

Panel 4. Ageing in the Digital Age: The Technological conundrum and its implications for Active Elders

Convenors:

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Keywords: ageism; elderly; elderly workforce; digital inclusion; technology in healthcare; ageism in technology

In today's rapidly evolving digital landscape, the relationship between technology and the elderly has become a priority in sociology, economics, social psychology, and management research agendas. Digital technologies within the Industry 4.0 framework present both opportunities and challenges for an ageing population and workforce. Understanding how older adults interact with technology's affordances and constraints, how they benefit from or are impacted by its materiality, and how they socially construct it requires fresh perspectives and new empirical evidence.

On the one hand, advanced technologies offer numerous benefits to older adults and senior workers (enhanced health, improved quality of life, and greater independence). On the other hand, the ageing process can create barriers to technology adoption (limited digital literacy, economic constraints, and age-related cognitive or physical limitations). The shift towards the industry 5.0 paradigm, with the advent of cutting-edge technologies like AI and collaborative robots, introduces new complexities, tensions, and challenges in both personal and professional domains. These developments increase the interactive role of individuals, making it even more essential to consider how ageing populations engage with technology. Addressing ageism in technology design and implementation is crucial for ensuring equitable access and usability for aging populations for several reasons. Firstly, the digital divide can exacerbate social isolation and reduce access to essential services for individuals lacking adequate technological skills or resources. Secondly, while digital technologies can support and empower older workers and help them to remain active in the workforce through greater flexibility in time and space, they can also create barriers, particularly due to the rapid pace of technological change, which often requires continuous adaptation, upskilling, and re-skilling of an ageing workforce. Thirdly, the successful integration of technology into elderly care – through telemedicine, wearable health devices, and assistive technologies— holds the potential to improve health outcomes, extend working life, and foster greater and longer independence for older adults.

The panel will contribute to the STS debate by addressing critical questions surrounding the intersection of technoscience and societal well-being, particularly in the context of aging populations. It directly engages with the ethical and epistemological challenges raised by "good" technoscientific practices based on justice, inclusion and equitable access, by questioning how technological development can either empower or marginalize older adults and workers. The panel also questions how industry 5.0 and technologies reshape human-technology relations and emphasizes the transformative potential and ethical risks of integrating cutting-edge technologies, such as AI and collaborative robotics, into the lives of ageing populations by addressing their socio-material implications for older workers and looking for age-centered designed strategies that benefit society at large.

We welcome theoretical insights, empirical research, and case studies particularly in the following areas: Digital Inclusion and the Elderly; Technology and Elderly workforce; Technology in Healthcare and Assisted Living; Age-centered designed smart territories and cities; Social Media and Ageing; and Ethical Considerations and Ageism in Technology. Interdisciplinary approaches and international comparisons are highly encouraged.

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ID 218 - Do older workers benefit from telework? An investigation of the effects on job insecurity and work-life balance

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The COVID-19 pandemic has accelerated the adoption of telework, reshaping traditional work models and employee routines globally (Eurofound, 2020). Alongside this shift, the proportion of older workers in Europe has risen from 26% in 2009 to 34% in 2022 (Eurostat, 2023), emphasizing the need to assess how older employees adapt to telework compared to younger ones. Despite this demographic change, research on telework's impact on the aging workforce and work-life balance (WLB) remains limited (Scheibe et al., 2024; Hamouch & Parent-Lamarche, 2023).

Telework research showed mixed results regarding WLB. Some studies highlight positive impacts, such as via autonomy (Metselaar et al., 2023), while others report negative effects, e.g. via employees' difficulties in disconnecting from work (Felstead & Henseke, 2017). COVID-19 research has corroborated these inconsistencies, pointing to moderating factors like sex, boundary management, and telework frequency (Elbaz, Richards & Provost Savard, 2023).

Focusing on older workers, this study investigates the mediating role of job insecurity in the relationship between telework and WLB. Job insecurity is categorized as quantitative (concerns about job loss) and qualitative (perceptions of reduced job quality and career stagnation) (Hellgren et al., 1999). Drawing on Conservation of Resources (COR) Theory (Hobfoll, 1989), we propose that job insecurity undermines WLB by depleting resources like energy and psychological well-being, leading to stress.

