NORDIC JOURNAL
of Science and Technology Studies

NARRATIVE REVIEW:

Welfare Technologies in Eldercare

by Susanne Frennert and Britt Östlund

Background: The Scandinavian concept of welfare technology appears to be one of the answers to meeting the care needs of the growing elderly population in Scandinavia. Welfare technologies need to be adopted if they are to have an impact on older people's quality of life. However, while this may seem obvious, there are numerous examples of technology that have limited uptake despite being based on sound engineering.

Objectives: This paper reviews the use of technology in eldercare and describes the determinants of the successful implementation of technology in eldercare. The review aims to summarise and critically evaluate the key success factors, controversies, and dilemmas associated with technology use in eldercare.

Method: A narrative review method is used to analyse the literature. The application of a narrative perspective to review the literature on technology use in eldercare enables a broad understanding of controversies and dilemmas related to the use of technology in eldercare, as well as the key success factors of implementing and using technologies in eldercare.

Result: The review yields 71 publications related to the key success factors, controversies, and dilemmas associated with the use of technologies in eldercare.

Discussion and Implications: The results of the review show that technology in eldercare is promoted to enable seamless, efficient, safe, and patient-centred care; however, technology may be contributing to making eldercare more fragmented, time-consuming, technology-centred, and risky. Technology in eldercare seems to be only as successful and suitable as the organisational culture, infrastructure, work practices, and management practices allow them to be.

Keywords: eldercare, technologies, digital transformation, welfare technology, home care

Author: Susanne Frennert, Ph.D., Researcher, Department of Technology in Health Care,
Royal Institute of Technology, School of Chemistry, Biotechnology and Health, Stockholm, Sweden

Britt Östlund, Ph.D., Researcher, Department of Technology in Health Care,
Royal Institute of Technology, School of Chemistry, Biotechnology and Health, Stockholm, Sweden

Introduction

In the last five decades, medical innovation has increased life expectancy and decreased mortality (Larsson and Szebehely 1989). As a result, the proportion of people 70 and over, in the population is increasing rapidly (Garmann-Johnsen and Eikebrokk 2017, Hofmann 2013, Bygstad and Lanestedt 2017, Nilsen et al. 2016, Peek et al. 2017, Milligan, Roberts, and Mort 2011). Compared to previous generations, most people are living longer and healthier lives. In Scandinavia many will live an average of 20 years after the usual retirement age of 65 (Bygstad and Lanestedt 2017). This generation has experienced fundamental changes and improvements to the standard of living, medical treatment, welfare systems, and accommodation throughout their lives (Peek et al. 2014). Compared to previous generations, many people now have higher education degrees, and the final years of their lives are expected to be meaningful and stimulating (Wildevuur and Simonse 2015). It is believed that people will demand to have greater control over and say in the management of their healthcare in general and eldercare in particular, which directly affect their well-being (Bouwhuis, Meesters, and Sponselee 2012, Gomersall et al. 2017). Although the fact that people are living longer is a positive development, many older people will live with at least one chronic disease (Yusif, Soar, and Hafeez-Baig 2016). Old age also increases the risk of falling, which can, in turn, lead to injuries and, in the worst cases, death (Hawley-Hague et al. 2014). As former friends pass die and family ties become looser, old age may increase the risk of loneliness and social isolation (Sjölinder and Scandurra 2015).

The future welfare society will face challenges due to the upward pressure on public expenditure; this is partly a result of the demographic development of an increasingly aging population and partly a consequence of citizens' increasing expectations of higher welfare quality (Kierkegaard 2013). It is suggested that an aging population increases the need for healthcare services and, in particular, eldercare (Murray et al. 2011, Doughty et al. 2007). At the same time, there are fewer young people to provide and finance these services (Garmann-Johnsen 2015). Many countries are suffering from a shortage of home-care professionals, as well as, doctors and registered nurses (Öberg et al. 2017). Discourse around the matter of the aging population and shortage of care professionals suggests that digitalisation and technology will resolve these problems by making healthcare more efficient and strengthening citizens' resources related to self-management, self-care, participation, and independence (Ertner 2016, Stokke 2016, Hinder and Greenhalgh 2012). Digitalisation and technology have been portrayed as a means to increasing quality of life, including for those who are aging at home (Procter et al. 2016, Mostaghel 2016). It is argued that technologies can contribute to an increased quality of life and better services while also improving the well-being and working environments of care personnel and having positive effects on the private sector, especially in regard to the development of welfare technology products and know-how, which can lead to new sales and open up export possibilities (Garmann-Johnsen and Eikebrokk 2017).

Several initiatives exist in regard to the use of technology in eldercare. Numerous technologies are promoted in eldercare (van Hoof et al. 2011, Pritchard and Brittain 2015, Garmann-Johnsen and Eikebrokk 2017, Petit and Cambon 2016, Pols 2017, Peeters, Wiegers, and Friele 2013), including telehealth services, telecare, smart devices, monitoring technology, personal alarms, ambient living technology, and welfare technology (Hofmann 2013). All of these are said to enable a safer, healthier, and more active lifestyle for older people, thereby maximising their independence, quality of life, and well-being (Milligan, Roberts, and Mort 2011, Sánchez, Taylor, and Bing-Jonsson 2017). It is suggested that monitoring and surveillance technologies (Peek et al. 2014), as well as pendant alarms, smoke alarms, and fall detectors and sensors (Sánchez-Criado et al. 2014, Bouwhuis, Meesters, and Sponselee 2012, Gomersall et al. 2017) can be used to enhance safety, while it is suggested that information and communication technology (e.g. teleconferences, telecare, mobile phones, and portals) can improve social connectedness (Åkerberg, Söderlund, and Lindén 2017), and devices such as blood pressure meters, glucometers, and weighing scales can improve health and increase activity levels (Peine and Moors 2015, Gherardi 2010)

