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Technology, ageing and human rights: Challenges for an ageing world

Belinda Bennett

Faculty of Law, Queensland University of Technology (QUT), 2 George Street, Brisbane, Australia

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ABSTRACT

Technology can be used to support healthy ageing and to support those who are living with disabilities. With the ageing of populations globally there is increasing interest in the role that technology can potentially play in supporting older persons. This paper analyses the role of technology in supporting everyday living, social engagement, and mobility by older persons, including those living with dementia. It argues for a human rights-based approach to assessing the role that technology can potentially play, arguing for a consideration of: decision-making in relation to use of technology; whether the technology protects privacy, dignity and liberty; whether it fosters mobility and social engagement; and whether it is accessible to all who need it on an equitable basis.

1. Introduction

With the ageing of populations in many countries around the world, increasing attention is being paid to the role of technology in supporting healthy ageing and the lives of people with disabilities. However the use of technology raises complex questions about the meaning of vulnerability in the context of ageing, and the interface between technology and human rights. This paper argues for a human rights analysis of assistive technologies. It begins in Part 2 with an overview of the ageing of populations around the world and recognition, at a global level, of the importance of giving consideration to the issues raised by these demographic shifts. Part 3 considers the role that technology may play in supporting healthy ageing, grouping technologies into three categories: those that support everyday living; those that support social engagement; and those that support mobility. In Part 4 the relevance of the concept of vulnerability to discourses around ageing and technology is considered briefly before the relevance of human rights to the use of technology in relation to ageing is evaluated in Part 5 to argue that there are four key questions to be decided when evaluating the human rights implications of technology in the context of ageing: (1) who gets to decide whether an older person should use assistive technology? (2) does the use of the technology protect privacy, dignity and liberty? (3) does the use of the technology foster mobility, companionship, social interaction? and (4) is the technology accessible on an equitable basis to all who need it? Part 6 concludes by arguing that the interests and human rights of the person using the technology should be central to evaluations of the use of technology.

2. An ageing world

Many countries are experiencing an ageing of the population. There are not only greater numbers of people aged 60 years or older, but also the number of older people as a proportion of the population is also increasing (World Health Organization, 2015, p. 43). Even within that general trend of ageing there are variations between countries with the populations in some countries ageing more rapidly than the populations in others (World Health Organization, 2015, pp. 43–45). In Japan more than 30% of the population is aged over 60 years, although it is expected that by 2050 many countries will have a similar proportion (World Health Organization, 2015, p. 43). For some countries the speed at which populations are ageing is also increasing. The World Health Organization has noted that it took nearly 150 years for the percentage of the population of France aged over 60 years to increase from 10% to 20%. In contrast, for India, China and Brazil, the same increase will occur in just over 20 years (World Health Organization, 2015, p. 43).

In Australia for example, the proportion of the population aged over 65 years is projected to increase from approximately one in seven Australians in 2012 to one in four by 2060 (Productivity Commission, 2013, p. 53). The ageing of the population can be seen dramatically in the proportion of people aged over 100 years compared to the number of babies, with approximately one person older than 100 years to every 100 children below the age of one year in 2012 in Australia. By 2060 it is expected that there will be 25 people older than 100 years for every 100 children below the age of one year and by 2100 it is projected that there will be more centenarians than there are children below the age of one year (Productivity Commission, 2013, p. 53).

These increases in the ageing of populations are driven by two main

E-mail address: belinda.bennett@qut.edu.au.

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trends. First is the increase in life expectancies. In high-income OECD countries this has meant that deaths increasingly occur after 70 years rather than at younger ages. Furthermore, people are living for longer at older age, meaning that even once people reach older ages, life expectancies at older age are increasing (World Health Organization, 2015, pp. 45–48). The second reason for ageing populations is that fertility rates are declining (World Health Organization, 2015, pp. 48–49).

The ageing of populations has meant that ageing, and the economic and policy considerations associated with ageing, have become important factors for governments. It is difficult to predict the impact of ageing populations on the workforce. For example, although people may retire at later ages, they may also be more likely to work part-time (Productivity Commission, 2013, pp. 65, 96-98). Ageing populations are also likely to be associated with increases in health care costs, given that older people tend to use more health care than those at younger ages (Productivity Commission, 2013, pp. 127–128). The question of how best to promote 'healthy ageing' is an increasingly important policy consideration (World Health Organization, 2015).

The relevance of ageing as a policy consideration for governments has been furthered by the adoption of the Sustainable Development Goals (SDGs) by the United Nations in 2015. The SDGs articulate 17 goals for the next 15 years. With SDG3 being to 'Ensure healthy lives and promote well-being for all at all ages' (United Nations, 2015), there is a clear goal of ensuring that everyone, including older persons, has the conditions to support a healthy life and well-being. It has been argued that the use of assistive technologies may also help in achievement of goals articulated in the Sustainable Development Goals (Crayton & Meier, 2017; Tebbutt et al., 2016).

