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# The Future of Aging and Assisted Living Technologies (AALT) in 2035

Eye of Europe Foresight Workshop Report

VDI/VDE-IT

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## 1 Project Scope

As a Coordination and Support Action, the project “Eye of Europe” aims to enhance the integration of foresight practices into Research and Innovation (R&I) policy making across Europe. Ultimately, the project envisions a more cohesive and influential R&I foresight community that contributes significantly, as a collective intelligence, to shaping and guiding policy decisions.

To this end, Eye of Europe builds on existing initiatives and experiences to foster knowledge-sharing between foresight practitioners and policy makers, attract domain experts in foresight endeavours, and engage a broader audience in futures thinking. Nurturing [futures4europe.eu](https://futures4europe.eu) as the online home for the community and running various face-to-face events with different stakeholders underpins these ambitions.

Methodologically, the project relies on the following building blocks:

1. Sharing of practices: This entails mapping institutions engaged in R&I foresight activities, promoting mutual learning through interactive formats, developing shared visions for the future of foresight in R&I policy within the European Research Area (ERA), fostering exchanges among the foresight in R&I policy community through conferences, encouraging dialogues between futurist/expert communities, academics and policy practitioners.
2. Running foresight pilots: Conducting a series of pilot workshops and online consultations with diverse formats, methodologies, and participants – among them the workshop at hand. This involves identifying topics of common interest within the ERA, where foresight perspectives offer added value, designing and implementing tailored pilot foresight activities involving various stakeholders, harnessing lessons learnt and feeding them into the platform and other dissemination channels.
3. [futures4europe.eu](https://futures4europe.eu) as the online hub for the R&I foresight community in Europe: The platform accommodates the interests of various

stakeholders such as foresight experts, beneficiaries, domain experts, and an active audience. It operates on multiple integration levels, from mapping organizations and experts to sharing foresight results and capabilities. Moreover, it acts as the communication gateway for ongoing foresight activities, events, educational and inspirational materials.

4. **Boosting futures literacy:** The project encourages meaningful engagement with diverse audiences, from foresight professionals, researchers, policy-makers to various futures sensitive profiles (e.g., entrepreneurs, journalists, artists) and the wider civil society. The project provides guides, methodology toolboxes, and training modules for R&I foresight and futures literacy, incorporating written and multimedia content.
5. **Fueling the public discourse around futures:** Promoting the project and fostering the foresight community via the online platform [futures4europe.eu](http://futures4europe.eu) and complementary channels such as social media and a dedicated newsletter. In addition to highlighting the project's own initiatives, Eye of Europe also aims to promote foresight content developed in other projects, showcasing a diverse range of perspectives and insights within the foresight field.

The topics of the foresight pilots (see bullet point 2 above) – including this very workshop – were identified with the help of an extensive document analysis of official national and EU level perspectives on “topics of common interest in ERA” as well as a series of qualitative interviews with European policy and R&I stakeholders. The final set of topics was then generated in a joint process among the project partners in several rounds of bilateral and group discussions, among them the topic of Aging and Assisted Living Technologies (AALT). Indeed, in light of increased aging of European societies the integration of smart and digital technologies into assisted living and care for older adults has become increasingly important in recent years. The thematic focus of this specific workshop therefore lies on the relevance and impact of AALT both from a demography angle as well as from a technological



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innovation lens. The main goal of the workshop is to identify and describe the overarching effects of AALT on society as a whole as well as in the context of R&I policy, using an anticipatory approach through foresight.



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## 2 Introduction

In response to the profound demographic changes reshaping European societies—characterized by increasing life expectancy, aging populations, and a rising prevalence of chronic health conditions—the **Eye of Europe** pilot workshop was conducted to explore how AALT might shape the future of care and inclusion. Using the **futures wheel method**, participants engaged in structured development of future pathways to examine potential developments in three distinct contexts:

- institutional long-term care,
- home-based care, and
- the inclusion of individuals with special needs in the workplace.

This report synthesizes the insights and implications generated during the workshop, structured around three future assumptions: that by the year 2035, AALT will be the standard in long-term care settings; AALT will be commonly used in private households; and AALT will be successfully integrated in workplaces to support individuals with special needs.

### 2.1 Definitions, Context and Method

**Aging**, as considered in this workshop, refers to both the biological process of growing older and the demographic trend of increasing proportions of older individuals in society, often accompanied by functional decline, chronic illness, and a growing reliance on support systems. In parallel, societal aging presents mounting challenges for health care, social systems, and labour markets. Advances in health and development have enabled most people to live into their 60s and beyond, while declining birth rates mean seniors make up a larger share of the population (WHO, 2024a, 2025b). Globally, the number of people aged 60 and over is projected to rise from about 1.1 billion in 2023 to 1.4 billion by 2030. By the mid-2030s, those aged 80+ will reach an estimated 265 million worldwide, even outnumbering infants in some regions (indicating a profound demographic shift) (United Nations Department of Economic and Social Affairs, 2024). This trend presents opportunities—such as longer

working lives and experienced contributions—and challenges, especially in health, care, and social support systems, as longer life often comes with increased frailty or disability in advanced age. Healthy ageing initiatives (e.g., the UN Decade of Healthy Ageing 2021–2030) emphasize creating (Kharlamov & Parry, 2021) age-friendly environments, combating ageism, integrating care, and providing long-term care to support the well-being and participation of older people, while recognizing the diversity of this age group.