In Scandinavia, the term that is used—welfare technology—is a policy concept that was launched to promote digitalisation (Bygstad and Lanestedt 2017). Welfare technology is described as the knowledge and use of technology that can maintain and/or increase the feeling of safety, activity, participation, and independence for a person (any age) who has or is at increased risk of having/developing a disability (Hagen 2011, Kolkowska et al. 2017, Modig 2012, Hofmann 2013, Bygstad and Lanestedt 2017, Kilbourn and Bay 2010, Corneliussen and Dyb 2017, Östlund et al. 2015). The vision of welfare technology suggests that technologies will enable more person-focused care, reduce the risk of falls and social loneliness, and increase coping and self-care management while enabling older people to live in private homes (ibid.). It is also suggested that welfare technology will become a profitable business venture, giving rise to avant-garde Scandinavian innovations (Kilbourn and Bay 2010).

Assistive technology (AT) is also a concept that is found in the literature on the use of technology in eldercare (Bryant et al. 2010, Lilja et al. 2003, Joyce et al. 2016, Doughty et al. 2007, Saborowski and Kollak 2015). According to one source, AT "provides a means to circumvent barriers, subsequently increasing activity and participation" (Pape, Kim, and Weiner 2002, 5). Another source defines AT as "an assistive device which is qualified to prevent, support or balance restrictions that result from a disability, and to support participation" (Saborowski and Kollak 2015: 135). Ambient assisted living or smart homes are said to be "intelligent systems

of assistance for better, healthier, and safer life in the preferred living environment"(Gomersall et al. 2017: 193). The descriptions and definitions of welfare technology illustrate a wide-ranging perspective that indicate no restriction to a specific technology or technologies. The concept incorporates a heterogeneous group of welfare technologies (Hofmann 2013) related to AT and ambient assistive living. The discourse around welfare technology implies that the increased use of technology will be a win–win for society (Dugstad et al. 2015, Fleming, Mason, and Paxton 2018), as it targets older people, who have a higher risk of falling, developing chronic diseases (e.g. dementia), and suffering from social isolation, depression, poor well-being, and/or poor medication management (Yusif, Soar, and Hafeez-Baig 2016). The consequences or qualitative outcomes of the use of technology from the user's perspective—that is, safety, participation, and independence—and not the technology per se are what matter. However, these kinds of definitions and descriptions can result in technological black-boxing and a lack of attention to the complexity of technology adoption and innovation (Latour 2005b). In this context, technology is evaluated against the standard of living and the user's feeling of well-being (Groot-Marcus et al. 2006).

It is difficult to stipulate goals and criteria for the care and well-being of the elderly. The focus often shifts to the technology that is used and the effectiveness of the solutions in regard to meeting the target measurements (Bouwhuis, Meesters, and Sponselee 2012). The caregiving process and the evaluation of the technological solution thereby become codified into certain units that can be measured, and these measurements become standards (ibid.).

Ideally, the focus should be on the application of the technology rather than on the single technology itself. It is not rational to isolate a technology from its context of use and the stakeholders involved (Latour 2012). A single technology does not work in isolation but as part of a socio-technical system, and each instance of technology is interwoven with organisational and social processes (MacKenzie and Wajcman 1999, Orlikowski 1992, Feldman and Orlikowski 2011). The consequence or qualitative outcome of technology use from the user perspective is often affected by materiality (the material and design in which the technology manifests itself), the application/service that the technology provides, the context of use, and the human–technology interaction, which refers to how the user interacts with the technology (Lie and Sørensen 1996). The process is a multifaceted relational structure between role, line-of-action, practice/routine, and artefacts (Faraj and Azad 2012). Social norms and values often link the state of what is considered "good" or "bad" technologies, as well as "good" or "bad" standards of living and well-being (Hofmann 2013).

This is not the first literature review of the field of technology and older people. Several other sources (Östlund 2004, Peine et al. 2015, Joyce, Loe, and Diamond-Brown 2015, Peine and Neven 2018), including books, provide an overview of the research, theory, and practice of older people and technology use (Graafmans, Taipale, and Charness 1998, Domínguez-Rué and Nierling 2016, Prendergast and Garattini 2015). However, the related literature that has been produced in recent decades does not reflect a closer understanding of the importance of the eldercare organisation, in which the older people in need of care reside. It is not that eldercare organisations are completely non-existent. What is missing, however, is an analysis of how eldercare organisations, upon which older people who are in need of care depend, affect the elderly's everyday use of technology. This review discusses the configurations of technology in regard to eldercare.

The definition and delineation of welfare and eldercare technologies are challenging. It is impossible to draw any sharp boundaries between technology in general and what can be described as welfare technology or eldercare technology. However, the technologies that are the focus of this review are those that are adopted for purposes related to health, well-being, and the home care service of older individuals in eldercare. Eldercare is complex and involves multiple actors, routines, and working practices (Trydegård and Thorslund 2001, Szebehely and Trydegård 2012, Hvid and Kamp 2012, Almqvist 2001). Eldercare practices arise from the interactions between caregivers and their co-care personnel, caregivers and care receivers, and the structures of the eldercare organisation, and they are, by their nature, routine and habitual (Nicolini 2016). In this sense, eldercare personnel reproduce eldercare practices and are carriers of eldercare practices, which are relatively stable and recognisable units that persist even after a care worker has finished carrying them out (ibid.).

