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# ASSISTIVE TECHNOLOGIES in the HOME

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This research examined 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 included 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.


Bridge, C., Zmudzki, F., Huang, T., Owen, C. and Faulkner, D. (2021) Impacts of new and emerging assistive technologies for ageing and disabled housing, AHURI Final Report No. 372, Australian Housing and Urban Research Institute Limited, Melbourne, https://www.ahuri.edu.au/research/final-reports/372, doi: 10.18408/ahuri7122501.

## Implications of new and emerging Assistive Technologies (AT) for older ~~pe~~ople.

| Research question | Data sources | Methodology |
|---|---|---|
| **RQ1. What are the current and emerging directions in the development of assistive technologies globally and nationally?** | Academic primary research studies.<br>Grey literature. | Literature review |
| **RQ2. What are the current policy directions in Disability and Aged Care in Australia and Internationally for assistive technologies?** | Government housing policies and reports (national and international) | Literature review |
| **RQ3. What factors enable or constrain the use of AT to support independent living in practice?** | Original data:<br>Transcripts of focus groups<br>Survey data<br>Photo-journals<br>Interview data | Thematic and content analysis of original data |
| **RQ4. What are the potential economic and social benefits of policies and practices to support the development and adoption of ATs in Australia?** | AT Survey, case studies, AT pricing schedules, ABS population data | Cost analysis and economic (Markov) modelling |

# What is smart home AT?

- Interdependent assistive technological devices that communicate through a wired or wireless connection continuously modifiable to the needs of the user

(Bierhoff et al. 2007).

## Literature revealed a number of known vulnerabilities for older people

1. **Risk of data privacy, security and unethical practices**
   The risk of data privacy, security and abuse of vulnerable groups is a big concern when it comes to smart home IoT devices that have always-on monitoring features (Wangmo et al. 2019).
2. **Data vulnerabilities and management**
   The data vulnerabilities and lack of transparency on how data is managed, stored, and protected is an increasing concern where passive network observers, such as Internet service providers, could potentially analyse IoT network data to infer sensitive data (Apthorpe et al. 2017).
3. **Privacy and consent from secondary users**
   When smart home IoT devices are used, privacy tensions also arise when the use extends beyond the primary user to care providers as secondary users and incidental users who may visit the dwelling unaware of the smart home IoT devices in play (Lau et al. 2018).

**Cont.**

4. **Care replacement**
   As smart home AT become increasingly promoted and adopted, the ethical considerations of how this will potentially reduce or otherwise impact formal face-to-face care provisions is a concern for both users, and family members (Ienca et al. 2018).

5. **One size fits all assumption**
   Although mass consumer smart home AT can be seamlessly integrated into the home make participants feel like they are living in a standard dwelling (Amiribesheli et al. 2015), there is a risk in assuming the out of box experience fits all. Individual aspirations and goals of end-users need to be taken into account for any AT provisions (Eisma et al. 2004).

# Smarter multifamily apartment ageing – Richard's case study

- Richard's smart technology story starts with his wife (now deceased) being diagnosed with a neurodegenerative illness a few years back.
- After several upgraded versions, and after the Apple Watch waterproof version was offered, Richard switched to that model because the newest watch also offered fall detection with emergency services alert.
- Richard likes technology and voice control was important as he can't read or type because of severe macular degeneration (legally blind).
- Richard, with his son's help, added other temperature sensors, CCTV, and two Google mini HomePods. Richard wears his waterproof Apple Watch in the shower and in bed at night and has an iPhone near him when the watch is charging, they have a Google mini HomePod.

