themes with their basis were identified in order to be used later as a guide in planning the contents for the programmes. Lehto[13] uses mental health as an example for clarifying the development process, which shows how enhancing mental health was implemented by reading, memorizing and keeping company.

Based on feedback analyses, produced by action research, Caring TV® was seen as experienced meanings by the elderly, their significant others and health care professionals. The following five categories were identified: (i) Adding safety and security, promote activity, enhance self-care capability and cheer up one's daily life; (ii) Promoting physical capacities, add participa-

Figure 3. Physiotherapy students instructing physical exercises in the studio

tion, produce new stimuli and benefit hobbies; (iii) Enabling to gain new knowledge as well as bringing back old memories; (iv) Socializing related to meeting new people, taking care of the others and contacting the others; and (v) Adding activity, bringing humour and richness to life and to enable new life[13].

The advancing project resulted in the development of the concept of client driven development, which was identified by studying the changing roles of the clients as participation increased. A client was seen as a user but also as a service developer and producer. Participative programmes were planned in cooperation with elderly people and health care personnel, and implemented by Laurea UAS students, who learn by following the Learning by Developing (LbD) action model[5]. (*Figure 3*).

As a conclusion, the projects 'Coping at Home' I and II as well as 'Going Home' led to identifying the indicators of quality of life based on the elderly people's own conceptions (*Figure 4*).

The definition, given by the WHO Quality of Life Group[29] in 1998, emphasises individuals' own perceptions of their position in life, the context of the cul-

ture and value system in which they live, and their goals, expectations, standards and concerns. The conceptions identified in our research were compared to the earlier identified indicators in the four European countries[30, 31]. They show agreement for health as the major determinant of quality of life, having impact on all the others, which are related to physical, material, social and emotional well-being together with the extent of personal development and purposeful activity[1, 7]. Our indicators were checked after the subsequent project 'Safe Home', but new notions were not found.

The identified indicators[1], based on the elderly people's own conceptions could be divided into the main categories of health, mental health, activity, social support, nutrition and habitation with their sub categories (*Figure 2*). The indicators are meant to guide designing service production for and with elderly by applying intelligent ways of implementation. The participative programmes developed in the programme include discussions (private or shared) with health care experts, physical exercises led by physiotherapy students and encouraged by all partners, cooking together led by cooks in the Caring TV studio, different games, performances, art exhibitions and storytelling, meeting experts from different areas of life as invited guests, acting together for solving everyday problems in participants' home environments, and chatting together with the others in a safe, virtual environment.

Expanding the development of eServices
The third project, Safe Home[13, 32], in 2008–2011, funded by the European Regional Development Fund, was meant to produce new knowledge of how eWelfare services support different kinds of
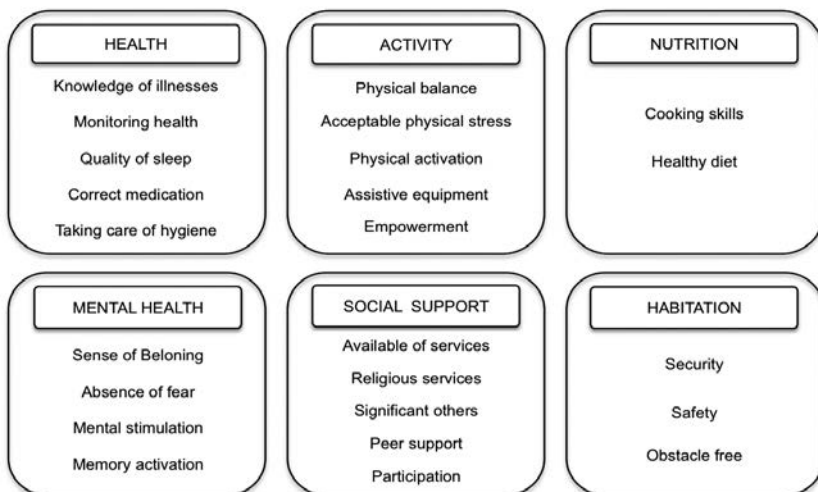
HEALTH	ACTIVITY	NUTRITION
Knowledge of illnesses	Physical balance	Cooking skills
Monitoring health	Acceptable physical stress	Healthy diet
Quality of sleep	Physical activation	
Correct medication	Assistive equipment	
Taking care of hygiene	Empowerment	