In this paper, the assumption is that the self-determination of older people who are in need of home care, as well as their use of welfare technology, are strongly correlated with the eldercare organisation in which they are situated. Consequently, the author reviews the literature on the key success factors, controversies, and dilemmas regarding welfare technologies in eldercare. This is important for several reasons. First, it provides insight into what is critical in the implementation and use of technology in eldercare. Second, by highlighting the controversies and dilemmas, a nuanced view of the implementation, use, and side effects is provided, as well as ideas about what it takes to obtain desired outcomes. The intention here is not to outline and analyse all the possible ways in which technology can be used in eldercare, nor is it to review the numerous technologies that exist in this area. Rather, the review will seek to address the following research questions:

- What key success factors are mentioned in the scientific papers published on technology in eldercare?
- Are there any dilemmas and controversies related to the use of technology in eldercare?

Welfare technology introduces novel relationships between human beings and artefacts. Technology is never simply present as an

instrument but, rather, as a mediating object between human-and-human and human-and-artefact (Latour 2005a). The unquestioned acceptance of technology use in eldercare might obscure the process of normalisation—that is, the consideration of alternatives that prefigure the translation of ideas, materials, and approaches into categories of good and bad technologies in eldercare (Fleming, Mason, and Paxton 2018). We aim to address the aforementioned research questions, to identify new ones that can serve as input for future research on technology in eldercare, and to highlight the success factors and approaches that have the potential to positively impact the implementation of technologies in eldercare.

Method

This narrative literature review article seeks to clarify the ongoing scholarly debate on technology use in eldercare, the key success factors mentioned, and the related dilemmas and controversies. The possibilities and challenges of implementing and using technology in eldercare will be embraced by exploring up-to-date research and outcomes.

Review process

Reviews can be either systematic or non-systematic (Ferrari 2015). Systematic reviews follow guidelines such as the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), while narrative reviews follow the Introduction, Methods, Results, and Discussion format (Ferrari 2015). The main objective of systematic reviews is to focus on a unique and specific query using detailed, rigorous, and explicit methods, while narrative reviews focus on one or more questions and articles that are selected based on inclusion and exclusion criteria. Following the PRISMA format might limit the review due to the focus on a specific query and heterogeneity in studies, and as a result, the narrative thread might get lost (Ferrari 2015). We have chosen a narrative review approach because we aim to provide a broad perspective and explore the general debates on the topic. According to Green, Johnson, and Adams (2006: 103), "narrative reviews can serve to provoke thought and controversy," as they can present a philosophical perspective on the research area.

The narrative literature review involved the following steps:

1) Literature search: we performed a broad initial search. The following electronic databases were searched: Scopus, Web of Science, IEEE Xplore, ACM Digital Library, Compendex, and Google Scholar. The following keywords were used in various combinations: technology, telecare, welfare technology, assistive technology, telehealth, eHealth, key performance indicators, older people, elderly, and eldercare. We decided to conduct a broad search to ensure that we would identify as much relevant literature as possible. The number of articles that we retrieved was extremely high (N=2,700).
2) Selection criteria: we excluded articles published in non-scientific journals and at non-scientific conferences and those that were published before 2006. We also excluded duplicate articles, technical-focused articles (i.e. those focusing on technical stability, configurations, fundamentals of algorithms, and data structures), and articles written in languages other than the Scandinavian ones and English. The number of articles decreased due to the exclusion criteria (Figure 1).
3) Critical assessment: the remaining abstracts were screened to get a feel for the literature in this field. The majority of the articles were irrelevant to the research questions. Only the articles and conference papers that were relevant were selected. The screening of the abstracts reduced the number of articles to 71.

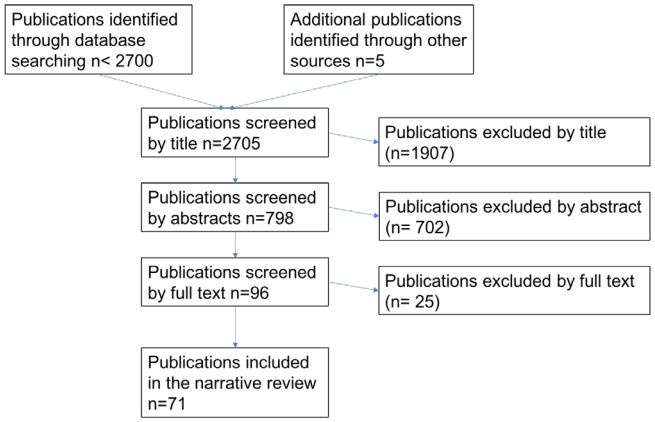

Figure 1: Flowchart of the literature selection process for the present article

4) Data extraction and analysis: the selected articles were analysed qualitatively, drawing on the central procedures used in thematic analysis (Braun and Clarke 2006, Blandford, Furniss, and Makri 2016). First, the author went through the articles, took notes, and formulated preliminary ideas for codes that could describe the article contents. Initial codes were assigned to the texts, and significant phrases or sentences were identified, extracted, and entered into NVivo (qualitative data analysis software for Mac). Various codes were compared (Graneheim and Lundman 2004). The codes were organised into the following themes: key success factors, dilemmas, and controversies.

