TECHNOLOGY AND AGING AT HOME
The Future of Aging in Place

AGE-WELL Industry Advisory Group
White Paper

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Background

Technology and aging at home

Technology use among older adults continues to increase, and in some respects has accelerated during the COVID-19 pandemic. An Environics poll commissioned by AGE-WELL indicates that 72% of older Canadians feel confident using technology, over 50% have taken advantage of telehealth appointments during the pandemic, and there is an increasing trend in the use of voice-assisted technologies, wearables and connecting online.

While technology is becoming a mainstay in many parts of our homes, to what extent can it serve the vast majority of older adults wishing to age in place for as long as possible? Furthermore, with demand for home care expected to increase by 50% over the next 10 years, how can technology be integrated into effective delivery of care at home? Research continues to demonstrate a multitude of ways that homes can integrate technologies and related services to support aging in place but to maximize adoption and the benefits that technology can deliver within a home, industry stakeholders in the AgeTech sector will need to consider more than technical innovation.

Introduction

The future of aging in place — Industry perspectives

In 2020, AGE-WELL brought together a working group of members of industry to provide their perspectives on the future of aging in place. In line with AGE-WELL’s commitment to co-creation, the group also includes older-adult and caregiver input to provide critical insights and context for each discussion.

Here we present the initial output of this group, which focuses on future possibilities for the “tech-enabled home” for older adults and what issues must be addressed to enable significant advancements.

Challenges & Limitations

This whitepaper represents insights and ideas from a collaborative working group, with an aim to contribute an important perspective to the overall conversation.

There is a significant diversity in the needs, preferences, and levels of access that affect how technology can support aging in place, which cannot be fully covered here. This whitepaper presents both universal and specific recommendations, with the understanding that every solution can and should be customized according to a resident’s specific needs.

What is certain is that if technology developers rely on assumptions about older users, their needs, and preferences or how this market is segmented, the ability to achieve adoption or positive outcomes is less likely.
Aging in Place

Throughout the day, a host of technologies in the home can interact with or support an older adult and their circle of care. A journey map like the one shown below\(^6\) provides a guide for envisioning the components of a tech-enabled home.

Figure 1: Example journey map for aging in place

Considering where and when technology can have an impact is not sufficient. Beyond technical requirements and specifications, there are important factors that will help determine whether solutions will be adopted by older adults, serve their circle of care and contribute to the goal of extending life at home. In the discussions of the working group, five overall themes emerged as being central to a home where technology can support aging in place, namely that it should be **user-friendly**, **intelligent**, **connected**, **ethical** and **effective**.

Each theme was broken down into recommendations outlined here as input for the development of future technologies; guiding questions under each theme can be reviewed by those who are developing or implementing solutions for the tech-enabled home.
User-friendly

1. **Easy to use:** simplicity may be prioritized over rich feature sets as a baseline. Special consideration should be given to ease of use during high-stress or crisis situations.

2. **Supports in-person care:** a tech-enabled home should not replace in-person contact and care or act as a barrier to providing care; rather it should supplement when necessary and also support it (e.g., handling routine work to create more time for actual care, predictive models and proactive recommendations, information sharing, with consent, to provide context for care visits).

3. **Supported:** a tech-enabled home with a support service model built around it can increase adoption and benefits; levels of service could vary as needed. Technology should not require the resident to be an expert and should remove fear of “making a mistake.”

**Guiding Questions: Easy to use**
- What barriers exist for all users who may access the solution (e.g., older adult, caregiver, health care professional)? Was input obtained from these user groups during product development?
- What does the onboarding experience for this solution look like? Can someone use the solution without training?
- How clearly is information presented (e.g., instructions, data visualization, user interface)?
- Are the number of steps required to reach appropriate support in a high-stress situation reasonable? How might potential medical emergencies impact the use of the solution?
- What mistakes could someone using this solution make and how can you mitigate the risk of issues arising from them?

**Guiding Questions: Supports in-person care**
- How does the solution serve a need that exists for in-person care?
- Does the technology create any barriers for or replace in-person care? If so, what are the potential risks associated with this? If not, how does it supplement in-person care?
- Can a caregiver access or use the solution when needed?

**Guiding Questions: Supported**
- What is the technology customer service model? Can technology issues be resolved in a timely manner?
- Does the technology provider stand behind the product (e.g., break, malfunction etc.)?
- Is there a sustainable engagement model to maximize the benefit of the technology post-installation?
Intelligent

4. Predictive: a tech-enabled home could have the ability to predict potential challenges (e.g., speech pathology, risk of falls, wandering, loneliness) and to recommend actions such as connection to allied health professionals.
   - For caregivers or residents, sensitivity to change can be quantified and/or visualized by technology. A data trail of health changes can help create predictive models (e.g., based on changes in a clearly defined metric, a change in overall wellness or risk of falls may have increased by some amount that is communicated to the circle of care).

5. Proactive: enabling healthy living through suggestions and reminders. This can also apply to caregivers if they are connected and have required permissions.

6. Personalized: a tech-enabled home can use resident profile or learn from activity to recommend and provide access to care as appropriate (e.g., along “frailty continuum”). The overall components, services and education should also be customizable.