In May 2016 the World Health Assembly adopted a Global Strategy and Action Plan on Ageing and Health (World Health Assembly, 2016). The Global Strategy articulates a vision of 'a world in which everyone can live a long and healthy life' (World Health Organization, 2017, p. 6) and sets out five strategic objectives:

1. Commitment on action to Healthy Ageing in every country.
2. Developing age-friendly environments.
3. Aligning health systems to the needs of older populations.
4. Developing sustainable and equitable systems for providing long-term care (home, communities, and institutions).
5. Improving measurement, monitoring and research on Healthy Ageing. (World Health Organization, 2017, p. 6).

Further detail around each of the strategic objectives highlights the importance of fostering the autonomy of older people (objective 2.1), enabling their engagement (objective 2.2), orienting 'health systems around intrinsic capacity and functional ability', including through the use of technological innovations such as assistive technologies (objective 3.1), ensuring 'the quality of person-centred and integrated long-term care,' (objective 4.3) which may include use of existing or innovative technologies for 'coordination, support and monitoring,' and the need to 'strengthen research capacities and incentives for innovation' (objective 5.2) including through the greater inclusion of older people in design and evaluation of innovations (World Health Organization, 2017, pp. 7–23). Within these objectives use of technology is configured as potentially playing a role in supporting healthy ageing.

3. Technology and ageing

It might be thought that a focus on technology and ageing is unnecessary or is simply too futuristic. However, given the dramatic social transformations that will take place in the coming years as a result of technological developments, it is important to consider the impact of these changes on the older members of the community, and the ways in which technology can either support or limit autonomy and freedom in older age. The potentially transformative social and economic effects of technology are such that this period in history has been described as 'the second machine age' (Brynjolfsson & McAfee, 2014, p. 37).

There is growing recognition of the role that technology could potentially play in supporting older persons (Garcon et al., 2016). While much of this discussion has to date focused around the use of technology for people living with dementia (Brims & Oliver, 2018; Eltis, 2014; Ienca, Jotterand, Vica, & Elger, 2016; O'Brolchain, 2017), some technologies are not dementia-specific and may have broader application for older people or for people with disabilities (Garçon et al., 2016).

There are of course, many technologies that could be considered here, ranging from relatively simple assistive aids, through to high-tech solutions (Alzheimer's Society, 2015; Garçon et al., 2016; Marasinghe, Lapitan & Ross, 2015, p. 183). For the purposes of this article, three groups of technology will be considered: (i) technologies for everyday living in the community; (ii) technologies that may facilitate social engagement; and (iii) technologies that may increase mobility (Alzheimer Europe, 2010; Alzheimer's Society, 2015). Clearly, some of these groupings may intersect and overlap (Alzheimer Europe, 2010, p. 51). A technology that supports an older person to continue to live at home may also help to support social engagement, as may a technology directed to supporting mobility. In the discussion below the groupings of technology will be considered in terms of their use in supporting healthy ageing as well as their potential to limit autonomy and freedom of movement.

3.1. Technologies for everyday living

Assistive technologies may help older people to manage some aspects of everyday living (Alzheimer Europe, 2010, pp. 59-61; Alzheimer's Society, 2015, pp. 6-8). Individuals and their carers may engage with both everyday technologies (such as smart phones), and assistive technologies to meet their needs (Alzheimer's Society, 2015; Gibson, Dickinson, Brittain, & Robinson, 2018). Assistive technologies may be beneficial for people living with dementia, particularly those who are living at home (Brims & Oliver, 2018; Gibson et al., 2018; Nauha, Keränen, Kangas, Jämsä, & Reponen, 2018). For people living with dementia, technology may help through the use of smart homes that are fitted with monitoring devices that activate, for example, if a stove is left on (Alzheimer Europe, 2010, p. 59). Monitoring devices may also assist with safety by monitoring for falls (Alzheimer Europe, 2010, p. 61). Of course, these technologies may also support carers of people living with dementia, often a family member, by providing peace of mind (Alzheimer's Society, 2015; Gibson et al., 2018; Ienca et al., 2016; Lorenz, Freddolino, Comas-Herrera, Knapp, & Damant, 2019). While such uses of technology may help to ensure the safety of the person monitored, they also have the potential to be intrusive of privacy or restrictive of a person's movement (Alzheimer Europe, 2010, pp. 61–64; Bennett et al., 2017, pp. 750–751).

Older persons may also be vulnerable through the use of other technologies to assist everyday living such as online banking (Australian Law Reform Commission, 2016; Bennett et al, 2017, p. 751), although such vulnerability is unlikely to be confined only to the elderly. However, the challenge of keeping up with technology may be particularly acute for older persons, and they may be vulnerable to 'elder abuse' (Australian Law Reform Commission, 2016) by those who would seek to take advantage of their limited knowledge of technology, or their limited capacity in the case of those with dementia or other cognitive conditions.

3.2. Technology and social engagement

Some technologies will support social engagement (Alzheimer Europe, 2010, pp. 53-55; Alzheimer's Society, 2015, p. 13). While telephones have long provided social links beyond the home, the use of

video-enabled smart phones can provide an opportunity to talk 'face-to-face' with friends and relatives. This is an example of a technology that is not age-specific but which can be used to support social engagement and interaction by older people and their carers (Alzheimer Europe, 2010, p. 54; Alzheimer's Society, 2015, p. 8). Other technologies however raise more complex ethical issues.

