

# SP: APPLICATION FIELDS & INNOVATIVE TECHNOLOGIES

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## Innovative technologies for health equity in marginalized groups and underserved communities

J. B. van Waterschoot (Convener)

**Participants:** J.B. van Waterschoot (the Netherlands), P.J. Gramberg (the Netherlands), M. Bults (the Netherlands), P. P. Morita (Canada and France), C. Daum (Canada), L. Liu (Canada), A. Miguel Cruz (Canada), A. Ríos Rincón (Canada). **ISSUE** Technology is a tool that can bring benefits, but may increase disparities between people due to limited accessibility or relevance. Health innovations should be more accessible for marginalized and underserved communities, including people with limited digital literacy. Co-creation is a strategy to reduce inequities by involving end users, such as patients, clients, residents, professionals, in the health innovation development and implementation. **CONTENT** This symposium focuses on technology acceptance, usability, and adoption in marginalized groups and underserved communities. We use the GATE's 5P framework (WHO, 2022) to describe aspects of innovative technologies: people, policy, products, provision and personnel. First, Van Waterschoot and Gramberg will talk about innovative technologies to support professionals in the communication with older adults living independently at home. A virtual assistant has been developed to increase the awareness of seniors regarding their living conditions at home. Bults, Zuidhof, van den Berg, Liu, and den Ouden will discuss barriers and opportunities for wide-scale implementation of innovative technology in healthcare. Morita, Istrate, Zalc, Rumeau, Vigouroux, and Campo will focus on sustainable AAL technology for supporting seniors in independent living shared homes. Finally, Ríos Rincón, Miguel Cruz, Daum, and Liu will challenge assumptions about digital technology acceptance among older adults. **STRUCTURE** Presenters from the Netherlands, Canada, and France will give a brief presentation summarizing their papers. This will be followed by round table discussions based on the GATE's 5P Framework. **CONCLUSION** The symposium will provide participants with an opportunity to apply the GATE's 5P framework to their work, and exchange international perspectives.

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**Keywords:** older adults, health equity, innovative technologies, acceptance, usability, adoption, inclusion

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## Virtual Living Coach assistant for older adults living longer independently

J. B. van Waterschoot & P. J. Gramberg

**Purpose** In the Netherlands, like many other places in the world, we are experiencing challenges with an aging society. In the past, most of the older adults not being able to live independently would move to a nursing home. Currently, one in seven people are working in healthcare. If nothing is to be done, by 2040, one in four employees of all working force will have to work in healthcare (Sociaal Economische Raad, 2020). Nursing homes cannot meet demand of the aging population and therefore older adults will need to live longer independently at home. A part of Dutch older adults live in low-income housing, which range from apartments to single-family homes. These homes are often built for families or younger couples and are not suitable for older adults. For example, a third floor apartment without an elevator is an obstacle for an older adult with limited mobility to go out much. Professionals working in low-income housing organizations visit older adults to talk about their living situation and try to help them make adjustments in their current home or help them move. However, there is not enough staff to support older adults in this process. We have to look for solutions that can help with staff helping more people in their limited time. A virtual living coach assistant would support the staff by doing part of the intake conversations and can help the professional with having this conversation. **Method** Our research is three-fold: 1) we want to know what the topics professionals talk about with older adults in their living situation, 2) how to best approach these topics in the conversations and 3) which technology could support professionals the best in this situation. We have partnered up with a low-income housing organization and an interest group of local older adults to address the first two research questions. We started by collecting literature on what to talk about and how to talk with older adults about their living situation. Additionally, we exposed both professionals and older adults, who have varying degrees of experience with technology, in focus groups to different types of technology: virtual reality, interactive websites, 360 degree camera's, serious games, sensor technology and social robotics. We used co-design with professionals to design a virtual living coach assistant that they can use in their daily work. For the third research question we partnered up with our Extended Reality Lab which can design and create the necessary technology. **Expectations** We expect a prototype of a virtual living coach that can be used in a personalized manner by professionals in low-income housing organizations. It should help professionals in reaching more older adults in the same amount of time and help professionals in the conversations about living situations. We hope to have finished the prototype before the summer of 2024. At the end of 2024, we will host a regional symposium aimed at professionals about the topic of technology support for living longer independently. Our research builds on four out of five Ps from the 5P framework (World Health Organization, 2022). We have organized focus groups with older adults, the people who we design with, we are co-creating a product that can be used for conversations about living independently, we show another way of information for older adults about living independently and we provide an additional tool that a living coach professional can use in their profession. This project is part of a larger project in the Learning Community of Supporting Older Adults Living Independently that started in January 2023 and will be finalized in December 2025<sup>1</sup>.

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World Health Organization. (2022). Global report on assistive technology.

