

LIFELONG PARTICIPATION THROUGH DIGITAL TECHNOLOGY

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FEBRUARY 2017



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ACKNOWLEDGEMENTS

This report draws heavily from the expertise and enthusiasm of the individuals who took part in the interviews with us. We are extremely grateful for the time, insight and ideas that each and every participant gave to this research. We also thank Dr Sarah Dods, Mr David Forman and Ms Barbara Lepani for acting as subject matter experts and informing the development of our stakeholder map. Finally, we thank Dr Simon Dunstall for providing the vision, strategic direction and ongoing support that made this work possible.



1 EXECUTIVE SUMMARY

Due to increases in life expectancy we are now facing what could be the longest ever retirement period in history. With this welcome trend comes new challenges, such as the need to meet increased demand for health and aged care services at a time when the ratio of working aged people to retired people is declining. Further disruption, in the form of exponential developments in digital technology, could exacerbate these challenges, since the automation of work is likely to push less digitally literate older workers into early retirement. But digital technology is not simply an exogenous factor that we are disrupted by. As has always been the case, our ability to flourish into the future will derive from the way in which we harness technology to overcome our challenges and create new opportunities. This report seeks to convey this potential, capturing insights from international experts and high-level representatives from across Australian society to understand how the capacity and energy of older Australians can be enabled by digital technology.

Such a broad question requires consideration of a multiplicity of factors and viewpoints; hence we sought a range of perspectives for this research. Thirty-eight interviews were carried out, with representatives from all levels of government, a range of peak bodies, aged and health care providers, seniors' advocates, researchers and education, recreation, finance, transport and technology providers. The interviews explored three key questions:

1. How might greater reliance on digital technology negatively affect social and economic participation in later life?
2. What are the key opportunities that digital technology might create when it comes to supporting social and economic participation in later life?
3. What actions and/or resources are needed to ensure that the risks are minimised and the opportunities can be realised?

1.1 Findings

RE-DEFINING LATER LIFE

Overall, the experts interviewed in this research were enthusiastic about the many ways in which developments in digital technology could enable lifelong participation. Some felt that the impacts of digital technology were potentially so profound that they could change our preconceptions about ageing, work and participation.

...the nature of work and my participation in society will change. We've got an enormous re-education to go through to start to stop this archaic view of "work, retirement and then 'be put out to pasture'"... I think of the incredible opportunity that we have to have our senior people more involved in life. I see the potential that technology can enable them to have a more active longer productive life than ever before... [13]

HARNESSING THE CAPACITY OF DIGITAL TECHNOLOGY

The manifold opportunities highlighted in the interviews centred around digital technology's capacity to minimise traditional barriers to social and economic participation, including physical and cognitive limitations, geographic distance, social, intellectual and financial capital, information and education and lack of connections. By addressing these barriers, digital technology was seen to open up an array of opportunities that could be adapted to the diverse values and needs of people in later life:

Minimising physical and cognitive limitations – Through the provision of online services, monitoring systems, sensors, video-conferencing, autonomous vehicles and others, digital technology has the capacity to reduce the physical and cognitive limitations experienced in association with age, illness or disability and allow people greater autonomy, mobility, independence and productivity in later life.

Bridging geographic distance – By creating the ability to instantaneously communicate and connect over distance, digital technology would allow individuals to maintain connections with family members or others around the world, access global markets, healthcare networks and education resources from any location, and have greater choice in terms of where and how to live.

Maximising social, intellectual and financial capital – Through digital technology individuals can generate revenue or income in new ways and realise greater return from their assets. Digital technology has also reduced the cost of goods and services. In particular, it has become less expensive to communicate, collaborate, or even start a social or business enterprise.

Access information and education – By providing immediate access to a wide range of information, digital technology (and the internet in particular) provides opportunities for a seemingly infinite number of rich and interactive learning experiences across a range of topics and domains.

Efficient connections – The connective capability of digital technology further supports lifelong participation by joining up people with similar values and interests, allowing service provision to be better tailored to and matched up with the end-user's needs, and facilitating the trust and security that is required to support more direct and individualised transactions.

However, participants acknowledged that the enabling capability of digital technology could also have unintended negative consequences. For example, over-reliance on videoconferencing, home monitoring and telehealth services could actually result in older people spending more time on their own. And along with enabling more efficient connections and access to information, digital technology brings new privacy and security risks. Finally, some workers might experience

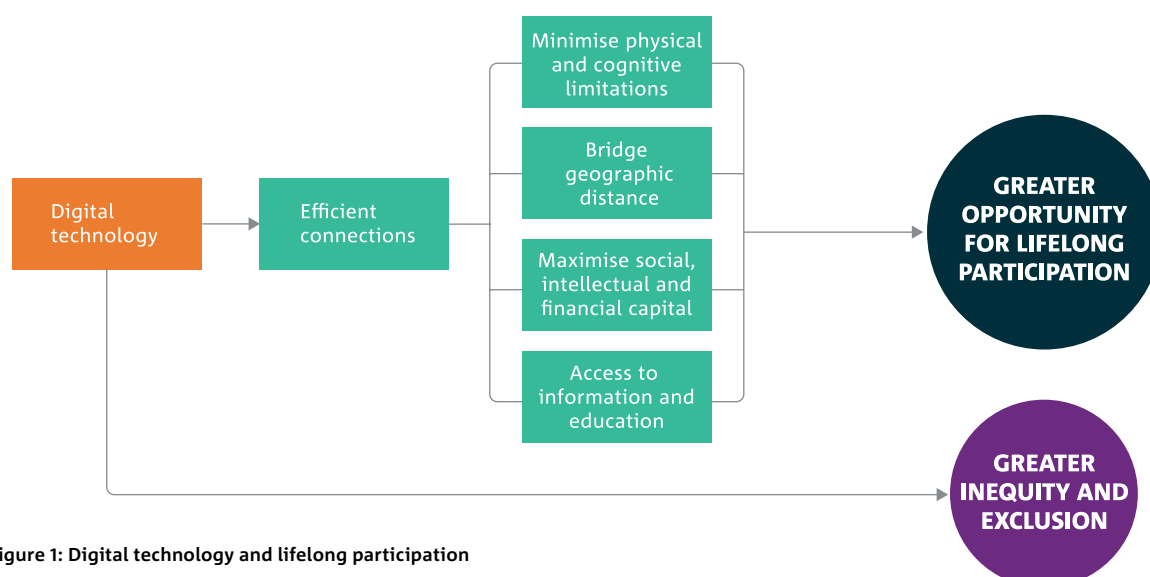


Figure 1: Digital technology and lifelong participation



the more flexible work arrangements enabled by digital technology as more precarious or onerous than traditional employment arrangements.

As digital technology becomes a key enabler of opportunities to participate, it becomes all the more vital to be able to access and use digital technology. Yet currently not everyone has the motivation, skills and resources to engage with the opportunities that are accessed through digital technology. When the very barriers that digital technology can mediate also serve as barriers to access, digital technology actually entrenches existing patterns of inequality and exclusion, an effect commonly referred to as the ‘digital divide’. Although digital technology offered greater potential for lifelong participation for the majority of Australians, it could actually further isolate and disadvantage the minority who are already limited in their ability to participate in our society and economy.

...rather than solving the troubles of the world we're actually going to create a bigger divide between the haves and have nots... [37]

1.2 Priorities

From this research we identify three priorities to address so as to optimise the potential of digital technology with respect to lifelong participation.

Digital inclusion: The ability to access and use digital technology will be a basic requirement for social and economic participation in the future. If we do not ensure that everyone has the resources, confidence and skills to engage with digital technology we increase the risk that many older Australians will be unable to participate on an equal footing with the rest of society. Access to affordable and efficient digital technology will be vital, as will fostering confidence and competence in older Australians regarding this technology. Furthermore, efforts to support digital inclusion need to respond to the diversity within this population, with interventions tailored towards giving people the skills to engage with technology in the ways that are of value to them.

Digital empowerment: Whenever we assume that Australians will have a passive or reactive relationship with digital technology we constrain their potential to participate in the future. Rather than being affected by digital technology, older Australians can be more effective through digital technology. The power of people and technology is realised when humans use technology to connect with each other, to solve problems, and to achieve that which is of value to them. This represents the highest form of digital literacy and is where we need to be aiming collectively.

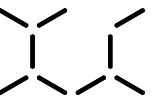
Digital connections: The combination of improved life expectancies and digital technology means that the potential to participate and contribute in later life is more significant than ever. To make best use of this potential we need to improve the linkages between individuals’ interests and capacity (supply of effort) and the valued activities for improving our society (demand for effort). The grandchild who needs caring for and the grandparent who lives in the same city are inherently joined up. However, digital technology provides the connective medium for realising many other opportunities to participate. Once these connections are made, individuals with resources, skills and expertise will be able to choose from a wide range of opportunities, whether by participating in a standby global emergency response taskforce or starting up their own business enterprise. However, there will be fewer options for individuals with less social, intellectual or financial capital. Effort will need to be dedicated towards identifying a broader suite of opportunities and/or providing alternative financial support for these individuals.

NEXT STEPS

Towards realising the opportunities outlined in this report, CSIRO’s Data61 will be inviting research participants and other stakeholders to take part in a forum process, underpinned by a collective impact framework. This forum is intended to build both the vision and the collective resources for testing and realising the potential for digital technology to support lifelong participation.

This report provides a very high-level view of the opportunities for lifelong participation. To complement this perspective we need to engage with a diverse sample of older people to learn more about how they currently participate and the role that digital technology plays in their social and economic activity. As part of this work we might explore how desirable and feasible the opportunities outlined in this report appear in the context of their own lived experiences.

There would also be value in engaging more broadly with older Australians to learn about the choices and transitions that they make as they move from middle to later life. By exploring their experiences we may be able to better define the pathways and forms of participation that people found most successful and rewarding. We should then be in a better position to support others in navigating the opportunities and risks associated with lifelong participation in a digitally-enabled world.



2 INTRODUCTION

In Australia, as in other developed countries, improved life expectancy has meant that many older citizens can look forward to a longer retirement than previous generations. With this welcome trend comes new challenges, such as the need to meet increased demand for health and aged care services at a time when the ratio of working aged people to retired people is declining. Further disruption, in the form of exponential developments in digital technology, could exacerbate these challenges since the automation of work is likely to push some less digitally literate older workers into early retirement. In this context, we cannot afford to wait to be “disrupted by” digital technology. As has always been the case, our ability to flourish into the future will derive from the way in which we harness technology to overcome our challenges and create new opportunities. This report seeks to convey this potential, by capturing insights from international experts and high-level representatives across Australian society as to how the capacity and energy of older Australians can be leveraged through digital technology.

2.1 The challenges

While there is no evidence that technological change leads to long-term increases in unemployment (Williamson et al, 2015), technological disruption can have negative impacts on some individuals and groups. Many jobs have been lost to automation already, and more will be in the future, but at the same time technology is creating large numbers of new jobs (Edmonds and Bradley 2015; Gregory et al. 2016). However, these new jobs often require different (and often increased) skills, and so not all workers will be able to make the transition (Arntz et al. 2016; Hajkovicz et al. 2016). Furthermore, the virtual networks and faster internet connections enabled by digital technology enable well-educated but lower cost overseas workers to compete for local jobs (Committee for Economic Development of Australia, 2015; OECD, 2015). In this context, there is a danger that many Australians could miss out on the opportunity to participate in productive and meaningful activity and secure their financial futures.