MENTAL HEALTH	SOCIAL SUPPORT	HABITATION
Sense of Beloning	Available of services	Security
Absence of fear	Religious services	Safety
Mental stimulation	Significant others	Obstacle free
Memory activation	Peer support	
	Participation	

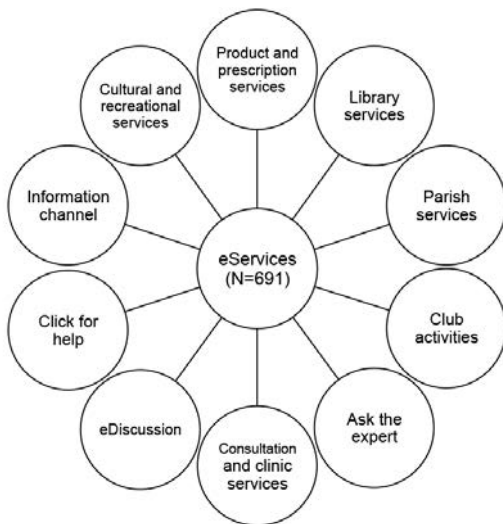*Figure 4. The indicators of quality of life based on elderly people's own conceptions*

Figure 5. The expanded concept of eWelfare services identified by Lehto in the Safe Home project

client groups for promoting health and wellbeing, rehabilitation and coping at home. In this project the interactive Caring TV® concept was developed further with and for seniors (n=176; age between 60 and 94, about the same number of women and men , families with small children in child welfare (n=7; average age 2,1), young people staying in family support centres (n=28; average age 17, women 22 and men 6), persons with mental health problems (n=4; average age 32,8, women 1 and men 3), and persons with learning disabilities (n=12; average age 42,3, women 9 and men 3). Furthermore, there were health care personnel (n=105; age between 24 and 56, mainly women) involved in the development work as informers. The invitation, for joining new groups of people to participate in the project, was sent to care personnel based on their own conceptions concerning people who could benefit from eWelfare services.

The Safe Home project had two subprojects; EHYENÄ led by Laurea UAS, and OMANA led by the earlier partner Turku UAS. The project invited some new industry partners and two towns from the west of Finland. Altogether there were two higher education institutes, five cities, seven companies and three service providers presented in the *Table 1.*

Following the earlier research procedures, material was collected by interviewing individuals and focus groups, as well as observing participants' discussions in workshops. Additionally, cooperative idea creation was used during arranged seminars, in which both clients and personnel participated. The Safe Home project widened the concept of eWelfare services. The study produced the additional themes for further developing eServices based on the content analyses of the collected material and continuing feedback[32] (*Figure 5*).

By analysing the nature of the expanded services it was possible to categorise all the functions of the Caring TV® concept as a road map as Lehto[32] has showed (*Figure 6*). It shows how the chain of eHealth and eWelfare services can be developed further with and for clients by focusing on clients' expectations, resources and possibilities to participate.

The programmes could be divided into three different categories. The interactive programmes enhance physical and mental activity, produce new knowledge and promote the achievement of new competences, and offer new experiences with special meanings for improving the quality of daily life. The Safe Home project showed how technology could be used for opening previously closed doors e.g. the doors of libraries, art museums, concert halls among others, which used to be meaningful when clients' physical capacities were good enough. Furthermore, the Safe Home project focused on the further development of the roles of eDoctor, eNurse, eTherapeutist etc., which was begun during the first Coping at Home project. It additionally expanded the development of contacts with significant others, and deepened the development of new friendship and peer support between clients.

The study of the Caring TV® programmes in the group of people with learning disabilities, as part of the Safe Home project, in turn, strengthened the previously identified indicators of quality of life[1,7]. The preliminary findings[32] additionally show that the development of eHealth and eWelfare services could support people with mental health problems in coping at home especially in cases where they need to have answers and advice for daily life challenges. The group sizes of people with learning disabilities (n=12) and mental health problems (n=4) were small but they opened a new door for future service production. The development of eHealth and eWelfare services is worth continuing by enabling staying at home, living independently and improving the quality of life as Lehto[32] and Lehto and Matero[33] showed.

