AgeTech, Ethics and Equity

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AgeTech, Ethics and Equity

Towards a **Cultural Shift** in AgeTech Ethical Responsibility

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Background

Population ageing is a global phenomenon which presents major challenges for the provision of care at home and in the community (ONS, 2018). Challenges include the human and economic costs associated with increasing numbers of older people with poor physical and mental health, loneliness, and isolation challenges (Mihalopoulos et al., 2020). The global ageing population has led to a growth in the development of technology designed to improve the health, well-being, independence, and quality of life of older people across various settings (Fang, 2022). This emerging field, known as "AgeTech," refers to "the use of advanced technologies such as information and communications technologies (ICT's), technologies related to e-health, robotics, mobile technologies, artificial intelligence (AI), ambient systems, and pervasive computing to drive technology-based innovation to benefit older adults" (Sixsmith, et al., 2020 p1; see also Pruchno, 2019; Sixsmith, Sixsmith, Fang, and Horst, 2020).

AgeTech has the potential to contribute in positive ways to the everyday life and care of older people by improving access to services and social supports, increasing safety and community inclusion; increasing independence and health, as well as reducing the impact of disability and cognitive decline for older people (Sixsmith et al, 2020). At a societal level, AgeTech can provide opportunities for entrepreneurs and businesses (where funding and appropriate models exist) (Akpan, Udoh and Adebisi, 2022), reduce the human and financial cost of care (Mihalopoulos et al., 2020), and support ageing well in the right place (Golant, 2015).

However, alongside the positive intended consequences of AgeTech, the introduction of AgeTech into older people's everyday life can create unintended problems based on the financial burden and social exclusion (Fang et al., 2022a,b), including:

- Inequalities in accessing AgeTech which can exacerbate social marginalisation and poor health and care outcomes;
- Social and employment exclusion through the digital divide and poor usability;
- Ethical issues including structural and relational power dynamics, and ethical questions around family relationships;
- Acceptability issues.

Considering the individual and societal challenges posed by AgeTech and potentially harmful unintended consequences, innovation in AgeTech requires a comprehensive understanding of the needs, aspirations, and everyday lives of older people to develop practical solutions that are responsive to their diverse needs, yet also maintain socially just and equitable access (Fang, 2022b).

This includes considering the needs of older people who may have multiple health challenges, low income, limited social support, and who reside in rural or remote areas with limited exposure to technology.

This suggests a sound ethical basis is needed to AgeTech whereby social justice and rights-based lenses should be considered if AgeTech design, research

and development is to enhance, rather than degrade, older people's lives. However, socially just and equitable models for AgeTech bring ethical challenges across the entire AgeTech pipeline (Sixsmith et al, 2021), from the generation of ideas to the commercialisation process (Sixsmith, J., 2022), requiring a re-think about who is responsible for ethical AgeTech and how AgeTech stakeholders, as a community, can shift towards a more integrated ethical and equitable design, research, development and implementation culture. This project develops understanding of this culture shift in terms of the ethical and equity implications involved.

Aims

The aims of this project are:

1 **To explore ethical issues involved in AgeTech design, research, and development, and the broader ethical cultural shift required to ensure ethical and equitable AgeTech products, services and solutions for older people and their family and carers.**

2 **To develop AgeTech ethical conversations with partners in Canada and Brazil towards developing future AgeTech research and development opportunities in response to future funding calls.**

Ethical Approval

Ethical Approval to use workshop data for research purposes was gained from the **University of Dundee's School of Health Sciences** on 8th June 2023.

What we did

To address the aim, we designed three workshops based on a series of presentations and associated activities:

Workshop 1

AgeTech and the disruptive digital divide

June 8, 2023 - Hybrid event

Workshop 2

Personal agency, protection and privacy

June 21, 2023 - Online event

Workshop 3

Unpredictability and unintended consequences

June 23, 2023 - Online event

These workshops were attended by healthcare professionals and researchers in physiotherapy and occupational therapy, older people with backgrounds and expertise in dementia advocacy, engineering and healthy ageing, students in health sciences and researcher/academics in the disciplines of health sciences, psychology, generontology, sociology, business, history, art and design, and technology, all of whom had an interest in shaping AgeTech research.

