A TECHNOLOGY ROADMAP FOR THE AUSTRALIAN AGED CARE SECTOR

PREPARED BY THE MEDICAL DEVICE RESEARCH INSTITUTE, FLINDERS UNIVERSITY FOR THE AGED CARE INDUSTRY IT COUNCIL (ACIITC)

JUNE 2017
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**Foreword**

The aged care industry is in an era of unprecedented change. The confluence of current aged care reforms, business model transformation and technological disruption is reshaping multiple areas of the aged care industry eco-system. Consumers are at the centre of these changes and the Australian aged care industry is embracing this change.

Following the release of the Aged Care Sector Committee’s Aged Care Roadmap, the Aged Care Industry Information Technology Council (ACIITC) recognised the need for further research to enhance understanding of the role that technological disruption and innovation are playing now, and in the future, for the aged care industry. In particular, the ACIITC was interested in exploring the contribution technological interventions could make to realising the Aged Care Roadmap’s vision for a sustainable and robust aged care industry.

Consequently, the Technology Roadmap has been designed to complement the Aged Care Roadmap, reflecting its underpinning principles, and applying the filter of technology to the way in which care is provided and to the business systems supporting aged care organisations.

The Technology Roadmap Project is based on a review of the academic and grey literature as well as consultation with key stakeholders in the aged care sector. That research has identified the critical success factors and barriers for uptake of new technologies in the sector, but has analysed findings on the effectiveness of particular technologies in the care settings, and innovations that support more efficient business systems in a reformed aged care environment.

The Technology Roadmap Project recognised the need to outline a vision of an innovative, technology-enabled sector for the next five to ten years. The Project was deemed critical to ensuring a sustainable future industry and to appropriately guide investment decisions in the long term.

It is hoped that the insights from this research will help policy makers evaluate the benefits of embracing technology as well as provide guidance and information for aged care providers seeking to embed appropriate technology in all aspects of their operations.

The Technology Roadmap Project has been a significant undertaking for the Age Care Industry Information Technology Council and an important investment in the industry driving its own future. It has spanned over a year of dedicated resources and brings together a number of esteemed researchers from Flinders University led by Professor Karen Reynolds.

The Aged Care Industry Information Technology Council trusts this work will assist in enhancing the positioning of the Australian aged care industry for a vibrant and sustainable future. Further it is hoped that this work will stimulate continued research, evidence gathering, and the deployment of practical demonstration projects designed to explore how greater innovation and technological uptake will help to improve the quality of the aged care industry in Australia.
The Project Management Team would like to thank those individuals who have provided insightful comment and advice on the content of the Technology Roadmap, in particular:

Members of the ACIITC CIO Committee
Members of the ACIITC Home Care Committee
Ms Jennene Buckley, CEO, Feros Care, Director ACIITC
Dr Kevin Doughty, Director, Centre for Usable Home Technologies
Mr Nigel Faull, CEO, Star Aged Living
Dr Malcolm Fisk, Senior Research Fellow, Centre for Computing and Social Research, De Montfort University, Leicester, United Kingdom and Director, Telehealth Quality Group EEIG
Mr Craig Porte, CEO, Carelink
Mr Michael Scurrah, Program Manager, Regional Assessment Service, Feros Care
Mr Lee Davis, Executive General Manager, Digital Services,, Silver Chair Group
Mr Bruce Coller, CIO, Sir Moses Montefiore Jewish Home

To the Aged Care Industry, peak bodies LASA, ACSA and the 50 organisations represented in the Technology Roadmap Forums for providing their employees, common resources and time as contributions to the development of this technology roadmap.

Project Management Team

Aged Care Industry Information Technology Council (ACIITC) Technology Roadmap for the Aged Care Industry June 2017
BRIEF FOR THE ROADMAP

The Technology Roadmap for Aged Care was commissioned by the Aged Care Industry Information Technology Council (ACIITC) in late 2016. The Council intended that this Roadmap would be an accompaniment to the Aged Care Roadmap (2016)\(^1\), providing a technology-specific focus on reform. The following six objectives were articulated by the Council:

1. Provide a summary of key global research and quantitative evidence currently available with respect to technological deployment and advancement in the aged care sector.

2. Facilitate a consultative process with the ACIITC Board and its Committees to canvass a range of views and consider these in the project outcomes.

3. Detail requirements of technological advancement and adoption required to meet the obligations and outcomes, as outlined in the (Aged Care) Sector Roadmap’s nine key domain areas.

4. Acknowledge the short, medium and long term considerations required to position the sector for the most appropriate uptake and deployment of technology.

5. Detail recommendations of funding requirements in respect to technology for the sector, including identification and detailing of what other funding/regulation changes are needed to enable mainstream adoption of technology across the industry.

6. Identify any key issues or considerations with respect to technology which emerge from the project and that may not have been detailed in the Sector Roadmap.

ROADMAP METHOD

The Project Brief for the Technology Roadmap specified the following methodology:

- A review of published and grey literature relating to ageing and technology and more specifically, to the role of technology in aged care. This has been provided in the form of two reports: a complete report and a summarising report.

- A Workshop with key ACIITC Committees prior to the ITAC Conference (Melbourne, November 2016) was identified as the main consultation mechanism to inform the Roadmap. A background Discussion Paper was circulated prior to the Workshop and a presentation on the project was made on the day.

- Subsequently, a number of individual and group interviews were undertaken for this purpose.

- Informed by the above steps, the Roadmap was prepared in draft and final form following consultation with the ACIITC.

**ROADMAP STRUCTURE**

The Roadmap structure aligns with that of the Aged Care Roadmap to enable ready cross-referencing between both documents.

It is framed around five Destinations, the first of which is focused on the operational and business systems underpinning aged care services, while the remaining four relate to the provision of services. The Destinations are:

I. Technology-enabled operational, business and communication systems.

II. Technology-enhanced care and support for older people.

III. Technology-enhanced information and access to care.

IV. Technology-enhanced assessment of eligibility and changing need.

V. A technology-literate and enabled workforce.

Each Destination is aligned, where appropriate, to one of the nine Domains of the Aged Care Roadmap.

The Technology Roadmap has six underpinning Value Statements and these have taken into account the four Principles shaping the Aged Care Roadmap, adding a technology lens in the process. The relevant Value Statements for each Destination are highlighted.

As with the Aged Care Roadmap, content is structured to identify:

- The desired Destination – through a brief vision statement
- A summary of what is in place
- A summary of what needs to change, articulated in the form of Issues
- A summary of what needs to be done
- A plan of action framed against the Short Term (1-2 years), Medium Term (3-5 years), and Long Term (5-7 years). This mirrors the timeframe applied in the Aged Care Roadmap. Most Actions are prioritised for the Short Term, reflecting the speed of technological change and the need for urgent action in most areas.
## The Technology Roadmap for Aged Care: at a Glance

<table>
<thead>
<tr>
<th>DESTINATION</th>
<th>ISSUES TO BE ADDRESSED</th>
<th>ACTION</th>
<th>SHORT TERM (&lt;2 YEARS)</th>
<th>MEDIUM TERM (3-5 YEARS)</th>
<th>LONG TERM (5-7 YEARS)</th>
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</thead>
<tbody>
<tr>
<td>1: TECHNOLOGY-ENABLED SYSTEMS</td>
<td>1. Need for interoperability, open standards and common platforms</td>
<td>Adapt for aged care Open Standards and protocols that facilitate interoperability and sharing of information.</td>
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<td></td>
<td>2. Under-developed sector Technology readiness</td>
<td>Undertake a <em>Technology Maturity Assessment</em> of the aged care system’s technological readiness, reviewing use of technology across the spectrum of care services, and structural arrangements, underpinning systems and capacity for interoperability. Repeat every 3 years.</td>
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<td>3. Fragmented capacity building and a failure to embed technology in aged care</td>
<td>Develop an Implementation Plan to accompany the standardisation of interoperability across the aged care sector.</td>
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<td>4. Need for national data exchange and readiness for electronic data usage</td>
<td>Collaborate with the Australian Digital Health Agency and Department of Health to embed technology capability as an essential requirement of aged care delivery, reflected in Standards and accreditation KPIs.</td>
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<td>5. Need for Aged Care B2B and B2G Interfaces in order to create an open ecosystem of secure data exchange.</td>
<td>Establish a national data exchange and reporting hub to support providers with advanced business intelligence, analytics and reporting capabilities.</td>
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<td></td>
<td></td>
<td>Develop a holistic government strategy for the aged care sector that provides B2B and B2G interfaces in order to create an open ecosystem of secure data exchange.</td>
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<tr>
<td>2: TECHNOLOGY-ENABLED SERVICES</td>
<td>1. Service sector silos</td>
<td>Establish a national network linking end users (consumers, their supporters and service providers) with developers of technology to support co-design and co-evaluation.</td>
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<td>2. Failure to integrate technology as a core feature of aged care</td>
<td>Develop a specific cluster within this network to support co-design in the development of Smart Homes for older Australians.</td>
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<td>3. Informed choice and improved system navigation</td>
<td>Develop a series of Demonstration Pilots to demonstrate how to extend existing telehealth and telemedicine programs into aged care (residential and community), and how to support the electronic sharing of consumer and service data between aged care and health system providers.</td>
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<td>4. Insufficient co-design</td>
<td>Explore with the disability sector scope to provide a specific component focused on older people in its NED database.</td>
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<td>Develop an App to assist in navigating assistive technologies designed to meet the needs of older people.</td>
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<td>Establish a Technology Initiative Fund, combining government support with providers pooling funds and resources, to support aged care providers to purchase and/or develop technologies to integrate into their care services.</td>
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### 3: Technology-Enabled Information and Access