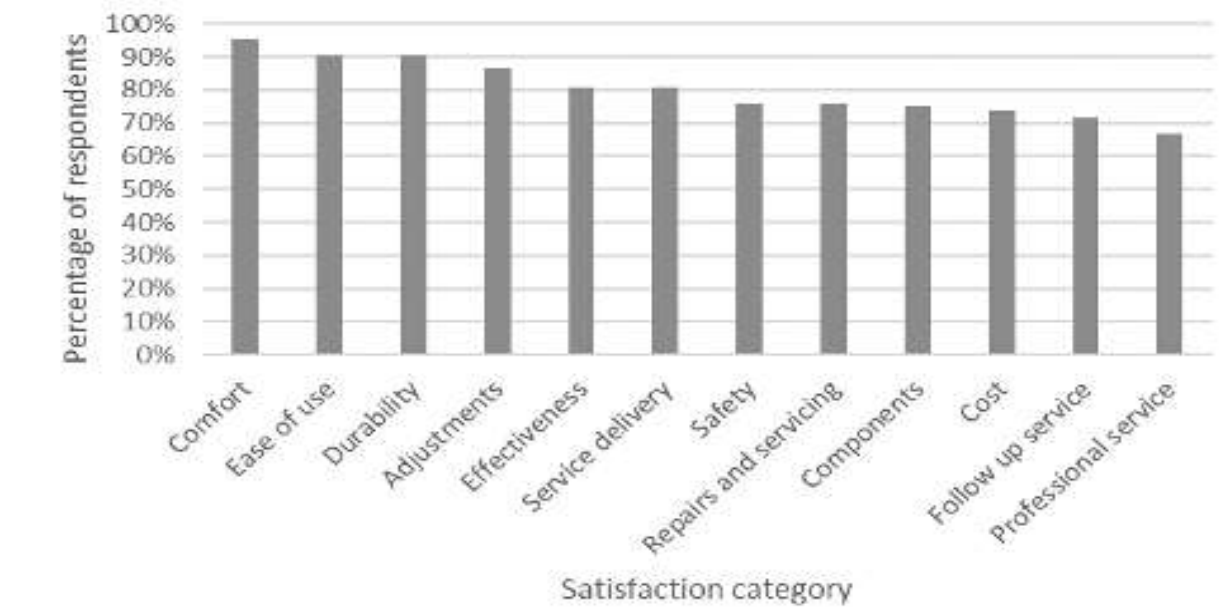
**Cont.**

- Most of the devices are less than 2 years old except their pre-existing iPads, which like many older people they were already using for reading and communicating with family prior to the onset of illness.
- In Richard’s case though, VoiceOver describes exactly what’s happening on the screen and lets you navigate using gestures or a braille display, while the Display Accommodations support colour blindness and other vision needs, and Magnifier works like a digital magnifying glass – all very important with his existing level of macular degeneration.
- Richard’s only son lives in the apartment directly below his parent’s unit and happily set everything up for his mum and dad.

# User evaluation of Smart Home Assistive Technologies

The highest satisfaction scores were reported for comfort, ease of use and product durability, with the lowest satisfaction related to after sales items of follow up service and professional service.

