Digital technology in healthcare and elderly care

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ABSTRACT

The focus of this ECCE 2017 panel is on digital technology in healthcare and elderly care. The discussion concerns the design of technology and the use of technology for health.

CCS CONCEPTS

• **Human-centered computing** → **Interaction design** • **Applied computing** → **Health informatics** • ***Computing methodologies*** → ***Artificial intelligence***

KEYWORDS

Digital technology, interaction design, healthcare, elderly care, daily life

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1 INTRODUCTION: ECCE 2017 PANEL

Digital technology is increasingly used in healthcare and elderly care since it enables communication, remote monitoring and collection of health data [5]. In order to manage present and future technological needs and skills among care takers and care givers, researchers and developers have to deal with new challenges for design and use of technology. This ECCE 2017 panel will focus on contemporary trends, challenges and possibilities regarding digital technology in homecare and elderly care. The panel will bring together two major perspectives. The first one is *the design of technology*. [1,2] The second one is *the use of technology for health*. [3,4] The two perspectives are further presented below.

1.1 The design of technology

1.1.1 Smart homes are so dumb – what can be done? (Maurice Mulvenna). If digital technology in healthcare and care of older people is to work, then the challenge is to make it smarter. A recent literature review on the state of the art in smart home and assistive technology at home indicated five areas that can help make digital technology smarter. The first is to use logic and **inference** engines to derive valuable knowledge from sensor and other data. The second is to **recognise** core behaviours and activities of living of older people at home. The third is to **represent** and present such knowledge in machine-digestible, ontology-based structures. The fourth is to embed hybrid artificial **intelligence** mechanisms such as case-based reasoning, machine learning and rule-based reasoning to detect and signal complex patterns of behaviour. Finally, the fifth area is about managing the **messaging** of communication of the knowledge to and about older people including the coordination of carer communication and cooperation, as well as recommendations to carers based on activity monitoring. Smarter digital technology puts a lesser burden on the users in terms of digital health literacy. Digital technology interaction augments rather than replace the personal touch in important health and wellbeing decision making for older people, therefore it needs to be intelligently nuanced to be a part of the conversation. The design of smarter digital technology should not be an engineered nudge to benefit the health and wellbeing care organisation over the individuals, but should be an ethically nuanced, user-centred and co-created solution for the older people, their care givers and family.

1.1.2 Social intelligence for meaningful interaction (Helena Lindgren). Digital technology is becoming embedded as instruments in everyday activities both in work practice for

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healthcare professionals and for citizens in need for specialized care or support in daily life. Moreover, preventing illness and decrease of functioning and ability could to large extent also be supported by digital technology. Key to making the human-technology interaction meaningful in these situations, is that the digital technology is made "aware of" the individual citizen's or professional's goals, needs, preferences, abilities and skills, and is able to update its knowledge when it is changing, as well as adapting its behaviour and support to the situation and to the human. I would argue that embedding and tailoring *social intelligence* together with more traditional artificial intelligence to create a meaningful interaction is the major challenge for research in human-intelligent technology interaction in order to handle future technology-supported healthcare and elderly care. Awareness of ethical norms is one important part of social intelligence. Moreover, a new generation of decision-support systems, self-management applications, social service robots and digital social companions will require new methods for co-design, co-development and re-design during daily use where the human is actively involved in shaping the behaviour and appearance of the digital technology.

1.2 The use of technology for health

1.2.1 What happens when the project ends? (John Waterworth). As more people live longer, it's important to ensure that they continue to enjoy a good quality of life in their old age, and digital technology can have a significant role – for example in alleviating social isolation. In the Q-Life group at the Department of Informatics, here in Umeå, we have focused on older people as end-users of emerging technology – how to introduce them to what is available, how to design for and with them for maximum ease of use and pleasure - and on the effects of digital technology use on mental and physical wellbeing. Amongst many detailed findings from our projects, we have learned that it is not the case - as some have suggested - that older people are not interested in or incapable of being end-users of social media and other recent technologies, and that this can be beneficial for them. But they need to be introduced to technologies in the right way to overcome initial resistance, and – unsurprisingly - there has to be some improvement to their lives, some fun, if they are to persevere with them. This raises several questions for discussion, such as: "What are the best ways to introduce potentially-beneficial technology to older people?"; "How do we create the conditions for continued use?"; "How do we know that quality of life is being improved?" and not least: "What will happen after the project ends?".

1.1.2 Human awareness (Ingeborg Nilsson). Digital technology has the potential to support older people to live an active life also on distance, to continue to meet friends and family, enjoy life and develop hobbies or interests although mobility limitations might have occurred or other problems that prevent them from leaving home. To reach the goal to continue an active life, digital technology needs to meet personal needs and wishes by supporting meaningful activities. Meaningful activities are fundamental for motivation and these activities are shaped by and reflect the unique characteristics of a person's values, desires and context. For example, something truly meaningful tonight – to attend your granddaughter's birthday party – might be totally meaningless tomorrow as there is no party. Digital technology needs therefore to be developed to base their activity support and guiding on individual choices and have a built-in flexibility for a naturally changing human mind. Technology needs to be able to consider the interaction between personal factors (physical, cognitive, motivational), context (cultural, social, institutional) and demands from different types of situations when guiding the person to activities. Knowledge from occupational therapy could contribute in this area.

2 PANELLISTS

The panellists are presented in alphabetical order.

2.1 Helena Lindgren

Helena Lindgren is Associate Professor in Computer Science, and has a professional background as Occupational Therapist. Lindgren leads research projects in the areas of human-agent collaboration, personalization, persuasive and assistive technology, decision-support systems, and on co-design of such systems. Lindgren serves as member of the boards of Swedish AI Society and Swedish Association for Medical Informatics. She is also Sweden's representative in International Medical and Health Association.

2.2 Maurice Mulvenna

Maurice Mulvenna is Professor of Computer Science. He has successfully completed over 75 national and international research projects in the research areas of AI, digital interventions for health and wellbeing, pervasive computing, digital media communication, assistive technologies, innovation and knowledge transfer and is currently principal investigator or co-investigator in around 10 of these kinds of projects.

2.3 Ingeborg Nilsson

Ingeborg Nilsson is Associate Professor in Occupational Therapy at the Department of Community Medicine and Rehabilitation, Umeå University and at the Norwegian University of Science and Technology. She is principal investigator in several projects, which aim is to understand meaningful activities in older people, develop strategies to support engagement and evaluate activity-based interventions.

2.4 John Waterworth

John Waterworth is a Professor of Informatics and member of the Q-Life group. He has a PhD in Experimental Psychology and is a Chartered Psychologist of the British Psychological Society. He has around 200 publications to his name. He has worked in several EU funded projects related to IT, health and ageing. He was the coordinator of the AGNES AAL project: Home-based systems for Successful Ageing in a Networked Society.

2.5 Moderator

Karin Danielsson, senior lecturer in informatics, will serve as the moderator for this panel.

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