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Mind the gap - between developer and older end users of health technologies

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Abstract

Ageing citizens and the use of ICT is discussed to enhance care productivity and promote elderly's quality of life. At the same time when it comes to the end users, elderly people might be the group farthermost from the developers of technology – placing the elderly in highest risk for fall into the gap between end user and developer of services. This gap might exists and contributing to designed e-health not meeting the elderly´s need and ability to use these services. In order to minimize this gap, it needs to be defined and debated. This paper is discussing elderly's use of e-health services and what challenges they might experience using the digital service designed for them. An informed article search was done followed by a narrative review of different primary studies. The result of the review is a collection of problems revealed in areas of technical difficulties, issues about the user's attitude and complications with the quality of the information available. From the research that has been carried out, it is easy to conclude that the gap is real but seemingly minimal. Further, we would argue that it should not be a challenge for the digital developers in 2017 to close this gap. We firmly urge the developers to alter these minor issues in the design process, thus bridging the gap by inviting elderly to the design process.

Keywords: e-health, elderly, technology

1 INTRODUCTION

When it comes to the end users, elderly people might be the farthermost from the younger developers of technology – placing the elderly in highest risk for fall into the gap between end user and developer of services. This gap might exists because the e-health designers do not meet the elderly´s need and ability to use these services. In order

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to minimize this gap, it needs to be defined and discussed (Rockmann, R. & Gewald, H., 2015).

E-health (Electronic health) and ICT are tools which are increasingly used in the healthcare system. ICT is the contraction of "Information and communication technologies", which include technologies that gives people access to information by using telecommunications (Techterms, 2010) Thanks to these technologies, people will be more independent, but this development also requires that the end user is able to use those techniques (Jarl, M. & Kjellsson, M., 2016).

In 2007, The European Union published the *Action Plan for Ageing Well in the Information Society*. This plan recognizes the needs of ageing citizens and the role of ICT–based products and services to promote their quality of life. Ageing of the population is a worldwide phenomenon. By the year of 2050, 22% of the world's population will be aged 60 or above (WHO, 2012) Currently,"frail older adults are at risk for negative outcomes and are the most costly consumers of healthcare resources in both acute and long-term settings." (Lattanzio, F. et al. 2014).

The aim of this paper is to discuss factors, which might risk the end users, in this case the elderly, to reject e-health services. This Arcada working paper is co-authored by students attending the e-health course at Arcada University of Applied Sciences in 2017 with supervising teachers. The purpose of the course was to explore the current state and future visions of the ongoing digitalization in the field of health and welfare. Co-writing as a process can be seen as a pedagogical model for enhancing students' deep evidence-based learning.

2 ELDERLY AND E-HEALTH

Prior research has shown that elderly population is slower to adopt ICT solutions than other age groups. (Kalderon, E. et al. 2013) Although the elderly is unlikely to use ICT (Marschollek, M. et al. 2007) they have shown a positive response on the potential benefits of the technology (Baber, C. et al. 2011) and there has been a significant increase in the use of ICT amongst elderly during the last decades (Kalderon, E. & Heart, T., 2013)
As of now, there is extensive research in ICT-based interventions on specific diseases that the ageing population is using. However, there is a lack of specific ICT-based interventions for the elderly population. (Marschollek, M. et al. 2007) This directs our research to the challenges that digital interventions are encountering within the ageing population.

In this article, we are going to discuss elderly's use of e-health services and what challenges they might experience using the digital service designed for them. There is general agreement that technology can improve the quality of life of the elderly (Amaro, F. & Glib, H., 2011; Hogeboom, D. et al. 2010). Seniors who are users of technology can continue living in their own home independently where they feel safe, comfortable (Bujnowska-Fedak, M. et al. 2015) and autonomous (Jarl, M. & Kjellsson, M., 2016). Digital solutions can function as a support system that helps elderly with performing everyday tasks while at the same time effectively managing risks to their health

and home environment. Additionally, digital solutions can provide a supportive network that links adequate social welfare and social aid in the community. (Formosa, M., 2015).

ICT and Telehealth provide access to healthcare professionals without the need to travel to distant places. Digital solutions make it possible to monitor elderly with chronic disease remotely (Bujnowska-Fedak, M. et al. 2015). Some of the most used ICT solutions are those dealing with dementia (Magnusson, L., Hanson, E. & Borg, M., 2004; Nugent, C. D., 2007; Selwyn, N., 2004).

