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## **ACTIVE DIGIAGE? Desirable Futures for Ageing People**

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### **Abstract**

The changing age structure of population, with its growing number of ageing people, is a worldwide phenomenon among industrialized countries, and Finland is not an exception. This has implications for swiftly rising healthcare and social welfare costs, but also for new type of demand in related services, and thus creates business opportunities for Finnish know-how. Through qualitative semi-structured interviews this research builds understanding on the desires, needs and challenges that the ageing people have in their every-day life and especially in their use of digital technology and different kinds of digital services. This will further provide insight for the service creation for the needs of elderly people in Finland. The results presented in this paper are part of a larger research project, of which this paper represents the pilot study phase.

### **1. Introduction**

The changing age structure of population, with its growing number of ageing people, is a worldwide phenomenon among industrialised countries, and Finland is not an exception. This has implications for swiftly rising healthcare and social welfare costs, but also for new type of demand in related services, and thus creates business opportunities for Finnish know-how. Current trend is shifting from a provider-dominated market to a consumer-centric market, where the end customers, the seniors, will control their ageing and quality of life. People want to stay active longer when ageing. The impact of these changes in Finland is already being felt today and is particularly acute at a current time of increased pressure on public budget and growing demands and expectations from people for equal and higher quality services of social welfare and health care. Therefore, the need for a reform emerged, and an overhaul of the structures of the social welfare and health care services system has been going on for several years. The objective is not only to create financially more viable bodies as service organizers, but also to achieve complete horizontal and vertical integration of social welfare and health care services. A priority is also to enable ageing population to remain healthy, active and independent for as long as possible.

Nowadays, digital technologies, particularly health and wellbeing assistive devices and service solutions, are expected to permit ageing people to live independently in their homes longer (see e.g. Niehaves & Plattfaut 2014), to increase essentially their quality of life by compression of morbidity, reducing social isolation and hospitalisations, and hence, to lower health and social

care costs. Innovative digital technologies are also expected to bring new opportunities for improving quality of the municipality-based social welfare and health care services and creating socially supportive and age-friendly living environments that enable people to enjoy longer, healthier and more independent lives from an early age up to seniority and being included in the community. Furthermore, adequate utilisation of digital assistive technology for active ageing can also help in achieving objectives of the Finnish social welfare and health care (SOTE) reform, and must be a part of the future municipality-based services delivery system. Advancing integration of digital assistive technology for active ageing into the municipality-based service system requires multiple stakeholders such as government ministries, agencies and communities as well as technology sectors to communicate with each other with the aim of coordinating ongoing activities and creating necessary conditions and consensus on action plans and specifications. To facilitate the communication between multiple stakeholders more empirical knowledge is needed.

Earlier research on new type of services in welfare sector (e.g. Ympäristöministeriö 7/2011, Sillanpää 2013) indicates that innovative services have various, many times unforeseen impacts on service system level (e.g. use and costs of services needed) and on individual level (factors related to quality of life). The current research literature lacks the information on innovative technologies' multidimensional (tangible, intangible, financial) impacts on ageing people's lives (in terms of health, well-being, abilities) and on the service system (effects on service needs, use and costs). Moreover, only a small number of empirical investigations have explored the barriers and drivers affecting acceptance and deployment of digital health and wellbeing technologies (Clark & McGee-Lennon, 2011; Heart & Kalderon, 2013). According to Niehaves & Plattfaut (2014) there are still too little comprehensive consideration and explanation of digital technology acceptance among elderly.

Thus, along with the existing benefits and opportunities, there are also challenges arising: How to ensure that deployed devices of digital assistive technology for active ageing are responsive to the needs, preferences and expectations of individuals and care providers and perceived as trustworthy? How to keep in mind the perspective of people who will be affected by these new technologies and ensure that deployed tools do not fail to provide desirable benefits and services? How to encourage a quicker uptake of new and most advanced tools that respond to needs and preferences of ageing users and care providers throughout the system of social welfare and health care services to ensure larger territorial coverage of a range of the services? How to deal with the large number of different devices and solutions currently existing on the market and high volume of health information these technological tools can generate?

The general aims of the research project are

- (i) to increase understanding of perspectives and opportunities for new business models and services utilising digital assistive technologies needed to maximize and sustain aging people's active and independent living at home and
- (ii) to generate sufficient evidence that portrays a desirable future for ageing people with regard to digital assistive technologies based on individual and professional users' needs, preferences and practical experiences.

The primary focus lies on the assistive digital technology for active ageing that includes any products such as devices, equipment, instruments and technology and software solutions.