AgeTech, Ethics and Equity: Prioritising involvement of older people in Ageing and Technology Research and Development

International Workshop Series

Technology is increasingly important in everyday life. While there are many benefits for older people, technology needs to be implemented in a way that's ethically appropriate for them and considers issues of equity. We're inviting anyone who works with older people, healthcare professionals, academics, policy analysts, and others who are interested in AgeTech research and development to join our series of in-person and online co-creation workshops. AgeTech covers digital technology for older adults, including mobile technologies, AI, and computing.

We'll be using scenarios and structured discussions to explore issues of ethics and equity in AgeTech research and development. Participants will be invited to reflect on their own use of technology, and to share their thoughts about ethical questions such as personal agency and surveillance.

Our programme involves one hybrid and two Teams workshops:

Workshop 1: AgeTech and the Disruptive Digital Divide

Thursday 8th June 2023 15.00-17.00 GMT (Hybrid – in-person, University of Dundee and Teams)

Presentation: Taiuani Marquine Raymondo on Ageing, inclusion and the digital divide: the global scene. We will consider how older people, especially those who are marginalised, may be excluded from advances in digital technologies, with less chance of benefiting from them and how to better include them in future technological developments.

Workshop 2: Personal Agency, Protection, and Privacy

Wednesday 21st June 15.30-17.30 GMT (Microsoft Teams)

Presentation: Andrew Sixsmith on AgeTech, Privacy and Trust. The discussion around this will provide key insights into the ethical issues surrounding privacy, protection, and agency specific to AgeTech development, and how these can be addressed in a collaborative way with older people.

Workshop 3: Unpredictability and Unintended Consequences

Friday 23rd June 15.30-17.30 GMT (Microsoft Teams)

Presentation: Judith Sixsmith on AgeTech, Complexity and Consequences: Thinking about AI and Inequity. This workshop will consider the benefits of including diverse groups of older people in the research, development, and implementation of AgeTech advances, and it will explore the existing and potential ethical issues in AgeTech research and development culture which can foster inequity.

Design Exercise

Each two-hour workshop began with a presentation from an expert in the area, followed by a question-and-answer section. Breakout rooms were then convened in workshops 1 (three breakout rooms) and 2 (two breakout rooms) to discuss a persona and scenario linked to the topic of the workshop and led by facilitators. In workshop 3, the breakout rooms were organised around a design exercise.

Personas and Scenarios

Personas are descriptions of a fictional person created using research data based on lived experience (Adlin and Pruitt, 2010). They are often used as a tool in the design and development of technology for particular population groups (Jackson and Hwang, 2021). **Scenarios** combine the settings or situations of real people to create a composite fictional narrative which sets out how or why a person acts in a particular way (Carroll, 2000). Together, **personas and scenarios** provide a level of detail about a particular fictional person in a particular situation which aids discussion. Personas and scenarios were used in workshops 1 and 2.

Using **design exercises** in research can help to solve complex problems through the application of divergent thinking and discussion. The design exercise process enables insight into the prioritisation of ideas, leading to critical consideration of the finished design. In the current context, a design exercise was used in workshop 3.

Workshop 1

AgeTech and the disruptive digital divide

Presentation:
Taiuani Marquine Raymundo on Ageing, inclusion, and the digital divide: the global scene

Breakout Room 1: The digital divide

Question: Has Mike been affected by the digital divide? If so, how?

Breakout Room 2: Algorithms and AI

Question: How do algorithms and AI cater for older people with similar experiences to Mike?

Breakout Room 3: Health and wealth

Question: We do not know what Mike's socioeconomic situation is, but we know he's generally in good health. If Mike could afford them, how might technology assist him live independently at home?

The digital divide can have a significant impact on the ability of older people to access and benefit from AgeTech. Not all older people have sufficient digital literacy or the same access to technology and assumptions about literacy and access may distance them from health and social benefits or the benefits of engagement in society (Fang, Canham, Battersby et al., 2019). Intersecting factors including age, gender, education, or employment status can shape older people's access to and use of technology. For example, for older women, limited education or employment experiences which precluded use of technology can contribute to the widening the digital divide (Fang et al, 2019).

This workshop focused on how older people, especially those who are marginalised, may be excluded from advances in digital technologies, with less chance of benefiting from them, and addressed issues of inclusion and exclusion which underpin ethical questions for AgeTech.