Results

The review yielded 71 publications related to technologies in eldercare. Many of the publications addressed several of the identified themes, which are presented below along with a discussion of the implications of the findings.

Key success factors

The growing literature on technology use in eldercare identifies the key success factors that are essential to achieving the desired goals regarding the implementation of specific technologies. The literature review identifies the key success factors that seem imperative:

- Clear goals, incentives, and strong leadership
- Infrastructure, organisational structure, and collaboration
- Economy and resources

Most of the publications included debates about more than one key success factor, and these were not exclusive but overlapping.

Clear goals, incentives, and strong leadership

One of the greatest challenges to supporting the implementation of technology in eldercare involves addressing management and leadership issues in eldercare organisations. Addressing the roles of leaders and managers, the literature review illustrates that technological change needs to be facilitated by a pronounced vision and clear goals for the digital transformation and implementation of welfare technologies (Gillingham 2017, Obstfelder, Engeseth, and Wynn 2007). It is important for care personnel and care receivers to be able to relate to the vision of digital transformation and change, and this should appeal to their sense of identity as care personnel and care receivers (Robichaud et al. 2006, Oswald et al. 2007). The roles of the managers and leaders include communicating the organisation's vision and goals to all the care personnel and care receivers involved. The vision and clear instructions need to be communicated to facilitate understanding, commitment, and encouragement to embark on the digital transformation in order for eldercare practices to change working routines and habits. A vision and clear goals might facilitate adherence to the changed practices (Garmann-Johnsen and Eikebrokk 2017). It is through the co-care personnel and care receivers—as well as their insight and their abilities to integrate new working routines and everyday practices into existing ones and contribute to abandoning old routines—that technological change will occur. A leader who is able to provide clear explanations—for example, in regard to technologies and digital transformation, which are perceived as difficult and time-consuming to learn and use— and who is familiar with the potential of technology, including in regard to eldercare practice, has the potential to enable digital transformation and the implementation of welfare technology. Leaders who are themselves involved and participate in the digital transformation and implementation work can set examples to motivate others in the eldercare organisation to participate in and conduct development and implementation work (Shea and Belden 2015).

An enabling change context is created by leaders and managers who are visible and provide support in the daily work of care personnel and care receivers (Nordgren 2013). These leaders and managers must convey the sense of meaningfulness of care work, must interact with employees both up and down the eldercare organisation during the implementation work, and must have the ability to continuously develop teams and renew skills in the change process (Gjestsen, Wiig, and Testad 2017). Having a positive attitude and the ability to explain the profits and benefits for both caregivers and care receivers helps to facilitate the digital transformation and implementation of welfare technology. In addition, permanent feedback from the leaders and management is a prerequisite to meeting the balance between standardised approaches and individual initiatives in the working group. Through this daily feedback, the working group can pay attention to and see the benefits of the improvements and receive support during the changing work processes (Kaplan and Harris-Salamone 2009). Leaders who work with clear goals and incentives, such as measurements and performance reports, can create stimuli for co-worker and care receiver engagement in the implementation and use of welfare technology (ibid.). By highlighting successes and failures, leaders and managers can address both positive and negative issues, as well as objections from the care personnel and/or care receivers (Hinder and Greenhalgh 2012).

Infrastructure, organisational structure, and collaboration

Favourable conditions for the implementation of welfare technology consist of an organisation that has modern network technology and that provides support in form of guidelines, standards, and policies, as well as a mature infrastructure that facilitates implementation work and change processes (Garmann-Johnsen and Eikebrokk 2017, Gjestsen, Wiig, and Testad 2017). The implementation work must also be supported by follow-up work that ensures sustainability and thereby creates opportunities for continued improvement and technological change (Shea and Belden 2015, Gillingham 2017). Organisations that have a person-centred approach emphasise the importance of written policies and guidelines, as well as the importance of being devoted to providing high quality care (Obstfelder, Engeseth, and Wynn 2007). A pronounced person-centred approach might serve as a foundation for the awareness and motivation regarding the implementation of welfare technologies in eldercare organisations (Milligan, Roberts, and Mort 2011). Person-centred care might foster an innovative culture in which dialogue between managers, care personnel, and care receivers is encouraged and the professionals' and patients'/users' everyday practices and the challenges and problems related to technology use are discussed and addressed (Nilsen et al. 2016). A supportive culture and a management structure that encourages participation and interest in, as well as responsibility for, quality work simplify the implementation of welfare technology (ibid.).

Information provided through workplace meetings and scoreboards with understandable presentations of results over time increase interest and the commitment of the working group to develop and improve their daily care work. Eldercare organisations that analyse the consequences of using welfare technologies for practical everyday care work activities and that provide the staff with adequate equipment are more likely to change their eldercare practices (Sävenstedt, Sandman, and Zingmark 2006). An eldercare organisation is considered accommodating when the organisational structure enabling the development of the skills and utilises the skills of the care personnel in the planning of the labour force to ensure that the right person is at the right place at the right time. It is important to underscore that care personnel need to have the requisite skills and abilities to ensure the implementation of welfare technologies (ibid.).