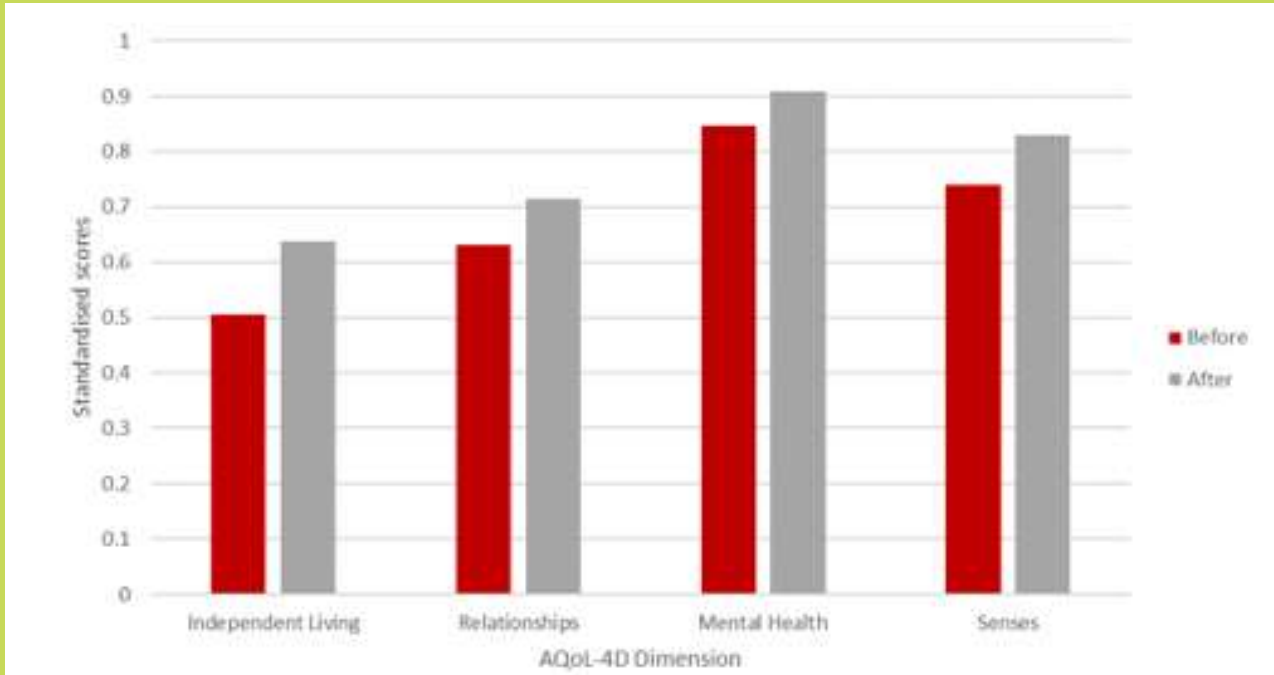
- Comfort rated 95%;
- Satisfaction with ease of use of their smart home AT purchases rated 91%
- Perception of effectiveness to meet their needs indicated 81%




Source: Assistive Technology user survey (n=20 to 24 across respective questions)

# Smart home assistive technology improves quality of life

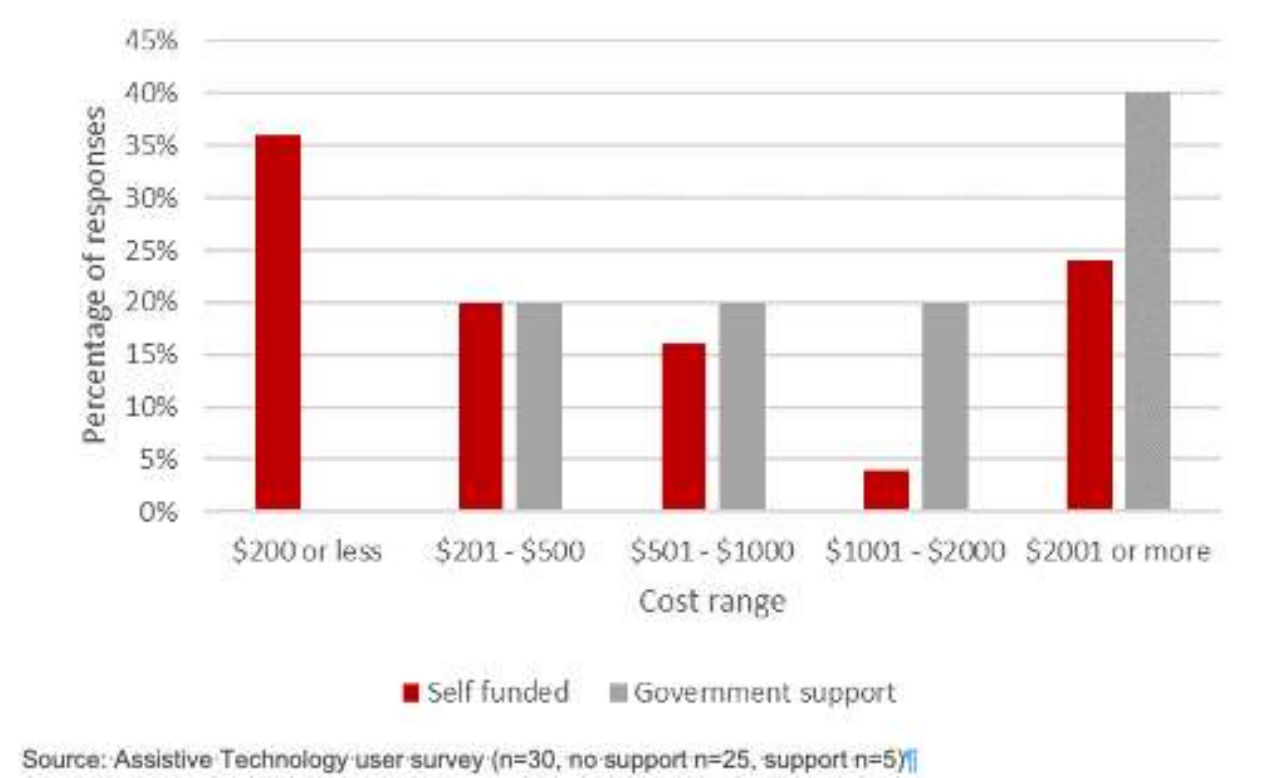
Assessment of Quality of Life (AQoL-4D) indicated improvements across all dimensions including, Independent Living, Mental Health, Relationships, and Senses.




