

# The role of smart home assistive technologies in supporting ageing in place and disability housing



Based on AHURI Final Report No. 372: Impacts of new and emerging assistive technologies for ageing and disabled housing

## What this research is about

This research looks at how smart home assistive technologies (AT) may be best used in both the aged care and disability sectors to reduce the need for support services. It includes an assessment of ease of use, quality-of-life and cost benefit analysis, and contributes to the development of policy options that could facilitate effective adoption of smart home AT in Australia.

## The context of this research

The proportion of people aged 65 years or over is projected to increase from 15 per cent in 2017 to between 21 and 23 per cent in 2066. As the population ages, an increasing number of people are living with chronic health conditions and limitations on their ability to undertake daily tasks. Smart home AT has the potential to promote independence, self-care and ageing in place with increased safety and quality-of-life.

The World Health Organisation (WHO) defines AT as 'an umbrella term covering the systems and services related to the delivery of assistive products and services'. The Australian and New Zealand and International Organization for Standards defines AT as 'any product, instrument, equipment or technical system used by a disabled person, especially produced or generally available, preventing, compensating, monitoring, relieving or neutralising disability'.

## The key findings

### How AT functions

Smart home AT may support a range of ongoing benefits, including extended independent living, smart home energy efficiency, safety and security, physical and mental activity and healthcare monitoring.

It is an ecosystem of independent and interdependent technological devices and programs that communicate with each other through a wired or wireless connection that is able to respond and modify itself continuously to the needs of the user.

Table 1: Examples of smart home technologies

Safety	Other
<ul style="list-style-type: none"> <li>• Security camera / CCTV</li> <li>• Alerting reminder system(s)</li> <li>• Gas automatic shutoff</li> <li>• Electricity automatic shutoff</li> <li>• Water main automatic shutoff</li> <li>• Smart smoke detectors</li> </ul>	<ul style="list-style-type: none"> <li>• Automated track hoist facilities</li> <li>• Smart appliances (including kitchen appliances, and cleaning appliances).</li> <li>• Smart furnishings</li> <li>• Assisted breathing device</li> <li>• Home backup generator</li> </ul>
Entertainment	Thermal
<ul style="list-style-type: none"> <li>• Smart tv</li> <li>• Smart audio systems</li> <li>• White noise control system</li> <li>• Automated lighting</li> </ul>	<ul style="list-style-type: none"> <li>• Automated air conditioning</li> <li>• Automated fan</li> </ul>
	Openings
	<ul style="list-style-type: none"> <li>• Automated curtain/blind control</li> <li>• Automated window control</li> <li>• Automated door control</li> </ul>

## Current situation

The key device that has stimulated the global smart home market is the smart speaker with virtual assistants. Through a voice prompt, users can trigger the device to retrieve information, perform tasks such as turning on a TV and control various parts of their physical environment. Although the technology can be customised to a degree, people with more complex needs still require modifications outside the manufacturer's settings to achieve the same operable functionalities.

There is a high variation in product ranges, specifications, functionality, quality and cost. This research established that the average smart home AT set-up costs per household over a five-year period were around \$700 to \$800, with the variation ranging from above \$1,000 to below \$600. Early adopters of smart home AT are predominantly self-funders.

Despite high variation in smart home AT costs between respondents, the data was indicative of cost-effectiveness in terms of reduced care.

## Current government policy

This project identified a sustained gap in piloting and development of smart home AT government policy. This has resulted in a limited consumer base for economic evaluation of smart home AT and a corresponding gap in published literature. The lack of clear policy frameworks and insufficient coordination has resulted in an ad-hoc and piecemeal implementation practice with many who could potentially benefit not having the skill, knowledge or financial ability to invest. In this context, the frameworks to promote the deployment of smart home AT are lacking or are confusing. There is a critical lack of clarity about the role of funders, housing designers, housing providers and individuals associated with smart home AT.

Existing AT policy is vague about deliverables, and typically mainstream services and supports (e.g., smartphones, tablets and 'apps') are considered as being outside of the scope of government funding.

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## Current AT support

Eligibility for smart home AT is lacking within Aged Care and evidence is unavailable regarding the extent of specific smart home AT product take-up under current policy settings.

In October 2019 the NDIS introduced an option for the funding and supply of nominated AT supports of between \$1,500 to \$5,000. This funding option includes nine general AT items across four levels of AT needs complexity, with no explicit definition for smart home products.

The overarching eligibility for technologies that are 'reasonable and necessary' is difficult to articulate for core items such as iPads or smart home assistants as these devices also integrate wider functions beyond the use of the needed AT.

So, while these improvements target streamlining NDIS AT processes for low-risk AT under \$1,500, the eligibility for AT remains focused on physical non smart home types of AT. Smart home AT and home modifications are still not primary considerations in planning and are unclear in terms of the emergence of new products and the convergence of bespoke versus mass-market products with complex AT eco-systems.

The nature and pace of smart home technology developments evolve rapidly as new technologies are introduced into the market, with a high rate of product obsolescence.

