Scandinavian Approach to Assisted Living: Navigating the European Research Agenda

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Abstract

Scandinavian and European states alike are faced with a growing elderly population. Health factors leading to sensory loss, dementia and increasing physical frailty can pose barriers to independent living for this population. Research initiatives and implementation projects have cropped up at many levels of government with similar goals of seeking ways of addressing the diverse needs of the elderly citizen segment. Often projects find it difficult to gain a holistic understanding and may not succeed in obtaining the benefits of the larger European research agenda. This paper develops a "roadmap" or clarification of the larger European research agenda. It is our aim that local initiatives may be better able to apply the lessons learned from other research and be made aware of the knowledge resources available through the international European research community at large.

Keywords:

Assisted living, elderly, European Commission, Scandinavia.

Introduction

Active and healthy ageing has been on the research agenda in Europe for the past decade. With low birth rates, and a longer lived population, the future need for care workers for the growing elderly population has been recognized as a future challenge for society. Assisted living for longer independent living and application of assisted living technologies is recognized by many as an approach for addressing this current challenge. This paper addresses the two-part question: what is the European research agenda on independent living and how can local Scandinavia initiatives make use of the European agenda to further their own goals. We introduce some international trends and the Scandinavian policy for active and healthy ageing, and then present the European research agenda, describing how it arrived at its current state and where it is going. In the discussion section we suggest a research agenda for Scandinavia that aligns with the European agenda, with the goal to obtain the greatest value from larger initiatives. In conclusion, we forecast the future of Scandinavian policies for society's support of independent living, and highlight the ongoing challenges.

The remarkable growth in the elderly populations presents challenges to the welfare services. One challenge in particular, is that the relative amount of health care workers is decreasing compared to numbers of elderly. Among the approaches to address this challenge are: to change the services to incorporate more voluntary help; and use of information communication technology (ICT) technology such as sensor- and smart-home technologies to assist the elderly and make them able to carry out daily living activities in a safe and secure manner, and with necessary alarm systems implemented. The approach of incorporating ICT may have great potential value, and many authorities think such approaches warrant further investigation.

Elderly Independent Living as Assisted with ICT

One of the barriers to adoption of ICT solutions have been the technology readiness of the stakeholder group. However, trends show that in the home, use of computers and Internet access in the home, have achieved high rate of acceptance among the elderly in the Western world, including Scandinavia. Over the last 6 years the proportion of people in Norway in the age group 65-74 that has used a PC and Internet on an almost daily basis, has more than doubled. In this age group, 45% use a PC and 39% use Internet daily or nearly every day [1]. We expect this group will continue to be PC and Internet users as they get older, hence we expect a high increase in net users among the elderly. Mobile devices with new and easy to use interfaces have also successfully penetrated the market of senior citizens [2]. Hence we can expect that senior citizens will be ready to adopt technology for assisted living to an increasing degree.

The challenges faced by elderly vary considerably [3], although a public report for the Norwegian Health ministry [4] suggests focusing on three issues; fall prevention and detection, communication technology and wander management systems (GPS). There are also other challenges that senior citizens living at home may face such as lack of nutrition, difficulties in managing opening doors, heating, communication with medical staff and family etc. A SINTEF project on assistive technologies lists a number of possibilities [5]. Both this report and the NOU 2011:11 [4] base their division on the Center for Aging Services Technologies´ work [6].

One of the challenges is to select a portfolio of equipment that elderly can get access to as the need for assistive technology occurs and possibly gradually increases. This will require solutions which are easy to tailor to the patients' specific needs, and adjust according to decline in physical and mental conditions. Challenges also include issues concerning financing, standardization and integration, implementation in a health care setting, operations and maintenance, and keeping track of technologies and their application. There is very little prior research on effects of assistive technology for elderly in need of care, while living alone. However Van Malden et. al. [7] provides a systematic review of studies of interventions to enhance the Quality of Life (QoL) of older people in residential long-term care. In this paper, 35 articles were assessed on issues such as study design, quality of the studies, measures of

QoL and effects on QoL. The study finds that most of the papers are low on methodological quality. The instruments used to measure QoL were diverse and interventions were often rather limited.