MIKE

Adapted with permission from Sixsmith, Sixsmith, Fang and Horst, 2020, pp. 22-23

Persona: Mike is an 82-year-old widower who lives alone in a traditional neighbourhood in the centre of Liverpool in the United Kingdom (UK). He is generally in good health, but he has been living with dementia for about five years, which has now progressed enough to significantly impact his daily activities. He experiences periods of forgetfulness and confusion, but lives at home with the support of his sister. He is generally independent - shopping, cleaning, and cooking for himself. He is proud of his independence and would not like to have strangers assisting him at home.

Scenario: Mike's sister recently became unable to visit, and Mike began to experience ulcers on his feet at the same time. Mike's sister had been taking care of many of his health needs, including his feet. Due to these ulcers, Mike was unable to enjoy his usual walks around his local area, and he was unable to leave the house to buy food, or to stand for long periods to cook. Mike's sister has been unable to visit regularly, and Mike's foot health is now affecting his nutrition and sense of independence. His health has now deteriorated to the point where an acute admission into hospital is likely.

Workshop 2

Personal agency, protection and privacy

Presentation:
Andrew Sixsmith on
AgeTech, Privacy and Trust

Breakout Room 1: Personal Agency

Question: Is Albert's personal agency being respected with the possibility of employing this assistive technology? What are the key ethical issues surrounding privacy, protection, and agency specific to AgeTech development? Explore ideas about the home as a power base.

Breakout Room 2: Protection

Question: How could this type of assistive technology offer protection for Albert and his daughter? How these can be addressed in a collaborative way with older people?

AgeTech systems are increasingly being mainstreamed and deployed as community supports with the potential to help older people perform everyday activities and live in their own homes for as long as possible. These involve monitoring health changes, connecting to community and health services, and detecting emergency situations such as falls (see Van der Roest et al., 2017; Sixsmith et al., 2020; Ren and Peng, 2019). Trials of these systems have, however, highlighted ethical dilemmas around surveillance, as well as trust issues which can disrupt social relationships, and the creation of observer-observed power relationships.

Privacy concerns in the context of in-home monitoring and surveillance in semi-public and public spaces have also been identified and linked to AgeTech (Berridge and Fox Wetle, 2020; Fontes et al., 2022), again highlighting how technology can fundamentally change social relationships and personal agency. The "home" is often considered a power base for an ageing person, where they have control over access, visibility, and personal domains (Mortenson, Sixsmith and Woolrych, 2015). The growth of technologies and their crossover into older people's lives has created important concerns for data protection, privacy, and personal agency in home and public spaces. This workshop addressed the implementation and use of AgeTech in monitoring systems for older people, particularly concerning personal agency and privacy.

ALBERT

Persona: Albert lives in his own apartment in Sydney, Australia. He has enjoyed being physically active and spending time with his friends throughout his life. He was diagnosed with Alzheimer's Disease four years ago, but it has now advanced to the point that he can't remember the routes for the walks he used to do. Albert's daughter works full-time, lives several hours away, and cannot care for her father full-time. She is growing increasingly concerned about his declining physical strength, fearing that he might fall without her knowledge. Liz is particularly worried about Albert's personal safety and well-being, as she has discovered the front door left open during several recent visits.

Scenario: Liz has been contemplating the use of technology to monitor her father for some time now. She has heard about an in-home monitoring system that offers detailed insights into Albert's daily routines and activities. The system would promptly notify Liz if Albert remains inactive or leaves the house, including instances when he unintentionally leaves the front door open. Liz feels that this technology would provide an enhanced sense of reassurance regarding her father's security and safety.

Workshop 3

Unpredictability and unintended consequences

Presentation:
Judith Sixsmith on AgeTech, Complexity and Consequences: Thinking about AI and Inequity

Workshop 3 Design Exercise

As a social robot, the 'paro seal' is an AI technology in the form of a seal which has been developed as a therapy for older people with dementia. It is intended to provide comfort, stimulation, and playfulness in everyday interactions. It costs around $6,000 per unit and has been used in care home settings. Unintended consequences of a social robot such as the 'paro' seal might be reduced human contact when family and friends assume the seal is supporting the social interactions of the older person.