Researchers have found that when labour markets are disrupted, late career stage individuals tend to be most vulnerable (Ahituv & Zeira, 2011). Not only are older workers most likely to be made redundant when large job losses are occurring, they are also less likely to find alternative employment (Weller 2007; Murtough & Waite, 2000). Increasing reliance on digital technology also makes it harder for older people to keep up with the necessary skills to remain in employment. Older individuals may have considerable capacity and enthusiasm for productive work but lack the access to training and the confidence to participate in a more digital workplace. They also have less time remaining to justify reskilling for a new occupation. At a broader level, our reliance on digital technology could have negative impacts for older citizens, since older people are less likely to be adept at using the internet and consequently, less able to engage with online services and activities (Dane, Mason & O’Brien-McInally, 2013).

For individuals and society in general, there is a substantial cost associated with people retiring from work and other forms of participation. Increased life expectancy means that retirees will need to be supported, either from their own savings and/or the aged pension, potentially for several decades. Being guaranteed a good income throughout retirement could require savings of up to \$1m at age 65 (Zhu and



Sneddon 2015); those with more modest savings are likely to rely on the pension (either in full or part). This will put additional pressure on Australian government expenditure on aged care, pensions, the National Disability Insurance Scheme (NDIS), education and healthcare services (Department of Social Services, 2015; Kudma, Tran & Woodland, 2015). To compound this, when combined with a falling birth rate, the trend towards a longer life expectancy will result in a decline in the ratio of people working to people retired. This shift will have important ramifications to the tax base that supports these government services (Australian Institute of Health and Welfare 2015).

Even for those who have adequate retirement savings, there are risks associated with disengagement from what sometimes described as our “digital society”. Withdrawal from traditional employment frees up time and energy to participate in different ways, whether by caring for family members, participating in volunteer work or taking a more active role in civil society. In the future, many of these valued and fulfilling roles will require the ability to engage, communicate and collaborate via digital technology. Older Australians who are not empowered to engage with digital technology are at risk of becoming cut off from meaningful and productive activities, which will have negative social impacts for them as individuals and society as a whole. A recent report estimated the value of older Australians’ potential contribution to the economy at around \$69 billion (PricewaterhouseCoopers, 2016).

Furthermore, as more Australians reach the official retirement age, their consumption behaviour in retirement will have important ramifications for the economy. Australians now have more than 1.25 trillion savings in superannuation funds (APRA, 2016). Currently, retirees with significant assets in superannuation tend to drawdown the minimum amount, with the result that many will die with substantial amounts of their superannuation unspent (Sneddon et al., 2016). If older Australians are not confident enough to participate fully and access goods and services via digital channels, we can expect to see even lower levels of spending and consumption in the future. Ensuring that older Australians have the skills and motivation to participate and engage in a more digital society and economy is therefore economically desirable, regardless of an individual’s financial circumstances.

Thus, even though advancements in technology can drive productivity and economic growth (Brynjolfsson & Hitt, 2003; Cardona et al., 2013; Stirih, 2002), the combination of digital and demographic disruption brings with it some serious challenges. On the one hand, longer lifespans require that we remain productive and active for as long as possible. On the other hand, continuous development of, and increasing reliance on digital technology has the potential to discourage social and economic participation in later life. Addressing these challenges is critical. And in so doing, there are important opportunities to be realised.

2.2 The opportunities

Advances in digital technology present manifold possibilities for greater social and economic participation across later life. First, while the automation of work and demand for very digitally literate workers may lead to older workers leaving the workforce, digital technology can provide a valuable tool for generating income outside of traditional employment models. Previously, the time, expertise and costs involved in setting up a business (marketing your skills or product, managing contracts and payments, communicating with customers) made it more efficient for people to pool their effort and skills and work in organizations (Coase, 1937). Now, there are new digital social tools to enable individuals to work collaboratively outside of traditional institutional structures, without managerial intervention and, sometimes, outside the profit motive (Shirky, 2008). Freelancing, crowdsourcing and other types of peer-to-peer platforms allow individuals to offer their services or products to an international market. Furthermore, digital services such as skype, online banking and online learning have reduced the costs associated with communications, business transactions and skills development for running a business.

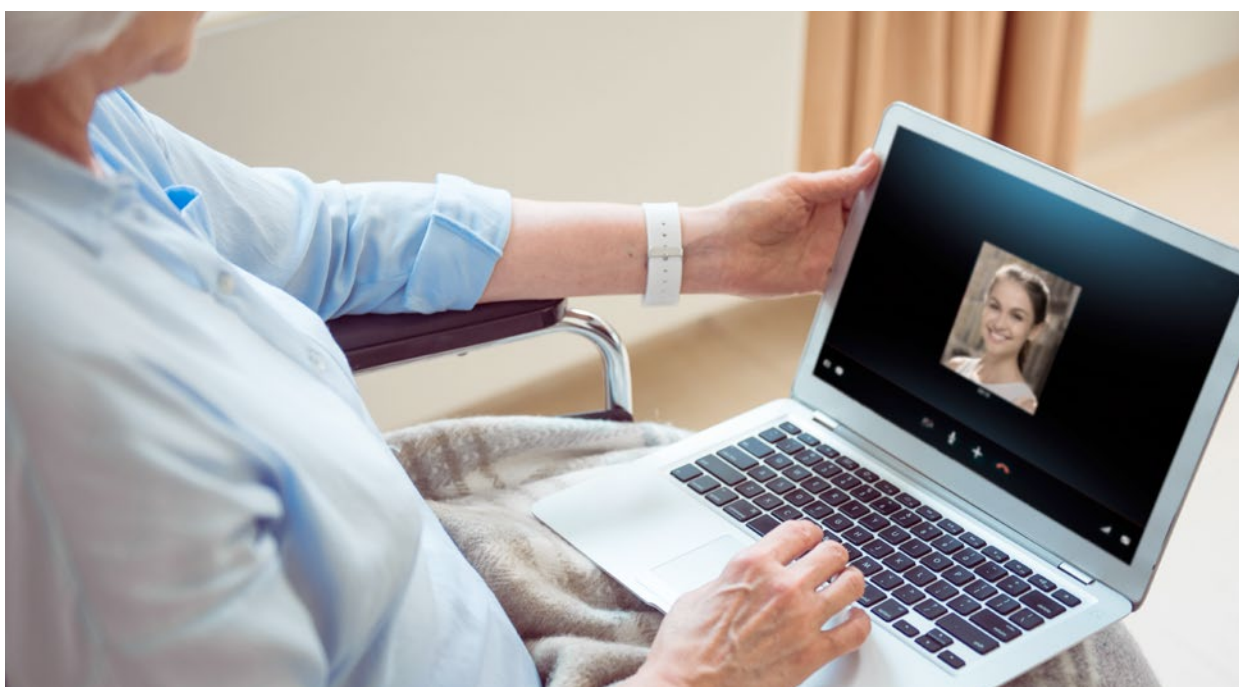
There is already a higher proportion of self-employed workers or employers in the 60+ age group (Brown, Miranti & Li, 2015) and there is evidence that many would value the opportunity to continue working. A recent survey of Australian retirees found that only 40% had decided for themselves when to stop work. The remaining 60% were either forced to retire or nudged out of the workplace (Agnew, Bateman & Thorp, 2012). Australia has already seen a significant increase in labour force participation rates amongst those aged over 60 (Brown et al., 2015) and 24% of

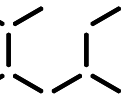
inactive males aged between 55 and 64 years report that they want work but are either discouraged from looking or cannot find work (Chomik & Piggott, 2012). Considering both financial resources and the objectives of people in later life, the flexibility of digitally enabled work arrangements is also likely to be attractive to this group. The opportunity to work more flexibly and tap into new markets allows people to balance paid work with the aspirations and responsibilities common to later life, such as living away from urban business centres, pursuing creative passions and caring for family members.

Digital technology also supports social participation. Older people often suffer from social isolation, with 8-10% of the older population identifying themselves as afflicted by loneliness (Victor, Scambler & Bond, 2009). They are also more likely to experience chronic illness and mobility problems. On the other hand, individuals who are more digitally engaged tend to experience better social outcomes (Koss, Azad, Gurm, & Rosenthal, 2012). Although older people tend to be relatively infrequent internet users, researchers have found that those who do use the internet regularly and in a range of ways report improvements to social connections, community engagement and access to knowledge and skills (Dane et al., 2013). Regular internet use is associated with substantially reduced incidence of depression in retirees (Cotton et al., 2014).

More broadly, digital technology supports community networks, fundraising, volunteering activities and new forms of citizen engagement.

Given the potential interactions between demographic and digital disruption, we believe there is value in exploring whether digital technology can provide a means of facilitating lifelong participation, and if so, how we ensure that it's potential is realised. Such a broad question requires consideration of a multiplicity of factors and viewpoints; hence we sought to capture input from high-level representatives across sectors and stakeholder groups. Informed by subject matter experts and online searches, we carried out interviews with representatives from all levels of government, a range of peak bodies, aged and health care providers, seniors' advocates, researchers, education providers, recreational, finance, transport and technology providers. Through interviews with national and international representatives of these groups, we sought to understand what effects digital technology was expected to have on lifelong participation. We explored their views on the opportunities and risks of digital technology for both social and economic participation and the actions required to ensure that it's potential to support lifelong participation is maximised.





3 ENGAGING WITH STAKEHOLDERS AND EXPERTS

3.1 Identifying participants

A four step process was followed to capture input from well informed and connected individuals representing key groups with an interest in or affected by digital technology and lifelong participation. This process is depicted in Figure 1 and detailed below.

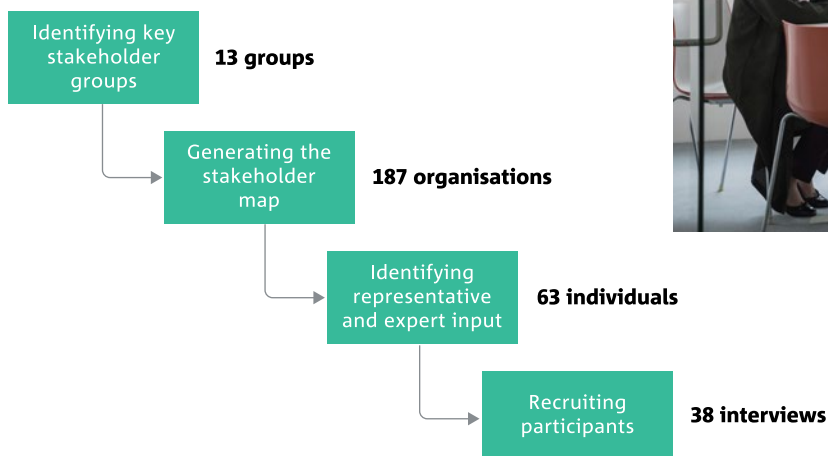


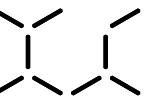
Figure 2: The sequence of steps for identifying participants

- 1. Identifying key stakeholder groups:** Three subject matter experts were asked to nominate sectors of Australian society with an interest in or affected by digital technology and lifelong participation. Based on their advice, we identified 13 key stakeholder groups, each of which had been identified by two or more of the subject matter experts.
- 2. Generating the stakeholder map:** Next, we generated a 'stakeholder map' of relevant organizations and representatives based on suggestions from the subject matter experts, internet searches and consultation with other researchers working in this space. The final map comprised 187 organizations.
- 3. Identifying representative and expert input:** Next, target participants were identified based on the following criteria (in order of priority): (1) a balance of representatives from each of the 13 stakeholder groups, (2) individuals who had a demonstrated interest in, or expertise on, developments in digital technology, (3) high-level representatives of organizations who were well-connected, well-known and respected, and (4) a balance of viewpoints (e.g. across small and large organizations, well-established organizations and new entrants, providing good coverage of the group as a whole).
- 4. Recruiting participants:** Target participants were emailed a letter (followed up with a phone call) formally inviting them to take part in an interview for research exploring "the role of digital technology as an enabler of social and economic participation in later life." Those participants who chose not to participate were replaced by alternative representatives from the stakeholder map. A few additional participants were subsequently invited to take part in the research based on the recommendation of other research participants. The final sample provided input from 38 organizations (and since two people participated in one interview, 39 individuals), representing a 75% response rate.