The Safe Home project assessment carried out by Lehto and Leskelä[13] was based on a review of processes and their impacts, and participants' feedback. The assessment followed the circle of impact[34] with focus on wellbeing as perceived by the clients, economic efficiency, technologies, achieved competences and the environment. A
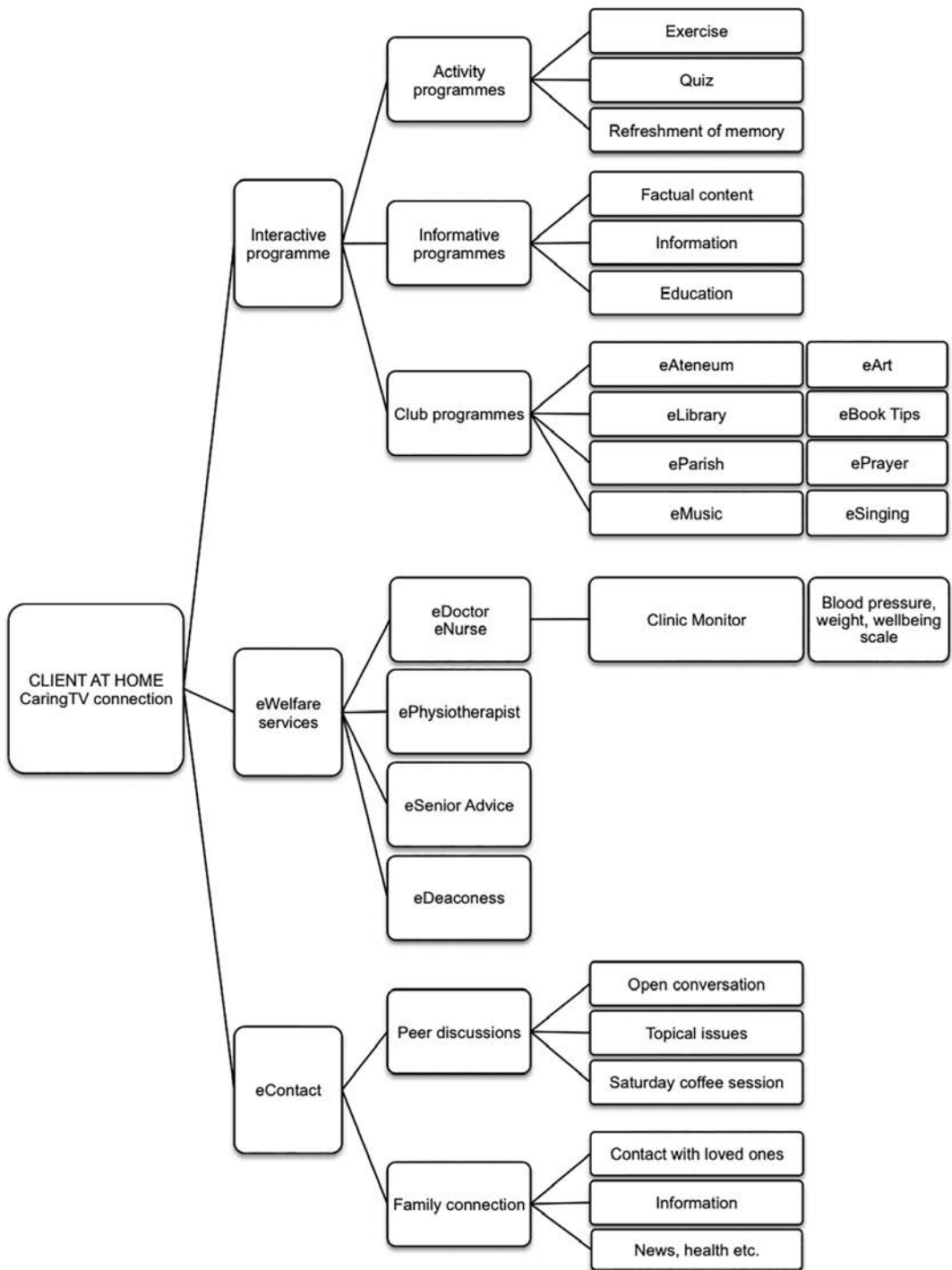
Figure 6. The expanded eHealth and eWelfare service road map as identified by Lehto[28]

high level of satisfaction amongst the users meant that satisfaction with equipment and the interaction opportunities related to the services were significant[32].

Respondents felt e.g. that Caring TV® had reduced their feelings of loneliness and promoted the safety of living at home; it had improved mood and made daily lives more active. Nearly all elderly respondents wished to continue using

the TV and taking part in the programmes. Additionally, an effort was made to assess economic efficiency but it proved to be challenging mainly because defining the costs of health care and welfare services in the public sector seems to be difficult due to the lack of suitable measurement tools [35]. However, the project showed that by replacing one home visit per day by using Caring TV®, costs and working time for travel could be saved[32].