Introduction of new technology, such as AgeTech, is inherently unpredictable and can lead to both positive and negative unintended consequences. The integration of Artificial Intelligence (AI) into AgeTech has the potential to greatly enhance the health and well-being of older people while at the same time perpetuating the social and health inequalities of more marginalised older people. AI can detect patterns in large datasets, predict future events, control actions, and personalise services to the needs and requirements of technology users. To do this, AI requires large scale data sets as training material. However, these datasets can introduce 'unseen' ethical issues in the relationship between the person and the technology, such as unintentional biases in AI training data (Sixsmith, J. 2022). For example, training data often misses complex information on social context, health, and wellbeing of more marginalised older people such as those with learning disabilities, older Roma people or LGBT+ older people. This means the AI systems are less able to respond appropriately to their needs. With complex and diverse needs unmet, there is a risk of perpetuating historical inequalities. This workshop considered the benefits of including diverse groups of older people in the research, development, and implementation of AgeTech so that negative unintended consequences, particularly those that impact marginalised older people, can be avoided where possible.

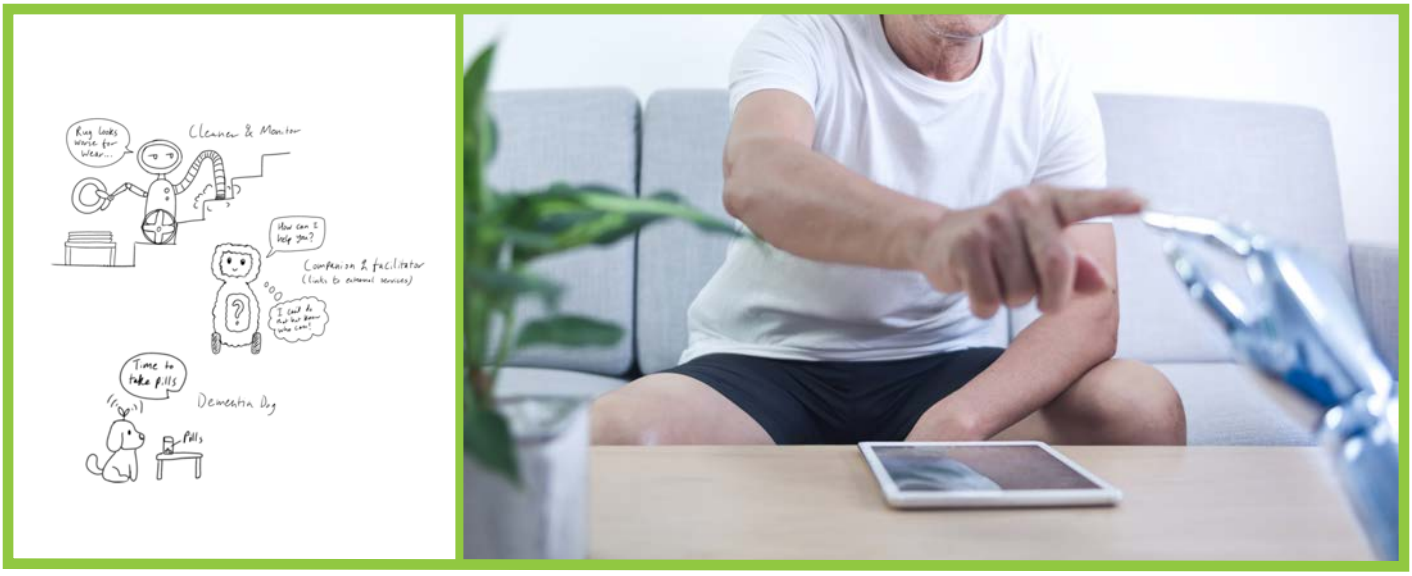
TASKS:

- Think about social robots and technological design for older people
- Now brainstorm as a group around possible unintended consequences of social robots
- Question: If you had unlimited funds, and were asked to develop a social robot, whatwould you create?

QUESTIONS:

1. What kind of social robot did you design? Why?
2. Who should be involved in the design of it?
3. What ethical issues need to be considered?
4. What are the intended benefits?
5. What might the unintended consequences be? How can we find these out?

The above were discussed in a care home context in **Breakout room 1**, and the context of a person's own home in **Breakout room 2**.



