Assistive Technologies and Inclusion for Older People
Introduction to the Special Thematic Session

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Abstract. This special thematic session aims to continue the discussions around Active Assisted Living (AAL) by looking into how AAL systems and technologies are related to older people's lives. Almost all countries are challenged by the aging demographics and issues that people face in the course of aging. A great diversity of technologies have been developed and implemented. However, there are many challenges involved in developing and deploying systems that truly fit the needs and wishes of older people. The papers included in this session look at various topics, including ageism, addressing privacy with sensors, and evaluations of systems.

Keywords: Older people · Assistive technologies · Active Assisted Living (AAL)

1   Motivation for the Session

Digital ecosystems for the inclusion of older people into society have long been popular agenda items for many stakeholders, from technology developers to governments, city councils, hospitals, and academics, as the aging demographics is a challenge almost everywhere. These technologies are often developed to ease or remove the burdens of changes such as changing homes, living with a new health condition, adapting to a new living environment, transitioning from working to retirement, and so on. These digital systems, also called Active Assisted Living (AAL) systems, are very diverse and include smart homes, robotic systems, telehealth, telecare monitoring, self-care technologies, and even technology enhanced community services and environments. However, there are many challenges involved in developing these types of systems. Developing and deploying innovative multi-stakeholder systems for an emerging, not yet fully explored social change is a significant challenge.

Growing older, being old, and belonging to a demographic group can mean different things at different times. Previous work showed and criticized that older people frequently presented with some stereotypical assumptions, such as being a socially isolated group in need of bolstering connections with family [3]. These stereotypical assumptions need to change. We suggest that AAL ecosystems include both the technologies and all the decision-makers and people affected by the technologies equally. The new and emerging AAL systems are pushing boundaries to answer the needs of an aging population in their diverse wishes such as to stay connected, social, independent, and age with more dignity and enjoyment.

Older people's abilities, life experience, and cultural and social infrastructures surrounding them are all diverse. It is essential to design ecosystems by focusing on how older people themselves approach their relationships with families and friends [3], rather than top-down definitions. There is a need to question common assumptions about older adults and their use of new and emerging technologies [2]. For instance, it is important to re-position older users as active agents [7].

Furthermore, older people may face physical, sensory, or cognitive limitations associated with the biological aging process. However, this should not create assumptions about how and when to assist older people. As an example, the assumptions on older people's will to be monitored by family members are proven contradictory, as the older people are more likely to enjoy observing their younger generations, but not that much to be monitored by them [3]. The AAL systems and technologies market is not yet able to deal with all of these complexities. A discourse analysis study [7] showed that previous interaction design work focused on the limitations to the cognitive and physical abilities and health-related problems, thus rendering aging as a 'problem' that technologies can manage. One idea for shifting this view is moving beyond what a person can do, focusing instead on the collective care that makes those capacities possible (i.e. how people work together to bring about attentive relationships) [1].

The Special Thematic Session (STS) follows our previous calls (AAL Forum 2018, ICCHP 2018). It aims to continue the discussions related to assistive and inclusive technologies for older people and the ecosystems in which they are created. We aim to define the changing role of the technologies within the changing context and perceptions of aging.

2   AAL Ecosystems: An Inclusive Perspective on Assistive Technologies in Later Life

For furthering the discussions in the placement of AAL and older people, we find the following topics relevant:

AAL for Individuals and Communities aims to point to the unique potentials of how people interact with each other and the role of AAL in supporting those interactions. For example, how are emerging social needs reflected in the AAL products? How do we design for the new norms after Covid-19 (independence

vs. interdependence)? Are there emerging digital artifacts, environments, and technologies? How does AAL change shape in a fast-changing world and contribute to better health, finance, education, etc.? In defining those assets, it is essential to remember that many of the older people are autonomous, do not define themselves as old, and have a similar approach towards the notion of family friendship as younger people [3]. Recent work showed that during Covid-19, a group of older people actively used an ecosystem of communication tools to maintain multimodal connectedness [6].

AAL at Scale: Cities, Governmental Services aim to point to AAL ecosystems' growth and scale potentials. Public services, smart cities, and citizen-centric digital systems are all exciting areas of research and development. Almost endless possibilities are available to support older people from automotive interactions and restaurants to hospitals, care homes, daycare, and therapy centers.