The technologies used in the Safe Home project were further developed, based on collected feedback, during the Coping at Home and Going Home projects, which led to using technology being accepted as a tool. However, the Safe Home project emphasized how important it was that the equipment was tested by social and health care professionals who were actively involved in the production of eServices and regularly used the equipment[13].

Crossing borders
The Virtual Elderly Care Services on Baltic Islands (VIRTU)[15] project (2010-2013), was funded by the Central Baltic Interreg IV, a programme, aimed to produce the interactive VIRTU channel for seniors living in the western part of Finland, on Åland islands and in Estonia[36]. It followed the model of the Caring TV® concept by involving participating elderly people, higher education institutes, and public, private and third sector organizations but did not take into account all developmental phases of the programme The focus was on supporting seniors living at home by enhancing their social interaction, and their feeling of safety and security. The activities of preventive and health promoting programmes were divided into five themes: (i) health, (ii) memory enhancement and quizzes, (iii) culture, (iv) current affairs, and (v) physical activity.

The Finnish partners were Turku UAS as a coordinator, Laurea UAS, Novia UAS, Åland UAS, and 16 municipalities, located at the coast or on islands. The Estonian partners were two cities and six municipalities, located on the Estonian islands. The users were supposed to be over 65 years old, living in a remote area alone, as a family caregiver, or as a couple. In the beginning of the project the number of participating clients was 98 (age over 65), which ended up being 48[15].

The project took the challenge of testing different technologies in producing eService programmes. It met with a lot of interruptions of technology in the beginning. The project decided to use 3G internet connections, but it still needed further development work. The wireless connections were not adequate to transmit simultaneously

both sound and image as it was in the beginning of the Coping at Home project. Testing new cable connections, which replaced wireless connections, took time and caused dissatisfaction and impatience. Another big challenge was the rigidity of contacts crossing telephone operator's borders, which led to waiting for functioning internet connections for several months.

The programme producers were different in two countries. In Finland, the programmes were prepared by university students facilitated by their teachers and care professionals, whereas in Estonia the production of interactive group activities was run by a content coordinator. The content of programmes was, however, planned to be similar. The VIRTU channel was mainly used for producing programmes but it additionally enabled consulting between a public health care nurse on house call and a doctor[36]. The VIRTU project was additionally interested in economic issues but settled upon to the conclusion that by replacing some of home visits with using distant services, costs and working time for travel could be saved as was seen in the Safe Home project.

In spite of the technical challenges at the beginning, the project ended up looking at the distance services as a change in a society, which is needed, and as a huge possibility in connecting people living isolated in remote areas[37].

Developing eHealth and eWelfare
The research findings of the retrospectively analysed projects are presented by following firstly the growth of partners in different phases, secondly by identifying the milestones in developing eHealth and eWelfare services, and thirdly by presenting the main findings of the projects.

Partnering
Three partners (Laurea UAS, TDC Song/ Videra and City of Espoo), began to develop the idea of Caring TV®. The R&D programme needed new partners to join the group when new possibilities were opened. At the end of the last project, the programme had connected 48 partners as producers and 440 partners as service users (*Appendix A*).

During the years 2005-2013 the Caring TV® research and development programme connected six universities, six cities and 16 municipalities from Finland, two cities and six municipalities from Estonia, 10 companies, four of them offering technical solutions and six of them offering services such as physiotherapy services, doctors', nurses', therapists' consultation services and call centre services. Elderly people (mainly over 65) formed the most important client group (n=392).

In addition, the Safe Home project[13] had families with small children in child welfare, young people staying in family support centres, persons with mental health problems , and persons with learning disabilities as clients. The numbers were small but preliminary findings showed that eServices could be developed and expanded to include different client groups. Furthermore, there were health care personnel, business representatives, students and senior lecturers involved in the development work as informaticians as it was mentioned in the project presentations.

Milestones
Analysing the material written in project reports (about 700 pages) enabled the identification of the focus areas, which were seen as core achievements in different projects. They enabled continuing development processes and directed setting new goals for going forward. The focus areas are presented as milestones of research and development programme (*Table 1*).

During the first year the development of technology had a main role. Care personnel were afraid that older adults would not accept new technology and neither would they be able to learn to use it. In the programme the majority of elderly people did not have difficulties in learning to use a touch screen, pushing the right button, which offered three different options: private contact, participation in the programme, or chatting with each other. But as it was mentioned earlier, the technology was not ready to be used after testing in a test lab environment, it needed to be further developed in a living lab environment.