People of age who use computers have better social interactions, they experience memory enhancement, and memory stimulation. (Heart, T. & Kalderon, E., 2011). With the help of online technologies, former restrictions and experiences of social isolation can be relieved (Bujnowska-Fedak, M. et al. 2015) and prevented (Choi, N. & Dinitto, D. M., 2013). The technology provides the users with an easy way to stay in touch with friends and family (Lewis, S. & Ariyachandra, T., 2010). Along with the advantages that digital developments are providing, there are challenges that need to be solved to bring the users closer to the ICT-based services.

Although there is a remarkable amount of health-related services based on digital means, this approach has not been well accepted by the elderly (Marschollek, M. et al. 2007). Until recently, technology has not been considered as a tool for seniors, and they have not been targeted as a group for developing digital services. (Amaroa F. & Glib, H. 2014). In Finland for instance, public service informatics are usually designed for a larger group of users, which makes it difficult to try to serve the interest and needs of each user. (Pietelä, J. 2016) In our paper, we have identified different barriers that older people experience upon the access to ICT. To guarantee the use of new technologies among the elder, we need to solve a number of problems relating to physical limitations, technology, information technology, and attitude. We will attempt to bring some light to the topic by reviewing the existing literature discussing the matter.

3 METHOD

For this article, we conducted an informed article search on the following databases: SAGE, Medline and Google scholar. The database search engine *Iris* was used exploring additional online material. Search results were limited to papers in written in English, Finnish, and Swedish, new articles (published after 2007, with the exception of one article from 1997 which was selected due to its relative perspective, showing that the gap is not a new phenomenon, rather a growing issue), and papers focusing on digital solutions for elderly where included in our literature review. This paper presents a narrative review of different primary studies. Further, we drew conclusions based on these articles which contributed to our theories and experiences (Bryman, A. & Bell, E., 2015).

The initial database search contributed to 123 articles that we scanned thorough and chose our articles following these inclusion criteria: digital health promotion for elderly, digital service development and empirical investigations or assessment of digital services. Keywords such as ICT, e-health, telehealth, and materials focusing on elderly use of ICT for health were preferentially selected. The 32 Articles selected included review

articles, research studies and interviews carried out on the use of ICT by seniors for health.

4 RESULT

The outcomes of our review are a collection of problems revealed in areas of technical difficulties, issues about the user's attitude and complications with the quality of the information available.

4.1 Technology challenges for elderly end-users

There are still many ageing people that do not have access to ICT-based resources or services. In different articles including an article conducted with 123 respondents and a review of more than 700 articles, it was found that many older people do not have a computer at home (between 30% to 52%), 61% of these never use it, and around 43,4% do not have Internet connection at home. (Kalderon, E. & Heart, T., 2013; Marschollek, M. et al. 2007). The phone seems to be a more useful as a tool than a computer (Formosa, M. 2015).

Constrained user-friendliness may restrict the aptitude to control technological equipment, just as cognitive limitations can hinder the understanding of procedures and navigation (Formosa, M. 2015; Fletcher, J., and Jensen, R. 2015). Guidebooks which are written in a confusing language and structure (Hawthorn D., 2007), or cumbersome processes, and intermittent or slow internet connections are examples of this (Anhoj J. & Nielsen L., 2004).

As people age or get sick, limitations in their cognitive functions, motor skills or sensorial inputs appear (Fletcher, J., & Jensen, R. 2015). A qualitative research has indicated that some older adults are still unable to use ICT services due to their economic cost. There has also been a concern of damaging the technology due to incorrect use of the ICT (Wu, Y. et al. 2015).