Using data from the 2021 European Working Conditions telephone Survey (EWCS 2021), we applied regression models and mediation analysis. Preliminary results suggest that telework positively impacts the WLB of older workers engaged in partial or hybrid telework but shows no significant effect for those in full telework arrangements. While telework reduces older workers' perceptions of career-related qualitative job insecurity, this effect diminishes with increased telework intensity. Both quantitative and qualitative job insecurity negatively impact older teleworkers' WLB. Contrary to expectations, neither job autonomy nor financial security mitigates the detrimental effects of job insecurity on WLB for older workers, unlike for younger age groups.

Our findings reveal that age-based differences exist in teleworking experiences. Older workers benefit from telework in reducing perceptions of job insecurity but not in improving WLB. Furthermore, their resources—such as autonomy, social support, and financial stability—appear insufficient to counteract the negative effects of job insecurity on WLB. These results highlight the complexity of telework's impact on an aging workforce and underscore the need for age-sensitive telework policies to address the unique challenges faced by older workers.

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11 JUNE 2025 14.30 - 16.30

SESSION 1

ID 197 - 'Someone makes videos and gets the money for it' - Agency of Older TikTokers in Digital Capitalism

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Keywords: digital capitalism, ageing, TikTok, visual-verbal video analysis

The capitalist operation of this day and age has been described in various forms by the literature. Platform capitalism (Srnicek 2017), surveillance capitalism (Zuboff 2019), techno-feudalism (Durand 2021), digital capitalism (Pogátsa 2024) and digital colonialism (Meijias and Couldry 2024) are concepts that describe the phenomenon of how the extensive spread of the internet, starting in the 1990s, has opened new markets for the capitalist operation. Although each concept underlines different aspects of the operation, they agree that those big tech companies are the biggest winners of this change that can determine the workings of the markets and customer behaviour. What opportunities does the individual have in this system? What options are open for those not the primary target group of this operation because of their age? Is it possible to win on an individual level in this setting? What dynamics describe the scope of the individuals, businesses, and big tech companies on a platform still mainly used by younger people?

In this research, we applied the Visual-Verbal Video Analysis Method to analyse the content of older TikTokers. Our results showed two ways to utilise the platform on the individual level. On the one hand, by displaying an existing product, service or brand. The TikToker can appear in an expert role based on their age, which grants credibility to their position. On the contrary, the popularity of personal accounts has grown so much that they have begun to provide income, and related services and product distribution have become profitable. Businesses also discovered the potential to reach the older TikTokers. We found examples of users becoming the faces of MLM systems to build their customer groups and share their good experiences with the advertised product. However, some profiles cannot be linked to individual users: an actress plays the role of an older woman, and the product is barely unperceivable.

What is the role of age in each case? How prominent is the display and stereotyping of age, and what conclusions can be drawn from this? Is the target audience of these videos the older age group, aiming at (creating) the 'grey market'? Or, on the contrary, do these videos try to appeal to the younger age groups, and by (over)emphasising the grandparental roles, they try to create a bond? And finally, is it worth it for the older TikTokers?

11 JUNE 2025 14.30 - 16.30

SESSION 1

ID 446 - Digital Divide and Risk of Social Exclusion Among the Elderly: A Case Study from an Inner Area of Campania Region in Italy

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Keywords: Ageism, Elderly, Digital Exclusion, Active Aging Policies

Various studies suggest that the population aged 65 and over is particularly vulnerable to digital exclusion and faces a higher risk of isolation in contexts where technology is increasingly prevalent in public services and daily life. One study specifically investigates the so-called grey divide, a gap among seniors aged 65 and older, whereby Internet usage is heavily imbalanced within this age group. This research suggests the need for greater emphasis on analyzing digital support services.

From this perspective, within the framework of the "Digital by Default: Older People, Digital Public Services and Risks of Social Exclusion" project – sector SH7, funded by the Ministry of University and Research (MUR) under the National Recovery and Resilience Plan (NRRP) – Mission 4 "Education and Research" – Component C2 – Investment 1.1, "Fund for the National Research Program and Projects of Significant Na-



tional Interest (PRIN),” a study has been initiated to describe the digital support system in two Italian regions, Lombardy and Campania, beginning with the “Network of Digital Facilitation Services.”