Analysis

The workshops were recorded, transcribed, and anonymised for participants' personal information and for any other identifying details. Notes were taken during breakout sessions. The data was thematically analysed (Braun et al., 2019) in a reflexive team approach. Each workshop was considered as a dataset in itself. Two team members read through the data transcripts to familiarise themselves with each dataset. Data was coded for meaningful chunks of information related to the research questions and those codes were brought together into potential themes. Following this, themes were discussed by team members taking part in the analysis, and were then collaboratively finalised. Each team member provided a reflexive account of their experience of the workshops to critically examine preconceived ideas and assumptions underlying the thematic analysis. In the analysis below, all workshop attendees, including members of the research team, are considered as participants. This recognises the participation of all attendees as individuals with expertise and knowledge drawn from different academic, professional and experiential domains in order to position all contributions to discussions and analyses as of equal weight and importance. The themes are presented for each workshop below followed by the reflexive analysis.

Workshop 1 Analysis: AgeTech and the Disruptive Digital Divide

Workshop 1 themes reveal the multiple, and sometimes unexpected, ways that older people can be 'left behind' in AgeTech research and developments. The two themes generated are: Digital

Hinterlands; and Disrupting Technology.

Workshop Theme 1.1: Digital Hinterlands

The initial discussion focused on the group's understanding and experiences of the key factors that either impede or facilitate digital inclusion for older people. Conversations centred on the generational differences in the ability to adapt to increasingly complex ubiquitous technologies, and how not growing up with technologies or a lack of exposure to technology in the workplace had resulted in what one participant described as 'a lack of history of (technological) problem-solving':

"My parents didn't get to using err, technology until they were much older, and because of that they didn't really have that hinterland of…one step in technology, followed by another, followed by another, followed by another. And because of that, they just don't have that sort of dexterity if you like, that we have, to understand how apps work."

Participants widely recognised the importance of social context in shaping the digital divide, specifically the importance of social connection in helping older technology users navigate increasingly complex technologies and act as an intermediary when 'something goes wrong'.

"Things get more complex, as systems get more complex, it's difficult as a…as a user of that technology, to understand actually what's happening… if it doesn't turn on, what then, then what? When things go wrong, and you don't have the background knowledge that you need, maybe that's when you use the, umm, I'm not going to call them a proxy, but maybe that in-between person."

The discussion also touched on the importance of understanding social context as dynamic, and how shifting relationships could also impact a person's ability to access technology and consequently their ability to benefit from the opportunities offered by technology.

For example, a breakout discussion focusing on the persona of Mike, a person dealing with declining physical and cognitive health, and the opportunities to integrate technologies into his life to enhance autonomy and independence, highlighted how Mike's access and use of technology would change if, for example, his sister as his main caregiver were to move away.

In this way, the barriers and enablers for older people's technology use which are linked to equity and ethics are clearly seen to affect not only autonomy, independence and well-being, but also to have wider implications for older people who are technology users.

Theme 1.2: Disrupting Technology

The pervasive nature of technology emerged as a consistent theme throughout the workshop. The impact of technological disruption on older people's everyday lives and the diverse factors that shape their ability to respond and adapt to rapid technological advancement may become more challenging as they age.

Several participants reflected on how the digitisation of essential services (such as banking or welfare services) had left some older people behind in their ability to access the benefits of those services, thereby increasing their marginalisation from mainstream society. This reflects a broader challenge for society.

"I think it's less of a digital divide and (more of) a leaving behind of, of a lot of

people…So I kind of don't…like the concept of the digital divide, because the, you know, the, the because the inequalities, the inequity, err, within systems, now…means that people are getting le-left behind. For, even essential services in society."

Participants highlighted the need for those involved in the design and implementation of technologies aimed at improving independence and autonomy to consider the consequences when a technology fails, highlighting how over-reliance on a single technology could potentially accentuate a person's sense of vulnerability:

"…you can…maybe get Alexas in dozens of disabled people's homes, and that may seem like a finished job, but then…after they become reliant on it, if there's a power cut, a hack, a missed payment, whatever…they're stranded."

This comment underscores the need for recognition of the challenges associated with technology dependency, particularly for the most vulnerable. Overall, workshop one analysis underscores the importance of a cultural shift in ethical thinking in the AgeTech field, particularly the need to better identify the role of developers and the blindness of society more generally concerning the potential negative consequences in the product or service design. This is particularly important considering the fallibility and unpredictability of technology and the adverse impact technological failures have on the most vulnerable and marginalised.