4.2 Additional challenges for elderly end-users

Here we have summarized additional challenges elderly are experiencing using digital solutions, such as attitude problems, expensive equipment and concern over security. The elderly's attitude toward technology has been a topic of interest amongst researchers, and it’s been argued that a negative stance on technology may come from a selective use of software (Broady, T. et al. 2010). It has been found that many elderlies don’t believe the use of ICT can significantly improve their quality of life. The technology is not seen as cost-effective if it’s seldom used or if they can’t afford the equipment (Amaroa, F. & Glib, H. 2011; Pietelä, J., 2016) or enjoy the benefits it can provide (Kalderon, E. & Heart, T., 2013; Gitlow, L., 2014). There is concern over security, privacy, and trust (Baber, C. et al. 2011). In 2013, Wallace et al. recommend that healthcare providers discuss privacy concerns with seniors; identifying their concerns, allowing modifications in design, and ensuring confidentiality of patient data. Both a secondary analysis of a focus group (Courtney, K., Demiris, G. & Hensel, B., 2010) and a research study

(Formosa, M., 2015) found that the participants believed that subscribing to assistive technology would threaten their independence and worsen their quality of life.

Studies have shown that the elderly have a clear preference towards conventional socialization, and some believe that new technology may have a negative effect on their social life (Broady, T. et al. 2010; Bujnowska-Fedak, M. et al. 2015: Jarl, M. & Kjellsson, M., 2016). An interview conducted by Mikkola and Halonen in 2011 showed that there is a general positive attitude towards technology, contradicting the above statement, which suggest that technology resistance varies from person to person (Hyry, J., 2015). A report by Gonzalez, Ramirez, and Vialdel from 2012 showed that elders that learned new technology are more confident in its use, therefore training the elderly on how to use the technology can improve their confidence, which in turn will tend to their level of frustration (Gitlow, L. 2014; Kalderon, E. & Heart, T., 2013; Holzinger, A. Searle, G. & Nischelwitzer, A., 2007).

There are concerns about the kind of information available on the Internet that works as a barrier for access to reliable e-health resources. These are especially limiting for older persons since they are not familiar with ICT technologies, such as the quality of information, peer reviewed articles and journals compared to materials which are not peer reviewed, information overload and retrieval problems, not being able to perform a precise search, and unconsidered consumer needs (Marschollek, M. et al. 2007).

5 DISCUSSION

The previous sections have shown that with minor changes included in the ICT-based services, the gap between the developers and the end users would be substantially reduced.

The content of the services and tools need to be adapted to the cognitive characteristics and disabilities of the end users. The mode of presentation should be intuitive, easy, and customizable. It should integrate the users, their health professionals, and their relatives. The cost needs to be sustainable (Marschollek, M. et al. 2007) and physical location can be established for technical support if the elderly is struggling or have a problem in the usage of digital services. To stimulate the elderly to use digital devices and services by using multidisciplinary approach on teaching can bridge the gap between elderly users and technology developers (Peek, S. et al. 2016).

Technologies like these need to become ‘domesticated’ and ‘embedded’ into the daily practices of later life in order to enjoy the positive effect they can have on the target group and on their family carers. “Since cognitive performance slows down with age, lowering the complexity of applications or the user-application interaction for (novice) elderly users could be a vital factor for design and development of mobile applications.” (Holzinger, A., Searle, G. & Nischelwitzer, A., 2007). According to Baldi, R., A. (1997), fear of ICT is coming from the lack of hands-on experience. A positive attitude towards ICT has been seen after the user has been exposed to the technology, memorizing and learning are likely the cause of this.

From the number of articles that has been used as a data for this research it was observed that older adults faced physical limitations. These limitations could be visual def-

icits that could be complemented with low glare screens, high contrast colors, and adjustable font size (Wallace, S. et al. 2013), while problems related to auditory deficits may be solved by using audio features with adjustable resonance, intensity level and volume control (Wallace, S. et al. 2013). Implementing modifications like these could increase the end users interest in utilizing ICT in their everyday life.

Motor and sensory functions can be improved with training and practice (Arning K. & Ziefle M., 2009), and devices should be designed with large buttons, rubber grip and be made easy to handle (Gao J. & Koronios A., 2010). Fewer menu options (Santa-Rosa J. & Fernandes H., 2012), simplified menus (Charness, N. & Boot W., 2009), and use of spatial navigation systems (Arning K. & Ziefle M., 2009) are some suggested functionalities that could be implemented in handling cognitive barriers in mobile health use.

From the review done by us it is easy to conclude that the gap is observed and it is seemingly minimal. It should not be a challenge for the digital developers in 2017 to close this gap. We firmly urge the developers to alter these minor issues in the design process, thus bridging the gap by inviting elderly to the design process.

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