**Keywords:** virtual assistant, older adults, housing

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<sup>1</sup> <https://www.werkplaatsensociaaldomein.nl/thema/ouderen>

# SP: APPLICATION FIELDS & INNOVATIVE TECHNOLOGIES

## Sustainable implementation of technology in healthcare using the Non-Adoption, Abandonment, Scale-up, Spread and Sustainability instrument

M. Bults, N. Zuidhof, G. H. van den Berg, D. van der Linden, J. Stokkers-Scholten, L. Liu, M. E. M den Ouden

**Purpose** In many countries, like the Netherlands and Canada, the healthcare sector faces similar challenges as a result of societal changes such as aging population, staff shortages, increased number of people with chronic health conditions and increasing complexity of care. Healthcare technology can both support professionals in daily practice and enhance autonomy and independence of older adults (Liu et al., 2022). In the Netherlands, efforts are being made to implement proven labor-saving technologies by healthcare organizations, such as the use of video conferencing technology, smart incontinence materials, and robotics. In addition, the World Health Organization gives high priority to improve access to healthcare technology for all, regardless of age, background of health status (World Health Organization, 2017). Although there is increasing attention, healthcare organizations experience major challenges in the uptake, widespread use and sustainable implementation of technology in daily practice. Barriers include limited time, inadequate knowledge and limited digital competencies of professionals as well as limited budget and support from management for the implementation of technology (Boyle, Husebo & Vislapuu, 2022). There are various instruments in the field of implementation of healthcare technology that can provide practical tools. A promising instrument is the Non-Adoption, Abandonment, Scale-up, Spread and Sustainability (NASSS) instrument that describes the relevant determinants, barriers and facilitating factors in the implementation of healthcare technologies (Greenhalgh et al., 2017). The aim of this study was to gain insight into the barriers and opportunities for sustainable implementation and upscaling of the Compaan. The Compaan is a tablet that can be used to provide remote care for older adults and to foster self-management. **Method** We used a qualitative study to examine the complexities and opportunities of the implementation of the Compaan, and experiences of using the NASSS instrument. The study was conducted at a healthcare organization that provides care at home, and is located in the east of the Netherlands. The research population consisted of nurses and innovation managers. We used focus group discussions and semi-structured interviews to explore the domains of the NASSS-framework, i.e., condition, technology, adopter system and organization. **Result and Discussion** Regarding the condition of use, respondents stated that the Compaan was used to support daily tasks, monitor medication intake, fall prevention and promote daily structure among older adults. The Compaan technology was used to reach specific goals, i.e., to prevent, support, reduce or replace physical care. Regarding the adopter system, it was important to take cultural aspects into account. Respondents stated they needed personalized information and instruction regarding the use of the Compaan. Professionals observed changes in the behavior of older adults, i.e., increase self-management among clients, reduced dependence on care and more control during the day. Hence, they experienced the added value of the technology from a client perspective. In addition, the technology competences of clients and professionals were important for sustainable implementation. Finally, the implementation of the Compaan had a major impact on the organization, as it required additional efforts at micro-, meso- and macro-levels. Given the persistent challenges in implementation across these levels, it is imperative that effort is made to align every aspect of the NASSS framework. This project explores the five Ps from the WHO-GATE 5P framework, i.e. people, policy, products, provision and personnel (World Health Organization, 2022).

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**Keywords:** implementation, technology, independence, autonomy