Workshop 2 Analysis - Personal Agency, Protection and Privacy

The findings from workshop two highlight opportunities to shift AgeTech ethical thinking around personal agency, protection, and privacy, pointing to the contextual factors involved in understanding changing the ethical landscape in AgeTech research and development. Two themes were generated: Bridging the Ethical Gap; and Contextualising Autonomy.

Theme 2.1: Bridging the Ethical Gap

Part of bridging the ethical gap in the research and production of technologies for older people involved discussing what ethics meant as a term.

One workshop participant suggested that ethics can be a mysterious process which is nevertheless of public concern: 'ethics is about things that are in the, in the public sphere, particularly in the professional sphere, and tend to be codified'.

Engagement with transdisciplinary notions of ethics and professional codes of conduct could provide opportunities to shift ethical thinking around 'ethics within the sort of medical and caring and social field'

or the ethics of technology development; where the lived experience of older people is less likely to feature as important as the technicalities of protection: 'ethics are a framework but don't really give us huge insights into things like…personhood'.

This means that their personal experiences of privacy and independence as individuals were deemed less important that the social blanket of protection. However, discussions and activities across multiple disciplines were proposed to offer a new roadmap for transforming ethical thinking in AgeTech while challenging ageist conceptualisations.

Workshop participants expressed the need to bridge the gap between AgeTech designers, developers, and researchers, and AgeTech consumers and users to enhance ethical thinking relating to personal agency, protection and privacy. Priorities for shifting ethical thinking involved accurately identifying AgeTech consumer and user groups, improving understanding of the diverse users and consumers of AgeTech among its designers, developers, and researchers, and improving understanding of living with AgeTech among its users and consumers.

The concept of 'trust' among users and consumer was deemed an important ethical consideration. Participants felt that lack of trust in technology can be 'highly context specific' and expressed in various ways. Accordingly, effective technological solutions require input from diverse groups of users and consumers where issues of how trust and other factors in technology adoption can be developed are addressed.

As one workshop participant noted, 'people developing technology need a real deep understanding of what they're doing and why they're doing it…and it has to be more individual'. Consultation with specific groups of older people, including those who are seldom heard, could help to shift ethical thinking through enhanced understanding of older people's diverse needs.

"In some ways everybody is unique. Their social environments are unique and the way that you use technology and how technology is implemented in their lives is unique to some extent. So, we need to understand that how technology fits in everyday life from the person's perspective."

It was noted that technology such as monitoring could "fundamentally impact on social relationship and personal agency." A lack of understanding of the context in which a technology is introduced (and relatedly the potential impact of the technology) was seen as a major ethical consideration in the Albert and his daughter Liz scenario:

'I can just see some, you know, Liz, getting some alarm and, you know, ending a meeting and rushing home and, you know, there's Albert going "Ohh wow. You know you left work early. It's good to see you…". You do that a couple of times, and before Albert knows he's in long term care because Liz can't keep leaving meetings for no reason.'

Improved understanding of the diverse views, contexts, and relational stakes relating to older people's consumption and use of AgeTech could shift ethical thinking and promote more equitable development of technology which puts older people's lives at the centre of AgeTech.

Theme 2.2: Contextualising Autonomy

Workshop participants expressed that AgeTech can both confer and remove elements of autonomy from older people. AgeTech, such as fall surveillance systems, can result in the removal of autonomy, for example decision-making about risk or

perceived risk-taking behaviours from the person identified as being at risk.

Technology that supports autonomy was deemed crucial, as exemplified by one workshop participant who said, 'If people have the insight to be able to make decisions about their life we must, we should be trying to support that decision-making'.

The social context of autonomy for older people can be multi-level, including family members, professionals, and organisations. In relation to falls prevention, one participant highlighted the normalised notion of risk assessment in everyday life which can be neglected as people age, saying:

"You know, we all risk assess all the time and we have a risk appetite whether we eat too much and we become overweight or we drink Diet Coke instead of water, you know, we do this all the time. So why when we start to get older, does that get taken away from us?"

Risk management was viewed as another dimension of protection, which could involve surveillance and 'is about control as well as care.' Once surveillance in the home is in place to risk manage the older person's actions, alerting caregivers when age related societal or personal norms are transgressed, their chosen behaviours may be curtailed to keep them "safe".