TABLE 1: INTERVIEW PARTICIPANTS (NOTE THAT THIS LIST IS INCOMPLETE AS SOME PARTICIPANTS PREFERRED NOT TO BE IDENTIFIED IN THE REPORT)

Table 1 lists those individuals who were willing to be identified as participants in the research, along with the name of the stakeholder group that they identified with and their organizational membership and position title.

NAME	STAKEHOLDER GROUP	ORGANIZATION	POSITION
Amelia Loye	Government	Engage2	Director
Andrea Pearman	Community	Australia Post	GM - Marketing and Communications
Andy Gardner	Fund Management	AMP Capital	Investment Manager
Barbara Lepani	Community and Innovation	Blue Mountains Living Lab	Founder
David Spriggs	Not for profit sector	Infoxchange	CEO
Dawn Carr	Academic	Florida State University	Assistant Professor, Sociology
Dorothy Coombe	Regional communities	Country Women's Association of Australia	National President
Dr Kim Houghton	Think tank for regional Australia	Regional Australia Institute	General Manager Policy and Research Organisation
Grant Miller	Volunteering	The Zooniverse / University of Oxford	Special Projects and Communications Lead
Helen Milner	NGO for digital inclusion and empowerment	Tinder Foundation	CEO
Jeremy Duffield	Financial Services	SuperEd	Co-founder
Julian Fogarty	Facilities Management	Spotless	General Manager, Brand, Innovation and Technology
Julie Porteous	Seniors/Community	U3A Network Qld Inc.	President
Lucy Bernholz	Philanthropy and civil society	Stanford PACS	Senior Research Scholar
Marek Kowalkiewicz	Research	Queensland University of Technology	Professor and PwC Chair in Digital Economy
Michael Whereat	Local government	Sunshine Coast Council Sector	Smart City Framework Coordinator
Nan Bosler	Older Australians	Australian Seniors Computer Clubs Association	President
Nancie-Lee Robinson	Telecommunications	Telstra	General Manager Digital Inclusion
Neil Temperley	Research	Data61, CSIRO	Product Manager - Future Cities, Information and Communication Technologies
Philip Taylor	Not for profit sector	National Seniors Australia	Director of Research
Robert Porter	Banking	Australia and New Zealand Banking Group Limited	Strategy Manager
Steven Spangher	Finance	ANZ Banking Group	Head of Business Management & Strategic Engagement
Stuart Smith	University	Southern Cross University/ Uni Sunshine Coast	Professor
Sue McKerracher	Libraries	Australian Library and Information Association	CEO
Susan Ryan	Human rights	Australian Human Rights Commission	Age and Disability Commissioner
Zach Johnson	Technology Start-up Incubator	Spark Bureau	Co- Founder and CEO



4 FINDINGS

4.1 Redefining later life

Overall, our interview participants were enthusiastic about the many opportunities that developments in digital technology could bring for supporting lifelong participation. Some felt that the impacts of digital technology were potentially so profound that they could change our preconceptions about ageing, work and participation:

...there are a lot of people who are frustrated with the fact that they have to...leave the world that they lived in and move to this completely new world where they're often disconnected...[They go] from a life where they get to contribute to society, they see the effects of their work, to a world where they suddenly feel like they're obsolete. They're being a burden, right?...So digital technologies allow them to be back again, participate in society, sometimes in slightly different ways, but definitely in very impactful ones... [Now] getting retired means being able to pursue completely new dreams, finally having impact on the world...Maybe moving from what most of us do, which is trying to fulfil the expectations of society by getting a job, having children, building a house and so on, to living your life to its fullest... [10]

We should get rid of the term retirement...I'm expecting to work until I'm 90, but the nature of work and my participation in society will change. I think we've got an enormous re-education to go through to start to stop this archaic view of work and retirement and then be put out to pasture... I do think governments need to take a role in redefining the nature of work...for all of us we're going to need to be open minded and continue learning and we need to learn how to learn again. And not opt out, which is often what's been the case....I think of the incredible opportunity that we have to have our senior people more involved in life. I see the potential that technology can enable them to have a more active, longer, productive life than ever before. [13]

Participants argued that the idea of later life as a time of limited opportunities is a legacy of old cultural assumptions and stereotypes rather than actual

limitations or preferences. One participant justified this view by describing the diversity of experiences and capacities that exist across all life-stages:

We're often trying to devise policy for this group that is 'older people' but they're incredibly diverse...There are women returning to work in their 50s, at a time when...some men will be "retiring", whatever that means nowadays. So, we're not necessarily talking about people at the same life stage... The 'three-stage life course' view is being challenged due to things like casualisation of the labour market and so on, the entry of women into work, the abolishment of fixed retirement ages. The confluence of all those things is meaning that that notion of the life course or the different life stages is undergoing a massive shift. [36]

Furthermore, the potential to participate for longer was connected with developments in digital technology:

...once you are getting into using a technology then I think age is sort of irrelevant. [33]

Participants also spoke about the importance and value of the contribution that older people can make, due to their extended life and work experience and the financial and social capital that they have built up over their careers. They emphasized the economic benefits to be gained from harnessing the resources and experience of older Australians. However, harnessing the productivity of older Australians was only part of the equation, because participation yielded benefits that are vital at all life stages, such as connection, identity and a sense of belonging:

...if they've been made redundant from a job that they had for 25 years, that job for those 25 years gave them a purpose, it gave them a sense of belonging, it gave them an organisation that they were part of and so I do see people in their sort of mid-50s to mid-60s who are craving that sort of sense of belonging. So it's about earnings but it's also about that kind of wider belonging to something and a purpose of you get up, you go to work, you come home again, you do something purposeful during the day. [19]



4.2 The ‘two sides’ of digital technology and lifelong participation

To engage with this potential, we need to understand why participants believed that digital technology could have such a transformative impact. Our analysis revealed that digital technology was seen to have both positive and negative potential. The positive potential of digital technology derived from its ability to minimise the impact of traditional barriers to participation, specifically:

- Physical and cognitive limitations
- Geographic distance
- Social, intellectual and financial capital
- Information and education
- Lack of connections

But although digital technology could reduce the impact of these factors, it could not remove them altogether. Furthermore, our increased reliance on digital technology brought with it the potential for some groups to be further excluded, due to their inability to access or use digital technology. In the next section of this report, we explain how digital technology was seen to support (and hinder) lifelong participation through each of these processes.

First, though, we should recognise that although we seek to explicate the specific ways in which digital technology was seen to facilitate and hinder participation, in reality, these enablers and barriers interact and combine in their effects. The following quote is illustrative of the way in which these processes interact:

...Uber, for example, people traditionally have used transport services to get around to various things whether it be the doctor or the social clubs or whatever it might be. Uber might be able to disrupt the public transport system or the patient transport system to enable them to be more connected and have their interactions more meaningfully for lower cost. [3]

In this example, Uber draws upon the connective capacity of digital technology (allowing individual drivers to directly connect with individuals requiring a transport service), and thereby addresses physical and cognitive barriers (individuals requiring transport services in later life rather than being able to drive themselves). It also addresses financial barriers for both parties in that it allows the driver to earn income and the passenger to enjoy access to a lower cost transport service. In so doing, Uber then facilitates the passenger’s connections and access by making it easier for them to engage in community activities or remain connected with family and friends.

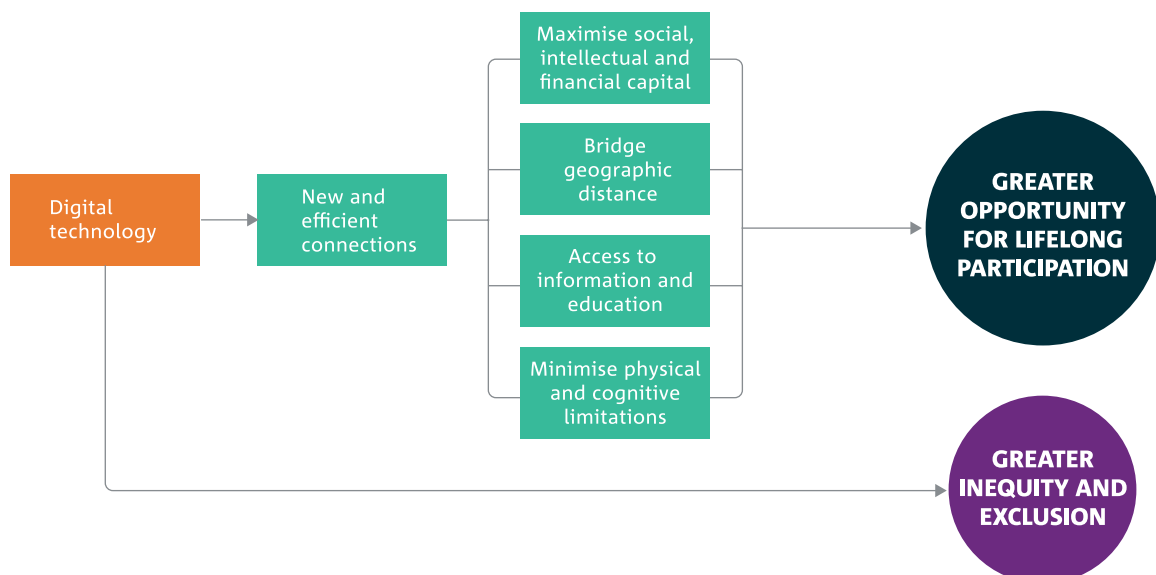


Figure 4: Digital technology and lifelong participation



In our view, the overlap and interactions between the enabling processes associated with digital technology do not lessen their impact. Disadvantage and social exclusion usually result from a combination of factors and successful interventions to address these problems need to be multi-faceted. The multifaceted capability and impacts of digital technology may well be fundamental to its potential to redefine participation in later life.

4.3 Minimising physical and cognitive limitations

A dominant theme in participants' discussions about digital technology and lifelong participation was its ability to reduce the physical and cognitive limitations experienced in association with age, illness or disability.