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<th>DESTINATION</th>
<th>ISSUES TO BE ADDRESSED</th>
<th>ACTION</th>
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<th>LONG TERM (5-7 YEARS)</th>
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<tbody>
<tr>
<td>1.</td>
<td>Under-developed and inequitable consumer readiness</td>
<td>Develop a national Digital Literacy Strategy for consumers, supporters and providers to ensure they have the skills to use technology-based products and services designed for older people.</td>
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<td>▶️</td>
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<td>2.</td>
<td>Addressing factors that determine adoption of technology</td>
<td>Develop a national Technology Awareness Raising Strategy to ensure consumers and their supporters are informed about technology based products and services for older people.</td>
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<td>Develop a national Technology Equity Strategy for aged care consumers, their supporters and aged care providers to address inequitable access arising from disadvantage (e.g. because of location, affordability, information, skills).</td>
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<td>Develop a tool for aged care providers to profile their consumers’ technological readiness/digital literacy. Repeat this over time to measure the impact of digital literacy interventions and to monitor the effectiveness of the first three Actions.</td>
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### 4: Technology-Enabled Assessment

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<th>DESTINATION</th>
<th>ISSUES TO BE ADDRESSED</th>
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<th>LONG TERM (5-7 YEARS)</th>
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<tbody>
<tr>
<td>1.</td>
<td>Need for a technology lens in assessment and care planning</td>
<td>Develop a Pilot to trial the embedding of technology expertise in assessment and care planning, and analyse outcomes achieved for providers and consumers.</td>
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<td>2.</td>
<td>Under-utilisation of automated assessment</td>
<td>Based on Pilot findings, establish a dedicated pool of Technology Specialists to advise on potential technology solutions or enhancements.</td>
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<td>Review existing validated assessment tools, identifying those that have been automated. Update every three years and share with the sector.</td>
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<td>Ensure that assessors and clinical care managers receive training in the application of automated assessment tools.</td>
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<td>DESTINATION</td>
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<td>5:</td>
<td><strong>TECHNOLOGY-LITERATE AND ENABLED WORKFORCE</strong></td>
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<td></td>
<td>1. Under-developed workforce technological readiness</td>
<td>Include questions designed to identify technological readiness in the ongoing National Census of the Aged Care Workforce.</td>
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<td>2. Under-developed informal carer technological readiness</td>
<td>Design, implement &amp; evaluate (via a series of Pilots) a national Workforce Technology Development Strategy to build capacity to use technologies effectively &amp; integrate them into service processes &amp; systems.</td>
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<td>3. Limited videoconferencing infrastructure</td>
<td>Provide increased opportunities for online learning and videoconferencing (possibly via a dedicated incentive fund) and explore capacity for sharing operational costs across aged care providers.</td>
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<td>4. Under-developed potential to improve workforce productivity</td>
<td>Include informal carers in paid workforce training and learning opportunities designed to enhance digital literacy and confidence.</td>
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THE NEED FOR A TECHNOLOGY ROADMAP FOR AGED CARE

Technology has the potential to make living as an older person more positive, and to radically transform the way in which people receive services and support as they grow older. This reflects the rapid and continuous growth of new technologies that have become integrated into everyday life, shifting from being ‘rare’ to becoming ‘normal’ in a matter of a decade or so. In the process, the way people live and work continues to change. As jobs become automated, new technology-driven jobs emerge, and new communication methods transcend time and distance. In creating increased opportunities to age in place—without loss of independence—technology supports positive ageing. It even challenges the traditional concept of ‘aged care’.

Almost all older people want to live in their own homes, with residential aged care being the service response to high level challenges in functioning and health. Recent aged care reforms support the continued expansion of care in the community, in line with consumer preferences. Independence, good health, security, and continued participation in family and community life are frequently identified as desirable key indicators of the experience sought in growing older. Technology has a critical role to play in realising this vision of a positive old age—in minimising or delaying the need for formal care services and in shaping the way in which such services are provided. For this reason, it is important that end users (that is, current and future consumers of aged care services and aged care organisations) contribute actively to the design of technologies that enable ageing in place and also optimise a technology-enabled aged care system.

In an ideal world, such technologies would be developed in collaboration through co-design with these end users. Not only would this ensure user-friendly and fit-for-purpose technology, it will promote seamless integration of technologies into everyday living and service provision, blurring the boundaries between ‘care’ and ‘living’ in the process.

The aged care sector engages with technology through its communication and business systems, as well as in the direct provision of care, and this Roadmap encompasses both forms of utilisation. In relation to care services, technology’s contribution has been most prominent in the use of Assistive Technologies, which themselves have undergone significant transformation over time. Originally non-technology-enabled aids and equipment (e.g. walking frames), Assistive Technologies now utilise technology to provide support, but without seeking to repair or modify an impairment. However, as technology advances, the scope for therapeutic technologies is increasing—for example; functional electrical stimulation (FES) has significant potential for restoring movement, while robotic exoskeletons enable movement. Consequently, the previously firm boundaries between purely assistive and therapeutic technologies are dissolving.

The other important outcome of technological progress is that older people no longer need to rely on technologies designed specifically to assist, but can benefit from a range of other
technologies that produce this outcome without this purpose, or without targeting them as the primary end user. Recent examples include technologies that enable Virtual Reality, ‘Smart Living’ and driverless cars. These *hybrid* technologies further remove the distinction between technologies designed to enhance daily living and Assistive Technologies. A range of emerging technologies (such as the Internet of Things) perpetuate this trend, and for this reason, technology in aged care needs to be understood as involving more than assistive devices.

As technology becomes increasingly accessible to consumers—with leading mobile platform providers (such as Apple and Google) expanding into Smart Homes, wearable technologies, autonomous vehicles and so on—consumers are perceiving technology as a key enabler of care, support and quality of life. Aged ‘care’ has ceased to be driven only by policy makers; increasingly it is also driven by consumers themselves, aged care service providers and technology experts.

In the past, formal care services, and the care and support of significant others, constituted the partnership providing support for older people.

It is now evident that technology is becoming the third partner.

The challenge is to ensure that this new trinity works in harmony, as a smoothly functioning team.

*Figure 1: A New Partnership*
Technology will disrupt Australia’s service-based economy in positive and negative ways … but it also offers unparalleled opportunities for positive experiences of ageing … (McKell Institute 2015: 31).²

It is critical that the aged care sector takes a proactive approach to the way in which technology plays a role in its services and provides leadership on a range of issues associated with delivering care in an increasingly technology-driven world. These include:

- Clarity about the ethical implications of particular technologies and about their security and privacy implications.
- The need for co-design and co-evaluation that involves end users (that is, consumers, their supports and aged care providers) in developing and applying technologies intended for their benefit.
- The development of networks of technology experts, ageing and aged care experts, consumers and their supporters who will provide structures and processes to support collaboration, co-design and co-evaluation.
- Increasing the readiness of the sector (including by increasing digital literacy skills) to make maximum use of available and evolving technologies in service delivery and its supporting digital infrastructure.
- Ensuring that technologies are integrated into assessment, care planning and delivery, rather than being added on and treated as separate to care provision.

The Technology Roadmap for Aged Care in Australia acknowledges that aged care is facing three complex and intersecting issues:-

1) Population ageing that has never been experienced to the same level
2) The rapid development of new technologies, and
3) Reform in the aged care sector that fundamentally changes the way in which older Australians will be supported.

These three meta-influences bring both challenges and opportunities, and while each is often treated separately, this Roadmap highlights their interdependence.

UNDERPINNING VALUES OF THE TECHNOLOGY ROADMAP

The Values underpinning the Technology Roadmap reflect findings from the research literature\(^3\), and are aligned with the *Aged Care Sector Statement of Principles* (the Principles) framing the Aged Care Roadmap.

- **Principle I:** *consumer choice* is at the centre of quality aged care
- **Principle II:** *support for informal carers* will remain a major part of aged care delivery
- **Principle III:** the provision of formal aged care is **contestable, innovative and responsive**
- **Principle IV:** the system is **both affordable for all** and **sustainable**.

These four principles are reflected in the *Value Statements* of the Technology Roadmap for Aged Care.

- **Value Statements 1, 2 and 3** align with Aged Care Roadmap *Principle 1* (Consumer Choice is at the centre of quality and care) and *Principle 2* (Support for informal carers will remain a major part of aged care delivery).
- **Value Statements 4 and 5** align with Aged Care Roadmap *Principle 3* (The provision of formal aged care is contestable, innovative and responsive).
- **Value Statement 6** aligns with Aged Care Roadmap *Principle 4* (The system is both affordable for all and sustainable).

1. Aged care reform is founded on the twin principles of **choice** and **control** and this applies equally to the use of technology designed to enhance older people’s quality of life.

2. Technology must be applied with sufficient **flexibility** to support varying consumer needs and preferences, in line with reform directions of choice and control.

3. Technology for use in private homes must **integrate into individual homes**, and be **personalised** to achieve this.

4. The development of technologies specifically for application in providing care and support must be based on **co-design**, that is, involving end-users.

5. The effectiveness of technologies developed to support quality care and individual wellbeing must be evaluated over time, preferably through **co-evaluation** with end users.