In Social Challenges and Opportunities for AAL Systems, we see ageism, sexism, and race issues in AAL, as no environment is free of social bias. More broadly, getting it right on ethics, legal aspects, security, and privacy are crucial when assessing impact, deploying and evaluating assistive technologies for older people. Thus, this extends to the broader societal implications and business models for inclusive assistive technologies for older people. The complexity of the designs can easily lead to technology being developed for older people by non-older populations. Systematically belittling, disregarding, ignoring and dehumanizing a group contributes to an epistemic exclusion [8]. It is essential that AAL systems do not treat the older people in these ways.

Lastly, we put a focus on *AAL across borders*. How do geographical differences, e.g. rural vs. urban, affect the assistive technologies for older people? What are the significant issues of cross-cultural experiences and mobility (migration, relocation)? Are there potentials for a low-cost AAL rethinking business models for geographies marked by low-income per person?

3   Papers in the Session

In the following, we describe the papers from the session. We have divided these into two parts, those about *Impressions about older people*, and those about *privacy considerations* and *outcome assessment*. In addition, we introduce the papers from this session that are included in the open access compendium for the conference.

3.1   Impressions About Older People

Related to the topic *social challenges*, at a previous ICCHP conference, Helen Petrie investigated ageism and sexism amongst young computer scientists in the United Kingdom [4]. Participants were shown a picture of either an old or young woman or man and asked to assess the likelihood that this person would use different computer systems, and their level of expertise with these technologies. The results found both ageism and sexism.

In this conference, Yao Chen and Helen Petrie build on this work in their paper "Ageism and sexism amongst young technicians and older people in China" and look *across borders* to investigate attitudes in China. This study investigated not only the attitudes of young computer scientists there, but also compared these to the attitudes of older people. It is interesting to compare the results to those of the previous study, and see that many issues transcend not only continents, but also generations.

In their paper "Ageism in Design: Accessibility without User Experience?", Jean Hallewell Haslwanter and Christiane Takacs also build on this work to explore how the prejudices against older people affect the designs considered for them, i.e. those aspects they are thought to want and need. Based on an image of either a younger or older person, participants were asked to suggest design aspects for that person. The aspects recommended for each age group were grouped into the elements of user experience, and compared. Furthermore, the study looks at the aspects young computer scientists recommend to support the accessibility of technologies for older people.

These attitudes are important, as it may affect whether the technologies produced are adopted by older people, so that they can profit from them.

3.2 Privacy Considerations and Outcome Assessment

In the topic *AAL at scale* we look at the high growth potential of the AAL ecosystems, which not only brings many opportunities, but also requires a serious consideration of many aspects related to it.

In their paper "Addressing Privacy Concerns in Depth Sensors", Wiktor Mucha et al. describe a study on privacy concerns related to depth sensors. Compared to the RGB camera sensors, the depth sensors are widely considered to be much less obtrusive as these types of sensors do not provide texture detail. Due to privacy considerations, depth sensors are commonly used in modern AAL systems to monitor user behaviour and detect emergency situations such as falls. In their study, the authors show that although depth sensors generally protect privacy better, this does not mean that they guarantee privacy under all circumstances.

Advances in sensor resolution, and particularly in deep learning technology, have significantly improved the level of detail that can be seen in depth sensor data. The authors have demonstrated this effect using test data and conclude that depth data is more confidential than RGB data, but that when using depth sensors in AAL systems, it is of great importance to analyse a possible disclosure of user identity in individual cases and prevent it. This is particularly important in the case of a small number of users and in the case of high-resolution depth sensor data.

Both AAL and AT can have a high impact on the user's day to day life. However, there still is a lack of reliable data regarding the user's actual needs and the real ability of AT and AAL products to reduce the impact of disability, disease or age-induced limitations. In "Assessing the Outcome of Mobility Assistive Technology (OMAT) in daily living: preliminary results in an Italian

sample" Francesca Borgnis et al. report about an ongoing research study where preliminary results showed positive impact of the provided AT products on the quality of life not only for the patients (primary users) but also for the caregivers (secondary users).

Scientific evidence for the impact and outcome of AT and AAL use is of high importance for the future growth of the ecosystem.