The research project attempts to accomplish the following four specific objectives:

- Firstly, to study aging people's needs and preferences for digital assistive technology as well as expectations or conditions affecting their trust, acceptance and usage of innovative technologies that enable them to remain healthier and independent in their own homes for as long as possible.
- Secondly, to identify the core gaps in information among potential users about currently available assistive technology, which respond to ageing people's needs and preferences.
- Thirdly, to study the direct and indirect multidimensional impacts of assistive technology as well as smart living environment on the both individual level, i.e. aging people's health, well-being and ability to live independently at home, and service system level, i.e. service needs and consumption. The discourse of "impact" is not limited only to analysis of desirable outcomes; risks of using digital assistive technology for active ageing will be also addressed.
- And fourthly, to introduce perspectives and opportunities for new businesses and services that will support building the desirable future of aging people as well as proposals for interventions to integrate appropriate tools and solutions of digital assistive technology into the municipality-based service system.

To achieve these objectives the research is divided into two phases: Pilot study and Main study. The purpose of the Pilot study is to build an initial understanding of the research phenomenon and to facilitate the data collection in the Main study. To this end, a Pilot study was conducted with the focus on research questions and design of the appropriate interview guide for the Main study. The results of the Pilot study phase are presented in this paper.

## 2. Theoretical Framework

Research from the fields of adult development and life span psychology has shown that the aging process is accompanied by a number of physical (Hedge, Borman, & Lammlein, 2006), cognitive (Baltes, Staudinger, & Lindenberger, 1999), psychological (Ryff & Keyes 1995, Ryff & Singer, 2006) and social (Bukov, Maas & Lampert, 2002; Wilkie et al., 2016) changes.

Although, ageing is an individual process, for instance, **physical** functions including various elements such as muscle strength, flexibility, agility, and equilibrium (Sugimoto, Demura & Nagasawa, 2014) show a declining trend among all people while ageing. Decline in physical health causes challenges for the maintenance of mental health. (Pynnönen, 2017) The concept of mental health can be considered as an umbrella term for psychological and social well-being (Kokko et al., 2013) as well as cognitive functioning (Pynnönen, 2017). **Psychological** well-being refers to six key-elements such as self-acceptance, positive relations with others, environmental mastery, autonomy, purpose in life, and personal growth (Ryff & Keyes, 1995). The changes in **cognitive** function that occur in normal human aging involve a decline in the ability to pay attention, working memory, long-term memory, perception, speech, language, decision making, and executive control (Glisky, 2007). While some common age-related stereotypes suggest that older adults are slower at performing many tasks and have poorer memories, the other stereotypes advocate that with age come increased knowledge and wisdom, which can be critical in solving many complex problems of contemporary life (Park & Schwartz, 2000). **Social** functions refer to interaction between people occurring in informal and formal contexts (Utz et al., 2002). Interaction in informal contexts includes, for example, contacts via phone, email, skype, letters, and meetings with relatives, friends and neighbours. Interaction in

formal contexts includes activities such as attending meetings of organisations or clubs, volunteer work, and religious participation. (Pynnönen, 2017) According to some studies, a major reason for a reduction in social participation in old age may be health problems (Bukov, Maas & Lampert, 2002; Wilkie et al., 2016).

The purpose of digital health and wellbeing assistive technologies is provide new opportunities for individuals to monitor and support their own health and wellbeing and to create a home environment that is safe and secure to reduce disabilities, falls, fear and stress, to support health. In the recent years, digital assistive technologies have developed rapidly augmenting the traditional assistive technologies. The term ‘digital assistive technology’ refers to the use of ICTs for the support of ageing people’s everyday tasks and activities (Olphert, Damodaran, Balatsoukas & Parkinson 2009).

Due to widely accepted beliefs regarding positive relation between these smart technologies and health improvement, quality of life and social welfare and health care services, it is increasingly important that ageing people accept these technologies and make use of them. The level of trust and acceptance as well as motivation to use innovative technologies will rise, when people are convinced that these technologies – useful and responsive to their needs (Mitzner et al. 2010, van Dijk 2006) and expectations.