The ethical and legal implications of the use of social robots to provide companionship and opportunities for interaction to people living with dementia is attracting increasing attention (Bennett et al., 2017, p. 750). Central to the debates over the use of social robots in aged care has been concerns over the implications of robotic carers for the dignity of those using them (Alzheimer Europe, 2010, p. 58; Draper & Sorrell, 2017; Ienca et al., 2016; Moyle et al., 2019; Sharkey & Sharkey, 2012; Sharkey, 2014; Vandemeulebroucke, de Casterlé, & Gastmans, 2018). Alzheimer Europe has identified five considerations for the use of social robots in dementia care (Alzheimer Europe, 2010, pp. 56–59). First, is the question of whether a person may become attached to the robot and the effect on the person if the robot breaks or if they need to share it with others. Second, is the question of whether interaction with a robot is authentic and whether it is ethical to give an interactive robot to a person with limited capacity who may not understand that the robot is not alive. Third, is whether users may feel that the robot intrudes on their privacy by 'watching' them or whether it assists with privacy by assisting with tasks they would rather not do in front of other people. Fourth is the degree to which robots promote autonomy and safety, and fifth, is the question of whether the person will be confused by the robot or potentially deceived if they do not understand that the robot is not 'real.' The complexity of these ethical issues highlights the need for further research into the human rights implications of the use of robots in aged care, as well as the views of the public, and particularly the views of people living with dementia and their carers, about the use of social robots in aged care (Lehoux & Grimard, 2018; Pino, Boulay, Jouen, & Rigaud, 2015; Wang, Sudhama, Begum, Huq, & Mihailidis, 2017). Indeed, as will be argued in Part 5, a human rights assessment has a key role to play in evaluating the use of new technologies by older persons and whether the technologies truly enhance the lives of those using them.

3.3. Technology and mobility

Mobility and access to transportation are vital elements in a person's ability to remain socially engaged outside the home. The ability to go for a walk may be compromised if a person with dementia becomes lost while out. The use of tracking devices or other technologies may help to support people with dementia and their carers (Alzheimer Europe, 2010, pp. 66-68; Alzheimer's Society, 2015, pp. 10-11), although the knowledge and attitudes of health professionals may influence access to assistive technologies (Jarvis, Clemson, & Mackenzie, 2017). Furthermore, the use of some technologies raises questions about their human rights implications (Bennett et al., 2017). For example, is it appropriate to use GPS tracking of people with dementia so they can be located if they become lost? Does such a use of technology enhance the freedom of movement of a person with dementia or does it represent a limitation on their freedom of movement and autonomy? (Alzheimer Europe, 2010, pp. 66–69).

The introduction of autonomous vehicles or driverless cars will potentially open up new transportation possibilities for older people, people with disabilities, or others who are unable to drive (Crayton & Meier, 2017; Pettigrew, 2017; Pettigrew, Cronin, & Norman, 2018). It should be noted though, that the use of automated vehicles as a means of transportation for elderly members of the community who are no longer able to drive assumes that the vehicles are in fact fully automated and do not require a driver in order to operate. As the House of Lords Science and Technology Select Committee in the UK noted in a recent report:

> CAV [connected and autonomous vehicles] have the potential to increase accessibility and mobility for those less mobile or those unable to use traditional vehicles, such as the elderly or disabled. However, they may not be suitable for some people with mobility problems, if, for example, they are unable to get into or out of a car without help. Furthermore, these benefits will only be realised with full automation and if the vehicles are both affordable and acceptable to prospective users. (House of Lords Science and Technology Select Committee, 2017, para. 80).

The potential for autonomous vehicles to provide increased mobility for those who are currently unable to drive does open up the possibility of a more inclusive society and could provide an important transportation option that would support the continued mobility of older persons (Crayton & Meier, 2017; Pettigrew, 2017; Pettigrew, Cronin & Norman, 2018).

4. Ageing, vulnerability and technology

There will be both advantages and disadvantages from the use of assistive technologies for the elderly and in dementia care (Ienca, Wangmo, Jotterand, Kressig & Elger, 2018). For those living with dementia, on the plus side, is the potential to harness these technologies to support greater independence and social integration, allowing older people to live in their own homes for longer than might otherwise be the case (Alzheimer's Society, 2015, p. 4; Ienca et al., 2016). On the negative side are concerns about loss of privacy and loss of dignity, particularly through the use of technologies that may be used to monitor the activities of the person living with dementia (Alzheimer Europe, 2010, pp. 60-72; Alzheimer's Society, 2015, p.17; Sifford & Bharucha, 2010), or loss of autonomy if technology is used to support restrictions on movement (Bennett et al., 2017, pp. 750–751; Ienca et al., 2016).