...because of the advances in technology, people who these days can't get a job or keep a job because they had some difficulty or other frailty will be able to use their brains, use their knowledge, their experience, to make a strong economic contribution. [37]

People who 20 years ago you may have thought had such a poor quality of life and had very little ability to actually add value, all of a sudden, we're going "Hang on a minute!" With the technology that's available, all of a sudden, we can actually get them to work for us and they could be anywhere in the world. A clear example is the young fella - a young guy whose - he's set up his own video AirSync company and he has cerebral palsy and basically his only way of operating is via switch technology. So a single switch on the back of the headrest on his wheelchair - but with that one switch and with his ability to use that and run software, he can actually do full video editing from anywhere in the world. [31]

Digital technology would also allow people to remain independent and autonomous for longer. In-home digital technology such as monitoring systems, sensors

and video-conferencing would provide cost-effective remote care for individuals. People who might have had to move into institutional care would now be able to 'age in place', and remain in their own home and community.

...If you live in the country and you need to see a specialist in the city, the specialist can actually monitor you, even at home. And I would say that that's ageing in place, not just - you can age geographically in place but you can also age in your own home. You don't have to go down the stairs or move to a smaller place as frequently...Your kids can stay working in the city and still continue to monitor you, to check in on you, they can send you gifts, they can actually stay with you and work from home potentially as well [8].

In addition to the safety and security offered by digital technology, the internet and online services would allow individuals who were restricted in their physical mobility to carry out essential household tasks:

...you can order prescriptions, you can have Skype conferences with your doctor, you can order your shopping...those simple transactional services that you might no longer be able to do frequently by going out of the home, you can do in the home [19]

In a more digital economy, it also becomes easier for someone with an ageing body or mind to continue to work because of:

...technology's ability to keep people more engaged and involved in low skilled or physical activities or related jobs because if it's automated then they can - so lifting and other activities that traditionally are a health and safety risk to people will allow someone to stay in work longer because they don't need to do those repetitive physical activities that will cause harm in time and then become difficult for a 65 year old person to remain doing that job perhaps. [22]

Finally, autonomous vehicles and digitally-enabled forms of public and private transport would support mobility and independence outside of the home:

Autonomous vehicles will be: press the button and bang, you go!...for transport in later life...you have a virtual concierge guiding you through and giving you a lot of confidence that you're going to get somewhere on time, and not have a train come that's too full that you can't get on, or a bus...that has been cancelled or diverted or whatever - so you have a lot of confidence that for a given plan you're going to make it. [30]

4.4 Bridging geographic distance

The second way in which digital technology was seen to support lifelong participation was by creating the ability to instantaneously communicate and connect over distance. Through videoconferencing and social media networks, grandparents can see as well as talk to grandchildren who live overseas or share their own travel experiences with family and friends back at home.

...my grandkids have come to visit and they've set up Skype for me and now I can Skype with family and friends. And kind of opening up a lot of opportunities for people who otherwise often become quite socially isolated in their homes. Gives that opportunity for connection into the wider community. [20]

Digital technology also allows individuals to find support and create connections with others around the world who share their special hobby, passion or problem. It also addresses some of the negative aspects of living remotely. For example, videoconferencing, wearable devices and remote monitoring and sensing technology make it possible for someone in a remote area to obtain advice from the relevant expert or specialist without having to travel. Goods and services can also be accessed more quickly when they are available for download online or purchased online and delivered via a drone.

Economic participation is also supported as a result of becoming less bounded by our geography. When delivering work via digital channels it becomes easier to work from home, access employment opportunities from a remote location or combine work with travel. It also becomes more viable to start a business or not for profit organisation, since digital technology allows you to reach end-users, regardless of their location:

...non-profit entrepreneurs used to be focused on what they could do in whatever physical region they were in and if they wanted to make change happen on the other side of the globe they had to go there – that's not true anymore. [18]

The ability to manage work remotely also creates opportunities for new kinds of work and increased productivity that are relevant regardless of whether you are living in an urban or a remote community:

...let's say some piece of equipment has a fault that then perhaps you don't [get] an engineer [to] go to all the way out to the site to look what the fault is. We could have a 3D scan of that piece of equipment and it has sensors on it that trigger a message to a person sitting in a central capacity to say, it looks like there's an issue with this air conditioning system vent and they can remotely assess it and then determine what the problem is and then deploy someone from a different location that's closest at the time efficiently to go and fix it.. So moving away from, say, people walking around premises and having a physical presence to cameras that can be motion sensed and trigger warnings if there's unusual movement in the area that one person remotely can be reviewing what's going on and then deploy resources. [22]

Finally, by making it possible to access social support, work, markets, healthcare and education from any location, digital technology gives everyone more choice in where and how to live:

...we can have deurbanisation. So why is it that we're all drawn to cities? The only reason why we work in cities is because that's where the jobs are. But if I don't need to come into an office building and I can actually work completely remotely on my laptop I can now order my food online and my pharmaceuticals online. Everything I need can be delivered to my door and I can work on my laptop then why do I have to live in a city which is crowded, which is smoggy, which is intense, stressful? I can go and live on the south coast where property prices are lower, I've got a beach. [15]



PERSONAL AND FACE-TO-FACE CONNECTION IS RICHER

However, participants also identified risks and limits associated with the use of digital technology to mitigate the impact of physical and cognitive impairments and geographic distance. Participants believed that digitally mediated connections and support were not the same as a physical, face to face experience and that 'real' connections were still very important, especially in building and maintaining strong relationships for work or family. With greater reliance on videoconferencing, home monitoring and telehealth services, there was a risk that older people might end up spending more time on their own.

...people still need that face-to-face contact, people still need touch, and people still need caring in terms of – for example, the family example, just seeing your family on Skype or your grandkids on Skype is not enough. They definitely still need to have that connectivity. The touch connectivity and face to face time. And even caring, I would say no matter how much we've got in the way of technologies for eHealth, people are still going to need that contact with other human beings, that real face to face contact. [8]

The reduced requirement to travel in order to access services might also mean that individuals experience less of the well-being that is achieved by going outside to a variety of places and interacting with a variety of people. Similarly, workers might experience less connection with colleagues when working from home alone, rather than in a shared space. One participant illustrated the importance of face-to-face and human connections when discussing the limitations of online platforms to support volunteer efforts:

...a lot of work that's gone on in previous years around moving volunteering to online platforms, for example, hasn't been successful, because of that human element in that kind of work....so others might come into that platform and say, "These are the types of people we're looking for and these are the types

of skills we're looking for." But really at the end of the day, it comes down to a human element of being able to connect those people with the appropriate organisations...So sure, you can match somebody's skills and the area that they live in and all of those sorts of things. But at the end of the day, you need a human connection between the person who is volunteering and the organisation or the group. And that's very difficult to try and work out in an online environment. [20]

INCREASED COMPETITION FOR LOCAL BUSINESSES AND WORKERS

Furthermore, when digital technology allows local businesses to reach international markets, it also opens up competition from those same markets. This puts pressure on local jobs and local skills. Participants often talked about the need to 'keep up', and 'adapt' or be 'left behind'. Even though digital technology was seen to enable small, niche businesses, small organizations were also seen to be more vulnerable in the more global competition for markets and labour.

small organisations...I hate to say this, there's a certain Darwinism in there. So those who don't cope terribly well and don't evolve terribly well and it's not just about technology, it's about other societal changes and it's about changing income models as well; they will no longer be there and others that are good and can cope will be created and they will survive. [19]

Similarly, less skilled and digitally literate workers (often older workers) would find it more difficult to find employment in a more digital economy:

...older people get into their 50s and 60s, and so on, with often extremely out-dated skill sets. ...this digital transformation has great potential to leave many older workers very vulnerable. [36]



4.5 Maximising social, intellectual and financial capital

Besides addressing physical, cognitive and geographic barriers, digital technology was seen to support participation by reducing the cost of goods and services and allowing people to derive greater return from their existing social, intellectual and financial capital. One of our participants cited research which found that individuals can save significant amounts of money by accessing services and goods online.

...something that some people here refer to as the digital dividend. So by being online, you save money... right now in the UK, an average person saves 744 pounds a year and this is a bank that's done this based on real data and for low income people, that's people earning less than 15,000 pounds a year, they save 518 pounds a year and if everybody went online, that's a 3.7 billion pound annual saving. [19]

Entertainment, (e.g., music, books and movies), communications and education are less expensive when accessed online:

When I first went to live in New Zealand, which would be 40 years ago it cost me \$45 dollars - New Zealand dollars then - to ring my mother just to say, "Hello, Mum, I'm all right, how are you?" It was a four or five minute phone call....Now...My son was talking to me yesterday. It was here night time, there it was in the morning. He put me on Facebook. The eldest grandson was in a ski race down from the top of the mountain. I mean not costing me a cent and I'm seeing all this. It's fantastic. [11]

Even when a service or product costs the same amount online and offline, purchasing them online (rather than travelling to a shopping centre or office to obtain them) can also save time and money.

The cost of setting up and running a business is also greatly reduced by digital technology. Not only does digital technology reduce the cost of communications and open up access to international markets, the

advent of digital freelancing platforms can make it cheaper and easier to access the legal, technical and marketing support that a small business owner needs. As one participant explained:

...digital technologies are allowing for what we call micro-services or micro-payments. So sometimes it's one question, right? That you ask. And you know, there are services like fiver.com where you say, "I'm going to ask a short question in a paragraph and [they] will charge \$5.00 for it." [10]

Our participants noted that many people use their financial freedom in later life to become involved in social or environmental action or advocacy. Just as digital technology makes it easier to run a small business, it also makes it more feasible to establish a micro-charity or not for profit organization.

...entrepreneurship among older people is the fastest growing sector... [27]

Digital technology also allows us to generate revenue or income in new ways and thereby realise greater return from our assets. This opportunity is particularly important for older people who have had the time to accumulate wealth and assets and now seek to draw back from full-time employment.

...there may be new types of revenue or salary generation than what we've had before and it may start to spread wealth even more broadly ... But I think the service industry will become far broader than what we know it is today. And the wealth creation opportunities will move into small family owned, personally owned businesses, rather than what we've relied on, these big institutions...[13]

For many individuals there will be a more pressing need to continue to generate income in later life:

The reality is that quite the majority of the people who will go into retirement will not be able to fund their retirement... [14]

For individuals with less wealth or lower financial literacy, applications of digital technology can empower them to manage their money more effectively, as the following participant explained:

...if you had a lot of money, what do you do with it? If you have a lot of money, you go to a wealth advisor, or you hire a wealth advisor and they tell you how to invest your money, right? And if you don't, then you're on your own, basically, right?...[eToro] is a social trading platform. The way it works is they provide services where you can just, you know like a traditional trading platform, you can invest in all sorts of assets. But on top of it, you have a social network, you have a list of people and connections among those people and the people who are in the network, decide to disclose their investment strategies and how much they invest, how much they make on it and so on. And then when you go to eToro, you can just create an account, browse the list of most successful investors. We're talking about individuals, right? And this could be your neighbour, this could be you know, a taxi driver or so, who is extremely successful at their investing. And you could just press one button, which says, "Copy the investment strategy of this person" and then you'll say, "I'm going to put \$10,000 towards it," right? So \$10,000 and copy that person. That person knows that they're being copied, so they will likely adapt their investing strategy...because that's important as well [10]

The opportunity to generate revenue in new ways also applies to other forms of capital. Social trading platforms such as Craigslist, Uber, Ebay and AirBnB make it relatively easy for an individual to generate income from under-used household items, whether furniture, equipment a spare room.