The term **AALT** (Aging and Assisted Living Technologies) denotes the range of assistive technologies designed to support older adults and people with disabilities or special needs in daily living, health maintenance, and independence. According to the WHO, assistive technologies include any products or systems that maintain or improve an individual's functioning and independence to promote their well-being (WHO, 2024b). These can range from low-tech aids (e.g., mobility devices like canes or wheelchairs, hearing aids, medication dispensers) to advanced digital systems representing AALT. AALT are characterised by their ability to capture and process user and environmental information in order to allow situationsensitive support of the individual. AALT often leverages smart-home sensors, Internet of Things (IoT) devices, telehealth platforms, wearable monitors, and even robotic or AI-based assistants to help individuals age in place safely and with dignity (Srinivasan & Rajavel, 2025). Such technologies enable older persons and those with disabilities to perform tasks they might otherwise find difficult, thereby rendering impairments less disabling by adapting the environment to their needs (OECD, 2022). For example, home sensor networks can detect falls or health anomalies, medication reminder apps support cognitive limitations, and socially assistive robots might provide companionship or caregiver functions. The primary goal of AALT is to allow people to live healthy, independent, and productive lives for as long as possible, whether in private homes, care facilities, or the workplace (Bastoni et al., 2021). The need for these technologies is immense and growing: over 1 billion people currently need one or more assistive products, and this is expected to exceed 2 billion by 2050 as populations age, yet only about 1 in 10 people in need have access

today (UNICEF & WHO, 2023). Recognizing this, international policy frameworks (e.g., the WHO's Global Cooperation on Assistive Technology (GATE) (WHO, 2025c; World Health Organisation [WHO], 2018) and the UN Convention on the Rights of Persons with Disabilities (United Nations Department of Economic and Social Affairs, 2006) call for urgent action to expand access to assistive products as a component of universal health coverage.

In this context, our foresight workshop explored three plausible future pathways for AALT by the year 2035, focusing on distinct domains: long-term care facilities, private home care, and workplace integration for people with special needs.

In three workshops, AALT and aging was investigated using a systemic approach with the help of a STEEP VL framework. The thematic focus lies on the relevance and impact of AALT both from a demography angle as well as from a technological innovation lens. The main goal of the workshops was to identify and describe the overarching effects on society as a whole, in the context of research and innovation policy. For this sake, it convened international research and policy experts from the field of gerontology, social care work, high tech engineering and business<sup>1</sup>. Each future pathway was examined using a Futures Wheel exercise, brainstorming first-order effects of the assumed change, then second- and third-order consequences. The Futures Wheel method, developed by Jerome Glenn in the 1970s, is suitable for identifying potential future events and consequences and for visualising complex relationships in subject areas characterised by a high degree of uncertainty. Systematic brainstorming is used to anticipate direct and indirect consequences in successive rounds and to identify possible outcomes. This circular logic allows linear thought processes to be deliberately interrupted and alternative future developments to be uncovered. The result of the Futures Wheel is a 'mental map' that visualises cause-and-effect relationships and summarises consequences (Glenn, 2009).

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<sup>1</sup> Please refer to the last chapter of this report for a full list of contributing experts.





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For each of the contexts the workshop moderators defined assumptions, grounded in observable trends and plausible trajectories of the development and spread of AALT. These assumptions, which each describe a possible future, functioned as a starting point for the brainstorming of effects. The following sections present each pathway's assumption and a narrative of the futures wheel results, followed by a brief discussion of how these results align with current research and policy discussions on AALT and ageing.



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### 3 AALT as Standard in Long-Term Care Settings

**The first group considered a future in which AALT has become the standard in long-term care institutions.** This pathway reflects current pressures on institutional care, including workforce shortages, cost constraints, and the rising complexity of patient needs. In such a context, technological systems are expected to supplement or replace traditional forms of care, enabling more efficient and personalized support and policymakers and experts have argued that technology can be part of the solution to this challenge: for instance, investing in robotics, automation, and digital care software can improve care processes and reduce the physical strain on caregivers, helping offset the human resource gap (Lutze et al., 2021). By 2035, we imagine these technologies are no longer niche pilots but mainstream features of elder care. This includes smart sensors throughout facilities, routine use of telehealth consultations, assistive robots for lifting or social interaction, AI systems assisting in monitoring residents' health, and digital platforms coordinating care tasks.

#### 3.1 Futures Wheel Results

*Immediate effects (first-order)* of making AALT standard in long-term-care (LTC) settings in 2035 the workshop group describes a future where digitalization has reshaped institutional care structures. The immediate effect is an increase in the availability of data, enabling more precise and personalized care decisions. This digital shift allows services to move beyond the walls of institutions, supporting forms of remote rehabilitation and hybrid care delivery. Participants envisioned that care staff in 2035 works seamlessly with technology: day-to-day activities like monitoring residents' vital signs, preventing falls, or assisting with mobility are heavily augmented by devices. For example, wearable health monitors and in-room sensors continuously track residents' health metrics and activities, automatically alerting nurses to potential issues (such as fall risks or abnormal vital signs). Care quality improves as issues are detected and addressed earlier, and interventions

become more proactive. Additionally, many labour-intensive tasks (lifting residents, distributing medications, documentation, etc.) are partially automated or eased by specialized tools. This directly reduces physical strain and stress for caregivers, addressing a major challenge in today's LTC workforce. Workshop participants discuss that nurses and care aides in 2035 spend less time on routine paperwork or rounds – since digital systems chart health data and robots handle deliveries such as food or medication – and more time on interpersonal aspects of care. The transparency that comes with it is however also critically discussed and an alternative future path could lead to more monitoring of caregiver's action and corresponding data work and ethical issues concerning responsibility and accountability in human-computer-interaction. Another first-order outcome of AALT use in LTC settings is enhanced safety and autonomy for residents. With AALT pervasively installed, an implication might be that elderly residents can move about with fewer risks: for instance, sensor networks and AI fall-detection systems immediately summon help when needed (some facilities even use soft humanoid robots to accompany those with dementia on walks). Residents with cognitive impairments have personalized assistive apps or companion robots that help guide them through daily routines, providing a greater sense of independence. Furthermore, family members experience greater peace of mind knowing that their loved ones are under high-tech, continuous supervision. At the same time, workshop participants also imagined this pathway coming with potential downfalls for the residents and staff alike in terms of privacy. The standardization of these technologies also implies that in 2035, costs are lower compared to early adoption days, making it financially more feasible for most care homes to use them and many facilities start to see cost savings due to efficiency gains (e.g., reduced emergency hospitalizations thanks to early detection by monitoring systems). More technology and data available also enable a more diverse set of business models, and while participants discuss the risk of monopolies being created, they also highlight a need for more public and private partnerships and new forms of governance of digitally enabled care. With assistive living technologies enabled care the group envisions care structures and institutionalized care pathways to change

and be more flexible, with a shift towards care at home settings. At the same time, risk management is imagined to be more complicated as digitalisation and connected devices increase, threats for cybersecurity and critical infrastructures increase.