The eldercare organisation must address the care personnel's knowledge, their everyday work, and their efforts to better understand eldercare practice in order to facilitate the implementation of welfare technology (Nilsen et al. 2016). Controversies need to be handled through social negotiations that occur in an open and dynamic teamwork relationship (Obstfelder, Engeseth, and Wynn 2007, Shea and Belden 2015, Gillingham 2017). As indicated, effective policies and innovation strategies are needed to support the successful evolution of technology in eldercare (Bygstad and Lanestedt 2017); otherwise, there is a risk that local initiatives and projects will never move beyond the project phase or that technology procurement will be biased (Stokke 2017). Concern has been raised about the disproportionate amount of time that is spent on projects that never scale up (Gillingham 2017).

Economy and resources

To successfully implement welfare technology in eldercare organisations, financial resources are required (Garmann-Johnsen and Eikebrokk 2017). Similar to many technologies, welfare technology solutions often have relatively short lifespans (Garmann-Johnsen 2015). For many municipalities, one of the biggest obstacles to the implementation of welfare technology is the lack of financial resources (Søndergård et al. 2017). Other identified obstacles are access to broadband, lack of routines for technology introduction, limited knowledge of the benefits of technology support (underestimation of the need for continuous skills development and technical support for both care receivers and employees), lack of user involvement, and a lack of understanding of what features the user needs (ibid.). Development in the field of welfare technology can be expected to lead to increased resources; initially it requires both personal and economic effort. For the implementation to be successful, both caregivers and care receivers must perceive the development as affordable and economically justifiable (Nordgren 2013, Gillingham 2017)

The above key success factors indicate the areas that need to be considered and understood for the successful implementation and adoption of technology in eldercare to occur. External funding is often needed to start innovative projects (Andreassen, Kjekshus, and Tjora 2015). Innovation projects can contribute to challenging and rearranging current practices, which, in turn, generate enthusiasm and engagement (Andreassen, Kjekshus, and Tjora 2015). However, an excessive number of projects can generate tiredness and disengagement, as care personnel simply want to continue carrying out their everyday care work (Öberg et al. 2017).

The implementation of organisational change and welfare technology may resemble the construction of a house. The logic is that a house-building project begins with the construction of the foundation. It is only after the foundation has been laid that the erection of the walls and construction of the ceilings can take place. When implementing welfare technology, it is important to understand the present situation and identify the critical problems

(Kierkegaard 2013). The identified problems must be addressed as a whole and from a systemic perspective before considering which technology or technologies might be used to tackle the problem at hand; otherwise, there is a risk that the implementation will increase fragmentation and create multiple points of inputs (Öberg et al. 2017). The problems and challenges need to be well-defined, which requires looking at the effects of a particular technology, as well as the local and social contexts within which it will be deployed (Trydegård and Thorslund 2001). Which organisational, social, and material values will be affected by deploying a particular technology? What consequences will this have on the core care values? Who will do what? Once these issues are defined, one must consider whether there is a network infrastructure in place to support the implementation and adoption? If none exists, the development of this infrastructure must be the starting point before even considering the implementation of technology in eldercare (Garmann-Johnsen and Eikebrokk 2017, Gjestsen, Wiig, and Testad 2017, Gillingham 2017). The change work must be based on a consensus and overall view of the expected results and outcomes, process tools, working processes, and operational support. Collaboration between internal actors (management, co-care personnel, and care receivers) and external actors (e.g. other municipalities, technology developers, higher education institutions, care receiver organisations, and work unions) is important, as this contributes to the more efficient use of resources and skills (Kierkegaard 2013).

Dilemmas and controversies

The use of technology in eldercare has not been without controversies and dilemmas. It has the potential to change the status quo in eldercare. The recognition of dilemmas and controversies highlights the complex situation of eldercare and technology's fundamental dependence upon the interplay between situational and contextual factors in care situations. What follows is a discussion of how technology impacts care work, care relations, and responsibilities, as well as its influence on the private sphere of the home and care recipients (Mort et al. 2015, Nordgren 2013, Lenca et al. 2017, Milligan, Roberts, and Mort 2011, Stokke 2016, Peine and Moors 2015).

Impact on care work

The promise of technology use in eldercare is the shift in the way in which care work is conducted and the increased levels of flexibility, autonomy, and creativity (Pols 2017). The literature review shows that the implementation of technology to support the home care of older people created added work, novel work tasks, and the need for the technical competence to install and handle the technologies (Mort et al. 2015, Stokke 2016). For example, in a Norwegian study on tracking devices (GPS), care personnel needed to ensure that the device was fully charged and that the care recipients wore the device when out and about (Stokke 2016). This kind of task differs from traditional caregiving and might deskill care personnel and have a negative impact on the care given (Coeckelbergh 2013). On the one hand, this might result in a loss of skills, such as the empathy and reciprocity that are required to deal with the extensive experiences arising in different care situations. On the other hand, an increase in the amount of technology used in elder care means that the care personnel need technical skills (Ivanoff, Iwarsson, and Sonn 2006). Concerns have been raised that technology use makes eldercare biometric-oriented, disease-focused, and technology-driven (Wildevuur and Simonse 2015). Another worry is the amount of money that is invested in technology compared to that invested in care personnel. The governmental initiatives to invest money in technology might result in the degradation of the work of care personnel, as these initiatives might be interpreted as a request to replace care personnel with technology and could be perceived as a suggestion that care work is not important and can be carried out more cheaply, more effectively, more efficiently and more precisely by machines, teleoperators, and family than by care professionals (Saborowski and Kollak 2015). Monitoring technology use at home changes care workers from nurses into teleoperators (who answer if an alarm is triggered); teleoperators assess the home situation and decide which actions need to be taken and who needs to be involved (Mort, Roberts, and Callén 2013). Furthermore, it is argued that monitoring technology for older people may change the perspective of care from person-centred to family-centred—that is, the family having the responsibility of handling the technology while supervising the monitoring of their relative (Sánchez, Taylor, and Bing-Jonsson 2017).