This paper documents the initial findings of the research launched specifically in the Campania region, particularly in inner areas – those areas characterized by significant distance from major service centers. It presents digital facilitation experiences for individuals over 65, aimed at mitigating the risk of social exclusion, focusing on a specific project implemented in the Province of Caserta that involved several municipalities in the inner areas. The paper examines experiences that may have significant implications for defining policies supporting active aging, as suggested by the World Health Organization's strategy for active and healthy aging.

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11 JUNE 2025 14.30 - 16.30 SESSION 1

ID 692 - Fostering Social Connection in Aging Populations: A Cross-Sectional and Experimental Study on Virtual Reality Interventions.

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Keywords: Older Adults, Virtual Reality, Loneliness, Artificial Intelligence

Older adults often experience social, physical, and psychological deprivation, significantly impacting their well-being. Among these challenges, social isolation is particularly concerning, as it frequently leads to persistent loneliness, which has been associated to cognitive impairment, depression, and poor psychological health. This study assesses the prevalence of loneliness, depression, and social isolation among adults aged 60 and older in Córdoba while identifying individuals at high risk and evaluating the effectiveness of virtual reality (VR) together with artificial intelligence (AI) as an intervention tool.

The study follows a cross-sectional, prospective, and experimental design, organized in two phases. The first phase involved an observational cross-sectional study, in which a self-designed survey was distributed across public locations in Córdoba, yielding a randomly selected sample of 244 participants. The second phase comprised an experimental intervention involving a control group (n=31) and a VR intervention group (n=31). In December (2024), workshops titled “Technology and Health” were conducted at active participation centers and associations to foster social engagement, cognitive stimulation, and emotional well-being through VR. The gender distribution in this phase was predominantly female, with only one in seven participants being men. All the VR experiences presented during the workshops were designed to create immersive environments that reduce loneliness and encourage social interaction.



To assess the intervention's effectiveness, two validated tools were used: the UCLA Loneliness Scale for perceived loneliness and the Yesavage Geriatric Depression Scale for depressive symptoms. Low-risk participants completed a survey after their first workshop and a follow-up three months later, while high-risk participants, scoring above seven on the UCLA Scale, underwent intensive telephone follow-ups every 7 to 15 days.

The sample represented a diverse socioeconomic background, with annual incomes ranging from €17,000 to €32,000. Most participants were married or widowed, and over 55% were women. Age, gender, marital status, social connections, and socioeconomic background were significantly associated with social isolation and psychological distress ($p < 0.05$). The study revealed high loneliness and depression rates, with lower-income participants reporting greater isolation. Women constituted the majority in both phases.

The VR intervention group showed a significant understanding and usability of technology, particularly AI, with 96.3% reporting extreme satisfaction (5/5 on the Likert scale), 100% recommending the experience, 70.4% rating it extremely educational (10/10), and 74.1% reporting high learning outcomes (10/10). The experimental group, especially those with telephone follow-ups, reported reductions in loneliness and depressive symptoms compared to the control group, highlighting VR's role in improving social and emotional well-being. However, one high-risk participant tragically engaged in self-harm after the workshop, underscoring the severity of loneliness-related distress and the need for immediate intervention and support.

By identifying individuals at risk of unwanted loneliness and evaluating VR-based interventions, this study provides valuable insights into combating social isolation among older adults. The findings suggest that VR and AI can effectively reduce loneliness and improve well-being. Future research should explore the long-term effects of such interventions and develop targeted support systems for high-risk individuals. The results highlight the urgent need for structured intervention programs to enhance the mental health and quality of life of aging populations.

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SESSION 1

ID 586 - Gamifying Aging: Digital Inclusion, Informal Labor, and Ethical Dilemmas in Chinese Older Adults' Use of Money-Earning Apps

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Keywords: older adults, China, gamified application, money, digital inclusion

As digital platforms become more and more integrated into financial and social life, older adults are often seen as passive users or digitally excluded populations. However, their engagement with gamified money-earning apps in China presents a different narrative—one where older adults actively navigate and participate in the digital economy.