According to the most prominent Technology Acceptance Model (TAM), developed by Davis (1989) to understand expectations about information technology, two main variables have an impact on acceptance: perceived usefulness and perceived ease of use. This model has since been widely used, also in the context of digital technology use among elderly people (see e.g. Niehaves & Plattfaut, 2014). Another approach represented by the Unified Theory of Acceptance and Use of Technology (UTAUT) (Verkatash, Morris, Davis & Davis 2003) suggests that four key constructs such as performance expectancy, effort expectancy, social influence and facilitating conditions are direct determinants of usage intention and behaviour and takes into account sociodemographic and individual factors. Many empirical studies stress the significance of sociodemographic factors such as age, gender, cultural (at the national level) and religious background, family status and individual factors such as education and technological experience for the acceptance level and motivation. However, an important point needs to be taken into account that the sociodemographic background of future ageing people will be certainly different from that of contemporary older adults. (Flandorfer 2012)

Thus, in order to maximise trust and acceptance of innovative tools of digital assistive technology by ageing people, these tools should be responsive to people’s needs, preferences and expectations or conditions supporting trust. The rapid growth of ageing population will likely lead to a wider range of people’s needs, preferences and expectations from digital assistive technology and living environments. The importance of understanding what do ageing people actually need for assistance with daily activities when living independently at their own homes and how to respond to these needs is widely acknowledged in the literature (e.g. Kötteritzsch & Weyers 2016, Mitzner, Chen, Kemp & Rogers 2011) and is also highlighted in the recent report of Finnish Ministry of the Environment (Ympäristöministeriö 2017). Further, it can be assumed that needs, preferences and expectations of ageing people are also related to sociodemographic factors and vary essentially in different living environments and geographical locations.

### 3. Research Methodology and Data

The general aim of the research is a primary guideline in the choice of research methodology. It has an exploratory character pursuing to observe, interpret and describe the research phenomenon of “desirable future for ageing people with regard to digital assistive technologies”. Therefore, a qualitative methodological approach is applied for this research, and face-to-face semi-structured interviews are chosen as a primary method of obtaining sufficiently detailed first-hand data and ensuring co-creation of knowledge between researchers and interviewees.

For interviews in the Pilot study, persona cards were created according to the interviewees’ age, sex and living environment (city center, rural area and urban area). Additionally, the following descriptive characteristics were in focus: ability or constraints regarding physical, psychological, cognitive or social dimensions as well as their digital activity, i.e. the ownership and use of digital devices in everyday life. The educational background (academic (A) or non-academic (nA)) was considered as well.

At least one male (M) and one female (F) from each age group with different characteristics and academic background was interviewed. All together 10 pilot semi-structured interviews were conducted to build an understanding about their daily activities, challenges and needs and to create persona descriptions for the further investigations in the Main study. Persona descriptions have been visualised in the form of persona cards, i.e. illustrative persons with story lines of their lives, based on the interviewees’ real life experiences.

**Figure 1** Persona cards (remark explanation: F=Female, M=Male, numbers 1-6 = Number of interviewed person; nA = non-Academic, A=Academic)

AGE GROUP CHARACTERISTIC	55 -64	65-74	75-84	85->
<b>Living environment</b>				
- rural area	F2A	M1nA, F5nA	M2A	F1nA
- city center	M3A	F6nA, M4A	F4nA	
- urban area	F3nA			
<b>Ability / Constraints</b>				
- physical	F3nA	F5nA	M2A, F4nA	F1nA
- psychological				
- cognitive			F4nA	
- social				F1nA
<b>Digital Activity</b>				
- smart phone	F2A, M3A, F3nA	M1nA, F6nA, M4A	M2A	
- tablet	F2A, M3A, F3nA	F6nA, M4A		
- laptop	F2A, M3A, F3nA	M1nA, F6nA, M4A	M2A	
- personal computer		M4A		

In the Main study, the future needs of ageing customers and society will be clarified through futures research methodology, particularly by using multiple scenario approach, when alternative futures paths in long run will be generated in participatory scenario workshops. Additionally, recommendations based on these scenarios will be made for different persona groups.

#### 4. Results and Implications

The pilot study brought important insight to the main study and its objectives. Aging people's needs and preferences for digital assistive technology seem to be positive, although they are not yet very familiar with the latest devices and applications. Skills and competences to use them are still limited especially in the oldest age group females outside city centers. To get deeper understanding of the impacts on the people's wellbeing and on the new opportunities in business further investigation is needed in the field. Based on literature review (Rosenlund & Kinnunen 2018) it was observed, that elderly people mainly have positive attitude to use electronic services, but many problems were recognized, too. For example, too small font, unclear symbols or worries about security and safety issues might be reasons for lower use of e-services. Thus, according to Tuohimaa et al. (2014) e-health services might have an empowering impact on people's life generally.