...make money out of that junk you've got in the back bedroom; here's an opportunity to do such and such and you get paid for it, there are surveys where you get paid for it....There are lots of things like that that the people are doing online which does bring them in a little bit of money. [1]

In the past, opportunities to earn income were limited to employment or running a business. Emerging platforms such as Airtasker make it much easier to freelance, convert a hobby into a microbusiness or pick up 'gigs' (small, time-limited jobs) that suit your interest and availability. The range of ways in which individuals might earn money from their time, skills and experience via digital technology are illustrated in the quotes from participants below:

...I mean we have a lot of volunteers for example that do driving for us... But there's a lot of them that would actually like to be paid and that's where you could bring them in as an Uber driver as part of your fleet, because the opportunity is to provide wheelchair assisted vehicles in this space and get them assisting in that space. [31]

...I can tell you a couple of a little industries that older people, that I know, have and that's people that make scrapbooking cards and things and they sell them online...They'll take your photo and put it into cards and you buy it that way. I've got a cousin that does that. [11]

...anecdotally what we see with people in the later stages of their life is that they're using the Airtasker to actually do jobs and earn an income when they're potentially not willing to work full-time or have finished up with that part of their life whether voluntary or involuntarily...so things like cleaning, handyman jobs, administration, small business type jobs...and then up into workforces for enterprises, so there are at least some vertical categories on Airtasker but what we believe is most important is that Airtasker is really fantastic in aggregated niches and the biggest category on Airtasker by far is the category which we call "Other", right, so, oh, well, something else, right?There's lining up for In and Out Burgers, there's clean up my gutters, there's tidy up my garage, there's wait for the Foxtel guy at my house, all of these things, they're never going to be able to be done if you focus on verticals [23]

...at the moment, my daughter plays these farm building games, and she knows that in order to grow her farm, she needs to build up the internal game currency...let's say there was a service out there somewhere where real world people were contracted to generate in-game wealth that could be traded... having a link to play in each of these games together, and then...buy and share in-game currency or objects through real world exchange of cash... a lot of older adults quite frankly spend a lot of time playing games. The way in which they play their game could be earning them money... [12]

So if I live in an apartment and my next door neighbour is home all the time, so they register as a parcel sitter and then I can nominate you to sit my parcel, and then if I'm not home, John is my parcel sitter, and then he gets paid the delivery rate. [38]



MORE OPPORTUNITIES FOR THOSE WITH CAPITAL

But even though digital technology opens up new opportunities to save and generate money, the digital economy is similar to the traditional economy in that there are still more opportunities for individuals who have specialised skills or assets or networks than there are for individuals without some valued form of capital. One participant explained:

that portfolio type career is...very much [for] the well-off well educated well connected people who...have something special that people are buying from them because they've got a lot of expertise and experience in a particular field or particular fields...I mean when we talk to people on low income who have gone on the Internet, they do talk about things like selling their belongings on eBay. You've got that kind of option but to be perfectly honest...almost all the digital disruption stuff that's going on is for the well-educated middle classes. It's about lending the person next door your lawn mower and they'll lend you their power tool. It's about book groups and it's all about all skill swaps... [19]

DIGITAL TECHNOLOGY ALSO TAKES AWAY JOBS BY AUTOMATING WORK

Second, digital technology could actually reduce opportunities to participate as a result of machine workers and automation replacing human workers. Hence, participants were concerned about ensuring that displaced workers were empowered to embrace the new opportunities offered by the digital economy:

...there certainly is a case to say that digital technology will change the nature of the workforce and will potentially replace some of the jobs but what that view doesn't take into account is the way in which digital technology will support the competitiveness of firms and will drive innovation and growth in firms which in turn will create new jobs. They may be different jobs but there will be definitely jobs there. So for older people...the challenge for them is to engage and understand how things are changing from a digital point of view and engage with that... [5]

4.6 Access to information and education

Digital technology (and in particular, the internet) has also had a huge impact on our ability to access information and education. The internet provides immediate access to a wide range of information, ranging from a youtube video showing how to poach an egg to learning how to start your own business.

I think we're all amazed by the information that is available now and that can only increase. We can do a keyword search or just go online and find amazing facts that mean that for businesses your market research is so much richer; for people looking at the Internet for family history, which a lot of people are interested in that roots and genealogy stuff, amazing resources that mean you don't have to go to an English graveyard to find a tomb, you can actually find so much information online. I think it also is a democratising thing in that we can now find information from very different sources that can help shape our views. Propaganda, sure, but propaganda from all different parties so that is helpful. [25]

Furthermore, as digital technology improves, it allows for more immersive experiences and thus deeper learning in a range of domains. One participant explained:

...immersive 3D learning experiences.... you got a camera that you could swing around and it takes 3D imagery...So travelling through the Jenolan Caves, using this 3D imagery, you then got to do a whole lot of different experiments...and I was thinking... imagine that people could do that in all sorts of cultural and scientific ways to explore all sorts of different environments in the world. It would increase their understanding without destroying those precious





cultural and natural environment places....of course, physical visiting is good, but again when you're an older person that's not so easy, but you could do this with others...if you had a, sort of, immersive digital theatre in local communities, where people could come together with a facilitator and say let's experience X...and you can use these automatic language translators now, so you could have a bunch of people talking to people in other cultures....And I think that these kind of culturally enriched learning experiences...where digital technology could make it...a much richer embodied experience, it could be distributed to every local community in the country. [16]

Importantly, all this information allows people to do things and contribute in ways that were previously not possible. Our participants gave examples of people using the information, skills, social support and venues on the internet to become their own publisher, run their own social enterprise or (as in the following example) contribute to an international program of research:

...you learn to build small devices... Some of them you can send to space...So makers are older, you know the elderly people who build things and...citizen science requires...citizens to build sensors, build devices; experiment and so on. Maker movement gives people the skills that they need to be able to do it. So the moment you want to explore the oceans, you need to

build a device that explores the oceans, right? And it's possible. It's absolutely possible. There's a, you know, part of the maker movement, there's a project called Open ROV. Which is basically a small submarine that has a computer and a couple of cameras and is built by two people. And you can do it yourself, right now... So you want to be a citizen scientist, guess what, we have a platform for you that you can tap into, right? So here's 20 projects that we can offer to you. You can start measuring weather and share it with others, right? And this is how you do it. Or you know, you could start measuring yourself and contribute your measurements to huge projects that's analysing the impacts of retirement, right? [10]

Digital technology even allows people to complete coursework and obtain formal qualifications in a fully online environment.

...retraining and education I think is much more accessible...online with these Massive Online Open Courses which mean that you can continue to be learning and developing...it's you gaining the skills and knowledge that's required in order to know how to run a business if you have not done one before... [or to]...improve the quality of the product that you're trying to sell. A lot of education is now going to be effectively free and instantly available. [15]

A PERSONALISED AND THEREFORE UNEQUAL INFORMATION ENVIRONMENT

But one participant had a more negative view of digital technology and access to information. She warned that the algorithms underlying digital technology could have subtle, yet potentially very pervasive effects on individuals' ability to access information and opportunities:

...all of our interactions through any form of digital communications are intermediated by an algorithm or many algorithms, and those algorithms...they're proprietary and invisible...We don't know what data are being used to shape what we're shown anywhere, not just in a Google search, but on a crowdfunding platform or on a shopping site or anywhere, we don't know, we can't see it therefore we can't monitor it, we have no scrutiny over it and it has power, and that's fundamentally undemocratic. [18]





4.7 Efficient connections

Each of the enabling processes outlined above derives from the core capability of digital technology, which is the ability to make connections in new and very efficient ways. For example, the ability to efficiently connect a supplier and a customer can significantly reduce the cost of a service (financial barriers) by removing the need for intermediaries. The ability to live and work in a remote area and remain in contact with friends, family, employers, health providers, educators and customers (mitigating the effect of distance) is also enabled by the connective capacity of digital technology. In this section, we outline some of the ways in which the connective capacity of digital technology was seen to support lifelong participation in its own right.

First, digital platforms (in particular, emails, videoconferencing and online social networks) enrich existing social relationships by providing new channels for communication.

...where traditionally you would have things like phone trees of people calling to say, "Are you okay?" Or people visiting to say, "Are you okay?" I think there's a lot of opportunities that open up in the online world, to reach more people through those sorts of programs. But to have a deeper level of interaction as well, through some of the digital technologies. Which might be that rather than just a phone call, you're going to have a Skype call with that person. And rather than just a one call a week or one call a fortnight or one call a month, depending on the service, there's the opportunity for a more frequent interaction over social networks. Which doesn't necessarily mean any more net time for the individuals that are involved in it, it's just a more efficient way of communicating. [20]

They also facilitate new relationships and create new communities by joining up people with similar interests and concerns.

that ability to connect with and to find people, so you might be living with a particular disease or illness that's relatively rare and you can find your user group or your peer group online and not feel so alone... [24]

...there are groups available online for any of your hobbies - if you're a knitter, you're an embroiderer, if you're a gardener - there are all of these websites that look for members and you can share your hobby with

them, you can get patterns for your knitting, you can get instruction about how to stop mealy bugs eating your agapanthus bulbs, you can - all of these things. So there is a wealth of ways to communicate with others with a like interest over the Internet...you can play chess or scrabble with people overseas online [1]

Digital technology also enables providers (whether government, business owners, not-for-profits or individuals) to connect more directly with their end users and thereby deliver a more personalised and/or less expensive product or service.

...it allows smaller companies to engage directly with customers and clients rather than having to go through other intermediaries. So that changes the way the market operates, not just in the ICT sector itself but across the whole economy...So smaller food companies, speciality food companies can start selling their products in China without necessarily having to go through larger distributors....that's just one example but I think we can expect that technology will change the way business is done, the processes, across most of the economy. [5]

The ability to efficiently evaluate the quality and reliability of each party to the transaction (via digital technology) plays an important part in facilitating new business relationships, as one platform provider explained:

...we're now the largest online services marketplace in Australia and we've done that by crowdsourcing reputation...by allowing users in our community to rate one another and that's created a database of social currency, like, who's good and who's not good and who's reliable and who's not reliable... it's sobering to actually think about all these tens of thousands of transactions that happen a month, that's actually, like, two people actually meet....because we...are genuinely creating new economies and new interactions between people that wouldn't exist without our platform. [23]

However, there are many other means through which digital technology can facilitate the trust and security to support more direct and individualised transactions. For example, webcams (which allow a service to be monitored remotely) can provide greater confidence that a child or adult with dementia is being looked after suitably even if the provider is an independent worker rather than an employee of a large, well known organization or institution. This opens opportunities

that older adults may be especially well-suited to provide, such as joined up paraprofessional health and aged care services work:

...older people will have more life experience, they will have broader experiences and knowledge and they may well be able to provide some of those things that at the moment experts deliver, at a much cheaper rate, with the experts kind of really focused on the sort of pointy end of those services... potentially older people are better people to supply the kind of cheaper mass end of some of those services... [19]

The connective capability of digital technology also supports the joining up of data and services, making products and services more tailored and effective:

We'll understand where waitlists are...with that registration assessment referral. We can see...if they're not getting their assessment we don't have enough assessors. If they're getting assessed but nobody can find a place for them, we start realising that there is a gap in service...so we can know, well, we've got to start providing more services in different parts or we've got an excess supply of services; we've never known that, and the digital data that we're going to be getting is going to help us put those services in the right location ahead of the move... [4]

The ability to make connections through digital technology and its algorithms also allows people to work more flexibly, at the location and time that is convenient for them.