People's sense of identity is imbued into their professional work—that is, what they do and desire to do (Brown 2015). Their identity is drawn from their role in the organisation in which they work. Technological change and digital transformation will most likely affect care personnel's sense of identity and impact their work processes. Technologies can be seen as both tools and a catalyst for change. Regarding professional identity and the shift in care work, it has been highlighted that occupational therapists need to have more knowledge and a better understanding of technology, as one of their many roles is to promote, prescribe, consult, and co-coordinate the implementation of technology for the elderly (Ivanoff, Iwarsson, and Sonn 2006). In addition, other care personnel who are in the position to transmit know-how and knowledge about technology to older people are thereby important catalysts who need to have the requisite training, competence, and knowledge regarding available and useful technologies (Saborowski and Kollak 2015). The lack of time and/or skills among care personnel, as well as insufficient training, bad design, poor usability, and old and unreliable infrastructure, have been put forward as reasons for the low uptake of technology in eldercare (Öberg et al. 2017, Saborowski and Kollak 2015, Peek et al. 2014).

Impact on care relations

Technology in eldercare is closely related to self-management (Mort et al. 2015). As such, care recipients are responsible for and in charge of their health and should strive to prevent its deterioration (Nordgren 2013). It is anticipated that health self-management will be conducted at home in the same way that it has been done at hospitals and in primary care by measuring biometric and behavioural data (Greenhalgh et al. 2013) despite the differing context and cultural situation.

As indicated, welfare technology has the potential to increase social interaction with relatives and friends (Kolkowska et al. 2017, Modig 2012, Hagen 2011). However, a study by Sjölinder and Scandurra (2015) shows that social interaction via social media did not increase as much as expected and requires the older people to already have large social networks with which to communicate and from whom to receive motivational messages and photos. It is suggested that older people's adoption of technology in eldercare is not only a technical matter of the compensation or reduction of physical or mental ability but is also a question of personal goals, as well as maintaining roles, dignity, and self-image (Jensen 2014, Yusif, Soar, and Hafeez-Baig 2016, Greenhalgh et al. 2013). As such, the appearance, design, and suitability to the physical environment, as well as self-image, are prevalent (Peek et al. 2016, Hawley-Hague et al. 2014, Greenhalgh et al. 2013). Other important factors are usability and reliability. High quality usability and reliability support the older individual's feeling of being in control and being able to handle the technology independently; as a result, his or her dignity and self-image in relation to technology is strengthened (Hawley-Hague et al. 2014, Peek et al. 2016). Moreover, family members, friends, and care professionals have a significant influence on older people's adoption of technology (Peek et al. 2017), especially if they offer guidance, training, and support (Peek et al. 2017, Bouwhuis, Meesters, and Sponselee 2012). Welfare technology is presumed to have a positive impact on relatives, as it might remove some concerns, provide peace of mind, and reduce their burden, because technology can help the older relative to remain safe and enable him or her to reach someone if there is a need to obtain help (van Hoof et al. 2011, Pritchard and Brittain 2015, Stokke 2016).

Self-management, self-responsibility, and self-care might increase some elderly individuals' feelings of independence, while others might feel uneasy about the technology and the lack of social contact (Stokke 2016, Sánchez, Taylor, and Bing-Jonsson 2017). Some will refuse to use technology such as pendant alarms because they do not want to cause trouble, they do not want visits from care personnel, or find the technology stigmatising (Stokke 2016). Technology that has been designed for remote monitoring is likely to lead to reduced home visits by care professionals and, as a result, may negatively impact the mental well-being of care recipients who are lonely and have few other social ties (Milligan, Roberts, and Mort 2011). If the system triggers an alert or an alarm, a teleoperator contacts the elderly care recipient to evaluate the situation. The calls are often scripted to follow a certain procedure, and the teleoperator often has no former care relationship with the care recipients; rather, he or she knows the recipient's name and about his or her care situation as a result of information on the computer screen (Garmann-Johnsen 2015). It is suggested that these kinds of check-up calls may dehumanise care situations due to the strict protocols, brief care relations (Pritchard and Brittain 2015), and limited effectiveness (Garmann-Johnsen 2015). Reservations have also been raised about the goal of using technology in eldercare to support the care recipients' independence. Independence might be important for people who are in good health and are socially well-connected, while safety and close social contact with care personnel are valued by older people who suffer from illness, as well as physical and mental disabilities (Nordgren 2013).

Shift in responsibilities

Welfare technology raises ethical questions concerning security, reliability, confidentiality, legal obligations, technology acceptance, and adoption, among other issues (Sánchez, Taylor, and Bing-Jonsson 2017). While there is a governmental push to develop and implement technology to be used in eldercare, there are numerous unanswered ethical questions, as well as a lack of laws and regulation, national infrastructure, and standards (Garmann-Johnsen and Eikebrokk 2017, Gjestsen, Wiig, and Testad 2017, Pols 2017); this situation has a negative impact on the municipalities' manoeuvring spaces. The results of a Norwegian study on the implementation of assistive living technology in primary eldercare have shown that the lack of guidance from national authorities regarding financial, legal, and technological aspects had a negative impact on the uptake of new technologies (Gjestsen, Wiig, and Testad 2017). The results of a German study on care professionals who had the role of promoting, prescribing, consulting, and co-coordinating the implementation of technology for older people showed that their main source of information came directly from the manufacturers of the technology (Saborowski and Kollak 2015). In this case, there is a risk of seduction or preferences for a certain technology due to the manufacturers' sales capability, availability, and/or charisma, which may overshadow any objective evaluation of the care organisation or care recipients' needs and the primary goal of procuring a certain technology.