This can both invade privacy and reduce autonomy as well as provoke the older person to engage in more 'normative behaviours'. Acknowledging the potential for autonomy to be taken away and recognising societal and organisational norms around risk-taking are important in shifting ethical thinking.

Workshop 3 analysis: AgeTech, Intended and Unintended Consequences

Workshop three, focused primarily on the development and use of AI in AgeTech and identified how (dis)empowerment is integrally linked to AI and manifest in intentional and unintentional consequences of its development and use. Issues of what this means for increased ethical awareness throughout the stakeholder chain were discussed. The two themes were generated: 'Centring machine learning with older people'; and 'The good, the bad and the ugly'.

Theme 3.1: Centring Machine Learning with Older People

AI has the potential to benefit all in society but there are attendant risks of AI assuming an influence over people's lives in ways which are unintentional, invidious, and damaging. The example of individuals accessing unbounded information through the Internet leaves their habits, interests, desires and needs open to AI interpretation and manipulation. Many workshop participants felt the

rapid intrusion of AI in everyday life was 'fascinating' but 'frightening', and the following reflection underpinned several conversations around the forward movement of AI:

"We don't always realise that we're dealing with artificial intelligence. For example, when we're scanning through Instagram or we're scanning through Facebook [...] it's ubiquitous, it's everywhere, it's inevitable and its development is marching on at a pace, it's inevitable and it can disrupt."

Understanding what AI is, what it does, and how it learns, can be difficult for many people, particularly older people who may not be familiar with existing technologies and technological developments.

Workshop participants felt that the way AI develops could be more clearly communicated to older users and associated stakeholders, as well as ensuring that the diverse needs of more marginalised older people are well represented in machine learning. This requires that AI training data, used to set up AI systems, are appropriately centred on the diverse needs of mainstream as well as "seldom heard" older populations (e.g. older people with Learning Disabilities or older Roma travellers) so that unconscious bias based in ageist assumptions are avoided.

This would mean contributions from multiple parties along the stakeholder chain are sought ensuring greater understanding of AgeTech implications for marginalised older people who 'are really underrepresented in the training data'. The consequences of inappropriate, ageist or limited training data could, participants felt, negatively impact older people socially or in terms of their health and wellbeing.

Responsibility for ethical thinking across the stakeholder chain in AI within AgeTech research and development must consider not only the use and potential consequences of AI, but also the way that information is shared and how the users of AI consent to and understand these processes. These must respect the autonomy, agency, and rights of AgeTech users – including their right to make choices which others may not agree with.

Theme 3.2: The Good, The Bad and The Ugly

The use of AI in AgeTech has the potential to modify or disrupt older people's social networks and levels of social contact in unintended ways. Workshop participants stressed the importance of human contact and social connection in ageing, and the potential of AI to disrupt these and the wider implications for older people (loss of activity and/or mental health impacts). Further to this, workshop participants emphasised that when AI disrupts social contact, it is important to understand who the resulting disruption benefits, and exactly who gains an advantage from the power conferred in this process. One participant noted that machines can perform basic operations:

"but will they understand …that conversation that people have where they may not be saying exactly the problem… what your true meaning is."

One workshop participant stated 'I think technology is great…when it is used to assist rather than replace' people and support. The need to prioritise social contact and context were felt to be key in AI and AgeTech ethical thinking. During the research and design stages, this means including older people to understand their unique views and social context so that good outcomes can be anticipated, as well as bad and ugly consequences avoided.

Team Reflexivity

Each team member was asked to answer the following reflexive questions related to their experiences of being part of the AgeTech project:

Thinking about the workshops, how do you think you influenced them, and what is it about you as a person and/or a professional that influenced them in this way?

Experiential reflections from the project team incorporated both their own personal and professional dissatisfaction with elements of technology, and their views on how AgeTech could be better shaped for older people they knew or had worked with. Recognising the potential of technology to frustrate and complicate, one team member recognised their workshop influence as a person who sees the usefulness of technology, but who also values its absence in their life.