The concept of vulnerability is a common thread through these debates, even when not expressly articulated. Older persons are seen in society as vulnerable and in need of protection, due to their lack of employment, and their physical and mental decline (Fineman, 2012, pp. 75–76). This characterisation of the elderly as vulnerable stands in contrast to the autonomous, self-sufficient, adult legal subject who is not in need of any special protections (Fineman, 2012, p. 86). Fineman argues that both vulnerability and dependency are universal aspects of being human (Fineman, 2012, p. 86). Vulnerability for Fineman is 'constant and inherent in our embodiment', while dependency is 'episodic and largely developmental in terms of it being a universal status' (Fineman, 2012, p. 96). As Fineman argues, 'This embodied dependency has been assumed to attach to the elderly as a group, although many within that category are physically and mentally able' (Fineman, 2012, p. 87). Importantly, dependency is often perceived as a basis for limiting decision-making autonomy and rights (Fineman, 2012, pp. 86–87), with the law's evaluation of capacity to make decisions generally seen as a clear either/or question (Herring, 2009).

There is a possibility that technology could be seen as resolving some of the perceived challenges posed by ageing. However, it has been argued that the 'ageing-and-innovation' discourse, which sees ageing as a problem, and technology as a solution, rests on a negative construction of ageing, normalises technology as a solution to the 'problem' of ageing, and that it 'creates a high moral ground' with which it is difficult to disagree (Neven & Peine, 2017). In addressing these concerns it will be necessary to be cognisant of, and seek to move beyond negative stereotypes of ageing, and to engage in a human rights analysis of new technologies in order to assess the degree to which they uphold and support the rights of those using the technologies.

5. Engaging with technology and human rights

A human rights approach provides a useful lens through which to

evaluate the advantages and disadvantages of the use of technology (Australian Human Rights Commission, 2018; Bennett et al., 2017) and is an approach that moves beyond stigmatised portrayals of ageing. A human rights approach also serves as an important reminder that the rights and the interests of the older person who is engaging with the technology, and whether it will truly enhance the lives of those using it, must remain central to any assessment of the implications of the role of technology. Bioethical principles, including the principle of autonomy, could be seen as providing this role of articulating the centrality of the person's interests. Yet autonomy arguments may become more complex when the person concerned lacks capacity, and in that context autonomy and beneficence quickly become intertwined. Beneficence can often lead to a focus on best interests and substitute decision-making which locates decision-making in another individual rather than the individual whose autonomy we started by trying to protect. In moving beyond these debates, a human rights approach provides a mechanism through which to turn 'concepts of rights and freedoms into effective policies, practices and practical realities' (Australian Human Rights Commission, 2018, p. 17). The language of human rights provides a recognised language within which to articulate problems and possible solutions, and that interfaces readily with domestic and international legal systems (Ashcroft, 2010, p. 644). However, while a human rights approach can assist in evaluating the impact of technologies on particular groups, and in protecting the interests of those groups, 'international human rights treaties rarely refer expressly to the protection of human rights through technology. Instead, new technology provides a setting in which human rights are applied' (Australian Human Rights Commission, 2018, p. 12).

The provisions in the Convention on the Rights of Persons with Disabilities (CRPD), which was adopted by the United Nations General Assembly in 1996, are relevant to considerations of the use of technologies for older persons, including people living with dementia (Bennett et al., 2017). To date there is not a Convention for the rights of older persons similar to that of the CRPD (Baer, Bhushan, Taleb, Vasquez, & Thomas, 2016; Clough & Brazier, 2014). However, there is increasing recognition of the link between health and human rights generally (Mann et al., 1994; Murphy, 2013), and of the need for recognition and consideration of the human rights of older persons (Clough & Brazier, 2014; Cox & Pardasani, 2017; Kesby, 2017; Love & Lynch, 2018; Mikolajczyk, 2018), although the relationship between formal legal recognition of the rights of older persons and their lived experience remains complex (Doron, Cox, & Spanier, 2018).

In assessing the implications of technology for older persons and whether technology has the potential to enhance the human rights of those who use it, four questions and issues need to be decided: (1) who gets to decide whether an older person should use assistive technology? (2) does the use of the technology protect privacy, dignity and liberty? (3) does the use of the technology foster mobility, companionship, social interaction? and (4) is the technology accessible on an equitable basis to all who need it? Answering these questions as part of the assessment of any new technology will help to determine whether the introduction and use of the technology is supportive of the human rights of those using it (Alzheimer Europe, 2010).

5.1. Who gets to decide?

For older persons with decision-making capacity, they will be able to make decisions about the use of technology in their lives. For those who do not have decision-making capacity, Article 12 of the Convention on the Rights of Persons with Disabilities requires people with disabilities to be supported in their decision-making (United Nations, 2006). This is a critical point as the Convention marks a clear shift away from substitute decision-making ie decision-making by another person such as a family member or formally-appointed guardian on behalf of an individual to supported decision-making in which the individual is supported in making decisions (Bartlett, 2012; Craigie, 2015; Szmukler, Daw, & Callard, 2014). A focus on the individual as decision-maker, as reflected in Article 12, is an important reminder that disability does not negate rights and of the need to provide appropriate supports to ensure that those rights can be exercised (Australian Law Reform Commission, 2014). With the individual as decision-maker, consent becomes a key factor in the process of deciding whether to use assistive technologies to support an older person (Alzheimer Europe, 2010, p. 52; Ienca et al., 2016). As the Alzheimer's Society in the UK pointed out in its publication on assistive technology:

> Consent is particularly important. When choosing to use assistive technology and selecting the systems or devices to use, the person with dementia must be involved in any decisions, and their consent must be sought and gained, wherever possible. (Alzheimer's Society, 2015, p. 16).