This empirical study, based on participant observation and interviews in five Shanghai communities (2023–2024), examines how older adults (aged 60 and above) use money-earning apps (such as Alipay, Pinduoduo) that provide monetary rewards or free goods through gamified and social activities such as mini-games, video watching, friend referrals, and even physical exercise. These apps are not merely sources of entertainment; they become deeply embedded in older adults' daily routines, fulfilling multiple needs including time-passing, financial gain, and social interaction. Through everyday use, older adults redefine intimate relationships, expand social networks, and position themselves as active participants in the digital economy.

Beyond individual engagement, gamified money-earning apps serve as a gateway to digital inclusion. By participating in these platforms, older adults gradually develop digital skills and become more comfortable navigating online financial tools. At the same time, these apps blur the line between leisure, financial participation, and informal digital labor, embedding older adults into new forms of micro-work through daily tasks, rewards systems, and social networking incentives. This study critically examines the role of gamification in shaping digital labor and economic agency in later life, shedding light on both its opportunities and challenges.



However, this integration of older adults into gamified digital economies also raises ethical concerns. While these apps empower senior users by promoting digital literacy and financial inclusion, they also expose them to manipulative design strategies, such as digital nudging. Many older adults spend significant time completing tasks or making unplanned purchases to earn small money rewards, raising questions about the line between engagement and potential exploitation. This duality underscores the need for age-centered design strategies that prioritize fairness, accessibility, and ethical engagement, aligning with Industry 5.0's vision for human-technology relations.

The Chinese context offers a distinctive lens for understanding these dynamics. The widespread adoption of digital infrastructures such as WeChat and Alipay, and the seamless integration of mobile payment systems into everyday life, create an environment where older adults are increasingly drawn into digital financial participation. This socio-material conditions in China provide a unique framework for understanding the role of technology in later life.

Ultimately, this research contributes to broader discussions on aging, technology, and societal well-being by advocating for inclusive and ethical digital design that truly empowers older adults. It calls for interdisciplinary and international comparisons to develop age-friendly digital strategies that serve broader social good. By centering the Chinese case, this study not only expands global discussions in Science and Technology Studies (STS) but also supplement Western-centric perspectives on digital inclusion, aging, and economic participation in later life.



ID 397 - Swedish Cohousing and Assisted Living Technology: What Benefits to Healthy Ageing

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Keywords: ageing population, assisted living technology, co-housing, healthy ageing, digital inclusion

Purpose. The starting point of this research is the definition of adequate housing for the elderly, particularly regarding the new model of intentional community for the second half of life (Choi, 2004; Sandstedt & Westin, 2015; Sargisson, 2014; Saunders, 2016). Drawing from the ecological model and environmental gerontology, the present research adds Nussbaum's capability approach perspective to the life environment in "relation with individual's ability to convert (it) into valuable outcomes" (Bronfenbrenner, 1977; Nussbaum, 1997; 2003; 2011). In particular, the paper will analyse potential implications between assisted living technology and the specific housing model addressed to the elderly for fostering opportunities for enabling ageing.

Method. Based on the evidence from the study by Angioni and Musso (2020), a qualitative analysis has been designed, focusing on the Swedish pioneering cases of cohousing (at least ten) which adopt innovative and economically sustainable organizational solutions. Selected cases will be analysed through secondary sources, such as previous studies, reports and documentation available online.

Expected results. The study will reveal recurring aspects which could provide valuable indications not only for the design and management of cohousing facilities, taking in consideration the adoption of specific technology, such as remote surveillance or remote diagnostics, but also for better understanding what kind of advantages, constraints and benefit, the elderly could meet.

Implications. Regardless of the characteristics of the context analysis this study would add some further reflections about cohousing as housing model for healthy ageing, introducing the issue of digital inclusion not only as services and tools present in the housing design but also as services that offer opportunities for a real human development even in the old age. It would provide valuable indications in support of the political interest in better understanding how the cohousing model can be implemented for healthy ageing.

ID 508 - Digital Care Futures: AI Ethics and Social Change in an Aging Society

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Keywords: Personalised Care, AI, Digital, Social Impact, Ethics-by-design, UX, Dementia, Prevention, Active Ageing

The rapid aging of European populations has emerged as a critical societal challenge, prompting increased attention to technological innovation through AI and robotics in elder's care. Their development and deployment demand a balanced view considering ethical implications and broader societal impacts.