Team members also recognised that their input and influence in the workshops was shaped by their 'individual frustrations', including practical difficulties with technology, and feeling daunted by poor communication around rapid AI advances. Overall, the reflections demonstrated a fine balance for project team members of individual and interpersonal experiences with wider concerns around ethics and equitable research and development processes in AgeTech.
Team reflections around applying concepts and skills from prior professional practice focused closely on social justice and ethical elements of the team's expertise. Two team members highlighted commitments to understanding features of inequitable gendered access to AgeTech, among other intersectional concerns, with one team member drawing from their 'interest in gendered elements of structural and social inequalities' to apply a social justice lens to the discussions in the project workshops.

Additionally, another team member spoke of her feeling that as she aged, she was becoming 'more invisible as an older [person] both in public and in work life', and that this had shaped her contributions to the workshops. Age also influenced the workshops as more middle-aged participants felt their positionality was one of 'empathising rather than experiencing' technologies as an older AgeTech user, and that the ethical issues need to consider the strengths and great potential of older people rather than focusing solely on their challenges.

Project team members also reflected upon their personal and professional experiences of witnessing, and assisting in, situations where older people might be presumed to have a greater familiarity or literacy with technology than they do, and how these experiences contributed to their input in the workshop series.

The 'gradual familiarity' one team member had seen to be missing with their own parents, and the assumptions and misguided expectations around older people's technology use signalled the difficulties of taking for granted that diverse older people understand or use technology in certain ways.

Overall, the project team brought a combination of disciplinary experience and expertise to the work such that curiosity around 'what others thought in terms of AgeTech as an enhancement of life rather than a solution to health or social problems' was key to this project, to equity and to ethical AgeTech development across the whole research, development, implementation, and commercialisation stakeholder chain.

Concluding Remarks and Key Messages

The ubiquitous march of technology in everyday life requires careful consideration of ethical issues in the design, research, development, implementation, and commercialisation process if equitable, positive individual and societal outcomes for older people are to be achieved, the digital divide reduced, and negative unintended outcomes avoided.

This requires the AgeTech community to:

- Ask appropriate questions about ethical development and the implications of AgeTech on issues of social justice and equitable access to opportunity.
- Ensure that the appropriate stakeholders with the necessary expertise, knowledge and skills are at the design, research and development table and jointly discuss ethical issues as a community responsible for ethical design;
- Work in person-centred design ways, bringing understanding of the needs, wants and everyday lives of diverse older people into the design process;
- Understand the meaning of the "digital divide" for older individual and ensure that inequalities expressed in the divide are not perpetuated. This includes a recognition that some older people are at risk of, or experience being left behind in an increasingly digitised society.
- Develop holistic perspectives on the psychological, social, cultural, experiential, and professional aspects of AgeTech as socio-technical systems operating in complex everyday environments inhabited by older people;
- Appreciate that conceptualisation of moral and ethical imperatives are different across the academic, public and commercial sectors, and that an equitable ethical culture for the design, development implementation and commercialisation of AgeTech must include input from all aspects, disciplines and expertise across the AgeTech pipeline.
- Think through multilevel (individual, social, cultural) AgeTech solutions which are practical, relevant and culturally appropriate to diverse older people and those who live with and care for them, including older people whose experiences are seldom heard, under-researched and who are underserved in our societies;
- Be aware of supportive regulations and policy to avert harm, safeguard civil rights and avoid marginalisation.

At this point, it is important to note that the social determinants of inequity and exclusion are not fixed, but are fluid, flexible social constructs affected by time, place, institutions, and power relations within historical and cultural contexts. To create an equitable and ethical culture around the entire AgeTech process, it is important to tackle the intersecting challenges in older people's everyday lives, identities, and viewpoints. This requires an understanding of older people that goes beyond their "needs" and "desires" and into the expectations and the oppressions they face and the opportunities open to them, as well as cost, infrastructure, skills and usability concerns. This research has highlighted the importance of locating AgeTech within broader, more global contexts of trust, privacy, and unintended personal, social, and global consequences of escalating technological development.

Recommendations

1. Unconscious bias training for all stakeholders involved in the AgeTech enterprise.

2. Involve diverse older people and communities in AgeTech thinking, design, research, development, and marketing, including older people who are marginalised, seldom-heard, and structurally underserved.

3. Ensure AI training data is reflective of marginalised, seldom-heard, and structurally underserved older people.

4. Use person-centred design principles and practices.

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