Source: Assistive Technology user survey (AQoL-4D responses n=15)

## Economic perspective for smart home products reflects a still emerging market segment

- Preliminary evidence of plausible cost savings and quality of life benefits with average smart home assistive technology cost over five years, at around $700 to $800 with variations ranging from greater than $1,000 to below $600.
- There is a high variation in product ranges, specifications, functionality, quality and cost.



**The proffered out of the box ‘plug and play’ advantage that many smart technology products boasts is not always the case.**

- *I think for older people, it’s all very complicated, understanding all these different bits that they need to have and what is Wi Fi and what’s my internet plan and what’s my password for all the different pieces? And there's so many little bits of the chain that can go wrong, when they don't even really quite understand what they all are.* (Disability service provider, SA)
- *We don't work with just any installer. We only work with people that know how to customise the technology for people with a disability.* (Insurance and care provider, NSW)
- *Someone with a cognitive disability, either over 65 or an older person with dementia, remembering all the specific commands that Google Home is going need is a difficult task.* (Aged care and housing provider, SA)
- *And the issue of supporting people to be able to use it is that nobody's really funded to do that. …people are very unwilling to pay for advice... age care just can’t afford to do that anymore in the way that it’s funded.* (Disability service provider, SA)

# Barriers to smart home AT uptake for older people

1. An information gap exists, characterised by lack of clarity about the role of funders, housing designers, housing providers and for individuals with functional limitations in their knowledge and skills concerning what can be done and what is safe, sustainable and effective.
2. Lack of co-ordination, regulation, guidance and absence of an evidence-base about what works for who in what context exacerbates the current apathy and confusion around smart home funding guidance.
3. Commercial aged care and disability housing providers only reported uptake of smart home assistive technology policies where a market advantage was perceived, whilst social and community housing agencies found smart home

# Assistive technology policy

1. There are potential economic as well as the quality-of-life satisfaction gains that can be leveraged by government, the residential housing industry, smart home suppliers.
2. Current Australian policy in this area is fragmented and incapable of delivering at the population level, while at the same time service support for bespoke arrangements as illustrated in our case-studies is also lacking.
3. The lack of any national oversight is problematic.
4. Need an inclusive whole of system review of funding, tax arrangements, guidance and regulation across all housing, health, disability and telecommunication programs and initiatives.
5. Greater policy coordinating is needed to align better the responsibilities of differing statutory and regulating bodies in the ownership and procurement, funding, and coordination of service provision, training and information provision.

**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.**

# Assistive technology practice

1. There is a lack of awareness, fragmented, contradictory or non-existent service and policy standards and a sector-wide lack of collaboration and associated sharing of research and good practice.
2. lack of consumer-driven demand and service-related issues associated with assessment and funding for appropriate smart home AT provision and its repair and maintenance in an environment where the technology itself is constantly evolving.
3. Practitioners are looking for greater clarity and ongoing education to support competency development in this area.
4. Practitioners need to actively generate policy proposals that are technically, economically and politically feasible, grounded within the language and value system practised by the policymakers and a national round table discussion on the way forward may be a good step in this direction.

‘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.’

# Keep in Touch

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