Guiding Questions: Creating an intelligent solution

- Can the solution be customized for specific and changing user needs (e.g., for those with greater or less independence)?
- How can an older adult or caregiver get a sense of potential risks (e.g., falls, drops in blood sugar levels etc.)?
- What criteria and evidence were used to decide which data should be collected?
- Does the solution support decision-making by older adults, caregivers or health care professionals?
- Does the solution build in reminders and notifications that are meaningful and clear but not intrusive or bothersome?
Connected

7. **Connected to circle of care:** older adults should be able to connect to any healthcare provider (e.g., sharing glucose monitor reports) and caregiver with whom they choose to connect. With permission from the resident, technology can be used to keep the (selected) circle of care aware of potential emergencies, high-risk events or the overall risk profile.

8. **Connected to social groups, services, and resources:** technology should easily connect to family, friends, community (e.g., events and groups) and a social network. This can supplement or even facilitate in-person connection (e.g., activity recommendations, creating new social connections, reminders). In some cases, this can also feed into the proactive aspect of technology promoting healthy living. The tech-enabled home should also increase and simplify access to services (e.g., grocery delivery, pharmacies, retail, telehealth, transportation, nutrition and more) and resources (e.g., relevant and validated information).

9. **Integrated and interoperable:** various tech-enabled solutions should be integrated or have greater adherence to common frameworks or standards to complement ease of use and customizability (e.g., monitoring medical devices can have data uploaded through or integrated within same system as sensors monitoring activity within the home).
   - Solutions that talk to each other increase the effectiveness of predictive capabilities and context for health care professionals.
   - An industry shift towards better interoperability increases choice (not tied to one brand), affordable options, and the adoption of technologies.

Guiding Questions: **Connecting a solution**

- How is data shared? Can the resident control which data are shared and with whom (e.g., caregivers, health-care providers)?
- How does the solution enable connection to social groups?
- Can the solution work on most or all devices and platforms? Does it talk to other devices?
- Do the additional services cater to the digital literacy of the users?
- Are there training or resources available for the users’ increased access to services?
Ethical

10. Prioritizes privacy and data ownership: technology should not feel intrusive, and the resident must feel comfortable with it as a tool in their home. Language around privacy and data access should be clear and take an “opt-in” approach. A framework could be considered wherein data is owned by the resident.

11. Accessible: a tech-enabled home should accommodate a broad spectrum of users. While there are limits to what technology developers and providers can do to ensure equitable access to technologies, where possible, an effort should be made to design adaptable solutions and services that better address a range of user capabilities, requirements and barriers to access.

Guiding Questions: Ethical and accessibility considerations

- What are the risks of data breach or privacy violation? How will these be mitigated?
- How accessible is the solution (e.g., consider potential hearing loss, visual acuity, mobility, language, financial constraints, etc.)?
- What is the level of digital literacy of each user group?
- Is any risk, wellness or health information or visualized data presented in a way that is both clear and meaningful?
- What processes will be put into place to ensure that residents opt-in to features and the overall solution?
- Is the cost of the service affordable to the general public? If not, is there a way to offer a different financing model? (e.g., leasing, amortization etc.)?
Effective

12. Resilient: a tech-enabled home should be able to operate adequately in sub-optimal conditions (e.g., interruptions in connectivity, increases in devices within a home, power consumption and bandwidth in buildings with many users).

13. Validated: The approval of a technology or its ability to meet certain standards may not necessarily capture its ability to improve quality of life or health outcomes. Technology making a claim to improve an older person’s ability to age in place should have evidence supporting its claims.

Guiding Questions:

- Can the solution operate during periods of or in areas with reduced internet access?
- What evidence supports the claims made about the solution’s benefits and reliability?
- What user acceptance tests have been completed in real world settings?
- What implementation plan has been developed for real world settings with relevant stakeholder categories?
- Is there a risk management and a disaster recovery plan in place?
Referencing the journey map introduced earlier, we can provide some specific recommendations through the lens of the above themes to begin to envision what the future of aging in place in a tech-enabled home could look like.

While innovation and understanding the needs of older adults are central to creating effective tech-enabled homes, there are other challenges that should be addressed in order to increase the benefits for aging in place.

### Supporting effective tech-enabled homes

1. **Guidelines, standards and resources to help navigate an overabundance of options (for caregivers and older adults), to support a move towards interoperability and integration of solutions and to increase the quality of technologies introduced into homes.**

2. **Appropriate tech and digital infrastructure: connectivity with sufficient bandwidth, WiFi, digital services that have the option of human tech support, software and systems to facilitate interoperability between devices.**

3. **Upskilling programs for allied health professionals, formal and informal caregivers, as well as organizations to ensure that solutions are clinically relevant, easily integrated into service delivery and more likely to be adopted.**

4. **Training and support for tech and digital literacy.**

5. **Better communication between and understanding of relevant segments (e.g., technology companies and home healthcare companies).**
Concluding Remarks

As older adults looking to age in place continue to increase their use of technology, there is both a need and opportunity to do more than simply place technologies into a home. Usability, ethical and relevant data collection, features that assess and promote health and wellness, the facilitation of social connection and engagement, and ensuring the right standards and integration of technologies must all be taken into account. For this to happen, comprehensive and forward-thinking action is required across research and development, standards, training and education, and infrastructure.
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