Research shows the success of AT requires an integrated approach from the design of the physical environment to the inclusion of care provisions as a holistic solution. The plethora of choices will require best practice frameworks and rich knowledge exchange across disciplines to best leverage smart home technologies as AT.

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## What are the benefits of a smart home?

For older people and people with disabilities, key benefits include:

- prolonging 'ageing in place' and alleviating the need for institutionalisation
- improving the capture of critical information through remote monitoring of health status to identify and bolster functional abilities and overall wellbeing
- enabling more evidence-based decision making for users and family members on future health care plans. The data collected from smart home devices can be analysed and accessed by the user, family members and health care providers to facilitate a person-centred decision-making process
- helping users remain connected to the community and outside world, with the potential to reduce feelings of isolation
- potential for substantial cost savings by improving quality-of-life and reducing care provisions.

## What are the risks of smart home AT?

The data logging and exchange generated by AT presents concerns on privacy, security and ethical propositions. If ethical concerns of end-users and their caregivers are not adequately addressed, this often leads to scepticism and distrust of the technology. Research shows that the most frequently cited ethical concern for people with cognitive impairment is the clarification of informed consent. This area needs additional research to understand the required safeguarding measures.

The following concerns have also been identified:

- the risk of data privacy, security and abuse of vulnerable groups when it comes to devices that have always-on monitoring features
- the data vulnerabilities and lack of transparency on how data is managed, stored, and protected. Passive network observers, such as Internet service providers, could potentially analyse Internet of Things (IoT) network data to infer sensitive data
- privacy tensions arise when the use of smart home IoT devices extends beyond the primary user to care providers
- there are ethical considerations of how AT will potentially reduce or otherwise impact formal face-to-face care provisions for users and family members
- there is a risk in assuming one size fits all – as individual aspirations and goals of end-users need to be considered for any AT provisions.

## Insights from research survey

Nearly all respondents were using their smart home AT for entertainment, which is unsurprising given that this is how the majority are commercially marketed. However, two-thirds were using their smart home AT for safety and thermal comfort and just over one-third was also using it for operation of openings in the home.

The majority of respondents indicated that after their smart home AT was installed, they did not need any help with cooking, cleaning and so on. This reduction in the need for assistance was true even for the most difficult household tasks.

Around a third of respondents indicated they used AT products costing below \$200 reflecting, for example, entry level off-the-shelf smart home assistant devices and perhaps basic smart lighting. Around a third of consumers ranged between \$200 and \$2,000 in line with the flexibility to customise product profiles and functionality. The remaining third of consumers reported the higher cost bracket above \$2,000. The majority of smart home AT was self-funded, and even for the small number of Australian Government supported smart homes, the installations were jointly funded projects.

Quality-of-life and utility evaluation survey technology results showed relatively high satisfaction with most smart home AT.

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## Case studies

The case studies illustrate how the experience of end-users differs in terms of their motivation, knowledge, skill, social-support and financial capacities for AT. This means that policy and funding cannot deploy a 'one size fits all' approach to promoting and funding smart home AT. Meaningful change in servicing older people and people with disabilities is not just about changes to how funding is provided and the conditions under which people can apply but requires a dedicated and sustainable investment in education and training for sustained uptake and effective use of smart home AT.

The inequities in access to AT encompass geographic and socio-economic dimensions, as well as inconsistency and uncertainty in funding across different funding schemes and jurisdictions. These inequities need to be balanced with frameworks and policy structures that safeguard quality and mitigate risks (both perceived and real).

## What this research means for policy makers

Current policies must be reviewed in relation to smart home AT for older people and those living with a disability if Australia is to increase uptake and leverage economic and cost benefits, whilst improving outcomes. This is especially important in avoiding the risk of a wider digital and technological divide for those with less disposable income in social housing and rental accommodation.

Across both the disability and aged care sectors, there is the need to increase transparency for practitioners and end-users on eligibility and availability of AT interventions. Importantly, policy needs to establish and support ongoing education to facilitate competency development in this area. Pooling resources through innovative financing, such as co-financing, should be investigated. This may decrease the existing fragmentation of available resources, whilst facilitating demand.

If practitioners were willing to share their knowledge and preferred products, this would increase market transparency and collaboration, and may strengthen procurement for context-appropriate smart home AT whilst decreasing the fragmentation. The lack of collaboration and guidance are major barriers to fostering a climate of innovation and efficiency that can maximise the gains from this AT.

Better articulation of smart home AT product profiles targeted for defined eligibility may improve the most efficient targeting of funding and servicing whilst maximising smart home AT net benefit into the future. This could include an independent national education model and a specialist advisory group that can bring together and coordinate the necessary agencies responsible for policy and practice.

## Methodology

This research reviewed AT policy in care and housing provisions in New South Wales, South Australia, Tasmania, the Commonwealth and internationally; surveyed AT users; conducted focus groups with disability and aged care housing providers and associated non-government organisations; and investigated case studies to illustrate the end-user experience.

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