6. Technology must be **integrated into aged care policy and processes** (rather than added separately to daily care and support).
Destination 1: Technology-Enabled Operational, Business and Communication Systems

**DESTINATION**

Aged care organisations that operate effectively in a technology-enabled environment, achieving substantial resource efficiencies arising from automated business and operational systems. In addition, they will deliver more effective services, based on sensitive databases that identify consumer needs holistically, and support tailored responses based on individual need and preference. Working closely with vendors and technology developers, a range of bespoke systems are provided to meet the business demands of aged care organisations.

Electronic record-keeping replaces most paper-based systems, supported by appropriate digital infrastructure and a technology-literate workforce. This provides greater accuracy of consumer clinical records and rapid access to those records by service providers. The accompanying widespread use of mobile devices provides community care workers with access to information while they are travelling or in a consumer’s home, and enables them to update records at the point of care.

The move away from paper-based records to comprehensive electronic records facilitates communication within the aged care sector and to the health care ecosystem (GPs, pharmacies, hospitals etc). Aged care service provider software and consumer care records interface smoothly with My Health Record. Enhanced digital data collection supports the linking of aged care databases to external sector databases, such as health and disability services, to support more holistic care while avoiding unnecessary duplication.

The increasing connection between service providers that is enabled by the widespread adoption of digital technologies is supported by increasing collaboration between aged care providers, other end users, vendors, developers and other key stakeholders. In turn, this is enabled by agreement on interoperability and the adoption by industry of Open Standards to support the sharing of information.

Increasingly, the adoption of new technologies is supported by planning and collaboration at sector level, and the development of a national data exchange and reporting hub, coordinated by an appropriate body, such as the Aged Care Industry Information Technology Council.

**Underpinning Value Statements addressed**

- Technology must be integrated into aged care policy and processes (rather than added separately to daily care and support).
- Technology must be applied with sufficient flexibility to support varying consumer needs and preferences, in line with reform directions of choice and control.
WHAT IS CURRENTLY IN PLACE?

Increasingly, new technologies are offering (usually tailored) solutions to challenges faced by aged care providers in delivering care, challenges that are exacerbated by recent aged care reforms—which more than ever require the best ‘fit’ between worker and consumer. A growing range of technologies are able to achieve new levels of efficiency, for example, identifying the most appropriate consumer-worker match, minimising travel time by planning the most efficient travel routes, and automating the recording of travel times and distances. Automated timesheets are being used by a growing number of aged care organisations, enabling more efficient payroll processes and timely client billing. Similarly, automated rostering supports shift planning, up-to-date staff availability records, workforce training and meeting scheduling. Often those technologies are applied via workers’ mobile devices, using increasingly user-friendly software, and reducing paperwork in the process.

There are now multiple examples around Australia of vendors and aged care providers working together to achieve organisation-specific solutions that enable more efficient and effective business, operational and community systems. As this partnering precedent continues to be applied, it can be expected to become the norm.

However, across the sector as a whole, the extent to which available technologies are being utilised to effect is inconsistent and fragmented—divided by inequities in access, affordability, knowledge of what is available and under-developed collaboration. There is significant potential to achieve greater economies of scale with a more national approach to embedding technologies into aged care organisational processes.

WHAT NEEDS TO CHANGE?

The move to a consumer-directed aged care market model has changed the underpinning funding model for aged care, requiring greater flexibility from service providers in responding to individual consumer demand, and new business models to accommodate a range of changes, including changes in financial management, service design, data collection and analytics. Not only does technology have a critical role to play in managing these changes, it can be argued that it will determine how successfully aged care organisations respond to a reformed aged care system.

A growing number of aged care organisations are moving towards operating in an ‘intelligent environment’, that is, one which is technology-enabled and technology-enhanced, able to monitor consumers, the workforce and their patterns of interaction, to better plan how that interaction occurs and the resources required, supported by different automated processes and communicating across a range of devices and contexts. These organisations are providing leadership for the sector as a whole.

The next level of progress requires an operating environment characterised by seamless interconnection between devices, datasets, services, consumers and other stakeholders (e.g. government, health care providers, and disability providers). This requires the aged care sector to apply agreed standards and protocols that define precisely the interfaces between different components, enabling a range of combinations and ensuring interoperability.
ISSUE 1: NEED FOR INTEROPERABILITY, OPEN STANDARDS AND COMMON PLATFORMS

The aged care sector has developed its operational, business and communication systems at the organisational level, and while this allows individual providers to choose those systems with a great deal of freedom, the absence of common standards, sector-level policies and common data collection also means it is difficult for individual organisations to benchmark their performance and identify needed improvements. The consumer-directed care model brings a demand for more integrated services and holistic support, requiring providers to collaborate on care, budgets, pricing and contracts. ICT is a critical enabler for providers to develop individualised services and support, in response to increasing expectations for choice, and for services that overcome barriers between providers, and between sectors.  

At the same time, broader changes that have brought increasingly connected digital devices and delivery via Cloud systems, the growing digitisation of health and aged care records, and the automation of a range of clinical and operational processes, are all driving the need for a more collaborative approach between aged care providers, end users, vendors, developers and other key stakeholders. Similarly, for standardisation to ensure their interoperability.

The aged care sector can be guided in addressing this issue by national and international precedents. The Australian Digital Transformation Agency released the Digital Service Standard against which all government services have been assessed since 6/5/16. Among the 13 Criteria shaping the Standard, three are of direct relevance to the aged care sector:

- Criterion 7: Use open standards and common platforms
- Criterion 8: Make source code open (by default)
- Criterion 9: Make it accessible — ensure the service is accessible to all users regardless of their ability and environment.


The not-for-profit organisation HL7 (Health Level Seven) international standards are commonly used for the transfer of clinical and administrative data between software

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5 That is, the ability to communicate, access and exchange data without needing identical IT systems and products to do so.


applications. FHIR®— *Fast Healthcare Interoperability Resources*—is a new standard from HL7 that provides for easier exchange of healthcare information electronically. As such, FHIR can be used as a stand-alone data exchange standard, or in partnership with existing standards.

It is timely for the aged care sector to reach agreement on interoperability—both within organisations as well as between organisations in the sharing of data—and on agreed standard(s) to support this. The Aged Care Industry Information Technology Council (ACIITC) can play a critical coordinating and facilitating role in achieving this outcome, providing a unified resource point for providers, vendors and other key stakeholders.

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8. [https://www.hl7.org/fhir/](https://www.hl7.org/fhir/)
Once such agreement is reached, there will also be a need for an Implementation Plan that addresses issues of data custodian responsibilities and storage of data, privacy and security, legal issues regarding data sharing and agreed processes for accessing shared information.

Governance frameworks will need to be developed to regulate data collection and usage, adapting and contextualising for aged care from those already in existence.

**Issue 2: Under-developed sector technology readiness**

The degree to which the aged care sector engages with technology in its operations, business and delivery of care varies significantly. In 2014, the ACIITC’s National Home Care Group implemented the Aged Care Technology Benchmark Survey with community care providers to assess levels of digital maturity. Findings from the survey highlighted a low level of technological readiness in Australia, in relation to the provision of care, and to operational and business systems.9

It is timely to undertake another Technological Maturity Assessment, building on the 2014 benchmark research, but extending the survey beyond community care out to the sector as a whole. This review should be focused on technology-enabled care services, and on technology-enabled business and operational systems—quantifying structural arrangements, underpinning systems and the capacity for interoperability. The Technological Maturity Assessment survey should be repeated every three years.

**Issue 3: Fragmented capacity building and a failure to embed technology in aged care**

Impediments to effective technology-enabled aged care business systems include the absence of sector-wide IT planning, the absence of sector-wide workforce training and development for working in a technology-driven world, and the absence of incentive schemes to encourage investment by aged care providers in technology infrastructure.

There is a void in current industry Standards for requirements to meet technology use and management. For example, the closest that existing Residential and Home Care Standards come to this is in specifying that ‘effective information management systems’ be in place

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9 Livingstone A (2014) Technology and Aged Care, Presentation to the Aged Care Workforce Innovation Workshop, Adelaide, November 4th 2014
(Expected Outcome 1.3). This reflects the wider issue of technology being regarded as an afterthought to service provision, rather than being embedded as a critical enabler of services and their underpinning systems.

Consequently, development is fragmented and capacity is highly diverse. It is likely that resources are being used inefficiently, as individual providers ‘reinvent the wheel’ rather than draw from a shared knowledge base.

There is also a need to ensure that aged care providers have access to appropriate digital communications infrastructure, such as broadband (and at the minimum, an internet connection), and that contemporary consumer platforms—smartphones, rather than traditional mobile or landline telephones, and tablets—are accepted as standard usage in aged care.

**ISSUE 4: NEED FOR NATIONAL DATA EXCHANGE AND READINESS FOR ELECTRONIC DATA USAGE**

The aged care sector lags behind the health sector in its use of electronic data systems. It is important that this difference diminishes over the short term because of the multiple benefits possible. These include: efficient and more complete collection of data; distribution, storage and retrieval; the ability to record holistic information to better understand consumers’ needs and to support workforce development; improved monitoring of care and quality of care; better decision making; more time for direct care workers to spend with consumers because of time savings arising from reduced paperwork; better communication between all stakeholders; enhanced information management for the organisation; and improved documentation.

The adoption of *My Health Record* and its eventual alignment with *My Aged Care* means that aged care providers need to now prepare their data collection to support electronic health record sharing, including providing details of assessment findings, care plans, advanced care directives and a timeline of service interventions for each consumer. They will also need to ensure that their data collection systems include unique identifiers to support the linking of consumer records and provider information, with *My Health Record* in particular, and with the health sector more generally. Their workforce must be enabled to access these consumer records via mobile devices.