...it will provide an opportunity for them to contract as independents in a more flexible way, both as an independent direct to customer or to an organisation like ours...if we have more sophisticated kinds of scheduling and management skills and provide people with technology that allows them to work sometimes more remotely or at different times it's going to create more flexibility and that I think works better and better for everybody, from people who are young parents through to the later demographic. [22]

In turn, it becomes more attractive and feasible for people to continue participating in the workplace (while achieving other goals and fulfilling other responsibilities).

...So rather than somebody retiring at 60, for example, somebody might retire from their full time position at age 60, but then be willing to work for another five plus years on a two or three day a week basis, on a paid basis and/or a volunteer basis. [20]

The connective capacity of digital technology also facilitates more active and meaningful citizenship. Already, digital technology enables more representative and two-way communication between government and citizens.

...a lot of community engagement is driven by stakeholders and lobby groups. So I would say technology is going to change that because it diffuses power for starters. Information gets disseminated across community more easily using social media, and peer to peer referencing is valued...we will be able to target engagement...input from people who are participating in a more considered and meaningful way will start to become more valued than public opinion... Some of the tools that I've now been experimenting with, you can actually track whether or not somebody's actually read the document and what they've clicked on inside the document, versus people who are just on the page 2 minutes and have just said what they think top of mind. Actually practising citizenship... for me is actually about listening to other people's viewpoints and considering information before you participate. So there'll be an expectation that citizens will participate in a deeper way but there'll also be an expectation that government will actually listen and be much more willing to engage and collaborate with citizens that are genuinely willing to contribute time and consider information... [8]

In the future, digital platforms may allow government to deliver services with, rather than simply for, citizens.

...it's not only citizen panels offering legislative advice it's also citizens becoming involved in delivery of Government services. So early spotting of issues or challenges that might be happening, right? You know, it's the grandmother that might be spotting that something wrong might be happening with the grandchildren, right? And whether it's domestic violence or it's something else, they could be the ones that are kind of the extension of social service workers...perhaps the elderly people becoming employers? So when I'm 75 years old, maybe I would like someone to take care of my garden and I could be the one who actually is an employer now, right?...I can go to the Government and say "Look, I'm happy to give work to unemployed people"...I'll pay the same perhaps. Maybe less, maybe more. But I'll feel like I'm also contributing or helping others. [10]



Digital technology also supports joined up problem solving and innovation in other domains. Participants provided examples of individuals now being able to participate in international problem-solving and environmental movements from their own home thanks to digitally-enabled networks and platforms:

We are having projects now where the scientific researchers are based in Israel and United States and Australia and Asia and Europe, and the volunteers that are taking part in that project are based in every country in the world. And they are all talking to each other about one problem via technology. That would never have happened even five years ago, let alone 10 years ago. And you can do that from the pub. So maybe technology can ruin a pub conversation, but I think it really has this massive potential to bring people together across the world in the way that we've never been able to in the history of humanity. [17]

...online networks of people that were built around things like climate change and some of the...really big ticket social issues of our times, and being able to participate sitting in your lounge room in that kind of way...making a contribution relevant to the skills and knowledge that you have derived through your work history, or whatever. [9]

...much smaller groups of people...can accomplish something at a grander scale than ever before. So we're going to see more and more non-profit organisations, more and more civil society actors where there's really only four or five people behind the scenes, but they're making things happen around the globe...The disaster response network and the standby taskforce of global responders in emergencies are perfect examples of that, there's a whole universe of lifelong volunteers now that are literally the standby taskforce, right, they just - when something happens anywhere in the globe and they can put their skills to use from wherever they are, they don't have to be anywhere near it, not in their time zone, that's a completely new phenomenon... [18]

ONLINE INTERACTIONS CREATE NEW PRIVACY AND SECURITY RISKS

However, along with enabling more efficient connections and access to information, digital technology brings new privacy and security risks. These privacy and security risks mean that there are sometimes negative social and economic impacts associated with participating online:

...as we increasingly put all of our personal financial information online we're at risk of cybersecurity issues from a variety of levels, either information being stolen or misused or cyberterrorism or even cyberbullying. There's a lot of these risks of ultimately your information being taken by people that you wouldn't want to have that information. [15]

Participants were concerned that not everyone who was online understood how best to manage their information. Just as in the real world, criminals in the online world tend to prey upon the more vulnerable:

...criminals are targeting the people who are more vulnerable. So for example, phishing emails apparently quite often are spelt wrong. So the educated people delete them and uneducated people might reply to them. [19]

FLEXIBLE WORK ARRANGEMENTS BRING NEW RESPONSIBILITIES AND LACK OF SECURITY

Furthermore, participants noted that while flexible work arrangements were desirable to some people, they often provided less security and support than traditional jobs. Flexible work arrangements can mean less secure employment and income. Without an employer, individuals have to manage their own training and professional development, administration, contracts, liability and insurance, as well as health and safety and IT support.

...I mean if I look at my workforce, 86 per cent are female, generally between the ages of 45 and 55, and they've largely spent their life up to this point in time caring for somebody, be it their children early on and maybe their parents now or parents and children at the same time. [They] don't have particularly high technology skills...but they still have to run a business. They still have to run their schedules and quite often the group of people I'm talking about, their purpose in



life is to care for somebody and so they tend to spend way too much time caring for people and not enough time actually running their business or running their time management and all the rest of it. It's a hard transition for that group of people to move into this space...the majority are very uncomfortable with it. [31]

4.8 Access to digital technology becomes a requirement for participation

While participants were generally very enthusiastic about the opportunities associated with digital technology and lifelong participation, they were also conscious of limitations associated with each of these. The ability of digital technology to transcend geographic distance is limited because digitally mediated connections remain inferior to face-to-face connections. Similarly, while digital technology can help people to achieve greater value from their existing financial, social and intellectual capital, it does not necessarily provide more opportunities for those who most need them - those without sufficient financial, social or intellectual capital. And while the physical and cognitive decline associated with age can be mitigated to some extent through the use of digital technology, serious physical and cognitive limitations will remain inhibitors to participation. Finally, the ability to connect in new and more efficient ways brings with it new privacy and security risks.

However, above and beyond all these limitations, participants were concerned about a more fundamental issue. The more that digital technology becomes a key enabler of opportunities to participate, the more vital it becomes to be able to access and use digital technology. Yet currently, not everyone has the motivation, skills and resources to engage with the opportunities and resources that are accessed through digital technology. And ironically, each of the barriers to participation that digital technology mitigates is also a barrier to access and use of digital technology. Below, we outline this paradox, as our participants described it.

First, although digital technology can transcend geographic distance, those in more remote and isolated communities often do not have access to reliable high speed internet connections required in order to participate in most of the benefits of digital technology. One participant explained:

...So we now have people in rural and remote areas who get limited by the package they can buy at a more expensive rate than someone in a metropolitan area sitting on a 4G with an NBN access. They can only use certain packages, they usually use it in the first day, particularly if they have children who are in education, and education takes up the whole of their data package for the month and they pay through the nose on that. Now, to go and get other things to download, they then have to drive up many hundreds of miles to their nearest little town and hope to goodness there's a free Wifi in a library or McDonald's or something where they sit the kids down, download what you can while we're here.....I live in metro Melbourne and I've got a node across my road or 300 metres down the path, I'm going to be charged a small sum of money. But if...I've got a 1000 hectare property, and it's 300 kilometres away, what's the cost to me? [32]

Participants were also conscious that individuals with very limited financial resources were not able to afford to access digital technology in their own home due to the significant costs involved (including software, an ISP account and a computer or smart device). Furthermore, even as the cost of hardware and data is becoming cheaper, the latest developments in digital technology often require larger data plans and new devices:

And the other thing that is concerning about that, is when people build digital solutions now, they are building everything with bright pictures, bright colours, high resolution. Everything that moves in dots, because the more attractive it is, the more interactive it is, the more people that will use it under the old marketing theory. But underneath that banner, that takes up more digital space, and if you're sitting there with only 124Ks to download, it's okay for me sitting on an unlimited package but if you've only got 124 downloads, you've got to say well, will I download it or not? That takes up more than my whole package to download one solution, so I think people have to be careful. [32]

Even those with adequate financial resources and living in more central locations can be cut off from the benefits of digital technology if they lack the confidence, motivation or skills to engage with it. Keeping up with developments in digital technology (and new applications of digital technology) itself requires resources, knowledge and information, time

and support, motivation and confidence. Furthermore, digital capability builds on other skills such as reading, typing, understanding how to use documents, do searches and evaluate information credibility. Without these basic skills, people can be locked out of the online domain.

...if people aren't digitally literate to start off with, how can they access that increased learning and those international communities? Or show people what services they've got to offer by using digital technologies. I don't think that those skills are being taught. They're self-taught but you've got to have a measure of self motivation to do that, and also some level of understanding of digital before you can even access any of those things. [8]

Consequently, many groups in our society (remote communities, people on low incomes, migrants, the unemployed) are at risk of being 'left behind' in the more digital society and economy of the future. Furthermore, the categories of exclusion often overlap. In consequence, the online world and technology design work is dominated by particular social groups – generally those who are relatively well-off and well-educated. When digital technology reflects the needs and values of technology designers rather than its end-users, not only do we fail to realise the full benefits of digital technology, but further negative consequences can ensue. One participant explained that Indigenous communities were actually showing decreased engagement with digital technology over time, not only because of financial barriers but also because of lack of fit with their culture and values. This had consequences for the whole community in terms of the ability to apply for jobs, access education and government skills and build digital skills.

...what I've discovered, and it's a new dataset...[is] that in very remote Aboriginal communities and all over the country actually, that there are significant number of people, Aboriginal families, that are actually un-adopting or anti-diffusing the technology over time, between the 2006 and 2011 census...So that says to me that whether there's a cost aspect or whether there's something else that's going on...those benefits are not being realised by the Aboriginal community... the way that things are structured in terms of the hierarchy of databases and the technology itself is really built in the non indigenous hierarchy, there's a level of access and a level of structure that's associated with

an apex type structure rather than a much more flat structure...systems are structured around white man's ideology rather than Aboriginal governance... [35]

Participants also talked about the mismatch between the development of new technology (push) and the user demand for particular features (pull), including cultural and institutional biases (predominantly Western and English). This can be disempowering for the users:

They often have many more functions than the user wants or needs, but they're there on the product and they could become a source of confusion, they can become a source of malfunction, and in my view, that's because the design did not take into account the needs of different cohorts of users [37]

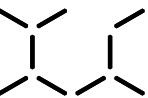
When the very barriers that digital technology can mediate also serve as barriers to access, digital technology actually entrenches existing patterns of inequality and exclusion, an effect commonly referred to as the 'digital divide'. Many of our participants believed that the benefits of digital technology have become so great that lack of access to digital technology has important implications for equity and empowerment in later life.

...the biggest issue facing online delivery is equity and access to that form of engagement...people on low income and particularly single women, dependent on the pension, will be massively disadvantaged if there isn't a countervail strategy to give them access. [16]

...as everything becomes more digitally enabled, if they have not got the feeling that they can participate in that new world, they become more isolated and less able to participate, and feel ostracised. [13]

Therefore, although digital technology offered greater potential for lifelong participation for the majority of Australians, it could actually further isolate and disadvantage the minority who are already limited in their ability to participate in our society and economy.