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# SP: APPLICATION FIELDS & INNOVATIVE TECHNOLOGIES

## Sustainable AAL technology for supporting seniors in independent living shared homes

P. P. Morita, D. Istrate, V. Zalc, P. Rumeau, N. Vigouroux, E. Campo

**Purpose** Affordable and sustainable housing for seniors is a major project in Canada and France alike (Bresson & Labit, 2020). While retirement homes and nursing homes have been developed to address this need and provide seniors with the necessary support as they age, the greater majority of the population lives on government-issued retirement and cannot afford living in such residential settings (Bresson & Labit, 2020). Driven by this need, unique models in France have been developed. The Ages Sans Frontières initiative (<https://www.agesansfrontieres.fr/nos-etablissements/maison-partagee/les-maisons-partagees-de-brens/les-maisons-partagees-de-brens/>) provides accessible and affordable shared seniors' homes, where a group of 6 to 12 seniors in each shared home provide support for each other with a house keeper, present during working hours, who help them organize themselves, creating a sustainable and affordable self-support community. In this setting, seniors are able to support each other, despite their individual limitations or disabilities, through a community-focused approach. While shared housing for seniors is an ideal model in a world where retirement homes have become too expensive for most of the senior populations, the lack of continuous support in these shared homes is still a major problem that has been identified by seniors in the community. This project attempts to tackle this issue by developing an edge-based monitoring system capable to prevent and detect distress using motion sensors and a smart sound recognition sensor. This project explores four of the five Ps from the WHO-GATE 5P framework (World Health Organization, 2022), focusing on developing supportive technology (Products) for seniors in need (People), and to support service provision (Service Provision and Personnel) for shared seniors' homes. For sustainable reasons, the number of sensors has been kept to a minimum: two motion sensors (in the bedroom & bathroom), a contact door on the front door and a smart sound sensor. These sensors can identify slow changes in a person's habits to detect frailty, but also infectious respiratory diseases (e.g., recognizing cough and sneeze sounds). The technology for recognising the sounds of everyday life, developed at the Université de technologie de Compiègne (UTC), provides a unique way to identify critical sounds in the home (e.g., water running, glass breaking, coughing, etc.) as a rich information input for a reasoning system to create automated alerts in a shared living setting. The reasoning system is developed by the Research laboratory specialized in system analysis and architecture (LAAS CNRS), the human-computer interaction by the Research Institute of Computer Science (IRIT), and the interaction and clinical assessments coordinated by La Grave Gerontechnology Lab. The monitoring system is developed using edge computing technology, where no actual sound is recorded or leaves the device, while indicators are shared with relevant parties. This privacy-focused solution provides a sustainable and affordable solution for supporting seniors living independently, without the need for a complex IoT infrastructure. In addition, every six months, the ADL and IADL scales are evaluated, supplemented by focus groups carried out by the Centre Hospitalier Universitaire de Toulouse (CHU-T) and IRIT to measure acceptability and identify new needs within the shared senior house. This information, correlated with information from the sensors, provides a better understanding of the frailty and/or behaviour of seniors. **Method** While these technologies provide mechanisms for supporting independent living, their acceptance remains a major barrier due to lack of technology literacy and cognitive deterioration due to aging. In this project we will explore (1) alternative design solutions for the enclosure of the device, aimed at increasing acceptance, and (2) the deployment of these devices as part of a longitudinal study in retirement homes in Canada. Devices will be deployed in six retirement homes in Canada, which will collect data continuously for 12 months. Data will come from a combination of sound recognition IoT device (microphone and Raspberry Pi board), in addition to smart home sensors capable of identifying activities of daily living. Each apartment will be equipped with door contact sensors, motion sensors, temperature sensors, and air quality sensor. Through the integration of our technological ecosystem, this project will enable us to further develop a sustainable and affordable system for detecting activities of daily living. **Expectations** This partnership will advance the development of sustainable and affordable solutions for supporting independent living through the new concept of shared homes. Our team expects to improve and optimize the overall acceptance of this technology in the Canadian setting.

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**Keywords:** AAL, shared homes, senior living, sustainability, IoT, independence, autonomy

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## Conducting agotech research with marginalized and underserved communities: Challenging assumptions

A. R. Rincón, A. M. Cruz, C. Daum, L. Liu

**Purpose** Our research teams have collaborated in several studies related to the use of digital technologies with older adults. We believe that digital technologies can support older adults' autonomy and independence (Liu et al., 2022). Through collaboration across various studies, our research teams have examined into the complexities surrounding the adoption of digital technologies among older adults, shedding light on critical factors such as access, literacy, technology acceptance, usability, and cultural perceptions. **Method** Drawing on data from multiple projects conducted over the past six years, including Vibrant Minds (Ríos Rincón et al., 2022), Health Care Aides and Technology (Miguel Cruz et al., 2022), and GuardiO, we scrutinize the assumptions made during the design phase against the realities encountered during implementation within community settings. These assumptions primarily revolve around the availability of infrastructure, digital literacy levels, interest in utilizing digital interventions, and the influence of social factors on technology acceptance. **Results** Reflecting on the challenges encountered in conducting these studies, our team identified four assumptions that were tested by the realities of implementation of digital interventions in community settings. **Assumption 1:** Initially, we assumed sufficient infrastructure to support technology acceptance, yet internet connectivity posed a significant challenge. Limited access and weak connections in places like retirement homes and community organizations required supplementary measures such as MiFi devices and WiFi boosters to ensure technology functionality, impacting user experiences and technology acceptance intentions. **Assumption 2:** Another assumption was that everyone possesses basic digital skills. However, older adults often required assistance with tasks like setting up devices or resolving minor issues, potentially leading to frustration and technology abandonment. **Assumption 3:** We also assumed universal interest in digital interventions, but cultural perceptions, as evidenced by some older adults of Chinese heritage abandoning studies due to perceived lack of value of playing mobile games, highlighted varying attitudes toward technology acceptance. **Assumption 4:** Lastly, we expected social influence to consistently impact technology acceptance, yet findings revealed discrepancies, particularly in rehabilitation contexts, challenging established models like the unified theory of acceptance and use of technology (UTAUT). For instance, social influence did not predict technology intention among healthcare assistants and family caregivers in one study, showcasing the complex dynamics at play. **Discussion** From the WHO-GATE 5P framework (World Health Organization, 2022), the challenges identified align with the 5P model. **People:** End users may lack readiness for adopting digital technology acceptance due to limited experience, leading to a lack of confidence in their usage. Additionally, activities designed for them may not always be culturally appropriate for cross-cultural interventions. **Policy:** Advocacy for free access to reliable internet is essential to ensure universal access to digital assistive technology, enabling older adults to benefit from technological innovations. **Products:** Digital innovations for older adults should prioritize ease of use, allowing access without assistance and enabling users to resolve common issues independently. Innovative service delivery models are crucial for enhancing accessibility. **Provision:** Licensing processes should be established for digital technologies benefiting older adults, facilitating government funding eligibility. **Personnel:** Training opportunities for rehabilitation professionals and support staff are vital to enhance their capabilities in utilizing digital technologies effectively with older adults.

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