*Secondary effects (second-order)* emerge as these immediate changes ripple outward. They include the acceleration of technological development and the emergence of personalized service offerings. Yet, with greater complexity comes a higher risk of fatal consequences when systems fail. Cross-sectoral collaboration becomes essential, with hospitals, primary care providers, and social services needing to align their goals and information systems. There is also a notable shift in how responsibility is distributed across stakeholders, including caregivers, institutions, and technology providers.

Another notable consequence is a transformation of the LTC workforce, professional roles and workflows. With AALT handling many routine tasks, the skills demanded of care workers shift: by 2035 there is high demand for workers who are not only empathetic caregivers but also tech-savvy “care technologists” capable of operating, maintaining, and interpreting data from AALT systems. This has led to new training programs and career paths (e.g. elder-care technology specialists). Some traditional roles are redefined or reduced – for instance, fewer entry-level care aides might be needed for tasks like nightly bed checks or lifting, since robots and sensors assist with these. However, new roles are created in managing the technology infrastructure and analysing the health data streams to inform care plans. Another second-order effect is on care standards and regulation. The care system itself is more diversified, as new actors—from technology firms to service integrators—enter the care ecosystem. Next to a shift in (professional) roles, this diversification leads to a decentralization of governance in the institution but also in the care system in general, requiring new skills and responsibilities among caregivers, institutional staff and other stakeholders. Governments and accreditation bodies respond to this tech-centric care model by developing rigorous standards for safety, data privacy, and effectiveness of AALT in institutions. Workshop participants highlight that this governance transformation involves both formal mechanisms (such as legal frameworks, quality





standards, and regulatory oversight) and informal or network-based governance structures, such as partnerships between care providers and tech companies or platform-based service coordination. Inspection and licensing of LTC facilities in 2035 include criteria for technology use and cybersecurity, ensuring that resident data is protected and that systems are reliable. There is also a financial implication: while long-term costs may drop, the upfront investment in technology is significant. Moreover, the widespread adoption of AALT spurs a robust market and innovation ecosystem. By 2035, a competitive industry of assistive technology providers for LTC has matured – companies offer integrated “smart care” solutions, and continuous innovation yields newer devices (e.g., more adept social robots, AI predictive analytics for care risks) that further enhance care. Facilities frequently upgrade their tech to remain competitive in attracting clients, much like hospitals adopting the latest equipment.

*The tertiary effects (third-order)* highlighted by the group’s futures wheel analysis delve into broader societal and systemic impacts by 2035. One such impact is a redefinition of what quality elder care means in society. With technology so embedded, the public’s expectations of care quality now include having state-of-the-art AALT – families might feel a facility is substandard if, say, it lacks fall-detection floor sensors or AI-driven health monitoring. This could widen disparities at a global level: developed countries and well-funded urban facilities lead in tech-enabled care, whereas some rural or under-resourced settings (or low-income countries) struggle to meet the new standard, raising equity concerns. There is also an ethical and human touch dimension. By 2035, society has engaged in debates about the balance between automation and human contact in elder care. While participants acknowledge that routine tasks can efficiently met by robots, they also worry about potential loss of human interaction for residents. In one future pathway imagined, ethical guidelines will have been developed to ensure technology augments rather than replaces genuine human caregiving. Another third-order effect is the integration of LTC tech with broader health systems and smart cities. For example, it is imagined, that data from nursing homes flows into health records; if an elderly resident is transferred to hospital, their months of



mobility and vital sign data collected by the care facility's system accompany them, enabling smoother, more personalized patient journeys. On a systemic level, this transformation leads to the development of housing models tailored to individuals' long-term needs. The effectiveness of care becomes more measurable, contributing to the rise of value-based care approaches that emphasize outcomes and efficiency.

### 3.2 Discussion

The workshop's vision of tech-enabled long-term care aligns closely with current scientific and policy discussions on ageing and care innovation. Researchers have noted that new technologies – especially robotics and AI – could greatly enhance productivity and quality in the LTC sector, provided they are used to assist rather than replace caregivers (OECD, 2025a). In the workshop a key aspect discussed was the relief of informal carers and professional care staff as automation could take over routine tasks and create time savings. This echoes findings in recent OECD reports, which highlight how digital tools and automation can streamline administrative tasks and reduce the physical demands on staff, freeing up more time for direct care (OECD, 2025b). However, it was also discussed that care will always remain a fundamentally relationship-based field. Technology may support care processes and shift workloads but cannot replace the emotional and social dimensions of caregiving. Ethicists and gerontologists have warned about over-reliance on automation potentially leading to social isolation; accordingly, strategies for ethical integration of robotics in care (keeping the “human touch”) are being actively explored in research and guidelines. Further ethical aspects discussed in this narrative mirror anticipated challenges around data privacy, ethics, and inequality, which are common themes in policy debates. For example, ensuring privacy and data security in aged care technology is a known concern that can hinder implementation if not managed (OECD, 2024).

In recent discussions it is noticed that this technology centered future points will likely require an organizational transformation in which not only



technologies but also new cooperation models and clearly distributed responsibilities between professionals, relatives, and technology providers gain relevance. The emergence of new professional roles was emphasized in the workshop, including digital care coordinators who interpret data from AALT systems and use it to guide care decisions. The emphasis on worker training and new roles is supported by literature calling for upskilling the care workforce to effectively utilize technology (since lack of digital skills among care workers is currently a barrier to adoption) (OECD, 2024). Moreover, it is questionable whether broad user acceptance can be achieved through usability and upskilling alone—financial and cultural aspects will also play a decisive role.

Policy analysts in the EU have similarly argued that investing in assistive robots and smart care infrastructure is crucial to address Europe's looming care gap as the population ages (Breuer & Müller, 2024). However, it also needs to be noticed that currently the reality of reimbursement and financing of technological innovation in the LTC sector remains a challenge, especially in Germany.

Finally, the vision of the future's wheel of linking LTC data with health systems resonates with the broader push for integrated care in ageing societies. The pathways discussed in the workshop and the discussions in the field underscore that AALT cannot be treated in isolation. Instead, it must be understood as part of a broader digital transformation of the health and care ecosystem. This includes issues such as interoperability, legal frameworks, digital literacy, and intersectoral coordination. Only if these enabling conditions are met can AALT realize its full potential for quality of life, autonomy, and system sustainability.