Of course, in order to be genuine, consent must be more than simple agreement to use of technology, without an understanding of its purpose (Alzheimer Europe, 2010, p. 51). Given the potential for some monitoring technologies to be intrusive of privacy or autonomy, the need for consent is vital. However three additional issues also arise. First, consent to use of monitoring technologies may be complex. For people with reduced decision-making capacity, such as those with dementia, decision-making about the use of technology may involve a process of either supported or substitute decision-making. Even for those with full capacity, constructing decisions about the use of technologies in terms of 'choice' may place a burden on the users of technology and may not in fact enhance understanding (Birchley et al., 2017).

Second, for those with medical conditions that will lead to a loss of capacity, advance planning emerges as a critical part of early planning (Bennett et al., 2017, pp. 751–752; House of Representatives Standing Committee on Health and Ageing, 2013). As in other areas of advance planning, early discussion about the person's values and views in relation to use of assistive technologies may help to inform later decision-making by the person themselves or by substitute decision-makers (Bennett et al., 2017, pp. 751-752; Eltis, 2014, pp. 436–437; Fetherstonhaugh, McAuliffe, Bauer, & Shanley, 2017). Technology may in fact support advance planning by increasing awareness of the need for planning and facilitating access to documentation to support the planning process (Bennett et al., 2017, p. 751).

The third issue relates to the importance of research to ensure that the views of those who will use or are using the technology are taken into consideration in the development or use of the technology. Such research will require engagement with older people, and may also require research with vulnerable individuals or populations, such as people living with dementia and/or their carers (Alzheimer Europe, 2010, p. 89; Bennett et al., 2017, p. 751; Bielby, 2014). If policy-making is to be evidence-based then research that is inclusive of the experiences of older persons, including those living with dementia will be important (Alzheimer Europe, 2010, p. 89; Nuffield Council on Bioethics, 2009, ch. 8; Pino et al., 2015), as will the views of carers (Mulvenna et al., 2017). In this context the issues of consent to participation in research and supported decision-making are key, as is the question of how best to ensure that the needs of older persons, including those living with dementia, are addressed through research (Bennett et al., 2017, p. 751; Nuffield Council on Bioethics, 2009, ch 8).

5.2. Protecting privacy, dignity, and liberty

In the current environment of increasing automation and use of 'big data,' there is an emerging debate over data and privacy (Montgomery, 2017; Terry, 2012). In the context of the use of new and emerging technologies for older persons who may not have high levels of digital literacy, or to support those who may have diminished capacity, the interface between technology, privacy, dignity, and liberty is an important consideration that may have implications for the human rights

of older persons (Alzheimer Europe, 2010).

For example, use of monitoring technologies in dementia care may potentially raise issues about loss of privacy and dignity for the person being monitored (Alzheimer Europe, 2010). The use of these technologies may also potentially infringe the privacy of others, as for example, when video monitoring is used in a shared or communal space (Alzheimer Europe, 2010, p. 53). There are of course different types of monitoring technologies – some for example may require a person to push a button to activate an alarm, while others may be more passive, as in the case of video monitoring (Alzheimer Europe, 2010, p. 61). Regardless of how active or passive the technology may be, there is an important balance to be struck here between using technology to ensure the safety of the individual and reassurance for carers on the one hand, and protection of the individual's personal privacy on the other (Alzheimer Europe, 2010, p. 61). It is also important to recognise the distinction between informational privacy, as may arise in the context of sharing of data collected about a person with a third party, and other forms of privacy, such as a sense of 'physical privacy' that may be violated by being observed (Birchley et al., 2017).

Monitoring technologies may provide comfort and relief to carers and in many instances the interests and perspectives of carers will align with those of the person for whom they are caring as, for example, when the use of technology to support the caring of person with dementia assists the person to continue to live in their own home, cared for by a family member (Ienca et al., 2016, p. 566). An approach that conceptualises a person's needs and interests in the context of their relationships with others can help to provide valuable insights into the best means of addressing those needs (Alzheimer Europe, 2010, p. 44; Herring, 2009). However, monitoring technologies also have the potential to be intrusive. The use of a human rights lens to evaluate the use of technology ensures that the interests of the person being cared for, including their privacy-related rights, are given full consideration (Bennett et al., 2017).

The right to privacy is recognised in international human rights law, including in Article 22 of the CRPD (Bennett et al., 2017, p. 751). Importantly, Article 22(2) of the CRPD upholds the principle of equal treatment of persons with disabilities stating:

> States Parties shall protect the privacy of personal, health and rehabilitation information of persons with disabilities on an equal basis with others.

In their 2010 report on assistive technology Alzheimer Europe stated:

> whilst it is important to make AT unobtrusive when fitted in people's homes, there is an argument in favour of making sure that it can be seen, especially in the case of equipment designed for monitoring purposes. Being able to see the equipment, to see when it is switched on and to control it (to the extent that the user has the necessary capacity) has implications for consent, autonomy and management of privacy issues (2010, p. 61).