Technology use in eldercare opens up discussions, as well as multiple positions and views, with a focus on the aging population, technology, and modern aging. Citing Blaschke et al., the promises of technology in eldercare are "improved quality of life, extended length of community residence, improved physical and mental health status, delay the onset of serious health problems and reduce family and caregiver burden" (Blaschke, Freddolino, and Mullen 2009: 641). This appears to be a win–win situation for all the actors involved. However, older people, their relatives, their caregivers, and welfare

technology do not function like the pieces of a puzzle that can be joined together to form the whole. Rather, due to their diverse purposes and materialities, they produce various versions that have different elements attached. For example, it is argued that care personnel sometimes act as gatekeepers, preventing older people's exposure to new technology (Sjölinder and Scandurra 2015, Hinder and Greenhalgh 2012, Sjölinder et al. 2017). However, this is not due to negligence but rather to misguided help given to the elderly (whom they perceive as uninterested in new technologies) with a view to protecting them and is based on an underestimation of their abilities to learn to use new technology (Sjölinder and Scandurra 2015). Care personnel have also expressed their fear that information communication systems could negatively affect the closeness and intimacy that embody genuine care situations, threatening the relationship between the care personnel and the care recipient and promoting inhuman care (Siegel and Dorner 2017, Öberg et al. 2017, Sävenstedt, Sandman, and Zingmark 2006). Reservations have also been raised about the quality of care provided by communication technologies, which, for example, limits the care personnel's ability to observe the events unfolding around the care receivers and to notice effects that are not readily revealed (Hout, Pols, and Willems 2015, Roberts et al. 2015, Öberg et al. 2017). Furthermore, there is a worry that replacing communication technologies with physical visits could increase loneliness and social isolation among older people who are in need of care (Siegel and Dorner 2017, Hout, Pols, and Willems 2015, Sävenstedt, Sandman, and Zingmark 2006). Conversely, many care personnel believe that communication technologies might contribute to more frequent social contact and the development of more caring relationships with relatives, friends, and care personnel (Sävenstedt, Sandman, and Zingmark 2006), which reflects the diversity in care personnel's opinions and expectations regarding technology use by older people.

Ambivalence was found in the literature regarding expectations among older people regarding technology use (van Hoof et al. 2011, Bouwhuis, Meesters, and Sponselee 2012, Roberts et al. 2015, Milligan, Roberts, and Mort 2011, Pape, Kim, and Weiner 2002, Pols 2011, Stokke 2017). On the one hand, the pendant alarm that is attached to an emergency response system is often presumed to provide safety and security. On the other hand, older people expressed concerns that they might forget to press the alarm in case of an emergency, or they worried about the time it would take for the care personnel to reach them (van Hoof et al. 2011). Reservations about being dependent on modern technology and worries about power outages, unstable Internet connections, and telephone failures were raised in the literature (van Hoof et al. 2011). False alarms or low reliability also evoked feelings of insecurity and unease (van Hoof et al. 2011, Bouwhuis, Meesters, and Sponselee 2012) and might result in non-use (Pritchard and Brittain 2015, Hawley-Hague et al. 2014). The non-use of alarm pendants has been justified by the fact that the technology fosters less autonomy and a lack of control while making older people feel disabled and stigmatised (Pritchard and Brittain 2015, Mort, Roberts, and Callén 2013, Peek et al. 2014, Hawley-Hague et al. 2014). The non-use of technology among older people is explained by Cook et al. (2016) as resulting from the following factors:

- Lack of knowledge and awareness regarding the available technology
- Lack of familiarity with the technology
    - Not knowing anyone else who is using the specific technology or having no previous knowledge of how to use a similar technology
- Lack of perceived usefulness
- Negative attitudes and perceptions of the technology available
    - Poor usability, such as difficulties changing batteries, are one factor that may lead to non-use. Other factors included difficulties filling medication reminders, the question of whether using the technology can make care recipients feel dependent, and the matter of having to rely on care personnel, relatives, or friends

In contrast to the non-users, the users often had previous knowledge and awareness of the available technology, which they perceived as useful, and they saw the benefits of using a specific technology (Cook et al. 2016). Similar results have been obtained in other studies (Peek et al. 2014, Hakobyan et al. 2013, Åkerberg, Söderlund, and Lindén 2017). Furthermore, it is suggested that older people will use technology if it is affordable, accessible, and usable and it supports independence, security, and privacy (Mostaghel 2016, Hawley-Hague et al. 2014, Pape, Kim, and Weiner 2002, Kolkowska et al. 2017). Likewise, it is implied that technology adoption is dependent on the older individual's perceived need for the technology, his or her interest in technology, and his or her willingness to invest in technology (Peek et al. 2016). Individual training and guidance have also been shown to increase the adoption and use of technology (Bouwhuis, Meesters, and Sponselee 2012). In the current research, the understanding of the responsibility for and use of technology in eldercare is interpreted as being down to the individual's—that is, the caregiver's and the care receiver's—behaviour, motivations, values, beliefs, and capabilities. If and when this script becomes active—that is, the successful implementation and use of technology are seen/judged on a dyadic and individual level—the danger is the underestimation of the social and organisational components of technology implementation.