...rather than solving the troubles of the world we're actually going to create a bigger divide between the haves and have nots... [37]



5 ADDRESSING THE RISKS AND REALISING THE POTENTIAL

Despite being able to cite a range of ways in which digital technology would facilitate lifelong participation, many of our participants felt that Australia and Australians were not ready to realise the full potential of digital transformation.

...the real question is, will we get there fast enough to remain competitive and a leader in where we want to be in the world as a country. And I think that's more of the challenge. [13]

We asked participants what actions or resources were needed to realise the best impacts from digital technology in terms of lifelong participation. Their responses tended to encompass one or more of the following three topics:

1. Literate, empowered and active users of digital technology
2. New mindsets around age, participation and technology; and
3. Joined up support

5.1 Literate, empowered and active users of digital technology

Given the enabling role that digital technology was seen to have in supporting social and economic participation, it is hardly surprising that most participants immediately spoke about the need to build digital literacy. However, digital literacy is defined in many ways. While the provision of infrastructure access and training represented a basic pre-condition for participation, many of our participants believed that a higher level of digital empowerment was needed in order to maximise the potential for lifelong participation.

...anybody over 45 needs to be digitally aware because that's what we need as a skillset for employment... but also to know where's the demand, am I pitching for something where basically it's no longer that skill's required, do I need to retrain? If I live out in the country or I've got caring responsibilities can I actually

get to the TAFE or the Uni or the short course; can I do it online...knowing the events are on, the multicultural festival...keep[ing] up with the headlines or watch[ing] ABC online...then eventually, how do I stay in touch with my friends and family and see my grandchildren on Facebook through to how's my super going...or I will need some care soon I think, what's the price, what's available here, how do I go about this...there's digital all the way through that participation. [4]

Within the large and diverse population of older Australians there is considerable variability in digital skills and capability. Those who already believe in the value of digital technology are intrinsically motivated to keep up with developments in digital technology. While these individuals may not need support, they nevertheless have an important part to play in digital literacy initiatives, since peer learning and role modelling was considered the most effective means of communicating the benefits of digital technology. However, many individuals would be at the other end of the scale, unwilling to engage with formal digital literacy training because of lack of confidence and in some cases, even fear.

And I think when we talk about the digital skills building, it's the awareness of the need and the confidence building as much as the skills themselves. [20]

Consequently, digital engagement should begin with and centre on the interests, aspirations and needs of the users rather than features or benefits of the technology. Digital technology then can be explained in terms of how it supports these needs and wants:

...In some of our sessions for example, people said, "Well, what do we need the technology for and what is it useful for? And I can't see myself using it." And then you talk about their interests. About their interests in areas like family history and what they can do online with that, or how they stay in touch with family and friends and kind of looking at those pathways into using the technology. And I think once we sort of hook on those pathways, then the development of digital skills is really pretty rapid in the uptake... [20]

Discussing the relatively low levels of digital engagement within Indigenous communities, one of our participants suggested that their desire to stay connected to activities relevant to their culture might



represent a meaningful hook through which they could be encouraged to be more engaged:

...I think the other thing is there's a definite feeling in some of the community they want to keep up to date with what's going on, whether it's nationally or internationally so I think that's important, but also it's something I've found again – and I haven't done any more study on this and I should have done – is that there's an element of wanting to keep connected to or at least understanding things like cultural revitalisation, language revitalisation because all those resources – a lot of those resources are digital and if you can make sense of that from a community perspective and say, look, the community – this is how we access these learning materials, all our cultural materials, then that might drive adoption of technology, but I'm not sure. Like I say, I have not seen that happen anywhere in the world necessarily. [35]

For this reason, participants believed that existing networks (family, friends, interest groups) and trusted service providers were key agents for digital literacy efforts. Rather than special trainers or agencies, digital technology should be introduced by:

...organisations that people are already involved with.... whether that's working with aged care facilities to ensure that some of that training in digital skill development is in place. Whether it's working with appropriate societies and library and neighbourhood houses. But working with those organisations, that people are already interacting with. [20]

Many of our participants were representatives of organizations and institutions that deliver services to older Australians (e.g., libraries, councils, aged care providers, post offices) and identified digital inclusion as part of their organizational mandate. Rather than simply thinking about how they used technology to interact with customers, they sought to use their service delivery interactions to expose customers to digital technology in a relevant and accessible way. Thus, frontline service workers needed to be using digital technology (iPads, sensors, 3D printers) not just for but with customers, towards ensuring that their

customers were not being left behind in our more digital society.

...it's about developing applications and services that are going to be meaningful for people working with the aged care sector and the health sector, the community sector, who work all the time with people who are aging or our disability clients. And what is going to be a benefit to them? [6]

...I think libraries are already doing this and it's just not being recognised as part of what they're doing, is creating the intergenerational space, the connection with all the knowledge resources people might need and the physical location is important because it's bringing everyone together. [25]

...for us, that digital capability and really helping people as it complements their life with being able to use technology is going to be really important...So we see digital literacy, for want of a better term, as probably one of our biggest community investments. [38]

Another principle that emerged when talking about digital technology and lifelong participation was that we should be aiming for active users rather than passive recipients of digital technology. The goal was not simply to be making someone comfortable with the installation of home monitoring via digital technology. Rather, we should be building the capability to use digital technology to achieve objectives, solve problems and innovate.

...whatever you want to do, technology is one of the frames, and probably the most significant frame by which people are looking for a solution. It becomes an important driver of not only communication but innovation, productivity, job security and to a degree food security. It becomes a core enabler of activities and if you don't have equal access to it, it's going to become a huge inhibitor or disabler. [32]

The other thing I want to briefly touch on is 21st century literacy...people in the community [need] a space where they can come in and they can learn from the basics to the advanced, what they need to know to engage with digital society, economy and government...the ability – not just to access it, but

to inspect it for reliability and for bias and for all the types of influences that are being perpetuated through the web. [24]

Some participants recommended that in order to optimise the potential for lifelong participation through digital technology, older people needed to be involved in the design, development and trialling of new technology. As one interviewee explained:

...a lot of things can go wrong with these sophisticated technologies, but they're more likely to go wrong if...the end user's needs aren't seen as central to the design...that's the real weakness of the new technologies to me, that they're designed by people who don't actually grasp what the user needs them for. [37]

Other participants argued that we are not currently utilizing the full potential of the technology that already exists. They argued that the challenge is not getting the technology right so much as helping people engage with the range of ways in which the technology can be used and applied.

...we tend to focus much more on the availability of the hardware, and occasionally on the take-up, but without those downstream issues about what it's it being used for. For me, to get the most of out of it, it's about recognising that those latter steps are things that can be influenced by networking, communications, stories, a bit of media; and a lot of that is actually best done at the local level by some of those local stakeholders who want to see change. [26]

Participants also stressed that when you were teaching someone how to use digital technology, it was vital to also equip them with the knowledge and skills to avoid the privacy and security risks specific to the online environment.

...risks are very, very important to cover very early if a senior is using the Internet...you want them to be aware of dangers and aware of how they can sensibly use their common sense and stay smart. They don't ever give passwords or bank information in an email, they're careful about any information they give about going on holidays..."My children had a beautiful holiday last week", but not, "Oh, fantastic, we're off on holidays at last, we're all packed up, we're ready to go, Saturday we're heading off to such and such and be away for three weeks"...So just little common sense

things. Would you, if a stranger came to the door, would you say, "Oh, my bank is St George and my bank account number is such and such, oh, no, I don't use passwords I just use 12345", you wouldn't would you? [1]

Participants were in favour of building user-friendly safety measures into the design of technology. They criticized lengthy and complex online privacy statements (which inhibit informed consent) and supported the use of simple security measures:

...Well, there can be a lot of smarts behind simplicity. You can build a lot of protections in using what we're good at in technology, ultimately to make it easier and safer... So we ought to be able to use smarts; whether it's artificial intelligence or better identification of scams, to both make it safer and simpler. [34]

I think one of the things that remains or boggles most people is there's so many thousand passwords to the point that they get frustrated with it and they use the same one over and over.on my iPhone I've got my - ability to use fingerprint technology and access it and you've got these new tools that are coming through that are facial recognition to open up things. So providing security but at the same time providing accessibility and then the next thing is the intuitive design that makes it easy for people to use it. [7]

5.2 New mindsets around age, participation and technology

Along with the skills and resources to participate via digital technology, our participants believed that prevailing social norms relating to ageing would need to be addressed in order for the potential of digital technology and lifelong participation to be realised. As one participant explained:

...in the present environment older people are told everyday that they're disadvantaged, excluded, discriminated against, on the scrap heap, in the name of good public policy, when we need a different vision of ageing and I think we don't have that. [36]

Two prevailing norms relating to age and later life need to be addressed. One is the assumption that certain forms of participation (particularly, but not limited to, economic participation) will be substantively reduced in later life, or that age inevitably leads to increased dependence and a gradual retreat to the fringes of society and the economy.

...I think we've got an enormous re-education to go through to stop this archaic view of work and retirement and then be put out to pasture...we're going to need to be open minded and continue learning and we need to learn how to learn again. And not opt out, which is often what's been the case....maybe you don't work in that traditional sense and go to an office every day, but you still contribute and that in different ways, so I think there would be a big education program around that. And get people thinking that they will be working in some capacity or giving back or creating meaning or value to - until they're 90 or 100 if they need to. And there's no reason why that can't be the case [13]

...We have these very black and white versions of what's work and what's leisure, and I think that's probably got to change, so that as the economy and the capability changes, how humans spend their time can change. [34]

Second, we assume that older people will naturally tend to have a relatively low and/or passive form of engagement with digital technology. Even efforts to support digital literacy can serve to reinforce more passive roles for older people if such stereotypes are not addressed. As one participant explained:

...often we have a bit of a deficit model when it comes to seniors...we're quite happy to say to older people, "You know you can connect better with friends and family if you're online,"...the key thing for me is helping people understand how the Internet can help really open the opportunities for them in terms of building on their interests and connecting them with like-minded people and allowing them to participate in our democracy and participating in having a say on issues no matter what's happening in the world that they're passionate about and contributing, I guess, as opposed to just having technology as something done to them. And I think it will make a difference if older people are also not just passive participants...

but actively engaged in creating not just content but ways of doing things through technology and involved in the development and design on all sorts of things ranging from housing and health right through to fun things as well. [9]

Deliberately countering or challenging expectations of later life will be important to ensure that all the relevant actors and institutions work to maximise the opportunities rather than simply accepting the status quo. Already, much effort has been directed towards countering age discrimination, both in the workplace and in society more generally. One participant argued that this effort is misdirected:

...We tell older people that they're discriminated against, we construct a whole edifice it seems to me, around disadvantage and social exclusion of older people, and then we tell business, and we tell older people that they're wanted as well. There's a whole lack of logic to this, it seems to me. The evidence is that older people on the whole are not discriminated against... [36]

The current focus on digital disruption, innovation and "doing more with less" provides another angle from which to tackle ageist stereotypes and behaviour. People understand that digital technology can disrupt whole industries. Now our task is to communicate that digital technology can also disrupt the way in which we approach later life.