Technology functions were discussed a lot in many of the steering group meetings as the memos tell. At the same time the development of content production had an important role especially because Caring TV® formed an essential learning environment for Laurea students.

When technology became a tool, content production became a development focus. Seniors were invited to participate in workshops arranged at Laurea, and they were interviewed at their own homes or through the TV. Applying action research guided the development work based on collected feedback.

Acting together with elderly people led to emphasise more active participation, and they were encouraged to be more self-directing and take more responsibility for their programmes. This process ended up identifying client drivenness as a new phenomenon, which can be seen in widening programme selections. Analysis of the collected material, which described seniors' experiences with the given meanings, led to identifying the indicators of quality of life as they see it. These are supposed to be used as a frame in developing service offering for and with elderly people.

During the first projects elderly people were strangers to each other, and communicated more through students or care personnel, who sent the programmes. In developing the concept further client drivenness also led to the development of peer support ending up in building different 'clinics' for enabling e.g. the selection of best equipment together.

Finally, the focus led to the development of the roles of eDoctor, eNurse, eTherapeutist etc. because it was clearly noticed that training should be developed at the same time. Working through the camera demands new competences and attitudes.

The last project presented in the programme concentrated more in developing distant services for people living in isolated areas. It focused more on producing new technical solutions but ended up in emphasising the meaning of social contacts distant services can enable.

Main research findings
The main findings of the projects show how important it is to act together in producing new innovations and getting them into use. The findings, following the phases of Action Research, additionally, guided the focus on mapping the different life situations of people involved before inviting them to participate in development work. The projects with their findings emphasise the meaning of multidisciplinary cooperation in research and development work (*Table 2*).

Research work in the 'Coping at Home' I and II projects led to identifying and describing fam-

Table 1. Milestones in researching and developing eHealth and eWelfare services with and for elderly people

Year	Milestone reached
2005	Development of technology and building the Caring TV® studio
2006	Development of content production
2007	Development of participative programmes
2008	From client-centred to client-driven content production
2009	Identifying the indicators of quality of life
2010	Development of peer support
2011	Development of eDoctor, eNurse, and eTherapist services
2012	Connecting elderly people living on isolated islands

Table 2. Main research findings of the Caring TV® projects in 2005-2013

Project	Central research findings			
Coping at Home 2005-2006	Identifying family caregiver perceptions of their life situation	Identifying different user groups		
Going Home 2006-2008	Identifying main problems of elderly people discharged from a hospital	Identifying experienced meanings of Caring TV® broadcasts for elderly people	Identifying indicators of quality of life	
Safe Home 2008-2011	Identifying expanded concept of eWelfare services	Producing Caring TV® road map	Clarifying and deepening roles of eProfessionals	Finding solutions for enabling eProfessionals' work
VIRTU 2010-2013	Identifying cultural challenges in developing distant services	Identifying difficulties of non-interactive technologies	Deepening understanding of people living isolated from each other	

ily caregiver perceptions of their life situations. Main categories found: unsafe, action competence, participation and work of the private family caregiver with their subcategories, show the changes a family caregiver meets in his or her new role. Identifying the different user groups helped to develop interactions with different users, gave them space to be present in a way they wish to be, and helped to meet them as individuals with their own life politics[12].

'Going Home' research work revealed how uncertain and frightening discharging from a hospital can be for elderly people. The findings enabled the development of eServices, which can support the feeling of safety and security at home even though a person lives alone. Identifying the experienced meanings of broadcasts for seniors guided the development of eServices and the ways of implementing them in a more client oriented way[13]. Producing the indicators of quality of life based on elderly people's own conceptions led to direct service production to meet the real life challenges of seniors, and helped to understand what is important for them in their everyday life. They seem to accept getting old and having some troubles but having someone who is available and aware of their life situation seemed to be important[1,7].

'Safe Home' research work[32] enabled expanding the concept of eWelfare services based on clients' conceptions. It led to focusing more on giving space for clients' own abilities and activities in preparing participative programmes. Clients were allowed to decide what is good for them. Research work additionally produced knowledge for describing the road map to be used in future development work. Research was also focused on producing knowledge for clarifying the roles of eProfessionals, which can be used in developing professionals' education and training programmes.

eWorld is an essential part of the future work. VIRTU research work[15] widened the understanding of how people live in remote areas, their difficulties, and the challenges care personnel and municipalities have. It furthermore revealed the inequality of people in getting help, and eServices that would be required. VIRTU research work strengthened the findings that show that the development of eHealth and eWelfare services is important, and it should be done together with professionals and their clients.