The COMFORTage project (www.comfortage.eu) aims to develop holistic and integrated healthcare models to promote personalised dementia and frailty prevention and care through AI-based innovations, digital twins (PDTs), virtual assistive technologies and behavioural change applications, addressing the dual need of care provision and active aging. CyberEthics Lab. strengthens the project's ethical foundation by integrating collaborative R&D practices with systematic AI ethics assessments and complemented by the evaluation of the social impact and acceptability of the proposed technology solutions. This aspect focuses on societal dimensions and includes a technology usability and user experience evaluation, by Fundació



INTRAS, to capture clinical outcomes and patient experience.

The shift toward decentralised, technology-assisted healthcare presents opportunities to improve medical outcomes through enhanced early diagnosis, accessibility and elder's engagement in their healthcare journey, enabling remote examinations, virtual consultations and home-based care. The project's pilot studies explore two main areas: the research on risk factors, vulnerabilities, and neuromechanics, along with the personalisation of interventions; the analysis of supportive systems, assisted living technologies, robotics, home sensing, mobile health, and AI-driven data analysis. These efforts aim to enhance independence for older adults while maintaining high standards of care. This transformation introduces critical ethical considerations throughout development and implementation.

An ethics-by-design methodology (ETHAI) addresses fundamental values within AI systems through co-design practices, examining how principles like transparency and fairness can be embedded in technical specifications from early development stages, ensuring AI systems respect user autonomy and privacy at their core. Simultaneously, social impact analysis examines how these values manifest differently when technologies enter real-world contexts, revealing how concepts like autonomy and privacy transform when filtered through social relationships, institutional structures, and cultural norms. Furthermore, Patient-Reported Outcome and Patient-Reported Experience Measures will allow technological interventions adjustments based on user needs.

This approach reveals how technical and social dimensions interact. Economic barriers and digital literacy gaps affect not only access to technology but also shape how ethics principles like non-discrimination and autonomy manifest in practice. Where AI ethics might address algorithmic fairness in decision-making systems, the social impact analysis reveals how these systems may affect social dimensions. For example, healthcare organisations prioritising automation for economic efficiency, may transform both clinical relationships and care delivery. Professionals may find their clinical decision-making authority constrained, while patients could experience a shift away from human-centred care interactions. This may have consequences on accountability regimes, professional judgment and patients' trust.

Ensuring that technological advancement enhances active ageing while preserving essential human relationships in care delivery, poses the need of addressing both technical and social dimensions of innovation.

11 JUNE 2025 17.00 - 19.00

SESSION 2

ID 514 - Automation of Everyday Life in an Ageing Society: Lessons from a case study on Self-Cashier Machines in Japan

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Keywords: demographic change, everyday automation, Social Practice Theory, self-checkout machines, Japan

As ageing societies worldwide face pressing challenges related to workforce shortages, digital inclusion, and technological adaptation, Japan has emerged as a pioneer in the integration of everyday automation technologies in the light of Society 5.0, such as self-chashier machines. Widely implemented across Japanese retail spaces, self-cashier machines represent a microcosm of broader societal and policy debates on the role of technology in an ageing society. While these technologies promise efficiency and convenience, they also raise concerns regarding accessibility, digital literacy, and social isolation, particularly for older adults. The transition from human cashiers to automated systems is thus not merely a technological shift but also a social one, with implications for everyday interactions and community engagement.

This project examines how different generations in Japan engage with self-chashier machines, how manufacturers of these machines navigate technological implementation in light of demographic shifts, and how policymakers balance the needs of older versus younger generations when introducing new technologies. Based on a series of group interviews with users across different generations, as well as expert interviews with industry representatives, and policymakers, this study explores the socio-material implications of automation in an ageing society.



To analyze these dynamics, this research is grounded in Social Practice Theory, which provides a valuable lens for understanding how technological adoption is embedded in everyday routines, social norms, and material infrastructures. Social Practice Theory moves beyond individual attitudes toward technology and instead examines how practices evolve through the interplay of material objects (self-checkout machines), competencies (digital literacy and adaptation), and meaning (efficiency vs. social interaction). This framework is particularly useful for exploring the generational divide in technology use, policy dilemmas surrounding digital inclusion, and the broader implications of automation in ageing societies. By focusing on practices rather than isolated behaviors or examining solely the technology, Social Practice Theory helps to illuminate how self-checkout machines are not only tools of convenience but also transformative elements shaping the social fabric of everyday life.