QoL is an umbrella conceptualization that refers to well-being across multiple domains. It has both subjective and objective components, is based on individual needs and is composed of multidimensional constructs influenced by relationship and environmental factors. However no consensus exists on how it should be defined [8]. Perhaps the best known QoL instrument is the SF-36, a questionnaire which originally had 100 items, but now has 36. This has been criticized for having limited accountancy of social functioning, and for completely missing of items addressing the environment [9]. In [10] two of us have adapted and extended the QoL framework based on the core domains of Schalock and Alonso [8] to the challenges of the elderly. We also recommend subjective measures in defining the success of assistive devices, and that the assessment framework focuses on the subjective views of the elderly to avoid source biases of powerful stakeholders, such as ICT vendors [10].

In the next section we will take a look at some international trends and the policies and initiatives in the three Scandinavian countries Denmark, Sweden and Norway, before presenting the emerging European research agenda on assisted living.

International Trends and Scandinavian Policies

The Continua Health Alliance (www.continuaalliance.org) has established a system of interoperable personal health care devices and solutions, to give recommendations for interoperability and to promote use of international standards. The alliance is a non-profit, open industry organization of healthcare and technology companies. However not many products and manufactures follow this standard, and there is a lack of standards from sensors on the patient's body and at the patients home to the other endpoint at the health care services. The consequence is several "silo" products with proprietary solutions, which currently are impossible to combine into a common framework.

In the Scandinavian countries, the term "welfare technologies" is widely used, addressing technologies and solutions to be used by patients and elderly people in their everyday life in order to be independent, to have tools to improve living in original homes with necessary support by family and friends, and to have voluntary services and the health care services (public and private). These efforts have a goal of reducing hospitalization and use of caring homes.

The social welfare services in the Scandinavian countries have several similarities; it is therefore reasonable to suppose that by learning from each other, the welfare and health care services can exchange experience and bring forward good examples and typical use-cases. This will also be important at the local municipality level, where currently multiple local projects are initiated on the same issues, but without coordinated actions. Thus there is motivation to make a coordinated effort to learn from each other, to establish a close Nordic cooperation within this field, including the municipality health care services. The Nordic Centre for Welfare and Social Issues (http://www.nordicwelfare.org) was established in 2009 in order to facilitate inter-Nordic exchange of experience and knowledge [11].

In Denmark, funds have been made available for project within welfare technology (The Danish PWT Foundation, The Prevention Fund), and there are a lot of ongoing R&D activities and national networks (Carenet, CareWare, Center for Sundhedsteknologi, HanDiaTek, IntelliCare, RoboCluster). The National Board of Social Services aims to promote new development and initiatives in social services, to follow up initiatives from the Danish Parliament. An important initiative due to the "Quality Reform" was to invest three billions DKR in new technology which could reduce manual work and lead to changes in the organizations. Most of the projects have been within welfare technology.

In 2011 the Agency for Digitalisation was established to speed up the digitization processes required for modernization of the Danish Welfare society [12]. Results from a study in 2012 on strategies for welfare technology and solutions, showed that economic benefits can be obtained and at the same time as quality in public services could be increased [13]. Local Government Denmark (an interest group of Danish municipalities) has evaluated efficiency in Danish municipalities in 2012 and 2013, and shows that 500 Mil DKR was saved due to use of welfare technology [14]. In 2010 MedCom published a status report on use of Telemedicine [15], this led to a National Action Plan for Dissemination of Telemedicine in 2012 [16], where home monitoring services was suggested implemented in large scale trials.