It will not just be older workers who need to adjust their mindset. Currently, most of us focus on being effective employees, with responsibility for a specific role within the organization and relying on other expertise and infrastructure within the organization to support our efforts. Digital disruption changes the nature of work. Our participants predicted that in the future, more people would be self-employed. People would need broader skillsets so as to be able to manage their own careers and find new ways of earning income in this disrupted economy:

...having someone come through with an accounting degree and just being a bean counter and just keep doing more of that is just not the reality and they need to have then the softer skills to be able to promote themselves or do other things that are more value adding...supported through technology... [22]

5.3 Joined up support

Digital skills training and a change of mindset would not be sufficient in and of itself for all individuals to experience the benefits of lifelong participation through digital technology. To address the range of barriers to participation, a more joined up approach is likely to be required, as one participant explained:

...if somebody wants to remain in their home, what are all of the drivers that will allow them to do that? Not just the technology that allowed them to stay there, but the income that also allows them to stay there and also enjoy living there and feel valued and be a valued part of community. [31]

Many participants made the point that digital literacy efforts would be limited in their impact if we do not address inequality in access to digital technology. Government was seen to have a vital role in ensuring that everyone would have access to the technology, and thus the opportunity to participate:

...particularly in the area of digital government services, one of the effects that the digital revolution

has had...is made digital required...we disenfranchised anyone who can't access it that way, and from a democratic standpoint that is not okay...by making those services cheaper and lower cost and more readily accessible to a small slice of the population you don't solve the problem, you just move it. [18]

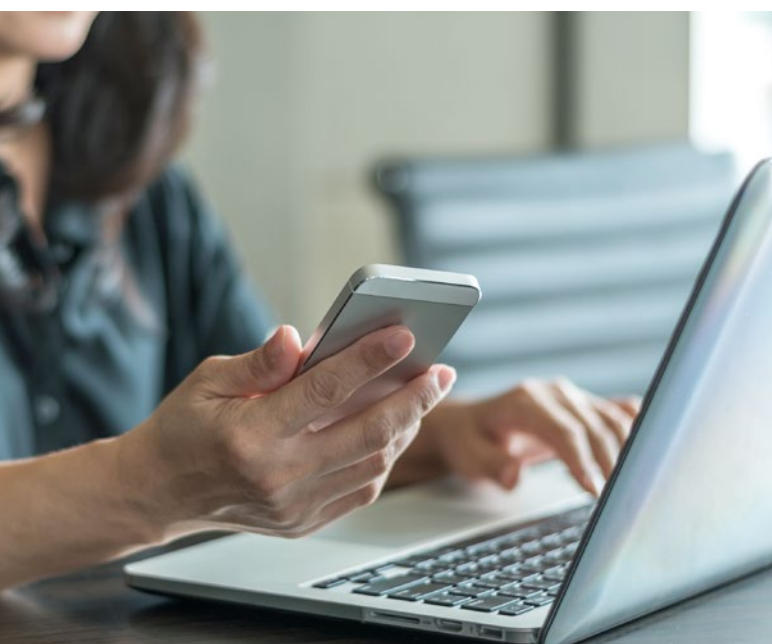
...access to the internet...access to community groups online...to participating on social media...online shopping and...access to learning more about health and wellbeing...learning about everything really, well it's absolutely fundamental...it's very important to ensure that people who are in lower SES areas, refugees and indigenous people, and people with disadvantages...people with disabilities....are brought in and have access. [2]

On the other hand, some people might never be able or willing to use digital technology. Therefore there should always be alternative (non-digital) channels through which people can access vital services:

...the Seniors Commissioner just completed this big research project, and it came out really strongly just how fearful many seniors are; it's just too overwhelming and how essential it is that there are alternatives provided, and that industry and business and government need to take responsibility for making sure that those who aren't online have some means still of engaging and being served. [9]

Third, given that individuals without capital or specialised expertise would still have more limited opportunities to participate economically, one participant argued that early retirement would still need to be an option for some:

...I think the problems facing many older people are structural, and for them they're long-term issues around their participation...If you're talking about the 460-odd thousand disability support pensioners, plus around 200,000 unemployed older workers. If you look at present public policy, look at the Restart Program for instance, that was targeting 32,000 people. The take-up has been around 3,000 places. What policy-makers are doing presently is an absolute drop in the ocean. ...people who have a sort of cumulative disadvantage...I struggle with the concept of just putting the retirement age up for absolutely





everyone. What does that have to say to a baker for instance, who has been working all his life, and he's suddenly finding that his health is declining in his late 50s. I don't know how that notion could resonate with him. [36]

For others, there may be a need for some kind of advice or mentoring for people transitioning out of traditional employment to identify alternative pathways for remaining engaged in meaningful activities and generating income through digital technology.

...get people to the realisation...you no longer just retire at 65 and live happy days. So you've got to find ways to be relevant, to be able to work in a flexible way...maybe there's programs to give the base help, educate the base realisation...around requirements to work longer and to be financially stable... [22]

Participants recommended early engagement to ensure people were psychologically equipped and resourced to participate when they reached later life:

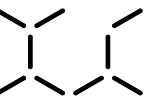
...equipping people to respond well to change in their environment over their working lives, rather than... assume at the age of 55 we can stick you on some sort of scheme, and hope for the best. That takes a massive rethink of learning and training in Australia... [36]

...people do not have realistic views on what type of things are available to support certain lifestyles. I think digitalisation, digital technology, especially gamification and artificial intelligence where you can do extensive modelling, should be able to help people plan for their retirement...and then of course start

saving on time....I don't think you can do it in the later years of your life because it will not happen, that's fundamentally it. [14]

This support might represent a blend of careers and financial advice, particularly focused on the range of ways in which their interests, capabilities and resources could be better harnessed via digital technology to support social and economic participation. One participant envisaged:

...working with them on assisting on the different types of research that's required...They could have great photographic skills, but their mobility is holding them back. I mean we can actually work out how you can link the lot together, so I think there's many, many opportunities in that space in working with people, because a lot of people may not need the money to live as well, but they want to continue to work because that's part of who they are. So that's when you're actually a solution provider and you're not just only in there to have a chat and have a cup of coffee. You're actually in there to find out what they really want and actually assist them in getting there holistically, not just one little part of their life. [31]



6 CONCLUSION

By addressing multiple barriers to participation, digital technology opens up an array of opportunities that can be adapted to the diverse values and needs of people in later life. On the other hand, the barriers to accessing and using digital technology could ultimately result in some individuals and groups being further excluded from opportunities to participate. The potential of digital technology is therefore emergent rather than fixed. To realise its full potential, older Australians need the capability, the tools and the vision to apply digital technology to meet our individual and collective needs and goals.

Digital inclusion: Digital inclusion must be a priority going forward. The ability to access and use digital technology will be a basic requirement for social and economic participation in the future. If we do not ensure that everyone has the resources, confidence and skills to engage with digital technology, some older Australians will be unable to participate on an equal footing with the rest of society. Furthermore, efforts to support digital inclusion need to respond to the diversity within this population, with interventions tailored towards giving people the skills to engage with technology in the ways that are of value to them.

Digital empowerment: However, while recognising the need to address digital inclusion, we should also be mindful not to define older Australians in a passive or vulnerable relationship with digital technology. Rather than being *affected by* digital technology, older Australians can be more *effective through* digital

technology. The power of people and technology is realised when humans use technology to connect with each other, to solve problems, and to achieve that which is of value to them. This represents the highest form of digital literacy and is where we need to be aiming collectively. Both for their own sakes and for society more generally, older Australians need to be emboldened to find their own answers to the question posed by one of our research participants:

...the tools themselves aren't the solution, it's the relationship between what the tools are and a deep understanding of how to actually provide the social good... taking a step back and thinking... What do we care about, what are our values, what do we seek to accomplish... what is science telling us for having a really good life and then how can technology facilitate that? [27]

Digital connections: Our research assumes that we already have part of the answer to this question. In asking how digital technology can support lifelong participation, we assume that the opportunity to connect with others and participate in productive and meaningful activity is fundamentally important and valuable. The combination of improved life expectancies and digital technology means that the potential to participate and contribute in later life is more significant than ever. To make best use of this potential, we need to improve the linkages between individuals' interests and capacity (supply of effort) and the valued activities for improving our society



(demand for effort). The grandchild who needs caring for and the grandparent who lives in the same city are inherently joined up. However, digital technology provides the connective medium for realising many other opportunities to participate. Once these connections are made, individuals with resources, skills and expertise will be able to choose from a wide range of opportunities, whether by participating in a standby global emergency response taskforce or starting up their own business enterprise.

We should not forget that, for some individuals, supplementing income will be a priority. In general, these individuals will be less skilled and less well educated in addition to less well financially resourced. The vital need here is to identify opportunities which they are suited to (both in terms of their disposition and their abilities) and which are in sufficient demand in a technologically-enabled society to attract financial remuneration. One opportunity may lie in the joining up of service delivery efforts across domains (e.g., health care and aged care) and then creating roles for these less skilled workers which reduces the demand on more expensive professional employees. However, such roles are likely to require good interpersonal skills and a caring orientation. For individuals who are not disposed towards this type of work, our participants could not identify a concrete role. It will be important to identify a broader suite of opportunities and/or alternative financial support for these individuals.

6.1 Next steps

Progressing these complex and multifaceted issues will require collaborative effort. We cannot afford to hope that the necessary vision and co-ordinated action will come about by itself. To progress the lifelong participation agenda, CSIRO's Data61 will be inviting research participants and other stakeholders to take part in a forum process, underpinned by a collective impact framework (Kania & Kramer, 2011). This forum is intended to build both the vision and the collective resources for testing and realising the potential for digital technology to support lifelong participation.

We must acknowledge that this research provides a very high-level view of the opportunities for lifelong participation through digital technology. These ideas need ground-testing to determine whether they actually align with older peoples' values and experiences. As a first step, we need to engage with

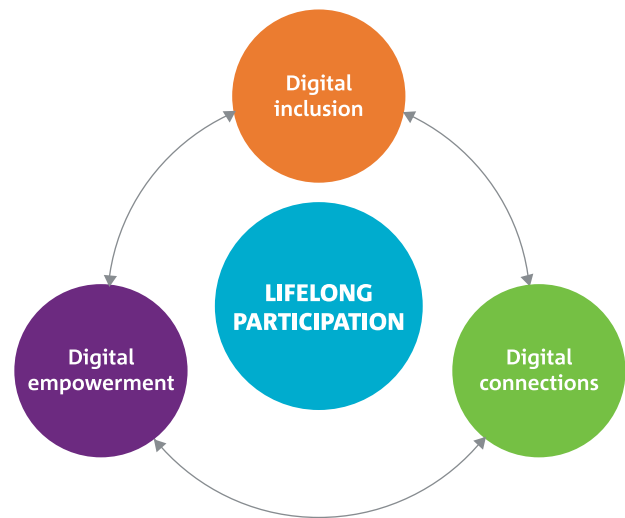


Figure 5: Enabling Lifelong participation

a diverse sample of older people to learn more about how they currently participate and the role that digital technology plays in their social and economic activity. As part of this work we might explore how desirable and feasible the opportunities outlined in this report appear in the context of their own lived experiences.

There would also be value in engaging more broadly with older Australians to learn about the choices and transitions that they make as they move from middle to later life. By exploring their experiences, we may be able to better define the pathways and forms of participation that people found most successful and rewarding. We should then be in a better position to support others in navigating the opportunities and risks associated with lifelong participation in a digitally-enabled world.



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