Examining Japan as a case study for large-scale everyday automation in an ageing society, this study provides a foundation for policymakers, industry players, and scholars to rethink the social dimensions of everyday technology in a rapidly changing demographic landscape. As Japan faces the critical challenge of balancing intergenerational digital equity and economic pragmatism, this tension is also increasingly relevant to other ageing societies in Europe, which must similarly navigate the intersection of automatization, demographic change, and social needs.

11 JUNE 2025 17.00 - 19.00 SESSION 2

ID 545 - Designing for Aging: Exploring Technology, Proximity, and Care for Inclusive Communities

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Keywords: Aging-Friendly Communities, Social Inclusion, Enabling Technology, Smart cities

According to the World Health Organization (2019), every person should have the opportunity to live a long and healthy life. WHO defines healthy aging as the process of developing and maintaining the functional ability that enables well-being in older age (WHO, 2019). From this perspective, living in environments that support and maintain one's intrinsic capacity and functional ability is key to healthy aging.

Numerous studies agree on the importance of social relationships and social engagement for longevity (Streeter et al., 2022). Those who are part of not only family relationships but also social networks not only feel better but are also better off (IRCCS - Istituto Neurologico Carlo Besta, 2021). The optimum conditions for aging-friendly communities are created at the intersection between individual and environmental pathways (Scharlach, 2016).

In this perspective, a new dimension of care is emerging—not limited to healthcare or individual approaches, private or institutionalized—but as a new existential and social paradigm (The Care Collective, 2020). This paradigm is based on interdependence between people, solidary and egalitarian networks, the practice of mutual support, and the sharing of resources and opportunities. Building communities nurtured by mutual care means constructing processes that technology can foster, trigger, innovate, and even expand.

At a time when the global population is urbanizing and aging in an unprecedented way (UN World Population Prospects, 2024), cities can either exacerbate loneliness and segregation for older people or, conversely, serve as ideal environments for developing innovative, open, and inclusive social networks (Beard & Petitot, 2010). While technological solutions in urban areas support older populations medically and promote their in-home autonomy, how could they also help generate the cornerstones of a caring community?

They could do so first by multiplying informal mutual support opportunities, fostering their expansion, and structuring them into more organized systems. Technologies can also enhance the expansion of communal public spaces and the sharing of resources (Yeandle et al., 2023), ultimately enabling localized forms of democracy and even scaling them upwards.



To address these issues, this paper will analyze a series of case studies focusing on technology, proximity, care, and aging. These case studies will be evaluated using a positioning matrix to identify four main design opportunity scenarios. Through this analysis, the paper aims to provide actionable insights into creating aging-friendly communities that leverage technology to foster mutual care and social inclusion while enhancing the quality of life for older adults in urban environments.

Ultimately, this research seeks to contribute to the discourse on aging, technology, and community design, offering a pathway toward more inclusive and supportive urban ecosystems.

11 JUNE 2025 17.00 - 19.00 SESSION 2

ID 852 - Regulatory and Ethical Considerations of Designing Inclusive Phygital Spaces for Elder Care

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Keywords: speculative design, aging technology, phygital spaces, elderly, ethics

Previous research in Science and Technology Studies has highlighted the growing gap between technological development and policy-making (Berardi et al., 2024; Hameed et al., 2024), particularly regarding technologies for aging populations. While scholars have examined technology adoption among older adults (Berkowsky, Sharit, & Czaja, 2018; Gambo et al., 2023) and the adequacy of technology to aging in place (Braun and Schultz, 2022; Marshall, et al., 2022) less attention has been paid to participatory approaches in designing future phygital spaces - environments where physical and digital realities converge through technologies like smart glasses. These technologies raise critical questions regarding human rights and values, such as privacy, autonomy, freedom, equality, control, and sociability in public spaces.