Overall, this group's results extend ongoing discussions by fleshing out a more concrete picture of a high-tech care future and while the narratives were quite optimistic about quality and efficiency gains, discussions were still cognizant of the policy frameworks and cultural shifts needed to ensure technology truly serves the well-being of older adults.



## 4 AALT Common in Home Settings

**The second group explored the pathway of AALT being widespread in home settings by 2035.** The assumption is that AALT has become ubiquitous in aging-in-place and home care contexts – not just in institutions. This reflects a continuation of the strong preference among older people to “age in place,” i.e. remain living in their own homes for as long as possible rather than move to residential facilities (Wiles et al., 2012). By 2035, advances in smart home technology, telemedicine, and user-friendly assistive devices have made home care tech both affordable and easy to use, leading to widespread adoption. Thus, our 2035 sees a typical home of an elderly person outfitted with an array of assistive tech: ambient sensors (e.g., monitoring movement, air quality, and appliance use), wearable health trackers, smart appliances with safety overrides, AI companions for social interaction, and connectivity that links the individual to caregivers or medical professionals on-demand.

### 4.1 Futures Wheel Results

A first immediate implication of the assumption at hand is that individuals remain in their homes longer. This implies new housing dynamics—such as overhousing and underutilized residential space—as well as a strong demand for flexible AALT solutions that can adapt easily to any type of home setting. Participants described a 2035 where a senior living alone can confidently do so because their home is a “smart home” tuned to their needs. Independent living is greatly enhanced: everyday activities are supported by technology in subtle ways, extending the period seniors can manage on their own. This, in turn, can create a sense of empowerment, safety, and relief for both older adults and their caregivers. For example, smart home systems automatically adjust lighting and reduce hazards (like shutting off a stove if it’s left unattended), addressing physical and cognitive limitations without requiring constant human oversight. Health status is continuously tracked, tailored to individual needs – wearable devices monitor heart rate, blood pressure, glucose levels, etc., and share these with healthcare providers. If any anomaly or sign of

trouble occurs (say an irregular heart rhythm or a missed dose of medication), an alert is sent to a family member or tele-nurse. The immediate outcome is that medical issues get caught early, often preventing emergencies. Falls, a major risk for older adults at home, trigger instant responses now: floor and motion sensors detect a fall and automatically call a caregiver or ambulance, drastically reducing “long-lie” times.

At the same time, the group recognized the emergence of stark inequities. While some may benefit from access to advanced technologies, others may face exclusion due to cost, connectivity, or digital literacy. This increases the need for inclusive social policies and programs supporting both formal and informal caregivers.

Another direct consequence of the initial assumption is the reduced burden and stress on family caregivers. Many older individuals in 2035 have family members who check on them remotely using AALT interfaces. For instance, an adult daughter can verify her father’s daily activity through an app (seeing that he opened the fridge in the morning, took his medicine as confirmed by a smart pill dispenser, and hasn’t triggered any alarm) – this remote reassurance means she does not have to be physically present as often, relieving caregiver stress. Additionally, social connectivity and mental stimulation for home-based elders improve in this tech-rich imagined future. Video calling and virtual assistant devices are standard; even those without tech savvy can simply speak a command to call a relative or join a virtual senior center activity. Some participants imagined AI-driven companion robots or voice assistants engaging seniors in conversation, reminding them to stay active or guiding them through exercises, thereby combating loneliness and cognitive decline.

However, at the same time, social isolation and loneliness become more prominent risks, potentially leading to a rise in mental health issues among the elderly. Some group members discussed that those developments prompt investment in proactive mental health care and broader programs supporting adaptation to longevity, while others highlight that this might extend the





burden of the care system, acknowledging that preventing loneliness is a broader societal challenge. Technological progress in this domain results in a proliferation of new care settings, roles and interdisciplinary jobs, blurring the lines between healthcare, technology, and social work. Educational and training systems respond by developing new curricula. Ultimately, this trajectory leads to a landscape in which formal and informal care are supported by open-access interoperable platforms. A wide variety of accessible solutions foster ongoing innovation. The cost of care decreases, while the efficiency and personalization of services increase. Simultaneously, the value of care work rises, with increased recognition of these roles. Moving to *second-order effects*, the widespread use of AALT in private settings begins to reshape healthcare and community support systems. One consequence is a significant reduction in premature or undesired institutionalization. Because more seniors can live safely at home longer, nursing homes and hospitals see fewer admissions of people who only need low-to-moderate assistance. Long-term care facilities in 2035 may increasingly be reserved for those with very high care needs, while the average elder can delay or avoid entry into such facilities. This eases pressure on overburdened institutional care systems and potentially yields cost savings for both families and public health programs. Healthcare delivery also evolves, a shift toward preventative care and technology supported independent living is anticipated, reducing the burden on acute care services and improving the well-being of informal caregivers, particularly women. With routine vital data streaming from homes, the role of telehealth and virtual home visits grows. Clinics and doctors now rely on telemonitoring dashboards; healthcare providers perform virtual check-ins, only dispatching community nurses or suggesting clinic visits when data indicates a need. This data-driven preventive and proactive care at home improves health outcomes (e.g., better chronic disease management, as problems are flagged early). However, participants noted that such dependence on data and remote monitoring raises concerns about privacy and consent.

Thus, a further secondary effect, is the mandatory institution of robust data governance policies—by the early 2030s, many countries roll out regulations



clarifying who can access an elder's health and activity data and ensuring that informed consent and cybersecurity measures are in place, given the sensitivity of monitoring someone's private life.

Another second-order outcome is market expansion and new services: with AALT common in homes, new businesses and services flourish to support it. For instance, "Home Tech Support for Seniors" services are widespread – professionals who specialize in installing and maintaining assistive tech, as well as training older users. There is also a proliferation of tailored services such as grocery delivery or transportation that integrate with home systems (e.g., a senior can tell their home assistant to order groceries, and an automated service handles it, aware of dietary needs). Economically, a large "silver tech" industry emerges, employing many and focusing design around older adults' preferences. This reflects a shift from earlier decades when many technologies were not user-friendly for elders.