The Productivity Commission (2016) has identified the need for investment in data and network development, and has called for government support in resourcing for such investment, as well as coordination across sectors.

Apart from the need to enable open but secure business to business (B2B) digital exchange, there is also a need to enable business to government (B2G) information sharing. Consequently, it is timely to develop a holistic government strategy for the aged care sector that supports interoperability, secure and ready data exchange, with appropriate


underpinning systems. The absence of such B2G interfaces is impeding the ability to enforce vendor best practice, and to create an open ecosystem of secure data exchange.

The ACIITC (2014) has previously identified the opportunity that exists for the aged care sector to establish a national data exchange and reporting hub to support providers with advanced business intelligence, analytics and reporting capabilities. The benefits identified by the Council remain relevant:

- more timely information;
- more consistent data and reporting standards that will drive streamlined reporting across the aged care sector;
- improved benchmarking and monitoring capability;
- increased productivity and efficiency arising from the availability of more and better data; and
- enhanced ability to provide consumers with quality information to support their decision-making.

**WHAT NEEDS TO BE DONE?**

- In order to support an operating environment increasingly characterised by interconnected devices, datasets, services and stakeholders, there is a need to develop agreed standards and protocols that ensure interoperability, or to adapt these from existing standards. The ACIITC should be the point of coordination and facilitation for achieving this outcome.
- An Implementation Plan will need to be developed that addresses issues associated with the embedding of interoperability in aged care information and communication systems (e.g. governance, legal issues, ensuring privacy and security, storage and custodianship of data).
- The ACIITC and its parent organisations (ACSA and LASA) need to work with the Department of Health and the Australian Digital Health Agency to ensure that technology capability is formally recognised as an essential capability of aged care providers—to be reflected in industry standards, accreditation and registration processes, workforce training, and assessment of quality of service.
- There is a need to establish a national data exchange and reporting hub that can support aged providers with advanced business intelligence, analytics and reporting capabilities, as well as collaboration with vendors and developers.
- A holistic government strategy needs to be developed for the aged care sector, that provides B2B and B2G interfaces in order to create an open ecosystem of secure data exchange.

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12 ACIITC (2014) *Digital care services: harnessing ICT to create sustainable aged care services* (p 16)
### Table 1: Actions for Destination 1: Technology-Enabled Systems

<table>
<thead>
<tr>
<th>Action</th>
<th>Short Term (&lt;2 years)</th>
<th>Medium Term (3-5 years)</th>
<th>Long Term (5-7 years)</th>
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<tbody>
<tr>
<td>Adapt for aged care Open Standards and protocols that facilitate interoperability and sharing of information.</td>
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<tr>
<td>Undertake a <em>Technology Maturity Assessment</em> of the aged care system’s technological readiness, reviewing use of technology across the spectrum of care services, and structural arrangements, underpinning systems and capacity for interoperability. Repeat every 3 years.</td>
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<tr>
<td>Develop an Implementation Plan to accompany the standardisation of interoperability across the aged care sector.</td>
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<tr>
<td>Collaborate with the Australian Digital Health Agency and Department of Health to embed technology capability as an essential requirement of aged care delivery, reflected in Standards for training and accreditation.</td>
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Destination 2: Technology Enhanced Care and Support for Older People

Technology is embedded in all aspects of aged care and utilised to maximum effect in providing quality, consumer-centred services. Responsive to consumer-driven demand for customised technological solutions and supports, providers have the capacity (infrastructure, products, and expertise) to integrate technologies into their service offerings. Technology enhancements and alternatives are considered, in conjunction with clinical services, along with complementary care plans and service design.

Technologies designed to support independent living, positive and healthy ageing, and enhanced quality of life are developed in collaboration through co-design with end users (consumers, their supporters, aged care providers and ageing experts) and their effectiveness is co-evaluated. This ensures user-friendly and fit-for-purpose technology. It also promotes seamless integration of technologies into everyday living, blurring the boundaries between ‘care’ and ‘living’.

People living in the community are able to benefit from co-designed Smart Housing, packaged with Universal Design principles and personalised technology solutions that support quality, independent living. Smart Homes are part of an overall strategy for older people to continue living well in the community.

People living in long term residential care benefit from technology-enhanced assessment, care planning and care delivery. They are supported by a tech-savvy workforce (see Destination 5) who customise technologies that are part of care provision to suit individual need or preference.

Aged care providers, consumers and their supporters have easy access to information about the range of assistive technologies available (through a specific database) and are assisted to navigate them (via purpose built Apps) in order to select those appropriate to their needs.

More holistic care, enhanced service provision and more efficient resource usage are the outcomes of electronic data sharing and collaboration between aged care and other providers, including in the health and disability sectors. One key mechanism for this is the alignment of My Aged Care and My Health Record. Technology-enabled collaboration between the aged care and disability service sectors supports the dissolution of barriers, allowing holistic care for consumers with dual service needs.
Underpinning Value Statements addressed

1. Aged care reform is founded on the twin principles of **choice** and **control** and this applies equally to the use of technology designed to enhance older people’s quality of life.

2. Technology must be applied with sufficient **flexibility** to support varying consumer needs and preferences, in line with reform directions of choice and control.

3. Technology for use in private homes must **integrate into individual homes**, and be **personalised** to achieve this.

4. The development of technologies specifically for application in providing care and support must be based on **co-design**, that is, involving end-users.

5. The effectiveness of technologies developed to support quality care and individual wellbeing must be evaluated over time, preferably through **co-evaluation** with end users.

6. Technology must be **integrated into aged care policy and processes** (rather than added separately to daily care and support).

**WHAT IS CURRENTLY IN PLACE?**

There are a number of technologies for which strong research evidence exists to achieve the following outcomes:

- Promoting independent living (particularly through monitoring technology and technologies associated with Smart Homes).
- Managing chronic disease (via telemedicine, telehealth, telecare, and with sensors playing a critical role in this).
- Reducing social isolation by increasing social connection.
- Alerting services and supporters to a fall event, which if detection is timely, may reduce hospitalisation or shorten hospital stay.
- Supporting people with cognitive issues, including dementia.
- Reducing or managing depression and enhancing wellbeing.
- Improving medication management.
- Supporting family caregivers.

Of particular relevance to aged care provision are the *sensor technologies*, which play a prominent role in telemedicine and increasingly in telecare, as well as in fall detection and

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management. Typically, these involve installing alarm systems and monitors that are capable of alerting service providers, carers or other supporters when something occurs that is out of the ordinary. Sensors include those that are embedded in the environment, those that are portable because they are designed to be *wearable*, and because of advances in nanotechnology, *implantable* or injectable sensors that support personalised treatment.

Sensor-supported telehealth and telecare is playing a positive role in managing chronic health conditions, a major challenge for ageing populations. These technologies can diagnose faster, identify potential medication interactions, update and secure health records in real time, and support real time assessment.

Between 2015 and 2016, the number of people worldwide being remotely monitored by health care providers increased by *51 per cent* and is forecast to grow at this rate until at least 2020 (Berg Insight 2016). Furthermore, as ownership of smartphones continues to grow, people’s own mobile devices are rapidly becoming an accepted part of remote monitoring, supported by the growing range of user-friendly, health-promoting apps. Consumers are now able to monitor and self-manage their condition, which is important because research findings identify self-management as critical to chronic disease management.

Evidence is growing about the effectiveness of monitoring technologies, in Australia and internationally, bringing positive health outcomes for individuals as well as significant service system savings through reduced hospital entry and length of stay. In Australia, the CSIRO

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14 In 2014–15, more than 11 million Australians (50%) reported having at least one of the eight main chronic diseases. This rate is positively associated with age, being higher for those aged 65 and over (87%) compared with people aged 0–44 (35%) (Australian Institute of Health & Welfare (2016) *Australia’s Health* – [http://www.aihw.gov.au/australias-health/2016/ill-health/#t4](http://www.aihw.gov.au/australias-health/2016/ill-health/#t4)


16 Smartphone ownership in Australia increased from 11.1 million in 2013 to 15.3 million in mid-2015. During the same period, tablet ownership increased from 6.3 million to 11.2 million.

The number of Australians with a smartphone is estimated to increase from an average of 78% in 2013 to a saturation level of about 81% in 2017.

17 Smartphone ownership in Australia increased from 11.1 million in 2013 to 15.3 million in mid-2015. During the same period, tablet ownership increased from 6.3 million to 11.2 million.


Home Monitoring project has identified a 36 per cent decrease in hospital admission and a 42 per cent reduction in length of stay in hospital.\footnote{http://www.csiro.au/en/Research/BF/Areas/Digital-health/Improving-access/Home-monitoring}

Interventions to minimise fall risk focus on both the individual (building capacity) and their environment (removing factors that enhance the risk of falling), and increasingly, technology has an important role to play in both. Currently, ATs are focused on detecting and managing the outcomes of a fall, but there is emerging evidence that falls could be prevented with appropriately designed intervention programs. Video games are also being used to prevent falls.

Evaluation of the effectiveness of different technologies in reducing depression has found general ICTs and pet-type robots to be most effective.
Increasingly, technology has a positive role to play in supporting people living with dementia through safety-related devices (especially falls prevention, tracking or way finding and cooking safety), memory aids, technology to prevent social isolation (including companion robots) or to support activities of daily living, and clinical devices of various kinds (particularly music therapy and symptom monitoring).