In Sweden, The Ministry of Health and Social Affairs have established the project LEV (Long-Term Demand for Welfare Services: Health Care and Care of the Elderly up to 2050) as an important instrument. Through this project, two reports focus on options better health and more efficient services [17]. Based on simulation models they expect the level of cost to increase. A new report focuses on how the relationship between patients/clients and healthcare professionals must change, and presents many examples from the real world [18]. A review of Swedish municipalities use of welfare technology in 2012 [19] showed a positive attitude, however the economic situations for the municipalities was a barrier to continued efforts for implementing new solutions. Lack of adequate competence, lack of information, need of infrastructure and lack of clear strategies were also shown to be possible barriers for future work. There are interesting ongoing projects in Gothenburg, Norrköping and Västerås, where technologies for elderly people are evaluated [20].

In Norway, several governmental reports address the impact of ICT in future health care services [21]. In addition the NOU 2011:11 focuses on innovation in technologies and innovative use of technology in the health care sector [4]. Based on [4] the Directorate of Health recently launched a report [22] and a set of recommendations on welfare technology, proposing 19 actions. The governmental report (Stortingsmelding 10 (2012-2013)) [23] sets the future policy for developing health care services with improved quality and patient safety. The report focus on actions, access to information is said to be crucial, and efforts to develop comprehensive ICT solution are suggested. Another governmental report (Stortingsmelding 9 (2012-2013)) [24] focuses on the ICT services in the health care sector, and sets a goal of only one electronic health record per inhabitant.

In Norway, the ongoing activities within welfare technology are quite fragmented, although a lot of projects have been initiated. There are several competence centers as the University of Agder, University College in Bergen, University College in Gjøvik, University of Trondheim/SINTEF, and University of

Tromsø/Norwegian Centre for Integrated Care and Telemedicine. In addition, there are business clusters such as Oslo Medtech, Borg Innovation, Arena Helseinnovasjon and IKT Grenland. There is a Nordic Medtech cluster with industrial partners from Norway and Sweden, where Welfare technology is one on the activities in addition to medical devices, eHealth, Bioinformation and solutions for diagnostics and surveillance.

Emerging European Research Agenda

The European Commission (EC) research agenda will no doubt influence the research agenda, trial programs and also indirectly the policy development in the Scandinavia countries. An understanding of the EC initiatives may therefore be essential to a better development of ageing well programs in Scandinavia. The following section creates a roadmap for understanding the EC research agenda.

European i2010 Initiative on e-Inclusion is the European Commission research agenda on ageing well. The actions of this initiative were outlined and adopted in June 2007, in the Ageing Well in the Information Society Action Plan [25]. The EU backed research in the FP7 framework under the CORDIS Programme for fostering independent living and inclusion using ICT [26]. The i2010 agenda was active in the period of 2005-2009. The i2010 introduced a policy framework for promoting the contribution that information and communication technologies (ICT) can make to the economy, society and quality of life. The research agenda of this framework focused on public inclusion and access to information.

The Digital Agenda, created in 2011 (for 2013-2014) focuses on actions to create growth and jobs in Europe. The meaning for this is enhancing skills through use of ICT and digital technologies. This agenda was described as a short term "To Do" list [27]. The list named 7 new priorities, all were very technology focused. This was followed by the **Digital Agenda for Europe (DAE)** – A Europe 2020 Initiative that contains 7 pillars of goals [28]. These are: 1- Digital single market; 2- Interoperability & standards; 3- Trust & security; 4- Fast & ultra-fast Internet access; 5- Research and innovation; 6- Enhancing digital literacy, skills and inclusion; and 7- ICT-enabled benefits for EU society. While the overreaching goal of DAE has been to help European citizens and businesses get the most out of ICT, the 7th pillar – ICT enabled benefits for EU society, mentions the support of ageing citizen lives.

The eHealth Action Plan 2012-2020 [29] was revised in 2012 from the earlier plan of 2004. The goal of the action plan is to clarify the policy domain and outline a vision for eHealth in Europe aligned with the objective strategies of the DAE. In particular, the eHealth Action Plan focuses on the innovative healthcare for the 21st century. The vision is to improve management of chronic disease and multimorbidity, increase sustainability and efficiency of health systems, foster cross-border healthcare and improve legal and market conditions for developing eHealth products and services. The **Competitiveness and Innovation framework Programme (CIP)** that runs for the years 2007-2013 is organized around three multi-annual specific programs: The Entrepreneurship and Innovation Programme; The Information and Communication Technologies Policy Support Programme (ICT PSP)[30]; and The Intelligent Energy Europe Programme.