At the *tertiary effect level*, the normalization of home-based assistive technology influences social structures and urban planning as well as the broader culture of ageing. One notable impact is on housing design and urban infrastructure. As it became clear that most people prefer to age in place, new housing and community designs in the 2030s adapt to be "age-friendly" and tech-ready. Many new homes (and retrofitted older ones) feature built-in sensors, step-free entrances, and modular layouts that can accommodate wheelchairs or robot assistants – essentially, smart age-friendly homes became a selling point in real estate. Communities also invested in neighbourhood-wide systems like smart street lighting and accessible transportation knowing that older residents are out and about. With more elders living at home, intergenerational dynamics might also shift: rather than being segregated in retirement communities, older people remain part of ordinary neighbourhoods, which could foster greater intergenerational contact (e.g., seniors mentoring local youth, or exchanging services with neighbours). However, as mentioned above, an increased reliance on technology at home also brings the risk of social isolation if not carefully managed – the group discussed that while tech can connect people virtually, it might inadvertently reduce some in-person interactions (for instance, family

might visit less if they assume “the tech has it covered”). To counter this, many community programs in 2035 deliberately combine technology with human outreach (for example, volunteer organizations use AALT data to identify which seniors haven’t had social contact recently and arrange a friendly visit). Culturally, ageing with the help of technology may become broadly accepted and even expected – there is less stigma for an older person to use, say, a robotic helper or a smart cane, as these tools are as common as smartphones. Finally, a further third-order effect regards public spending and the economy: if home AALT does indeed reduce hospitalizations and care facility usage, governments might redirect funds into further supporting home care tech initiatives. Pension and insurance systems might give discounts to those who utilize approved home monitoring (since it can prevent costly crises). Conversely, the energy and internet infrastructure must be robust – an implicit effect is that by 2035, regions have to upgrade power grids and broadband to ensure that ubiquitous home monitoring devices and emergency systems are always online and reliable, akin to critical infrastructure.

## 4.2 Discussion

The outcomes of this pathway strongly reinforce themes in current ageing and technology discourse, particularly the emphasis on “aging in place” as a desirable goal and the role of technology in achieving it (Forsyth & Molinsky, 2020; Lewis & Buffel, 2020). Studies have consistently found that most older adults prefer to remain in their own homes and communities as they age and that doing so can maintain higher quality of life. The workshop’s discussion about sensor-equipped homes, telehealth integration, and AI assistants corresponds with ongoing developments in AgeTech (European Commission). IoT-based home monitoring, smart medication systems, and ambient assisted living (AAL) bear the potential to support independent living and reduce caregiver burden. However, the pathway also highlights barriers and enablers that mirror real-world observations. For example, the adoption of home assistive tech can be limited by design mismatches and low digital literacy among seniors. While user-friendly design is essential, additional elements are

required for widespread uptake: training for family carers and professionals, participatory design approaches involving end-users, and transparent communication. By envisioning co-designed, user-friendly systems in 2035, this future pathway aligns with what gerontechnology experts call for – involving older adults in technology design and providing digital skills training to increase acceptance (HOMeAGE, 2023). However, broad user acceptance and adoption can not be achieved through usability alone and integration into daily life will depend on structural factors, too. Issues of reimbursement will likely be a challenge to overcome as initial investments into AALT are often prohibitive, especially for low-wage and pensioner households.

The pathway's second-order effects, such as reduced entry into nursing homes and the expansion of telehealth, are supported by policy reports suggesting that technology can delay or prevent institutionalization by managing health needs at home, which in turn alleviates strain on formal care facilities.

Organizations like the WHO and AARP have promoted age-friendly home initiatives and noted that smart home modifications can improve safety and confidence for seniors living alone (e.g. fall prevention, emergency response) (Butler, 2016; WHO, 2025a). Furthermore, the emphasis on data governance and privacy also discussed in this workshop reflects a common caution in literature: as monitoring becomes pervasive, frameworks to protect privacy must evolve in tandem – a point also raised in WHO guidelines on digital health and ethics for older populations (World Health Organisation, 2021).

In summary, this group's future wheel extends current scientific and policy discussions by illustrating a holistic, community-wide adoption of aging-in-place technology. It validates the direction of many aging policies (which favour home care and age-friendly communities) and underscores the importance of ensuring equitable access, human connection, and robust support services alongside technological solutions. The narrative serves as a tangible example of the oft-stated goal: enabling seniors to live independently at home through supportive technology, while safeguarding their rights and well-being. It also highlights how regulatory bodies in all European countries will need to address challenges of AALT integration and financing as well as a reimagination of care structure and processes in order to achieve this future.



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## 5 AALT Integrated in the Workplace for Persons with Special Needs

The third group engaged with the pathway that, by 2035, AALT will be successfully integrated into the workplace to support individuals with special needs. This future responds to several converging trends. First, many countries are facing ageing workforces as the population ages – by the mid-2030s, a large portion of the workforce is in the 50+ or 60+ range due to later retirement and demographic change. Keeping these older workers employed has economic benefits and is often necessary to counter labour shortages. Second, there has been growing policy emphasis on the rights and inclusion of persons with disabilities in employment. For example, in March 2021, the European Commission continued its long time engagement in this field and adopted the “Strategy for the rights of persons with disabilities 2021-2030” (European Commission: Directorate-General for Employment, Social Affairs and Inclusion, 2021). With this ten-year strategy, the European Commission wants to improve the lives of persons with disabilities in all domains of life putting a strong emphasize on social and economic partizipation. In this context it has to be taken into account that technological progress in the 2020s has produced a variety of assistive tools (many powered by AI) that can be applied in work settings – for example, AI-driven software that converts speech to text for hearing-impaired workers, exoskeletons that help workers with mobility impairments, or specialized apps that support neurodiverse individuals in task management. By 2035, the assumption is that these technologies are not rare add-ons but are standard features of the work environment considering the general progress in the digitalisation of work.