These can be beneficial for the person living with dementia, their supporters (by addressing concerns about safety) and for service providers. A growing number of apps are being developed specifically to support the wellbeing of people with dementia. An increasing number of aged care providers are incorporating virtual reality technology into their dementia-specific services because of its capacity for enhancing mood, wellbeing and engagement levels. These benefits are applicable for all older people.

Some researchers have identified a positive impact of assistive technologies (especially monitoring technologies) on informal carers. This arises from reduced time, assistance and energy in providing care, as well as from lessened anxiety about the safety of the person being supported by them.²⁰

There are also a number of emerging technologies for which less robust research evidence exists, but whose benefits are evident in their growing adoption.

- **Virtual reality (VR)** will be used as a key leisure and lifestyle service support, either in facilities or people’s homes—providing a range of virtual experiences tailored to past experiences, such as countries visited. A number of aged care providers are already using VR with positive outcomes for consumers.

- Another emerging field is the ‘gamification of therapy’, that is, the use of video games as therapeutic tools.

- In the longer term, the Internet of Things (IoT) will play a growing role in supporting independent living, including for people with dementia, because of its capacity to connect a range of devices and share the data emanating from them in real time.

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Virtual reality (VR) is being used in the entertainment industry but has significant potential for care providers. The use of virtual reality or "augmented reality assistants" can make people's lives more connected and engaged, and a number of studies have demonstrated its particular benefit for people living with dementia, and others who are unable to engage independently with their environment. The impact of VR reinforces research that confirms the triggers provided by music from a person's earlier life and adds a further dimension to that experience. In particular, VR experiences of travel to places visited earlier in life when independent mobility was possible are forming part of virtual lifestyle programs being explored by some aged care providers.

As VR technology has improved, providing high quality footage, and becoming increasingly light (and therefore portable) as well as more affordable, its scope for integration into care services is increasing. A number of providers are integrating VR into lifestyle and diversional therapy programs with positive outcomes reported for consumers.

The transformative impact of technology on everyday lives and living is most apparent in the developing 'Smart Living' market. This involves embedding a range of largely digital technologies that produce greater automation, energy efficiencies and easier management of day to day activities applied to homes (Smart Homes), work (Smart Workplaces) and communities (Smart Cities, Smart Towns, Smart Communities). As these technologies evolve, they highlight the growing importance of people's homes and local environments to support independent, healthy and positive ageing.

The Smart Home market is relatively recent but growing rapidly, with consumer awareness and acceptance increasing as major organisations such as Target, Apple and Telstra sell home automation products. Smartphone apps are the most common user interface for Smart Home solutions and importantly for older consumers, these are increasingly likely to be voice driven.²¹

Research findings indicate that multiple technology components that include activity sensing, and are tailored to individual need and preference can support 'smart' independent living at home.²² Emerging evidence for Smart Homes as enablers of independent living can be described as promising—see for example, the collaboratively developed Smarter Safer Homes for Older Australians initiative.²³ Smart Homes must form part of an overall strategy to enable

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²³ For more information, go to http://www.csiro.au/en/Research/BR/Areas/Digital-health/Improving-access/Smarter-safer-homes
people to live independently in their own homes. This would be enhanced by the application of *Universal Design* principles.\(^{24}\)

As with all technologies, developments in external fields are influencing the evolution of assistive technologies. Key enablers include smartphones, longer-lasting batteries, new materials and fabrics (including smart clothing, textiles and jewellery). Nanotechnology makes possible the printing of sensors with very fine features onto flexible rolls of plastic, in large quantities, at low cost. Changing the structure of materials through nanotechnology holds a range of possibilities, for example, creating water-repelling textures, adding coatings that allow materials to repair when damaged, and creating textiles which can regulate temperature. All of these developments have significant potential in the future support and care of older people.

The range of user-friendly technologies available, especially through mobiles and tablets, and the emerging array of health promoting apps, mean that consumers are able to access information which helps them self-manage their condition. As smartphone ownership increases and the app market continues its rapid expansion,\(^{25}\) aged care services have the opportunity to integrate apps into their operational processes, and consumers can benefit from using appropriately-designed health apps to support independent living.

The data generated through apps can provide reliable and real-time information on patterns of service use, needs and preferences. These developments represent opportunities for aged care providers, or increasing loss of market share if they, and aged care policy-makers, fail to recognise their relevance.

**WHAT NEEDS TO CHANGE?**

The adoption by aged care providers of technologies that support aged care and enhanced quality of life has been patchy, dependent on the willingness of individual providers to engage with technology... in the absence of leadership by aged care policy makers. In the process, significant opportunities for better care and for better lives have been missed.

**ISSUE 1: SERVICE SECTOR SILOS**

This is illustrated in relation to the group of technologies that support *teledmedicine*, enabling professional consultations by distance, and including diagnosis and treatment via telecommunication devices.

Teledmedicine has been driven by the health system without transference to the aged care system. This is despite its relevance for the care of older people, despite the strong evidence base for its effectiveness, and despite the direct correlation between chronic illness and ageing. Wider systemic issues, sometimes expressed in under-developed collaboration

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\(^{24}\) See [http://universaldesignaustralia.net.au/](http://universaldesignaustralia.net.au/)

between the two sectors, are part of the problem, exacerbating resource inefficiencies and providing siloed rather than holistic care for consumers.

Ideally, aged care providers should be electronically sharing consumer profile data with other services (e.g. health, disability) whenever there are clients in common, and developing joint care plans for those requiring services from more than one sector.

Aged care is just one of multiple sectors (e.g. health, housing, disability, recreation) that provide support to older people, but a perennial challenge continues to be bridging the divides between each of these sectors in order to coordinate resources and reduce duplication and fragmentation. As people grow older, their increased usage of formal health and aged care services heightens the need for shared communication between both sectors, especially to support complex care. Digital technology offers significant potential if policy and procedural agreements can be effected.

Aged care providers and consumers can benefit from e-health advancements, and in particular, the developing My Health Record system (previously known as the Personally Controlled Electronic Health Record). As a digital health initiative, My Health Record supports the electronic connecting of points of care in order to securely share health information.26 It also enables consumers to add Medicare information, and to create their own personal health summary. There is a need for alignment between My Aged Care (MAC) and My Health Record 27—but this is not scheduled to occur until 2019. Recently the AMA called for MAC referral software to be integrated with clinical software used by general practitioners (GPs), and for improved electronic interfaces between aged care (particularly MAC and Aged Care Assessment Teams), general practices and pharmacies.28

More broadly, there is a need for aged care providers to be able to share clinical data within their own sector and with other sectors, including the health ecosystem (primary and acute care, pharmacies and other health providers), and disability services.

ISSUE 2: FAILURE TO INTEGRATE TECHNOLOGY AS A CORE FEATURE OF AGED CARE

The growing array of technology-based responses to the ageing process is not reflected in current aged care funding, policy or service design (from point of entry onwards). The aged care system is developing in parallel with the evolution of assistive and smart technologies—and bridges are needed between both. Unless technology is an embedded feature of aged care, reflected in the standards by which it is measured, the priorities underlying funding, the design of workforce roles and workforce training, and the configuration of services, its potential to provide better care and better quality of life will be lost.

**ISSUE 3: INFORMED CHOICE AND IMPROVED SYSTEM NAVIGATION**

The plethora of available technologies brings the need for mechanisms and processes to guide end-users in their selection. Aged care providers are more likely to adopt technologies with evidence of their applicability, and prefer for this information to be delivered by a trustworthy source.

A model exists for this with the CareSearch online database for palliative care resources. Funded by the Australian Department of Health, its website content is checked for quality by Australian health professionals and it provides specific information for providers, consumers and their supporters. Again, this is health-sector driven and a similar site for technology resources could also be developed for aged care providers.

It is also important for consumers to understand the possibilities offered by technology, and to be able to navigate that information in order to select the most appropriate options. Therefore, having access to information about the evidence for a particular technology’s capacity to address a specified need, its user-friendliness and cost is all equally essential. As with service providers, information delivered by a trusted source is most likely to be treated as credible.

The disability sector is providing leadership on this issue with its free Equip Myself app. This was designed to support people with disability to navigate the growing market in assistive technologies. Through real life stories and virtual reality, the app explores assistive technologies in the environments in which they would be used in home or community settings. Equip Myself is linked to the national equipment database (NED) developed by Independent Living Centres Australia, which contains impartial information about more than 11,000 assistive technology (AT) and equipment options.

The aged care sector could benefit from collaborating with the disability sector to include aged-care-specific information. Developing an aged care focused navigation app, like Equip Myself, is also needed.

**ISSUE 4: INSUFFICIENT CO-DESIGN**

Co-design and co-evaluation with end users (that is, older people, their supporters and aged care providers) ensures that a product is fit-for-purpose and easy to use. Technology developers and end users require structured opportunities to collaborate in this way, for example, through Living Labs, Centres (physical and virtual) and forums for exchange (such as the annual ITAC conference). Co-design and co-evaluation must underpin technologies intended to benefit older people.

The Technology Roadmap for Aged Care could provide the catalyst for the establishment of a national hub to support collaboration between multiple stakeholders.

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WHAT NEEDS TO BE DONE?

 Develop a national network designed to link end users with developers of technology, in order to support co-design and co-evaluation. This would build on the existing work of the ACIITC and the ITAC (Information Technology in Aged Care) conferences, as well as existing partnerships developed for this purpose. A national entity will raise the profile of this work and provide a readily identifiable source for co-design and the further development of Living Labs.

A dedicated cluster within this network should be developed in order to support co-design in the evolution of Smart Homes, if possible, incorporating Universal Design principles.