It will be important for further research to be undertaken on the application of current laws to any data collected in the course of monitoring the activities of a person living with dementia to ensure that the security of that data is maintained, particularly given the likely sensitive and very personal nature of such data. Providing clarity around these issues will be an important element of assessing the human rights considerations of the use of technology for older persons (Bennett et al., 2017).

5.3. Mobility, companionship, and social engagement

Social isolation can be a challenge for older people who may have limited mobility and limited transportation options. The degree to which a technology can be used to support mobility, companionship and social engagement is another factor in assessing the human rights implications of the technology (Alzheimer Europe, 2010). Article 9(1) of the CRPD addresses the measures to be taken by States to enable people with disabilities to live independently:

> To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas.

These CPRD rights will also be relevant for use of assistive technologies (Bennett et al., 2017, p. 750). As mentioned above, once they are fully automated, autonomous vehicles may facilitate increased mobility for older people (Crayton & Meier, 2017; Pettigrew, 2017; Pettigrew, Cronin & Norman, 2018), thus supporting increased social engagement into older age.

The role of technology in supporting or undermining liberty of movement and access to transportation and the physical environment is a relevant factor in a human rights assessment of assistive technology. Some technologies may support freedom of movement by providing tracking of an individual should they become lost. However, it is also possible that technology could be used to monitor a person's movements, or restrict them in ways that infringe on their liberty-related rights and that technology could be used as a form of restraint (Alzheimer Europe, 2010, pp. 66–75; Bennett et al., 2017, p. 751).

Technology may also facilitate opportunities for social engagement and companionship (Alzheimer Europe, 2010). This may be through access to transportation or the use of technology to support safe access to the physical environment but may also include use of technology to support communication with others or through the use of robots as companions. Social robots may provide one form of companionship, although their potential impact on the dignity of users remains a complex ethical issue (Alzheimer Europe, 2010, pp. 56-59; Draper & Sorrell, 2017; Sharkey, 2014). Other commentators have expressed concern over a potential devaluing of caring roles in society if robots are used to care for the elderly (for discussion see, Vandemeulebroucke, de Casterlé & Gastmans, 2018, p. 22). Whether these technologies enhance the opportunities for social interaction and companionship or whether they undermine dignity and privacy will require careful evaluation.

5.4. Accessible on an equitable basis

For technology to be able to play a supportive role in the lives of persons who could use it, the technology needs to be accessible. Cost can be a barrier to the accessibility of technology (Alzheimer Europe, 2010, p. 60; Australian Human Rights Commission, 2018, p. 37) but it is not the only barrier. Other factors, including lack of awareness of technology can also be relevant (Australian Human Rights Commission, 2018, p. 37). As the Australian Human Rights Commission has noted:

> If technology is increasingly the main gateway to participate in the core elements of individual and community life, this gateway must accommodate all members of the Australian community, regardless of their disability, race, religion, gender or other characteristic (Australian Human Rights Commission, 2018, p. 36).

Lack of accessibility to technologies that can enhance healthy ageing may exacerbate existing inequalities and vulnerabilities. Thus accessibility is a key factor in assessing the human rights implications of new technologies.

6. Conclusion

In countries around the world populations are ageing. This trend

will place increased pressure on health budgets and present policy challenges for governments to introduce programs to support healthy ageing. Technology does hold the promise of supporting the lives of people into old age and the lives of older persons living with disabilities. These technologies may assist with the tasks of everyday living, and support social engagement and mobility. A human rights lens can provide valuable insights to assist in deciding whether the use of technology will be supportive of older persons, including those with disabilities. Key questions to be decided are: who gets the decision-making rights in relation to whether to use a technology; whether the technology protects the privacy, dignity, and liberty of the person using it; whether it supports mobility, companionship, and social engagement; and finally, whether the technology is accessible to all on an equitable basis.

When we do engage with the legal, social and ethical implications of technological and scientific advances we should remember the importance of putting the person first (Alzheimer Europe, 2010, p. 94). Our analysis of technology should be first and foremost about the ways in which advances in science and technology impact on people's lives. This is particularly important for vulnerable individuals and groups. A human rights lens will remind us of this.

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References

Alzheimer Europe (2010). *The Ethical Issues Linked to the Use of Assistive Technology in Dementia Care.* Alzheimer Europe.

Alzheimer's Society (2015). *Assistive technology - Devices to help with everyday living: Fact sheet.* Alzheimer's Society UK.

Ashcroft, R. E. (2010). Could human rights supersede bioethics? *Human Rights Law Review, 10*(4), 639–660.

Australian Human Rights Commission (2018). *Human rights and technology: Issues paper (July 2018).* Sydney: Australian Human Rights Commission.

Australian Law Reform Commission (2014). *Equality, capacity and disability in Commonwealth laws.* Sydney: Australian Law Reform Commission.

Australian Law Reform Commission (2016). *Elder Abuse - Discussion Paper (DP 83).* Sydney: Australian Law Reform Commission.

Baer, B., Bhushan, A., Taleb, H. A., Vasquez, J., & Thomas, R. (2016). The right to health of older people. *Gerontologist, 56*(Suppl. 2), S206–S217. https://doi.org/10.1093/geront/gnw039.