### 5.1 Futures Wheel Results

In this third pathway, the group discussed the extent to which the integration of AALT enables people with somatic or cognitive limitations to participate more fully in professional life (*first order effects*). Drawing from the assumption at hand many of the assistive features can be built into the standard work



infrastructure. For example, all computers and communication platforms have adaptive software by default: voice recognition and text-to-speech are ubiquitous, enabling employees with visual impairments to interact with systems and those with mobility issues to dictate commands. Meetings in 2035 routinely utilize AI transcription and translation, displaying real-time captions and sign-language avatar interpretation so that deaf or hard-of-hearing employees are fully included (even for spontaneous hallway conversations, people might wear AR glasses that project captions). Physical workplaces have also undergone changes: offices are equipped with things like motorized adjustable desks, robotic arms or exoskeleton suits for lifting tasks, and smart building features that guide visually impaired staff through audio cues or haptic feedback in floor tiles. An immediate outcome is that employees with disabilities or age-related limitations can perform tasks with far greater ease and independence. A worker who uses a wheelchair, for instance, navigates an office where doors open automatically and high shelves are accessible via robotic retrieval devices. A programmer with low vision can code using auditory feedback and enlarged, high-contrast displays. In manufacturing or logistics jobs, exoskeletons and ergonomic robots assist workers in heavy lifting or repetitive tasks, reducing injuries and fatigue, which benefits everyone, not just those with known disabilities. However, it may also place new pressures to take a job on individuals who are unwell or fatigued. As a prominent *second-order effect*, the reliance on advanced technologies gives rise to both opportunities and vulnerabilities. New insurance models and regulatory frameworks are needed to manage the emerging risks, data privacy and socio-technical oversight become central, leading to stronger monitoring and regulation. The participants noted that a higher dependency on technology also comes with a growing emphasis on technological sovereignty—developing domestic infrastructures that reduce reliance on large global tech firms.

Another critical *second-order effect* is the reorganization of work processes and increased employment and retention of people with special needs, an expansion of the work life, accompanied by a diversification of skills and training. Because workplaces are accommodating by default, more individuals

with disabilities (including those who might acquire disabilities with age) either remain in the workforce or join it, whereas in past decades they might have been unemployed or forced into early retirement. For example, an experienced employee in her 60s with arthritis can keep working effectively because voice-recognition and ergonomic tools adjust her workload. A young adult with autism finds a job in a supportive environment where noise-cancelling headphones and structured task apps are provided to help them focus. The unemployment gap between people with disabilities and others has narrowed, as initial adoption of these measures already showed that many could work if given the right tools. Companies also see benefits in diversity and talent retention – they are less likely to lose skilled workers when a health issue arises (say, an injury or impairment) because technology allows those workers to continue in their role with modifications. Over time, the working life of individuals is extended, enabling knowledge retention and reducing the costs of health and social systems.

Looking at *third-order effects*, the long-term, systemic changes from pervasive workplace AALT include a reframed understanding of work, ability, and ageing in society. One projected impact is the erosion of the traditional retirement age and more flexible career trajectories. As technology allows people to work effectively even with age-related impairments and special needs, many might choose to continue working into later life on their own terms (perhaps part-time or in consultancy roles). The concept of a fixed retirement age becomes more fluid, with policies adjusting to support lifelong learning and mid/late-life career changes. This can alleviate some economic pressures of an ageing population (more people contributing taxes longer) but also requires adaptations in pension systems. Another impact is on social equity and empowerment: seeing people with diverse abilities thriving at all levels in workplaces (including leadership positions) can change public perceptions about disability.<sup>2</sup> The Futures Wheel outcomes suggest a possible virtuous cycle: successful inclusion stories reduce stigma, which leads to further opportunities and demand for inclusion. By 2035, a generation of youth who

<sup>2</sup> The latest 'Trump effect', which is causing diversity efforts to grind to a halt in many companies, must be considered. However, it is not yet clear whether this is a long-term backlash or a temporary phenomenon.

grew up with accessible tech do not regard it as “special” – they take for granted that, say, a colleague who is blind uses a screen reader or a manager with a hearing impairment leads meetings with adaptive tech support. This normalisation might encourage more people with impairments and special needs to pursue higher education and ambitious careers, knowing the workplaces of the future are welcoming. In this future, labor laws may mandate accessibility tech provision as part of occupational safety and health requirements, and government employment programs possibly subsidize small businesses to acquire assistive technologies so that inclusion is not only for large corporations. Some workshop members also considered potential negative aspects: for example, if AI and automation become integral to inclusion, there is a dependency on technology that could be problematic if systems fail or are not updated. There is also the matter of ensuring *all* workplaces adopt these measures, not just selected ones – by 2035, if some sectors lag behind (say, a small factory that hasn’t invested in exoskeletons), it could create a new divide for workers with needs. As people can stay longer in workplaces, also unemployment of young people might increase. However, overall the trajectory was seen as positive: with AALT integration, employment rates among people with disabilities have significantly increased compared to a decade ago, and the economy benefits from a more diverse workforce. Society benefits too, from the contributions and talents of people who previously might have been excluded.

## 5.2 Discussion

The scenario’s vision of inclusive, tech-empowered workplaces is strongly supported by contemporary research and aligns with global policy goals regarding disability inclusion and ageing. A key principle reflected here is that assistive technology can render any impairment or functional limitation less disabling by making environments more accommodating (OECD, 2022). This notion, drawn from social models of disability, is exactly what the scenario plays out in the workplace context: rather than expecting the worker to adapt or be excluded, the environment (through technology) adapts to the worker.

Scientific studies suggest that, beyond the general and progressive implementation of 'good work', often only minor changes in the workplace or in work processes are needed to successfully integrate people with disabilities and bring their qualities and skills to bear. Such a change can be achieved, for example, by dividing a work step into two simpler individual processes in order to reduce complexity (Aichner, 2021). Current analyses on disability and work echo this, noting that accommodating workplaces – often *via* assistive devices or software – are a major enabler for persons with disabilities to obtain and retain jobs (OECD, 2022).