 Funding should be sought from Commonwealth and State governments for a series of Demonstration Pilots that:

1. **Create health and aged care partnerships** designed to illustrate the applicability of telemedicine and its supporting technologies in the aged care sector, and to identify the outcomes achieved for consumers in managing chronic health conditions, and for both sectors in terms of effective and efficient resource usage.

2. **Trial structures and processes that can support the electronic sharing** of consumer profile and service data between aged care, primary and acute health care providers. In the process, identify challenges and strategies to address them, and measure resource efficiencies and consumer outcomes. This will provide valuable information for the planned alignment of *My Aged Care* and the *My Health Record*.

 Explore the most appropriate mechanism for providing a user-friendly, easily accessed database detailing available assistive technologies for older people. In the first instance, the aged care sector should explore a possible collaboration with the disability sector to provide an aged care component in its NED database, and if this is not possible, develop an aged-care-specific database.

 In order to support consumers to understand the possibilities offered by technology, as well as be able to navigate that information and select the most appropriate options, develop one or more apps for this purpose, using the model provided by the disability sector’s free *Equip Myself* app.

 The Commonwealth government has provided support to the health sector, including the pharmacy sector, to build its capacity in a technology-driven world. Similar support needs to be sought for the aged sector to establish a *Technology Initiative Fund*, enabling aged care providers to purchase technologies that can enhance the provision of care. Service providers could contribute to this fund by pooling resources.
## Table 2: Actions for Destination 2: Technology-Enabled Services

<table>
<thead>
<tr>
<th>Action</th>
<th>Short Term (&lt;2 years)</th>
<th>Medium Term (3-5 years)</th>
<th>Long Term (5-7 years)</th>
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<td>Establish a national network, linking end users (consumers, their supporters and service providers) with developers of technology in order to support co-design and co-evaluation.</td>
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<tr>
<td>Develop a specific cluster within this network to support co-design in the development of Smart Homes for older Australians.</td>
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<tr>
<td>Develop a series of Demonstration Pilots to demonstrate how to extend existing telehealth and telemedicine programs into aged care (residential and community), and how to support the electronic sharing of consumer and service data between aged care and health system providers.</td>
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<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Explore with the disability sector scope to provide a specific component focused on older people in its NED database.</td>
<td>✔️</td>
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<tr>
<td>Develop an App to assist in navigating assistive technologies designed to meet the needs of older people.</td>
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<tr>
<td>Establish a Technology Initiative Fund, combining government support with providers pooling funds and resources, to support aged care providers to purchase and/or develop technologies to integrate into their care services.</td>
<td>✔️</td>
<td>✔️</td>
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</table>
Destination 3: Technology-Enhanced Information and Access to Care

Technology provides ready access to information about aged care, linking service providers and consumers in the aged care marketplace.

Consumers and their supporters are empowered by technology to make informed choices about their care and support.

The Australian aged care system (government and providers) recognises that embedding technology in assessment, care provision and support processes also requires the provision of national strategies designed to ensure that varying capacity to access and use technology does not create or exacerbate inequities.

A range of accurate and up to date information is available in a user-friendly, digital format to support informed choices and decision making by consumers and their supporters, and by providers of aged care. National funding is available to assist consumers to purchase digital devices (e.g. tablets) that are essential to access and engage in aged care services.

National interventions ensure that consumers have the digital literacy needed to navigate this information, and are provided with education and support to help them. Websites, social media and Apps enable comparison of services, assistive technologies and providers.

With support from government, service providers are able to measure and monitor over time consumer technological readiness and to tailor their services accordingly.

Three mutually-reinforcing national strategies — a Digital Literacy Strategy, a Technology Awareness Raising Strategy and a Technology Equity Strategy — ensure that consumers, their supporters and service providers have equitable access to products, services and support that enable them to engage effectively in a technology-enabled aged care system.

Underpinning Value Statements Addressed

1. Aged care reform is founded on the twin principles of choice and control and this applies equally to the use of technology designed to enhance older people’s quality of life.

2. Technology must be applied with sufficient flexibility to support varying consumer needs and preferences, in line with reform directions of choice and control.
A Technology Roadmap for the Australian Aged Care Sector

CORRESPONDING AGED CARE ROADMAP DOMAIN
#1: HOW DO CONSUMERS PREPARE FOR AND ENGAGE WITH THEIR AGED CARE?

WHAT IS CURRENTLY IN PLACE?
The Aged Care Roadmap identifies three information and access points that all require a reasonable level of digital literacy, infrastructure (e.g. broadband, internet connection) and tools (e.g. computers, tablets, smartphones) in order to benefit from the information they contain. These are:

- MAC web-based portals for consumers, assessors and service providers
- The Home Care Today website supports consumers and providers — https://homecaretoday.org.au/.

Individual service providers also provide websites with information about the services they offer. As a market-based aged care system is implemented, these and other sources of information are being accessed with greater frequency as consumers exercise choice in their selection of provider. At the same time, word of mouth from trusted sources continues to play a key role in making decisions, as do hard copy sources of information and consumer helplines.

Globally, Australian consumers are notable for being fast adopters of new technology. By 2013, 78 per cent of Australians had upgraded to a smartphone (predicted to reach 81 per cent in 2017), a significantly faster adoption rate than the United States, United Kingdom, and leading European countries. However, uptake of technologies by older Australians to support health and independent living does not yet reflect this trend.

Furthermore, while the number and range of web-based and app-based sources to support informed choice and decision-making is growing, the ability to access and benefit from them is distributed unequally.

Lunden I (2012) Kantar Worldpanel: Android Dominates Smartphone Sales Overall; In U.S. iOS Closing In,
TechCrunch, May
WHAT NEEDS TO CHANGE?

ISSUE 1: UNDER-DEVELOPED AND INEQUITABLE CONSUMER READINESS

Regardless of the extent to which a technological innovation is fit-for-purpose, is well designed, or is likely to significantly enhance quality of life, its adoption requires its end users to be reasonably ‘tech savvy’—that is, having digital literacy coupled with confidence in using technology. For older people who have not grown up with ICTs, this can present challenges that must be addressed.

The Digital Divide is an inequality that particularly affects older Australians, people of low income, and people living in rural and remote locations. The recently released 2016 Australian Digital Inclusion Index\(^{32}\) measures digital inclusion on the basis of Access (e.g. internet, broadband), Affordability and Digital Ability (digital literacy, confidence, etc). It confirms that the most digitally excluded age group continues to be those aged 65 and over (unfortunately the boundaries of this group are too broad to capture generational distinctions), and that the Digital Divide persists between urban and rural locations.

As the number of digitally literate people grows, with skills enabled by connectivity and the ability to purchase digital communication devices, those on the other side of the Divide become progressively more disadvantaged by comparison. As more people become digitally capable, businesses increasingly assume customers will engage with their products online, and governments increasingly assume people can and will use apps for services like Medicare. My Aged Care requires access through an online portal and assumes a level of digital capacity that will not be present in many older consumers. For those on the wrong side of the Divide, this brings the consequence of not being informed about what is available, and therefore being unable to make appropriate choices on this basis.

ISSUE 2: ADDRESSING FACTORS THAT DETERMINE ADOPTION OF TECHNOLOGY

It is important to recognise that digital exclusion does not equate to digital rejection. There is sufficient robust research evidence involving older people that identifies willingness by the majority to accept technology as part of overall care and support, with some provisions (other than the most obvious factor of affordability) that this Roadmap acknowledges to be important:

- **Control** over the technology and how it is used is very important to older people, particularly with regard to protection of privacy. For this reason, video imagery (e.g. depicting them after falling) is seen as highly intrusive while alarms that cannot be turned off (e.g. when falsely activated) are unlikely to be used, mainly because of not wanting to ‘bother’ supporters and care workers.

- Linked to control over technology is **choice** of technology, with preference for user-friendly technologies that older people are able to manage—thus reinforcing the importance of assistive technologies customised to individual need and preference.

Technology is also more likely to be used by older people if it is perceived to improve personal safety, particularly in relation to real time monitoring and connection to response systems, and is perceived to be relevant to their needs.

Usability, reliability and how well the technology integrates into the home also affect adoption and long term use of technology. Large buttons and easy-to-read screens and signs are part of this, as are design aesthetics. Older people living in the community do not want technology that identifies them as vulnerable, or makes their home look like a hospital or other institutional environment.

**What needs to be done?**

It is critical that the application of new technologies to enhance the experience of ageing, including through formal care services, includes remediation strategies for those with low levels of technological readiness. Therefore, a three-part Technology Readiness Strategy, designed to address diversity in technological readiness, is proposed in the Roadmap. These three components are mutually reinforcing and should be implemented as a single initiative, involving:

- **A national Digital Literacy Strategy** combining information, training and support for older consumers and their supporters. This could be undertaken in partnership with the Australian Digital Health Agency or through the Department of Industry, Innovation and Science. Consideration could be given to framing this as an intergenerational program where younger digitally skilled people are trained to share their knowledge and supported to provide education and support to older people. This model is already being applied successfully by some aged care providers.

  Consumers, regardless of their own levels of capacity, will be influenced (positively or negatively) by service providers and significant others in their willingness to engage with new technologies. However, service providers’ own levels of digital acceptance, understanding and competence cannot be guaranteed and this too needs to be addressed (refer to *Destination 5: A technology-literate and enabled workforce*).

- **A Technology Awareness Raising Strategy** designed to ensure that aged care consumers, their supporters and service providers are informed about technology based products and services targeting older people.