The **ICT Policy Support Programme** is aligned with and supports the policies of the Digital Agenda for Europe (DAE). Within the ICT PSP programme Theme 3 is of relevance for ageing wellness. The objectives proposed under this theme are ICT for health, ageing well and inclusion. These are inspired by extensive consultation with stakeholders, in particular via the **European Innovation Partnership on Active and Healthy Ageing (EIP AHA)** and the eHealth Action Plan.

The EIP AHA was introduced as a "pilot partnership" with the intention to be a key driver in the Horizon 2020 Programme (to be described in the next sub-section). The EIP AHA has stated the goals "a triple win for Europe: 1- enabling EU citizens healthy, active and independent lives while ageing; 2- improving the sustainability and efficiency of social and health care systems; and 3- boosting and improving 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" [31].

The pilot Partnership will aim to achieve this by bringing together key stakeholders (end users, public authorities, industry); all actors in the innovation cycle, from research to adoption (adaptation), along with those engaged in standardization and regulation." [31][32]. The action plan is based on a report from more than 500 contributors from private sector, private individuals and public authorities. Overall respondents criticized existing financial mechanism as "fragmented and insufficiently coordinated", further stating that they expect the EIP AHA partnership to provide a detailed mapping of all available funding opportunities in the field of active and healthy ageing [32, p.4]. One of the programs referred to is the Ambient Assisted Living (AAL) Joint Programme. Impacts of the Call 6 programs are expected to be "contributing to the aim of the EIP AHA to increase by 2 the average number of healthy life years in the EU by 2020" [33].

Table 1 - Research Calls "aligned" with the EIP AHA

AAL JP Call 5 - Ambient Assisted Living (AAL) Joint Programme – ICT for ageing well is aimed at the development of ICT-based solutions which enable and sustain older adults to continue managing their daily activities in their home. This Call is closed [34].
AAL JP Call 6 - Progamme aims at the development of ICT-based solutions which enable older adults to continue managing and supporting their occupation, while preserving health and motivation to remain active [31]. This Call is opened (2/2013) [33].
EC ICT PSP /WP FP7- Part of the ICT PSP. This is listed as a programme serving as a bridge to activities in Horizon 2020. The ICT Work Programme in FP7 contains Challenge 5: ICT for Health, Ageing Well, Inclusion and Governance. The 2013 WP for FP7 is described in WP2013 [35]. This call is open through 2013.

Table 1 lists some of the calls for research proposals that are intended to be aligned with the EIP AHA. The WP2013 also makes preparations for the next framework, Horizon2020. It states, "WP2013 will support the EIP AHA by addressing relevant actions of its strategic implementation plan.

The most recent research agenda is called **Horizon 2020**, the EU framework programme for Research and Innovation. Horizon 2020 is intended to bring together all existing EU research and innovation funding currently provided through the Framework Programme for Research and Technological Development (e.g. FP7), the Competitiveness and Innovation

Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT). Horizon 2020 is an initiative for Europe's global competitiveness (2014-2020) that aims to strengthen EU's position in science and industrial leadership. While competitiveness is the primary focus, the initiative recognizes the rest of society's challenges. Horizon 2020 will therefore also address societal challenges "such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population" [36]. A steering group designed the Implementation Plan for Horizon 2020 in November 2011. The plan outlines a structure of Action Plans that are being mobilized by Action Groups [37]. The groups of interest to Active and Healthy Ageing (AHA) are

- C1: Assisted daily living for older people with cognitive impairment,
- C2: Extending active and independent living through Open and Personalized solutions, and
- C3: Innovation improving social inclusion of older people [37, p.7].