Digitalisation therefore means more than just the use of a technical system; it also involves the redesign and restructuring of work processes and structures, which can generally lead to greater freedom in the way work is performed. The removal of spatial and temporal boundaries in work creates more scope for individual forms of work performance. Empirical studies have shown that digitalisation does indeed have a positive impact on the inclusion of people with disabilities. In Germany, for example, it has been found that companies that already heavily use digitalisation and the associated potential, such as flexibility and personalisation, are more likely to employ people with physical or cognitive disabilities, impairments and special needs than companies without this digitalisation orientation (Metzler & Werner, 2017). According to the same source, around 30 percent of all companies see new opportunities for employing people with disabilities as a result of digitalisation. The potential for inclusion is assessed more positively by companies that are already highly digitalised than by companies with no connection to digitalisation.

The first-order effects of improved productivity and higher employment among people with special needs are in line with empirical findings that when barriers are removed, many can perform on par with others (Aichner, 2021). For instance, providing screen readers or adapted tools yields immediate performance gains for blind or physically disabled employees. Many of these tools, like real-time captioning or AI-driven accessibility features, are emerging in today's software. In business practice, compensation systems are used for the loss or absence of sensory perceptions, and there are a variety of input aids for computers and other technical systems. In addition, there are systems for





worker guidance (pick by light, etc.) and for checking that tasks are performed correctly. In the area of cognitive support, the provision of activity-related (additional) information reduces the feeling of being overwhelmed and thus stress; depending on the level of support, functional support is primarily aimed at reaction, thinking, memory and reasoning skills. AALT are characterised by their ability to adapt individually to each employee and thus provide exactly the level of support that is necessary according to their employment history (range and level of individual abilities and skills) and current psychosocial situation ('daily form'). This distinguishes digital and AI-based AALT significantly from barrier-free workplaces with special keyboards, large screens, text-to-speech programmes, etc., and goes far beyond them. The workshop's expectation of attitude shifts and a more inclusive culture corresponds to the broader anti-discrimination and inclusion training movements in organizations; indeed, as assistive tech becomes common, it helps normalize disability in the workplace, which researchers argue is crucial to reducing stigma. The results complement European policies like the Commission's "Disability employment package" to support Member States in ensuring that persons with disabilities enjoy social inclusion and economic autonomy through employment. In this context, the European Economic and Social Committee (EESC) stresses the need to accelerate the better integration of people with disabilities and people with altered working capacity – typically older workers with and without impairments acquired in the course of their working and life biographies (EESC President, 2024). The Employment Package is particularly important to ensure that the green and digital transitions are fair and inclusive, and include people with disabilities. The acceleration of digital transformation and the clean industry transition offer opportunities to meet the employment needs of people with disabilities, impairments and special needs. The use of information and communication technologies (ICT), artificial intelligence and robotics to design on-site and remote services adapted to the needs of this group can create new employment opportunities Disability (European Commission: Directorate-General for Employment, Social Affairs and Inclusion, 2022).





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The participant's Futures Wheel outcomes align with those policy goals and recommendations and show the potential pay-off by 2035: a larger, more diverse workforce and improved livelihoods for people with disabilities or special needs. It also touches on known challenges: for example, the need for digital skills and training (employees and employers must learn to use new tech) and the risk of unequal implementation: "People with disability face persisting difficulties in the labour market. There are concerns that AI, if managed poorly, could further exacerbate these challenges. Yet, AI also has the potential to create more inclusive and accommodating environments and might help remove some of the barriers faced by people with disability in the labour market" (Touzet, 2023). In summary, the Futures Wheel extends current policy discussions by providing a concrete, positive picture of what a tech-inclusive workplace could look like. It reinforces the idea that fulfilling the rights of persons with disabilities and adapting to an aging workforce is not only a social imperative but can yield economic and cultural benefits – a message that the workshop outcomes vividly confirm.



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## 6 Implications and Conclusion

The foresight workshop results strongly align with—and in some areas extend—the priorities and frameworks set out in current European Union research and innovation (R&I) policy. In particular, the workshop's pathways reinforce the strategic importance of AALT within the EU's broader objectives on demographic change, healthcare transformation, and digital inclusion, as well as the transition to a socially fair and resilient society. The call for smart long-term care institutions and robust home-based AALT solutions aligns with Horizon Europe's emphasis on integrated care, AI-enabled health services, and patient-centred design (European Commission, Directorate-General for Research and Innovation). The shift toward value-based care and data-rich LTC environments, as foreseen in Workshop 1, fits with the EU's European Health Data Space (EHDS) initiative, which aims to facilitate safe sharing of health data to improve care and research. However, the workshop also stresses the importance of regulatory safeguards on cybersecurity, privacy, and equity, echoing calls for robust data governance in the EHDS implementation roadmap (EUR-Lex, 2025). Workshop 3 addresses the importance of technological sovereignty, particularly in the context of workplace integration of AALT. This directly connects to themes in Mario Draghi's 2024 report on European competitiveness, which calls for reducing dependence on foreign tech platforms, investing in homegrown digital infrastructure, and building strategic capacity in key technologies such as AI, robotics, and health tech (Draghi, 2024).

There is a clear need for interdisciplinary programs that blend technological development with ethical, social, and behavioural research. Policies should support open, interoperable systems that promote accessibility and equity across care and work environments. Workforce development will be critical—both for professional caregivers and for emerging tech-care hybrid roles. Investment in mental health, cybersecurity, and user-centred design is essential to ensure that AALT solutions are safe, inclusive, and empowering. Finally, governments and institutions must foster collaboration between public

and private sectors to balance innovation with accountability, enabling these technologies to contribute meaningfully to aging societies.

Across all three pathways, a common thread is that Assistive Aging and Living Technologies serve as a catalyst for empowering older adults and people with special needs, while also helping societies cope with demographic shifts. The futures wheel method offered a valuable tool for exploring the ripple effects of AALT adoption, enabling participants to articulate both the promises and the perils of our increasingly digital future.

Whether in a care facility, at home, or in the workplace, the foresight exercises depict a 2035 where technology is deeply integrated in support of ageing and inclusion. These narratives align with prevailing scientific research and international policy goals, yet they also highlight the critical conditions for success. The futures wheels showed that realizing the full potential of AALT involves more than just inventing new gadgets – it requires systemic change, from healthcare policy to labour market practices and cultural attitudes. Importantly, the pathways emphasize that technology should complement human support, not replace it. Ultimately, this report provides strategic foresight into how embracing AALT could lead to higher quality care, greater independence, and inclusive growth in the year 2035, while warning that careful planning is needed to address challenges of equity, privacy, and human connection as we navigate the path to that future.