Promoting staying at home
The main purpose of the projects described was to investigate and develop eHealth and eWelfare services as well as processes for promoting staying at home. Applying Action Research enabled the identification of elderly people's life situations and their conceptions concerning needed health and welfare services. By inviting different user groups, it was possible to build service delivery for family care givers and for care receivers for promoting staying at home. The findings additionally showed the importance of living lab methodology in developing technology to be used as a tool, as well as new services in a virtual environment. Living lab methodology resulted in involvement of different partners (users a clients and professionals, their significant others, and other stakeholders from public, private and third sector organizations).

The identified indicators of the quality of life based on older adults' own conceptions[7,8], the expanded services[12,13,14,] and the functions of the Caring TV as a road map[14, 32] show the development chain of eWelfare services, and offer an example how elderly people living at home would

Table 3. The identified processes as a model for developing new innovative services by using technology as a tool, and services that can be offered in a virtual environment

ENABLING THE DEVELOPMENT OF EHEALTH AND EWELFARE SERVICES
-Connecting users, service producers, researchers, decision makers
-Mapping home environments and different life situations
-Getting to know different user groups
-Identifying the need for training and technical assistance
-Building living labs
-Achieving new competences in using and developing technology
-Acting together in planning and producing services
-Expanding and renewing services, service models and responsibilities
-Assessing impacts on different levels
EHEALTH AND EWELFARE SERVICES
-Services for promoting and maintaining health
-Services for enabling monitoring health and welfare
-Services for strengthening self-care capabilities
-Rehabilitative services for strengthening physical activities
-Services for increasing safety and security
-Services for training new skills and abilities
-Services for enabling participation
-Services for enabling constructing new relationships

like to fulfil their everyday life. The processes show how acting together leads to produce new experiences with special meanings, and widens the experience of good life. Concrete products can be seen in the road map (*Figure 6*). The services, which can be produced in a virtual environment, are grouped following the service production that was developed and implemented in the four projects, which were used as a study material (*Table 3*).

Concrete products services can be divided into six main categories following the earlier identified indicators of quality of life (*Table 4*).

CONCLUSIONS

The conclusions, based on the above described projects, are presented by following the indicators in the circle of impact[34] mentioned earlier. It means looking at the impacts with a focus on wellbeing as perceived by the clients, economic efficiency, technologies, achieved competences and the environment.

The research and development programme consisted of four different projects, three of them being planned to follow each other and the fourth one applying the idea in two different countries. The clients were mainly elderly people who still are capable to stay at home if help is available. In all the projects most of the older adults really liked Caring TV® and the possibilities it offered. They would have liked to continue, although they knew from the beginning that they participate in a project with an ending.

The most described advantages were increased sense of safety and security, decreased sense of loneliness, and increased level of activities, which were physical and mental. In the 'Coping at Home', 'Going Home' and 'Safe Home' projects elderly people showed how they are willing to take more independent roles in developing services for themselves, and use their creativeness. On the other hand, identifying the different user groups showed how important it is to become familiar with clients as individuals and develop services which are not only suitable but meet the life situation of an individual. In this way our program can be seen resulting in improved quality of life.

In spite of some effort to show economic efficiency, the projects' Safe Home' and VIRTU ended up comparing the costs of physical home visits with the costs of Caring TV® broadcasts, which resulted in noticeable savings. However, there are research findings which show significant cost savings in applying technology e.g. in the care of elderly people with dementia[38], and in examining technology's effect on the use of time from the perspective of the home care service, institutional care and the care of relatives[39]. On the other hand, postponing institutionalisation probably is cost saving, which favours the development of eServices as a part of an integrated service chain.

The development and use of technology seem to be challenging. Technical interruptions, which often were associated with inadequate guidance and availability of information as it was in the beginning of the 'Coping at Home' project and later in the VIRTU project, were described also in the research and development project, where the focus was on the care of people with dementia[38]. They indicate the importance and urgency of further development of technology in a way that different technologies and their environments, platforms etc. interact. Our programme also showed that focusing on the development of technology in cooperation with seniors and care personnel, as well as building living lab environments was a successful strategy. The integration of different competences enabled producing technology that functioned well and was seen as a tool for allowing the development of services in different forms.