Bartlett, P. (2012). The United Nations Convention on the Rights of Persons with Disabilities and mental health Laws. *Modern Law Review, 75*(5), 752–778.

Bennett, B., McDonald, F., Beattie, E., Carney, T., Freckelton, I., White, B., & Willmott, L. (2017). Assistive technologies for people with dementia: Ethical considerations. *Bulletin of the World Health Organization, 95*, 749–755.

Bielby, P. (2014). Research on patients with dementia. In C. Foster, J. Herring, & I. Doran (Eds.). *The law and ethics of dementia* (pp. 361–378). Oxford and Portland, Oregon: Hart Publishing.

Birchley, G., Huxtable, R., Murtagh, M., ter Meulen, R., Flach, P., & Gooberman-Hill, R. (2017). Smart homes? Private homes? An empirical study of technology researchers' perceptions of ethical issues in developing smart-home health technologies. *BMC Medical Ethics, 18*, 23.

Brims, L., & Oliver, K. (2018). Effectiveness of assistive technology in improving the safety of people with dementia: A systematic review and meta-analysis. *Aging & Mental Health*. https://doi.org/10.1080/13607863.2018.1455805.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress and prosperity in a time of brilliant technologies.* New York and London: WW Norton & Co.

Clough, B., & Brazier, M. (2014). Never too old for health and human rights? *Medical Law International, 14*(3), 133–156.

Cox, C., & Pardasani, M. (2017). Aging and human rights: A rights-based approach to social work with older adults. *Journal of Human Rights and Social Work, 2*(3), 98–106. https://doi.org/10.1007/s41134-017-0037-0.

Craigie, J. (2015). A fine balance: Reconsidering patient autonomy in light of the UN Convention on the Rights of Persons with Disabilities. *Bioethics, 29*(6), 398–405.

Crayton, T. J., & Meier, B. M. (2017). Autonomous vehicles: Developing a public health research agenda to frame the future of transportation policy. *Journal of Transport & Health, 6*, 245–252.

Doron, I., Cox, C., & Spanier, B. (2018). Comparing older persons' human rights: Exploratory study of the International Older Persons' Human Rights Index (IOPHRI). *The Gerontologist*. https://doi.org/10.1093/geront/gny080.

Draper, H., & Sorrell, T. (2017). Ethical values and social care robots for older people: An international qualitative study. *Ethics and Information Technology, 19*, 49–68.

Eltis, K. (2014). The use of new technologies in the management of dementia patients. In C. Foster, J. Herring, & I. Doron (Eds.). *Law and Ethics of Dementia* (pp. 433–442). Oxford and Portland, Oregon: Hart Publishing.

Fetherstonhaugh, D., McAuliffe, L., Bauer, M., & Shanley, C. (2017). Decision-making on behalf of people living with dementia: How do surrogate decision-makers decide? *Journal of Medical Ethics. 43*, 35–40.

Fineman, M. A. (2012). 'Elderly' as vulnerable: Rethinking the nature of individual and societal responsibility. *Elder Law Journal, 20*, 71–111.

Garçon, L., Khasnabis, C., Walker, L., Nakatani, Y., Lapitan, J., Borg, J., Ross, A., & Berumen, A. V. (2016). Medical and assistive health technology: Meeting the needs of aging populations. *Gerontologist, 56*(S2), S293–S302.

Gibson, G., Dickinson, C., Brittain, K., & Robinson, L. (2018). Personalisation, customisation and bricolage: How people with dementia and their families make assistive technology work for them. *Ageing & Society,* 1–18.

Herring, J. (2009). Losing it? Losing what? The law and dementia. *Child & Family Law Quarterly, 21*, 3–29.

House of Lords Science and Technology Select Committee (2017). *Connected and autonomous vehicles: The future? (HL paper 115).* London: House of Lords.

House of Representatives Standing Committee on Health and Ageing (2013). *Thinking Ahead: Report on the Inquiry into Dementia: Early Diagnosis and Intervention.* Canberra: Commonwealth of Australia.

Ienca, M., Jotterand, F., Vica, C., & Elger, B. (2016). Social and assistive robotics in dementia care: Ethical recommendations for research and practice. *International Journal of Social Robotics, 8*, 565–573.

Ienca, M., Wangmo, T., Jotterand, F., Kressig, R. W., & Elger, B. (2018). Ethical design of intelligent assistive technologies for dementia: A descriptive review. *Science and Engineering Ethics. 24*, 1035–1055.

Jarvis, F., Clemson, L. M., & Mackenzie, L. (2017). Technology for dementia: Attitudes and practices of occupational therapists in providing assistive technology for way finding. *Disability & Rehabilitation: Assistive Technology, 12*(4), 373–377.

Kesby, A. (2017). Narratives of aging and the human rights of older persons. *Human Rights Review, 18*(4), 371–393. https://doi.org/10.1007/s12142-017-0470-6.

Lehoux, P., & Grimard, D. (2018). When robots care: Public deliberations of how technology and humans may support independent living for older adults. *Social Science & Medicine, 211*, 330–337.

Lorenz, K., Freddolino, P. P., Comas-Herrera, A., Knapp, M., & Damant, J. (2019). Technology-based tools and services for people with dementia and carers: Mapping technology onto the dementia care pathway. *Dementia, 18*(2), 725–741.