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## 7 Attachements

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Dassel, Katharina, Dr.	VDI/VDE Innovation + Technik GmbH
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Florez-Revuelta, Francisco	University of Alicante
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## 7.2 Participants Feedback



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# Aging and Assisted Living Technology: Post-Workshop

20 Antworten   03:16 Durchschnittliche Zeit für das Ausfüllen   Aktiv Status

1. Please, confirm you accept our privacy policy aligned with the GDPR, <https://if-institute.org/terms>

yes

20

no

0



2. How satisfied are you with the following aspects of the organisation of the workshop? (1 extremely dissatisfied > 2 dissatisfied > 3 neither satisfied nor dissatisfied > 4 satisfied > 5 extremely satisfied)

1 2 3 4 5

Background materials

Introductory presentations

Instructions how to participate

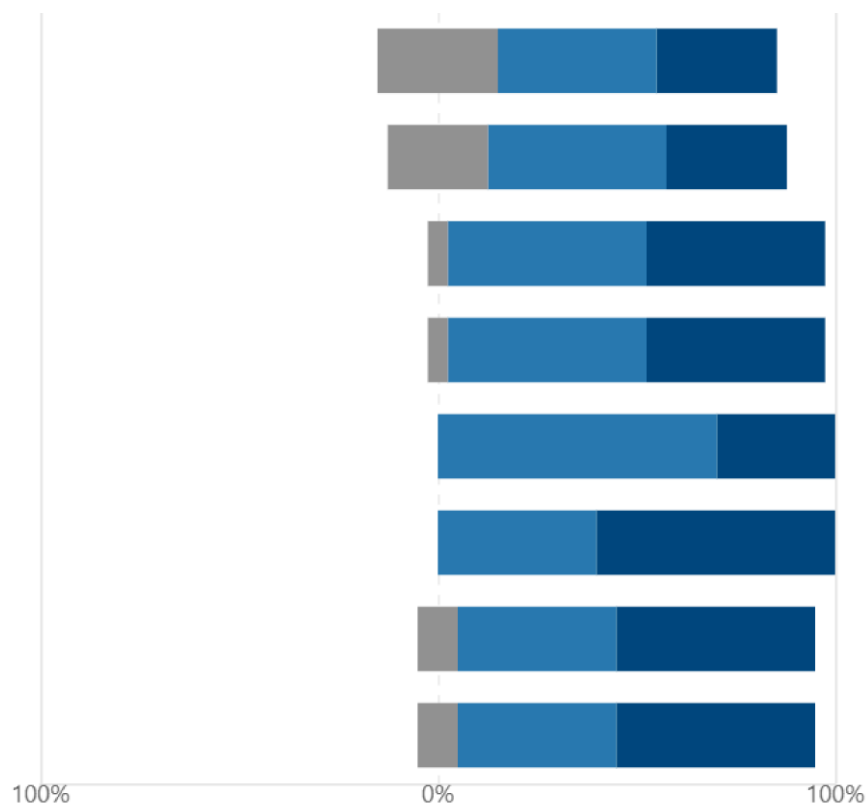
Group work

Wrap up of group work

Facilitation

The workshop, in general

Learning about foresight methods



3. Please, if you wish, comment on your responses above and explain how the workshop could have been improved.

13  
Antworten

Neueste Antworten

"I thought we were coming to consult somehow. My mista...

"The topics long term care and independent living are ver...

"Very successful event"

4. How satisfied are you with following aspects related to the topic and outcomes of the workshop?

■ Very dissatisfied  
 ■ Somewhat dissatisfied  
 ■ Neither satisfied nor dissatisfied  
 ■ Somewhat satisfied  
 ■ Very satisfied

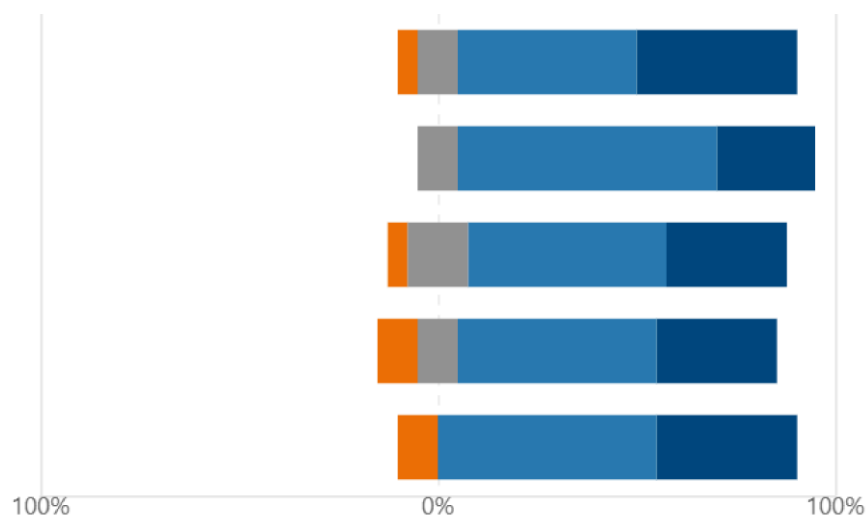
Topic relevance

Scope and coverage

Results, in general

Results for the use of your organisation

New insights for you





5. Please, if you wish, comment your responses above and tell us any new insights you learned.

6

Antworten

Neueste Antworten

*"Indeed I will have this consequences methodology in min..."*

6. Have you registered for the [www.futures4europe.eu](http://www.futures4europe.eu) platform?

<span style="color: blue;">●</span> Yes	1
<span style="color: orange;">●</span> Not yet, but interested	19
<span style="color: green;">●</span> No, not interested	0



7. Please, if you wish, comment your response above and tell us your expectations for the platform.

5

Antworten

Neueste Antworten

*"If its a LinkedIn for our field wonderful!"*

8. Please provide your email address if you would like us to contact you about your feedback.

8

Antworten

Neueste Antworten

*"geja.langerveld@xs4all.nl"**"Rmbond008@gmail.com"*