  In order to address inequities in access to new technologies (e.g. because of economic disadvantage), the Roadmap makes provision for a Technology Equity Strategy to assist consumers in the purchase of digital devices that can be used to access and engage with aged care services, in particular tablets and Smartphones. The Strategy must also address the needs of service providers disadvantaged by rural or remote location.
The Technology Readiness Strategy is a companion to the systems readiness strategies outlined in *Destination 1: Technology-Enabled Operational, Business and Communication Systems*.

In order to monitor the impact of these three interlinked strategies, there is a need to design a tool that enables care providers to measure consumers’ technological readiness in order to tailor their services accordingly. With a benchmark survey in 2018, this should be repeated over time to assess the impact of the Technological Readiness Strategy.

**Table 3: Actions for Destination 3: Technology-Enabled Information & Access**

<table>
<thead>
<tr>
<th>Action</th>
<th>Short Term (&lt;2 years)</th>
<th>Medium Term (3-5 years)</th>
<th>Long Term (5-7 years)</th>
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<tbody>
<tr>
<td>Develop a national <em>Digital Literacy Strategy</em> for consumers, supporters and providers to ensure they have the skills to use technology-based products and services designed for older people.</td>
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<tr>
<td>Develop a <em>Technology Awareness Raising Strategy</em> to ensure consumers and their supporters are informed about technology based products and services for older people.</td>
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<tr>
<td>Develop a <em>Technology Equity Strategy</em> for aged care consumers, their supporters and aged care providers to address inequitable access arising from disadvantage (e.g. geographic location, affordability, information, skills).</td>
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<tr>
<td>Develop a tool for aged care providers to profile their consumers’ technological readiness/digital literacy. Repeat this over time to measure the impact of digital literacy interventions and to monitor the effectiveness of the first three Actions.</td>
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Destination 4: Technology-Enabled Assessment of Eligibility and Changing Need

DESTINATION

The Australian aged care assessment system has technology-based expertise and solutions embedded in the assessment of need to determine eligibility for services, and in ongoing assessment that captures changing need.

Wherever appropriate, technology-enabled assessment enhances ongoing review of need, enabling more timely identification of changing need, and empowering consumers to self-monitor their status with the support of aged care providers and new technologies.

Assessment records are shared in digital form, with appropriate protocols, across the aged care sector and other relevant sectors, in particular, health (refer Destination 1). Longer term, the adoption of Open Standards supports the sharing of assessment information with the health sector, enabling significant resource savings, reduced duplication of assessment, and more holistic care.

Technology-driven supports, embedded in aged care from the point of initial assessment and entry to the system onwards, augment services and quality of care. A pool of technology expertise is available to support assessors, care planners and care coordinators, to make maximum use of technologies that monitor individual status and enhance care provision.

In order to maximise resource usage and to improve service quality, technologies are applied to better track changing client need, and to enable ongoing and seamless assessment. Technology-enabled, ongoing assessment supports consumer self-monitoring (for example, via purpose-designed apps and drawing on Smartphone sensors) — important in the self-management of chronic conditions, and in an aged care system based on consumer choice and control. Service providers benefit from training in the use of technology-enabled assessment tools and from an online database of such (validated) assessment tools, updated every three years.

Increasingly, assessment is a portable (rather than home or service-based) activity, made possible by the availability of sensor-based monitoring technology, by sensors that are embedded in Smartphones, as well as a range of health apps used by consumers.

CORRESPONDING AGED CARE ROADMAP DOMAIN

#2: HOW ARE ELIGIBILITY AND CARE NEEDS ASSESSED?
Underpinning Value Statements addressed

- Technology must be applied with sufficient flexibility to support varying consumer needs and preferences, in line with reform directions of choice and control.

- Technology for use in private homes must integrate into individual homes, and be personalised to achieve this.

- Technology must be integrated into aged care policy and processes (rather than added separately to daily care and support).

**WHAT IS CURRENTLY IN PLACE?**

Assessment is one of the most critical components of the aged care system, with a dual function: a) acting as a gatekeeper to the system and informing the individualised plan of care designed to respond to identified need, and b) monitoring service recipients for changing need. People seeking entry to the system are screened by My Aged Care (MAC) Contact Centre staff and assessment of need is then undertaken by either a Regional Assessment Service (RAS) or an Aged Care Assessment Team (ACAT), depending on intensity of individual need.

- The RAS assesses for lower intensity services available under the Commonwealth Home Support Programme (CHSP).
- ACATs assess people requiring higher intensity care available under Home Care Packages, Transition Care, and in Residential Care.

Assessment of need continues beyond the point of entry to the aged care system, being part of ongoing care planning and review that is undertaken by aged care service providers.

To support nationally consistent screening and assessment, the National Screening and Assessment Form (NSAF) is used by My Aged Care Contact Centre staff, the Regional Assessment Service (RAS) and Aged Care Assessment Teams (ACATs) when screening and assessing the aged care needs of older people. The NSAF supports the augmentation of information collected by My Aged Care Contact Centre staff during screening, and any previous assessments, and informs the choice of services to meet assessed need. Assessors can access the NSAF via the internet or offline via the myAssessor app.
WHAT NEEDS TO CHANGE?

The required knowledge and skillset of assessors was developed at a time when technology played a peripheral role in the support of older people (and in their day-to-day lives). However, its rapid evolution means that it can now play a very important role in meeting the needs of many service providers, providing immediate access to a wide range of data, and in the process, improving service delivery quality. This is not a temporary phenomenon.

Workforce roles and core competencies in aged care do not reflect the significant implications brought by technology to direct care provision and to assessment. Selection for assessment roles (and clinical care roles) is usually focused on clinical knowledge, which is appropriate, but without also requiring an understanding of assistive or other technologies that may complement or enhance clinical care. Any inclusion of a technology-enabled response to consumer need occurs as a matter of chance, rather than design, and thus depends on varying individual assessor and service provider technology awareness. Ongoing assessment of need requires the filter of technology-based enhancements to be regarded as an essential requirement.

Furthermore, administration of most assessment instruments is undertaken manually by service providers, at isolated intervals and without the benefit of ‘real time’ data collection. There is scope for greater use of technology-enabled assessment, allowing for more frequent assessment in ‘real time’ as well as for self-administration by consumers—empowering them to play a more purposeful role in monitoring their status over time. Smartphones also offer significant promise because of their ability to capture a range of data, including sensor-based information, making assessment a portable activity whose data can be analysed anywhere at any time.

The TUG test is widely used in functional assessments, being able to test for several different mobility skills and to determine the risk of falling. It can assess sit-to-stand and stand-to-sit chair transitions, turning, forward moving gait, balance control, and the ability to sequence tasks. It uses minimal materials: a chair, 3 metres of walking space, and tape for marking the turnaround point. It is simple to score and requires minimal training to use. A number of different technologies have been tested by researchers to automate TUG assessment.

With the addition of ambient sensors to capture such variables as temperature, light and motion, studies have established that it is possible to estimate speed of walking. Meanwhile, a sensor-enabled chair has been designed to automate TUG assessment (aTUG). This also offers scope for older people living at home to self-administer the TUG (and then share data with their care providers), along with the potential to be further developed into a ‘smart chair’ capable of also collecting various biometric information (Sprint et al 2015).

Assessed need is aged care sector-specific, lacking in access to health sector derived assessment, not because of a lack of appropriate digital technology, but because of a lack of processes and protocols for shared data and collaborative delivery of care, and a lack of interoperability in the aged care system – as discussed in Destination 1: Technology-Enabled Operational, Business and Communication Systems.

**ISSUE 1: NEED FOR A TECHNOLOGY LENS IN ASSESSMENT AND CARE PLANNING**

Failure by aged care assessors and care planners to include technology-driven supports in service provision can result in consumers’ supporters filling the void by providing technologies that may work against, rather than enhance, services tailored to that person’s assessed need. Not integrating technology with service provision also increases the risk that consumers are vulnerable to those technology providers whose motive is profit, rather than meeting need.

There is a need to revisit current criteria for selecting people with a formal assessment role, and include the additional criterion of awareness of technologies that can support care and support needs. This could be achieved through assessor education, but given the need to keep pace with rapidly changing technological developments, developing a pool of technology expertise to supplement assessment and care planning is a strategy deserving consideration. Pilot projects are needed to trial such approaches, and to quantify outcomes achieved for consumers and service providers.

It is also critical that service providers who have developed technological capacity are able to be identified by assessors making referrals, particularly RAS teams. A major gap in the referral and assessment system is the failure to identify service providers who can deliver digitally based service options in particular, and other forms of technology-enabled support. This information would enable assessors to develop care plans to be delivered by providers with this expertise, particularly those in the Community Home Support Programme. Asking providers to list this capacity sends an important message about the valuing of technology-enabled services for older people.

**ISSUE 2: UNDER-UTILISATION OF TECHNOLOGY-ENABLED ASSESSMENT**

Despite the resources that could be saved, technologies with the capacity to make assessment ongoing, portable and able to capture ‘real time’ data are not *embedded* in formal assessment processes. These technologies have the capacity to achieve efficiencies in the resource-intensive aged care sector, save time, facilitate more effective assessment and monitor changes in capacity. Some technologies, for example, sensors, can yield information that may be missed by a single or even repeated assessments.