The Horizon2020 action plans in the area of EIP AHA are still being established in 2013.

Discussion of Implications

We have given a brief overview of the current situation and strategies in the Scandinavian countries and in EU regarding ambient assisted living and welfare technologies. Although there are several similarities between Denmark, Norway and Sweden regarding the social welfare services, we found that these countries actually have quite different approaches to patient oriented services and implementing welfare technologies, to assistance of the patients at home and to effective delivery of public services.

Denmark has invested monetarily through different funds; this has led to several projects and initiatives where new technology solutions are deployed and being evaluated. In addition, use of welfare technology is integrated into the national effort for digitizing the public sector in Denmark.

In Sweden there has been a project focusing on prognosis for future health care services, and some initiatives have looked into use of welfare technology. Ministry of Health and Social Affairs is responsible for policy issues related to disability and assistive technology, and the Swedish Institute of Assistive Technology is responsible for sharing knowledge, initiate pilot projects and assist companies in developing new ideas for international markets.

In Norway, the new Collaboration Reform will influence how the future home care services will be modernized. The Norwegian Directorate of Health has a dedicated division for eHealth and IT, with dedicated departments working on health portal, on core electronic health records and on standardization issues. Based on local initiatives, there is a plurality of ongoing projects and trials using new welfare technologies, even if those activities lack some coordination and common infrastructure for standardization.

When we study how the EC at a strategic level is organizing all the different efforts within eHealth and welfare technologies, we see some important points that can benefit the Scandinavian programs. First of all, the actual calls for strategic projects have been based on a defined problem statement and visions for the future. Such calls have not been used in the same manner in Scandinavia. This can give some explanation of why the initiated activities are not synchronized and coordinated. In the EIP AHA initiative, a main goal is that competence milieus and partners develop meeting arenas to share experiences and influence future research and projects. This multidisciplinary collaboration across organizational borders could be useful, also in a Nordic setting. Within each country, this model might also give opportunities to structure national and local initiatives, thus we will propose to introduce this model of organizational initiatives for gathering actual competence milieu's and to obtain a common interest for future development and projects.

Based on this overview we see a number of implications. One of the main goals of Horizon 2020 is competitiveness, stimulating research and development in industry and bringing together key stakeholders. A means for achieving this is innovative procurement or pre-procurement, opening up for cooperation between public sector and industry prior to announcing tenders. By doing this, industry can learn about the needs of public sector and the transparency in competition can still be maintained. Three areas are highlighted under EIP action group for active aging [37]:1- assisted living for elderly with cognitive impairment, 2- open and personalized solutions and 3- innovations improving social inclusion of older people.

Horizon 2020 is expected to start from 2014, and to carry more funding for research than previous frame programs. We will be seeing a number of calls for research proposals over the next few years, and it would be smart for the research community in Scandinavia to prepare for this. The government in the different countries and the numerous local pilot projects could benefit from aligning with the European research agenda, while at the same time keeping national policies and local contexts in mind. It is still only possible to "read between the lines" to identify some of the "big" research directions coming out of the Horizon 2020 program and the EIP Action groups. We call for more research and for more pilot projects on the following themes: 1- innovative procurement involving key stakeholders prior to announcing call for tenders; 2- open solutions / standardization / interoperability; 3- personalized solutions; 4- solutions for elderly with cognitive impairment; and 5- solutions for social inclusion.

Conclusion

In summary, we have in this paper shown the importance of meeting the challenge of the growing elderly population in Scandinavia, and that assistive technology can be one way of addressing this issue. We have further given an overview of the Scandinavian policies on active ageing and independent living, and shown some of the focus on the coming EU research agenda, and we suggest aligning the research community and the many local projects to priorities in the upcoming Horizon 2020 program and the EIP Action group on Active and Healthy Ageing (AHA). Finally, we recommend addressing the ethical problems of welfare technology with an open mind and that society needs to adjust the law in order to make the new possibilities useful for the users.

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