Our research employs a speculative design methodology to investigate how emerging phygital technologies impact four key interaction types: person-to-person, person-to-space, person-to-reality, Person-to-Platform Interactions (P2P, P2S, P2R, P2PL). Building on Pink's (2022) conceptualization of futures as experiential and contingent rather than predetermined, we developed a participatory board game as our primary research tool. This game facilitates structured interactions between multiple stakeholders - elderly individuals, families, caretakers, technologists, policymakers, and designers - through role-play scenarios addressing ethical challenges in technology adoption.

This case study introduces a newly developed design-driven research methodology that combines multiple approaches to ensure ethical and comprehensive data collection and analysis. First, we conduct participatory design workshops using our custom-developed board game, which introduces participants to near-future fictional scenarios where they must navigate complex trade-offs of technology adoption. Second, we employ the Voros Futures Cone framework to analyze possible, plausible, preferable, and preposterous futures, moving beyond binary techno-utopian or apocalyptic visions. Third, we conduct stakeholder interviews and feedback sessions to gather qualitative data about participants' experiences and insights about the integration of advanced technologies in elder care (be it care robots, agentic AI, or immersive technologies). Finally, we perform a comparative analysis of emerging policy frameworks to contextualize our findings within current regulatory landscapes.

Our results reveal several key findings that contribute to both theoretical understanding and practical application. First, the game-based approach successfully bridges communication gaps between stakeholders, enabling more nuanced discussions about privacy, autonomy, and sociability in phygital spaces. Second, we identified specific friction points between different stakeholders' needs and values, particularly regarding surveillance and agency for elderly individuals and their caretakers. Third, our methodology effectively exposes blind spots in current policy approaches to aging technology, highlighting areas where regulatory frameworks need adjustment to address emerging challenges in phygital spaces.

These findings contribute to STS discourse by extending Pink and Salazar's (2017) work on anthropologies



of the future into the domain of aging technologies. Our research demonstrates how speculative design can serve as a practical tool for democratic technology governance, while also advancing theoretical understanding of how futures are "made, tamed, and transformed" in the context of aging populations and phygital spaces. This approach enables us to consider not only technologies and innovation narratives but also the diverse needs and perceptions of older people, leading to more inclusive and equitable digital futures.

11 JUNE 2025 17.00 - 19.00 SESSION 2

ID 282 - City 4.0 and demographic aging: Strategies and innovations for sustainable urban welfare

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Demographic aging represents one of the most pressing challenges for contemporary cities, necessitating a profound transformation of urban welfare policies (Castel, 2011; 2019). The emergence of "City 4.0" - smart, connected, and sustainable cities - offers opportunities to address the complex needs of an evolving population. This study aims to explore the relationship between demographic aging and the development of smart cities, analyzing the strategies, innovations, and challenges that may, on the one hand, facilitate the transition toward an inclusive and sustainable urban welfare model while, on the other, reproducing social and territorial inequalities.

Demographic transformation requires a rethinking of traditional urban services to ensure accessibility, security, and well-being for all age groups (Castel, 2021). City 4.0, characterized by the integrated use of advanced technologies such as the Internet of Things (IoT), provides innovative tools for optimizing urban resource management and enhancing quality of life. For instance, smart mobility solutions can ensure accessible and flexible transportation systems for the elderly, while smart devices and telecare services enable health monitoring and promote autonomy among older adults.

It is crucial to emphasize that the urban welfare system of City 4.0 is not limited to technological implementation but necessitates an integrated approach that also considers social, economic, and environmental dimensions. This approach entails the active involvement of the community in the co-design of urban policies, fostering inclusion and participation (Ferraro & Gardini, 2016).

The adoption of smart solutions can also contribute to reducing urban inequalities by ensuring equitable distribution and improved access to services, even in peripheral or less developed areas. However, the digital divide constitutes a significant barrier, particularly for the older segments of the population, who may face exclusion from essential services due to technological, economic, or cognitive limitations.

Moreover, the center-periphery structure (Petrillo, 2006; 2013) introduces additional constraints to the development of City 4.0. Central areas tend to benefit from technological investments and advanced infrastructure, whereas peripheral areas, often characterized by lower population density and economic fragility, risk being neglected. This dynamic may exacerbate territorial disparities, leaving underdeveloped areas deprived of digital services, smart mobility solutions, and access to welfare infrastructure (Sassen, 1991; Harvey, 1998).

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