Love, J. G., & Lynch, R. (2018). Enablement and positive ageing: A human rights-based approach to older people and changing demographics. *International Journal of Human Rights, 22*(1), 90–107.

Mann, J. M., Gostin, L., Gruskin, S., Brennan, T., Lazzarini, Z., & Fineberg, H. V. (1994). Health and human rights. *Health and Human Rights. 1*(1), 6–23.

Marasinghe, K. M., Lapitan, J. M., & Ross, A. (2015). Assistive technologies for ageing populations in six low-income and middle-income countries: A systematic review. *BMJ Innovation, 1*, 182–195.

Mikolajckyz, B. (2018). *Older persons' right to health: A challenge to international law.* Ageing & Society https://doi.org/10.1017/S0144686X18000156.

Montgomery, J. (2017). Data sharing and the idea of ownership. *The New Bioethics, 23*(1), 81–86.

Moyle, W., Jones, C., Murfield, J., Thalib, L., Beattie, E., Shum, D., & Draper, B. (2019). Using a therapeutic companion robot for dementia symptoms in long-term care: Reflections from a cluster RCT. *Ageing & Mental Health, 23*(3), 329–336.

Mulvenna, M., Hutton, A., Coates, V., Martin, S., Todd, S., Bond, R., & Moorhead, A. (2017). Views of caregivers on the ethics of assistive technology used for home surveillance of people living with dementia. *Neuroethics, 10*, 255–266.

Murphy, T. (2013). *Health and Human Rights.* Oxford and Portland, Oregon: Hart Publishing.

Nauha, L., Keränen, N. S., Kangas, M., Jämsä, T., & Reponen, J. (2018). Assistive technologies at home for people with a memory disorder. *Dementia, 17*(7), 909–923.

Neven, L., & Peine, A. (2017). From triple win to triple sin: How a problematic future discourse is shaping the way people age with technology. *Societies, 7*, 26.

Nuffield Council on Bioethics (2009). *Dementia: Ethical issues.* London: Nuffield Council of Bioethics.

O'Brolcháin, F. (2017). Robots and people with dementia: Unintended consequences and moral hazard. *Nursing Ethics*. https://doi.org/10.1177/0969733017742960.

Pettigrew, S. (2017). Why public health should embrace the autonomous car. *Australian and New Zealand Journal of Public Health, 41*(1), 5–7.

Pettigrew, S., Cronin, S. L., & Norman, R. (2018). Brief report: The unrealized potential of autonomous vehicles for an aging population. *Journal of Aging & Social Policy*. https://doi.org/10.1080/08959420.2018.1500860.

Pino, M., Boulay, M., Jouen, F., & Rigaud, A.-S. (2015). Are we ready for robots that care

for us? Attitudes and opinions of older adults toward socially assistive robots. *Frontiers in Aging Neuroscience, 7*, 141.
Productivity Commission (2013). *An Ageing Australia: Preparing for the future.* Canberra: Productivity Commission.
Sharkey, A. (2014). Robots and human dignity: A consideration of the effects of robot care on the dignity of older people. *Ethics and Information Technology, 16*, 63–75.
Sharkey, A., & Sharkey, N. (2012). Granny and the robots: Ethical issues in robot care for the elderly. *Ethics and Information Technology, 14*, 27–40.
Sifford, K. S., & Bharucha, A. (2010). Benefits and challenges of electronic surveillance in nursing home research. *Research in Gerontological Nursing, 3*(1), 5–10.
Szmukler, G., Daw, R., & Callard, F. (2014). Mental health law and the UN Convention on the Rights of Persons with Disabilities. *International Journal of Law and Psychiatry, 37*(3), 245–252.
Tebbutt, E., Brodmann, R., Borg, J., MacLachlan, M., Khasnabis, C., & Horvath, R. (2016). Assistive products and the Sustainable Development Goals (SDGs). *Globalization and Health, 12*, 79.
Terry, N. P. (2012). Protecting patient privacy in the age of big data. *UMKC Law Review, 81*, 385–415.
United Nations (2006). *Convention on the Rights of Persons with Disabilities (United Nations General Assembly)*.
United Nations (2015). Sustainable Development Goals. Retrieved from www.un.org/sustainabledevelopment/sustainable-development-goals.
Vandemeulebroucke, T., de Casterlé, B. D., & Gastmans, C. (2018). The use of care robots in aged care: A systematic review of argument-based ethics literature. *Archives of Gerontology and Geriatrics, 74*, 15–25.
Wang, R. H., Sudhama, A., Begum, M., Huq, R., & Mihailidis, A. (2017). Robots to assist daily activities: Views of older adults with Alzheimer's disease and their caregivers. *International Psychogeriatrics. 29*(1), 67–79.
World Health Assembly (2016). *Resolution WHA69.3, Global Strategy and Action Plan on Ageing and Health 2016–2020: Towards a world in which everyone can have a long and healthy life*.
World Health Organization (2015). *World Report on Ageing and Health.* Geneva: World Health Organization.
World Health Organization (2017). *Global strategy and action plan on ageing and health.* Geneva: World Health Organization.