Training and education

Caring TV® was also seen as a learning environment for university students and their teachers,

Table 4. CaringTV products that were developed and produced in cooperation with elderly people and care professionals, as well as different experts from a society, following Action research and led by Laurea students and their supervisors

PHYSICAL HEALTH
-Measurement tools for monitoring health
-Health and care information
-Medication information
-Controlling medication
-Sharing health and care problems
-Looking for the individual solutions of the problems with professionals
-Training new self-care skills

MENTAL HEALTH
-Contacting and connecting elderly people
-Peer discussions
-Refreshment of memory
-Quiz
-Club programmes (e.g. eArt, eLibrary, eSinging, ePlaying)
-Meeting different experts
-Training programmes

ACTIVITY
-Physical exercises
-Balance exercises
-Testing and sharing experiences related to assistive equipment
-Club programmes

SOCIAL SUPPORT
-Information and guidance for using available social support services
-Meeting the representatives of a church
-Connecting family members and friends
-Encouraging participation
-Building new networks
-Developing peer support

NUTRITION
-Guidance for food shopping
-Cooking together
-Diet information
-Meeting cooking experts
-Sharing cooking recipes

HABITATION
-Security information
-Sharing experiences related to alarming systems
-Connection with care professionals and significant others
-Connection with security experts

As it was mentioned earlier, some of the findings indicated the need of training for staff to act in the TV. New competences are needed not only as an actor but also as a user of technology. Lack of competence can be identified behind care professionals' reluctant attitudes in using technology, which were identified in earlier studies (c.f. JADE project[40] and 'Active and Healthy Ageing' report[41]). The development of technical solutions should be taken into account in developing care professionals' education. The transnational JADE-project showed that we do have some separate courses or training programmes for health care professional, but that a systematic education is still lacking. This should be seen as a challenge in developing educational programmes on different school levels.

The development of eServices changes the meaning of a care environment. Hospitals and health care centres will be needed for first aid patients, and for seriously ill patients. Otherwise people stay at home and eServices are brought to them. Some examples showed how Caring TV® was forgotten as equipment, and elderly people concentrated more on the people who they met in the TV. They became real friends, and Caring TV offered a meeting place.

Digital development
Caring TV programme was begun in 2005 although planning and the development of technology was begun in 2003. Since then a huge number of projects has been carried out aiming at the development of eHealth and eWelfare services as the following examples show.

care professionals, and clients, as users and developers of eServices. In the projects the programme was used as a platform for training care personnel, for enabling consultations between care personnel and specialists, and as an environment, which enabled sharing new information for empowering self-care capabilities. All the games, quizzes and puzzles that were part of the broadcasts, and which older adults favoured, were not only seen as mental stimuli but also as learning resources.

The Netcarity project (2007-2010)[42] was interested in how new and existing technologies can be integrated cost effectively into people's homes, and make them feel more comfortable, which is essential in renewing the ways of delivering care services in aging societies. It was also seen important in 'selling' the idea of the Caring TV concept. The project selected four key areas; inclusion, assistance, protection and health, for delivering benefits and services by developing and applying new technology. Although the theoretical approach directed by the Action research,

was different in the Caring TV® projects, there are some similarities in the findings. Technology was seen to enable elderly people's participation in a society, assistance in using and developing technology was seen important, technology based solutions were experienced to add feeling safe at home, and it could be found that the provision of health care services can be built based on using technology as a tool.

Many of the projects have focused on the development of technical devices. In developing distant care, a video phone was used for allowing contact between a care giver and a care receiver as an example e.g. the Viedome project (2003-2004)[43], which additionally focused on the development of safety and alarm systems, and surveillance for supporting independent living. The CAALYX project (2007-2008)[44] focused on the development of new technology based tools for monitoring elderly people's health status, and shows that they need to be developed further. Developing new solutions for monitoring older adults' health status, physical and mental capacity, was seen important also in the our programme by the elderly staying at home and health care personnel for supporting staying at home. Caring TV was planned and developed for offering a platform as a meeting place for connecting elderly people, their significant others, care professionals etc., which demanded more complicate technology.

Using the home TV

As it was mentioned earlier CaringTV selected a TV equipped with video conference technology, a touch screen and a camera to be used for developing eHealth and eWelfare services, because elderly people usually have a TV, it is familiar, and belongs to their home environment, and has a special role in their lives.