Pilot study draws a picture of ten ageing persons, who all have different kinds of needs for services based on their living area and level of activity:

- M2A is an 81 years old male, retired widow with academic background, still working actively in his research area, following the newest information, for instance from science and technology. Thus, he uses smart phone and laptop only for professional and for everyday banking purposes, but not for personal health or wellbeing monitoring, although he has type 2 diabetes.
- M1nA is a 65 years old, retired, married non-academic male person, using mostly smart phone and laptop for musical activities with his band. He is not willing to broaden the use of smart devices, for instance, to social media side or for self-monitoring in terms of wellbeing, because no health problems yet.
- F1nA is an 89 years old lady widow, living alone in her one-family house in the countryside. She is an artist, still painting aquarelles every now and then. She has no interest for smart devices and she has no internet connection or any computer at all in her home. She is active in music and literature, in summertime actively working in her garden with flowers and other plants.
- F2A is a 61 years old female, still active in working life in the research branch, using smart devices actively in her work every day, but also in her semi-professional hobbies in the field of literature, gardening and antiques.
- M3A is a 59 years old man, actively involved in working life in ITC-field. He employs different smart devices daily at work and home. He is very fluent and motivated to use digital technologies in everything what he is doing during working and leisure time.
- F3nA is a 60 years old, married non-academic female, working part-time due to health limitations and physical constraints. She uses smart devices at work, but at home only for some specific everyday needs. In spite of her physical constraints, she is very active person, and gardening, reading and walking are favorite ways of spending free time.

- F4nA is an 82 years old lady widow, living alone in her apartment in the city center. She does not have any smart device and is not willing to learn any of them. She is physically in a very weak condition with slight cognitive constraints, but socially very active. She spends most of her time reading periodical press, watching TV and communicating with her old friends typically on the mobile phone. Due to poor physical health status, she is recipient of different home care services. In particular, she wears a safety button, provided to her by municipal social welfare and health care services.
- F5nA is a 72 years old lady, who is living with her husband in the countryside. She had a stroke in head area four years ago and since that she has been in a wheelchair due to problems in using left side (both hand and foot). Her husband has served as her personal care keeper since that, but they also have a nurse visiting their home three times per day to assist with daily routines. There are these kinds of physical disabilities, but socially she is active and likes to see her family, friends and relatives. However, she doesn't own a smartphone, so the social interaction is limited only to visits. Previously she was active in using computer and finding information through Internet, but after the stroke there has been also signs of slight cognitive disabilities, which seem to have an effect also to her use of computer, that has been decreasing during last couple of years.
- F6nA is a 66 years old lady living in a center of a small town with her husband. She has retired two years ago from her regular job in insurance company. She is physically very active and she doesn't have physical or cognitive disabilities. Socially she is very active, she has few very close friends and she is also actively taking care of her grandchildren living nearby their house. She makes a 5 km long walking round every morning and she also goes to the gym twice a week with her husband. She has a smart phone, which she uses actively. She is also very active in the social media, especially in Facebook. However, even though she has no physical or cognitive disabilities, she is using only those digital technologies that she is very familiar with, and is rather critical to take use any new kind of digital technology.
- M4A is a 68 years old married man, living with her wife in an own house in a center of a small city. He has an academic education and he served for several years in a leading position in a big national company operating in energy sector. He is very technology oriented person, using smart phone, laptop and tablet on every day basis. He has no cognitive or physical disabilities, and he is also rather active socially. With an engineering education background he is enthusiastic to take use of new digital technologies and he actively follows the public discussion around new available technologies.

Based on the interview data and the short narratives of the interviewees, we are able to create two interesting personas from the viewpoint of digital assistive technology and use of services for further investigation:

#1: Active elderly person who is living in the city center near by all different kinds of services

#2: Non-active elderly person with disabilities, living in the rural area far from services

These two personas are rather different when it comes to the use of digital assistive technologies and digital technologies. However, both of these personas are heavy users of different kinds of services, although different types of services, but still they are key customer groups for further investigation and service creation. These two personas will be the focus of the Main study phase of larger research project.



The anticipated findings of the Main study will address both theoretical and practical implications, and in general will provide valuable insights on the desirable future for ageing people with regard to innovative digital technology for active ageing. The findings will support a greater availability of and easier access to digital assistive technology for ageing people and encourage public as well as private social welfare and health care service providers to increase utilisation of the technology in order to deliver more efficient and individually oriented services for ageing people's independent living at home in the future. The findings will also drive innovations in digital assistive technology for active ageing and increase demand for new devices and services.

The aforementioned findings will allow avoiding major risks of protecting outdated status quo, spending public money on something ineffective and protect individuals and communities from financial ruin due to rising costs of social welfare and health care. Ultimately, the findings will facilitate integration of digital assistive technology for active ageing into the municipality-based service system by providing necessary knowledge for communication between multiple stakeholders such as government ministries, agencies and communities as well as technology sectors. This will also serve the cooperation in research and development, replication and co-deployment of digital solutions and products. Thus, the findings will benefit the objectives of the Finnish social welfare and health care (SOTE) reform.

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