Impact on the private sphere

Traditionally, the private sphere of the home is the realm of home life that is without interference by government, medical, and social institutions. This private sphere, however, fluctuates and evolves if the tenant needs home care or other institutional help. Traditional

home care means that services and healthcare are delivered at home, while telecare offers care from a distance. Sensors, cameras, or webcams are installed at home and can collect data around the clock. The technology can collect data and detect anomalies (Sánchez, Taylor, and Bing-Jonsson 2017). This might provide a sense of security for the care recipients, as well as reassurance for their relatives; however, it also raises questions about who has access to the data that are collected, how the information can be used and stored, and what kind of data should be collected (Procter et al. 2016). Furthermore, one cannot help but ask what kind of care can be rationalised by sensors, figures, and data.

Another question is how health data will affect the care receiver—that is, will the digital devices collect health data and enable the care receiver to know how he or she feels and whether he or she is in good or poor health? Can it give him or her advice on how to maintain and improve his or her health? Will care receivers become more aware of their health and body signs or will they become simply passive and trusting of the digital device? (Lupton 2014) Furthermore, monitoring devices can be perceived holding their users hostage or granting them freedom and security. For example, GPS trackers can offer a sense of security by ensuring that someone else knows the location of the individual who is being monitored; however, it can also be restricting if the care receiver knows that the alarm will go off if he or she leaves a certain area (geo fencing). In addition, the care recipient might feel watched due to knowing that someone can find out where he or she is at any given time.

Concluding Remarks

It is suggested that user-centred design could help and support the evolution of technology use in eldercare (Hakobyan et al. 2013, Sánchez, Taylor, and Bing-Jonsson 2017). Design that is based upon an understanding of older users, their tasks, and their environments and that is driven by user involvement is believed to more likely result in the use of technology that responds to the psychosocial and occupational needs of the users (Gomersall et al. 2017), if the users are rightly involved (Joyce et al. 2016). Low-hanging fruits are easily identified by user-centred design. For example, bedroom sensors made for illuminating the floor on the way to the toilet can be activated when sleepers turn around in the bed or there may be light sensors in the bathroom that switch the lights off if there is no movement (Bouwhuis, Meesters, and Sponselee 2012). However, issues such as organisational resistance, a lack of clear goals and strategies, weak leadership, dysfunctional organisations, and a lack of resources and financing might be more problematic to address. Rectifying these might require improved technical know-how, change management, national guidance, and regulations. This also raises questions about power relations: Who has the power to affect technological change in eldercare organisations? Who can influence what in which situations?

This review raises questions regarding what the working practices of eldercare organisations means in relation to the uptake of technology by older people who are in need of care in their everyday lives. Eldercare organisations might be affected by or might themselves affect these older people's use of technology and their possibility of partaking in an increasingly digital society. It might be that eldercare organisational structures are particularly oppressive with regard to technology change. Technology and its value might be contributing to subordination in eldercare organisations. The subordination of technologies might be considered irreversible within the framework of present eldercare organisations. Modifications might need to be made to the existing work processes and organisational structures. It is easy to believe that the implementation and use of technology in eldercare is about technology per se. However, this review has shown that the successful implementation and use of technology is primarily about developing new working methods and organisational structures that are made possible by new technology and digitalisation. A fixation on the technology itself might risk the successful implementation and use of technology in eldercare. The implications of not considering eldercare organisations' impact on older people's technology use might be grave. Such ignorance might prove to be a serious obstacle to the achievement of an inclusive digital society and the equal participation in society of older people in need of eldercare.

Technology is fluid, has diverse and sometimes unexpected effects, and may change the expectations and aims of care (Mol 2008). As a result, it is important to acknowledge that technology in eldercare cannot be seen as a neutral tool that can be introduced to achieve a special effect (Stokke 2017). Technology is not prescriptive and deterministic in its ability to solve problems that have the same basic shape. The role of technology in eldercare depends on how a specific technology is designed, the context in which it is used, cultural habits, and the user's skills and knowledge. Technology can both enhance and degrade the older person, as well as help or hinder care personnel in regard to their provision of good care. Technology use in eldercare is thought to enable seamless, efficient, patient-centred, and safe care; however, it might make eldercare more fragmented, time-consuming, technology-centred, and risky. The result of this literature review shows that the successful implementation of welfare technology is down to a trait of the entire eldercare organisation and that the level of technology implementation and usage is not down to the individual's traits. Technology in eldercare might be only as prosperous and fitting as organisational culture, infrastructure, and management practice allow it to be.

The organisational culture, infrastructure, and management practice might need to be progressive rather than regressive, active rather than passive, bottom-up rather than top-down, innovative rather than conforming, and enterprising rather than sedentary.

Acknowledgement

We would like to thank the anonymous reviewers, for their careful reading of the manuscript and their many insightful comments and suggestions.

Funding

This work was supported by the Swedish Research Council for Health, Working Life and Welfare [grant numbers 01755, 2017].

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Contribution of author

Susanne Frennert independently planned and carried out the literature review. Professor Britt Östlund critically reviewed the first draft and added valuable comments. Two anonymous reviewers, reviewed the manuscript and gave insightful comments and suggestions, which have been assimilated in the final manuscript. Professor Britt Östlund has contributed with reading and minor revision in a preliminary version as well as financing the work.