Service providers would benefit from the establishment of a review of validated technology-enabled/automated assessment tools, updated every three years, and available online. Training in the use of those automated tools will also be essential for their uptake.
**WHAT NEEDS TO BE DONE?**

**Table 4: Actions for Destination 4: Technology-Enabled Assessment**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>SHORT TERM (&lt;2 YEARS)</th>
<th>MEDIUM TERM (3-5 YEARS)</th>
<th>LONG TERM (5-7 YEARS)</th>
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<tr>
<td>Develop a Pilot to trial the embedding of technology expertise in assessment and care planning, and analyse outcomes achieved for providers and consumers.</td>
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<td>Based on pilot findings, establish a dedicated pool of Technology Specialists to advise on potential technology solutions or enhancements</td>
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<tr>
<td>Review existing validated assessment tools, identifying those that have been automated. Update every three years and share with the sector.</td>
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<tr>
<td>Ensure that assessors and clinical care managers receive training in the application of technology-enabled/automated assessment tools.</td>
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Destination 5: A Technology-Literate and Enabled Workforce

The Australian aged care workforce is supported with the digital infrastructure and digital literacy needed to maximise the potential offered by technology in delivering services in a market-based and consumer-driven system. Both paid and unpaid carers benefit from ready access to education programs designed to increase digital literacy and confidence in using technology. In the process, a ‘tech-savvy’ aged care workforce is developed.

The workforce plays a key role as an end-user in the design and evaluation of technologies targeting older people, and participates in networks and partnerships that bring together consumers, their supporters, ageing and aged care experts and technology developers. The aged care workforce benefits from the embedding of technology expertise in the core workforce.

Workforce capability is enhanced by aged care organisations’ increased investment in online learning opportunities, and in videoconferencing infrastructure that enhances access to learning and development opportunities, reducing travel time and costs and ensuring consistency of training across multiple sites. National workforce development resources support the establishment of videoconferencing centres and a national Workforce Technology Development Strategy.

New technologies, in particular, wearable devices, support workforce safety and provide a range of efficiencies in workforce organisation. Smart rostering systems match individual care workers to consumers based on pre-determined criteria (e.g. preference for particular workers) and support continuity of care. GPS and other technologies support planning processes and reduce travel time and operational costs.

New workforce roles are developed to ensure that the aged care workforce includes technology expertise to continuously integrate new technologies into services, and employ those with specialist skills in smart data system usage and data analytics.
WHAT IS CURRENTLY IN PLACE?

Aged care providers vary in the investment made in technological infrastructure and in workforce technology readiness training. Leadership in this is driven by individual organisations, due to a wider trend for the aged care system not to embed technology capacity in its processes, policies and structures. This extends to workforce preparation. Pre-service training for Certificate III-qualified care workers (the majority of the workforce) makes no provision for digital literacy training, and only one competency is identified that could require a level of digital ability—an elective in the use of ‘business technology’. This leaves the responsibility with aged care employers.

The three-yearly national Census of the Aged Care Workforce currently has no provision for collecting information about digital literacy (because the Department of Health and Ageing has not required this focus), but scope exists to add additional questions to capture this in the next Census and monitor it thereafter.

New technologies can support a significant number of care workers working alone or in isolated locations. New wearable devices, such as the mCareWatch, have a range of safety-related features that can issue personal alarms linked to 24-hour emergency monitoring services. Some combine security features with functional features and can be programmed to send a range of data about the aged care consumer back to an aged care organisation.

Developments outside of the aged care industry are likely to help the sector build technological capacity. The National Digital Health Agency recently completed consultations to inform the development of the National Digital Health Strategy, and identified the need for specific strategies to enable paid and informal carers to access digital services at no cost. The aged care workforce has been identified by the Agency as a critical support in the ‘diffusion of innovation’. The Agency has also identified informal carers as benefitting from My Health Record because of their access to its information.

WHAT NEEDS TO CHANGE?

ISSUE 1: UNDER-DEVELOPED WORKFORCE TECHNOLOGICAL READINESS

Aged care organisations need to ensure that their workforces have levels of digital literacy appropriate to an increasingly technology-driven world, and can communicate with their clients interpersonally and electronically. This demand will grow as technological change
brings increased use of ICTs and digital communication, and as future generations of aged care consumers become more technologically ‘savvy’ in the process.

A key barrier to the effective use of technology in aged care is under-developed digital literacy, particularly for those with low language and literacy skills, and negative attitudes by some to technology. Building a technology-literate care workforce is a major challenge; it requires regular training and upskilling. This can be provided online, but requires reliable broadband, wifi access and other infrastructure, and these cannot be assumed to be available to all aged care workers. Some members of the aged care workforce will need more advanced digital capability to support smart data system usage and data analytics.

**ISSUE 2: UNDER-DEVELOPED INFORMAL CARER TECHNOLOGICAL READINESS**

As with the paid workforce, informal carers vary in their digital literacy levels and so accessible learning and support opportunities are needed to address inequities in capacity. Providing shared opportunities for capacity-building in technological readiness for paid and unpaid carers is a cost-effective approach.

**ISSUE 3: LIMITED VIDEOCONFERENCING INFRASTRUCTURE**

Some larger aged care organisations have invested in videoconferencing infrastructure, providing consistent and ongoing learning opportunities for their workforce across multiple sites, and achieving savings in staff time and travel in the process. These were mostly developed at a time when the aged care sector was supported with dedicated workforce funding, including from the Teaching Aged Care Research Services (TRACS) Program. The wider provision of videoconferencing provides a platform for aged care providers to build and update workforce skills, including technology-related skill sets.

**ISSUE 4: UNDER-DEVELOPED POTENTIAL TO IMPROVE WORKFORCE PRODUCTIVITY**

Technology has a role to play in supporting direct care provision, for example, by improving workforce productivity through reducing the time spent on administration and travel. However, the adoption of technologies designed to achieve these outcomes is unequally distributed across the aged care workforce. Increasing this capacity is linked to fulfilling the actions associated with *Destination 1: Technology-Enabled Operational, Business and Communication Systems.*

**WHAT NEEDS TO BE DONE?**

- Design and implement a sector-wide, national *Workforce Technology Development Strategy* to build capacity to use technologies effectively and integrate these into service processes and systems.

Include questions designed to measure technological readiness in the three-yearly Census of the Aged Care Workforce, beginning with the next Census (2019/2020) to establish benchmarks, and monitoring progress over subsequent Censuses.

In order to inform a re-design of the core aged care workforce structure to operate in a technology-driven world, undertake a series of pilots where technology experts are employed as core (as opposed to outsourced) workforce members, identifying how they are used to greatest effect in building workforce technological readiness and in redesigning care for the benefit of consumers. Evidence from other initiatives, such as the TRACS Program, has identified a range of consumer outcomes and resource efficiencies from employing certain professional groups as core team members; normally outsourced roles. It is likely similar outcomes will be obtained by embedding technology specialists in the core workforce. These pilots should be designed to also measure return on investment for aged care organisations arising from this technology-focused workforce model.

There is a need to provide the workforce with increased opportunities for online learning and videoconferencing (with infrastructure to support that, possibly via a dedicated fund). Due to the establishment costs associated with videoconferencing facilities, incentive funding should be sought from government but with capacity for sharing ongoing operational costs across aged care providers, as well as through regionally located videoconferencing hubs that providers can rent if they are unable to invest in this infrastructure.

Paid workforce training and learning opportunities designed to enhance digital literacy and the application of technologies to care provision should also be made available to informal carers.

Table 5: Actions for Destination 5: Technology-Literate and Enabled Workforce

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<thead>
<tr>
<th>ACTION</th>
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<th>MEDIUM TERM (3-5 YEARS)</th>
<th>LONG TERM (5-7 YEARS)</th>
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<tbody>
<tr>
<td>Include questions designed to identify technological readiness in the three yearly Census of the Aged Care Workforce.</td>
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<tr>
<td>Design, implement and evaluate (via a series of Pilots) a national Workforce Technology Development Strategy to build capacity to use technologies effectively and integrate these into service processes and systems.</td>
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<tr>
<td>Provide increased opportunities for online learning and videoconferencing (possibly via a dedicated incentive fund) and explore capacity for sharing operational costs across aged care</td>
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<tr>
<td>ACTION</td>
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<td>providers. Include informal carers in paid workforce training and learning opportunities designed to enhance digital literacy.</td>
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</table>
About Aged Care Industry IT Council (ACIITC)
The Aged Care Industry IT Council (ACIITC) was formed by the two industry Peak bodies Leading Age Services Australia (LASA) and Aged and Community Services Australia (ACSA) some six years ago with the express intent of providing the industry with a vehicle to consider and debate IT related opportunities and to disseminate the lessons learned from that process to the wider aged care industry.

Contact us at:
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Email: enquiries@aciitc.com.au
Website: www.aciitc.com.au

Up to date information and progress reports on the technology roadmap can be located at: http://www.aciitc.com.au/roadmap

About Flinders University and the Medical Device Research Institute
Flinders University has built a reputation for world-class research, clinical and educational expertise in health technologies, with capabilities spanning medicine, engineering, science and social sciences. Flinders University programs engage widely with industry and other partners to drive innovation and deliver improved health outcomes to the global community.

The University’s Medical Device Research Institute is well known for its collaborative and accessible approach to engagement with industry and community. The Institute’s research is driven by real-world problems that are explored through multidisciplinary partnership across established networks. It is also home to the nationally-acclaimed Medical Device Partnering Program (MDPP). The MDPP has been successfully bringing together partners from across industry, research and the clinical community since 2008 to drive new medical innovations and encourage industry growth.

Contact us at:
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Website: www.flinders.edu.au/mdri