The KÄKÄTE project (2010–2014)[45] showed later that only 19% of elderly people between 75 and 89 years in Finland were familiar with a computer. Another reason was the size of a screen because it was meant that older adults, living alone in their homes, can meet each other through the TV, find new friends and get peer support. The Caring TV® made it possible and furthermore enabled the production of new health and welfare services driven by seniors as active partners. A touch screen was planned together, based on the expectations of the elderly. They were happy with the three buttons that were big enough, and guided either to have a contact with a care giver (doctor, nurse or a therapist), or to participate in the interactive programme produced, based on elderly people's own wishes, or to chat with each other. Computers are used by the next gen-

erations, and it is important that their use friendliness is taken into account from the beginning as is shown e.g. in the Herelam project[46]. Our concept is not depending on a technical platform; technology is seen only as a tool enabling new openings.

Further developments

Technology will be developed further resulting in more advanced solutions. CaringTV® findings show the services, and the ways of producing them, identified by elderly people and professionals, which could support staying at home in different roles; as a family care giver or a care receiver, and could be delivered by using intelligent technology and a virtual meeting. The identified indicators of the quality of life for example describe the conceptions of elderly people about how they understand a good life. The findings additionally show how elderly people should be taken into account as equal partners in planning and delivering services for them. Within their homes and ways of life, elderly people brought a living lab environment for continuing development work.

It seems that robots will renew the future of healthcare and welfare services. There are many research and development projects dealing with the development of different robots, some of them occupied with practical skills and even some cognitive skills as e.g. the Mobiserv Robot[47] and the CompanionAble project[48] show. In Finland, the 'Robots and the Future' of the Welfare Services (ROSE) project[49], funded by the Academy of Finland, was begun in 2015, which is interested in finding out how the perceptions of care professionals and clients about robotic support will change during a six-year project and how a robot can support clients and professionals. It additionally studies social and ethical issues related to human-robot relationships, which are found to be very important in developing robotic support.

CaringTV® findings are utilized in building the living lab environment for involving professionals and elderly people as clients in participation in the project. Since 2013 the service concept and research findings are applied in some municipalities (homes for elderly, hospitals, home care) with different names, mainly because the applications often focus only on some service productions.
Although CaringTV services were designed and implemented with clients and care professionals, and in this way became meaningful in elderly people's lives, the price of technology was seen too high by municipalities, which, in Finland, are responsible for delivering health and social care services. On the other hand the research and development programme was begun in 2005, and

in that time, applying integrated technical solutions in developing care services was new. CaringTV, additionally, showed that renewing health care and welfare services and service structures seems to be compliicated and many-sided. Although different user groups are able to identify the benefits of new solutions, holistic service renewing seems to be a huge challenge.

Care professionals like to hold on their traditional ways of acting without replacing them with the new ones, which leads to overloading their work. Another challenge in renewing care services lies in counting the real costs of services. During the projects, it was seen that municipalities, hospitals, homes for elderly etc. had their own cost counting models, which differed from each other. Thus showing the possible economic benefits is challenging. However, Caring TV can be seen as a forerunner in developing eHealth and eWelfare services. It emphasizes the involvement of different expert groups; users, care professionals, decision makers, experts from public, private and third sector organizations, as well as researchers, in developing new services. This cooperation could be deepened on different levels for enabling a real commitment to using developed technology, and renewing the ways of acting in delivering care services.

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Appendix A. Caring TV® partners during the years 2005-2013

Year	Partner				
	University	Public sector organization	Company	Third sector organization	Older adults, n
2005 - 2006	Laurea UAS University of Jyväskylä	Espoo City	TDC Song Videra Ltd Medixine Ltd Aava (private medical centre)	Uudenmaan sydänpiiri (heart disease union)	25
2006 - 2008	Laurea UAS Turku UAS Tohoku University (Japan)	Espoo City Vantaa City Turku City Laitila Town Lappeenranta Town	Videra Ltd Medixine Ltd HUR Ltd FysioSportis LtD Lappeenranta Spa	Uudenmaan sydänpiiri Palvelukeskus Kotikunnas (service centre)	93
2008 - 2011	Laurea UAS Turku UAS	Espoo City, Turku City, Laitila Town Salo Town	Videra Ltd Medixine Ltd Everon Ltd Medineuvo Ltd ArctiCare Technologies Ltd FysioSportis Ltd Aava	Turku Palvelukeskus Kotikunnas, Laitila Terveyskoti, (service centres)	176
2011 - 2013	Turku UAS Laurea UAS Novia UAS Åland UAS	16 coastal Finnish municipalities Kärdlä Town Kuresaari Town 6 coastal Estonian municipalities	Videra Ltd	Red Cross employees Parishes	98
Total, n	6	30	10	6	392