3.3   Additional Papers in the Session

In addition to the papers in this volume, further papers presented in the session are available in the open access compendium for the conference [5].
These include papers evaluating specific technologies and problems users have with them in practice:

– "Long term impact of using Smart Speakers in accessing literary works by people with vision loss - usability study of BLVNZ Alexa Skill" by Jarek Beksa and Sara Chin.
– "SmartGlass implementation: Lessons learned in long-term elderly care" by Monique Lexis et al.
– "Technical support needs of older users of digital health technologies to support self-management of multimorbidity" by Suzanne Smith.

One looks at the state of the art in community-based services and points out some of the current limitations:

– "Smart Community-Based Services for older persons with disability: A desk review and analysis of design projects" by Mabel Giraldo et al.

Others look at the needs with respect to these technologies:

– "Ageing, Technology, and Experiences of Home" by Jeffrey W. Jutai.
– "Needs assessment regarding ICT for elderly people and their carers: The PROADAS study" by Maria Prodromou.

The final paper from the compendium links into the topic of ageism:

– "Narratives of digital technology use: Understanding the role of ageism in the digital inclusion of Older Adults" by Cora van Leeuwen.

We encourage readers to look at these in [5].

Finally, there was an entry in the inclusion forum, a format intended to provide an opportunity for discussion and participation: "Elderly people living in the Information society supported by *intelligence*" by Laura Burzagli and Pier Luigi Emiliani, which describes the limitations of AI with respect to two specific apps that address difficulties preparing complex meals and loneliness.

In sum, the papers in this session provide interesting insights about aspects to be aware of (e.g. ageism and privacy), but also show there are a variety of technologies, some of which can reduce the impact of disability, disease or age-induced limitations and improve the lives of people. For this, it is essential not to

think only of the technology or the carer point of view, but take a holistic view of the AAL ecosystem and be sensitive to the views and needs of older people, who are in end the primary users.

References

1. Bennett, C.L., Rosner, D.K., Taylor, A.S.: The care work of access, pp. 1–15. Association for Computing Machinery, New York, NY, USA (2020). https://doi.org/10.1145/3313831.3376568
2. Durick, J., Robertson, T., Brereton, M., Vetere, F., Nansen, B.: Dispelling ageing myths in technology design. In: Proceedings of the 25th Australian Computer-Human Interaction Conference: Augmentation, Application, Innovation, Collaboration, OzCHI 2013, pp. 467–476. Association for Computing Machinery, New York, NY, USA (2013). https://doi.org/10.1145/2541016.2541040
3. Lindley, S.E., Harper, R., Sellen, A.: Designing for elders: exploring the complexity of relationships in later life. In: Proceedings of the 22nd British HCI Group Annual Conference on People and Computers: Culture, Creativity, Interaction, BCS-HCI 2008, vol. 1, pp. 77–86. BCS Learning & Development Ltd., Swindon, GBR (2008)
4. Petrie, H.: Ageism and sexism amongst young computer scientists. In: Miesenberger, K., Kouroupetroglou, G. (eds.) ICCHP 2018. LNCS, vol. 10897, pp. 421–425. Springer, Cham (2018). https://doi.org/10.1007/978-3-319-94274-2_60
5. Petz, A., Hoogerwerf, E.J., Mavrou, K. (eds.): Assistive Technology, Accessibility and (e)Inclusion, ICCHP-AAATE 2022 Open Access Compendium. Johannes Kepler University, Linz, Austria (2022). https://www.icchp-aaate.org
6. Richards, O.K., Marcu, G., Brewer, R.N.: Hugs, bible study, and speakeasies: designing for older adults' multimodal connectedness. In: Designing Interactive Systems Conference 2021, DIS 2021, pp. 815–831. Association for Computing Machinery, New York, NY, USA (2021). https://doi.org/10.1145/3461778.3462075
7. Vines, J., Pritchard, G., Wright, P., Olivier, P., Brittain, K.: An age-old problem: examining the discourses of ageing in HCI and strategies for future research. ACM Trans. Comput.-Hum. Interact. **22**(1), 1–27 (2015). https://doi.org/10.1145/2696867
8. Ymous, A., et al.: "I am just terrified of my future" - epistemic violence in disability related technology research. In: Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems, CHI EA 2020, pp. 1–16. Association for Computing Machinery, New York, NY, USA (2020). https://doi.org/10.1145/3334480.3381828