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Design for Longevity (D4L): Project Your Future Self through Service and Technology

Sheng-Hung Lee
Massachusetts Institute of Technology (MIT) Department of Mechanical Engineering; Massachusetts Institute of Technology (MIT) AgeLab

Joseph F. Coughlin
Massachusetts Institute of Technology (MIT) AgeLab

Sofie Hodara
Northeastern University College of Arts, Media, and Design (CAMD)

Anna Meroni
Politecnico di Milano School of Design

Carla Sedini
Politecnico di Milano School of Design

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Editorial: Design for Longevity (D4L): Project your future self through service and technology

Sheng-Hung Lee[a*], Joseph F. Coughlin[a], Sofie Hodara[b], Anna Meroni[c], and Carla Sedini[c]

[a]Massachusetts Institute of Technology, USA
[b]Northeastern University, USA
[c]Politecnico di Milano School of Design, Italy

*Corresponding e-mail: shdesign@mit.edu

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Abstract: This is an overview editorial of the track "Design for Longevity (D4L): Project Your Future Self Through Service and Technology" at Design Research Society (DRS) 2024. The track chairs presented 13 exceptional papers, carefully chosen from 24 initial submissions. This track is categorized under the three themes—LongevityTech, Longevity-friendly city, and Longevity community—to unify diverse research topics encompassing assistive technology, interface, privacy, urban, data, workspace, social structure, and identity across various design scales and multiple layers of considerations to explore and investigate a comprehensive comprehension of these interrelated fields. The selected papers showcase the diverse ways scholars and practitioners interpret and implement the D4L concept intertwined in various contexts, complex social structures, cultural settings, and socioeconomic issues.

Keywords: Design for Longevity; service design; longevity planning; system

1. Introduction

Amid the advancement of technologies, robust socioeconomic systems, transformational healthcare systems, and sustainable wealth management, people not only live longer but want to live better: with purpose, delight, and respect (Coughlin, 2017). As lifespans extend, the traditional stages of life—learning, earning, and retiring—have transformed into multi-generational stages (Golden, 2022). The demographic shift and social-economical context have inspired and generated the concept of Design for Longevity (D4L), which emphasizes a sustainable life-long cycle (Lee et al., 2023; Ulrich et al., 2020; Sedini et al., 2020; Justice, 2019) where artifacts, services and systems are designed to be accessible and support also late stages of life which are usually and progressively excluded from social and active life.

One key factor to maintaining a better quality of life depends on strategic planning and executing of D4L across a variety of industries and services. Thus, D4L can be seen as a tool to empower designers to make sustainable decisions by keeping longevity in mind (Attia & Gifford, 2023). Table 1 summarizes the themes found in the papers, which consist of case studies, methods, and theories, including place (Meroni & Selloni, 2022), technology (Zakir Abdul Hamid & Suoheimo, 2023), and service (Miettinen, 2017), among others.

Table 1. Potential research topics and applications of D4L integration across various fields

D4L in **Wealth** cultivate design interventions to rethink financial planning and enhance financial literacy for longer lifespans.
D4L in **Health** reimagine healthcare systems that adapt across different life stages.
D4L in **Mobility** cultivate personal or civic solutions to enable mobility and independence for elderly individuals.
D4L in **Place** design and develop policy for living spaces and shared environments that meet elderly needs.
D4L in **Technology** utilize emergent technologies and data for empowering multigenerational societies.
D4L in **Service** design social and civic service system infrastructures for enhancing physical and cognitive wellbeing.

The panel is organized in three main sessions LongevityTech, Longevity-friendly city, and Longevity community, whose descriptions are provided in the following paragraphs according to the selected papers' contributions.

2. LongevityTech: assistive technology, interface, and privacy

How does D4L impact the need for and development of products, wearables, and other technological interventions related to the smart home?

The increase in elderly populations has spurred the need for assistive technologies. While smart homes, health wearables, and apps offer support, their visual design often remains unaddressed. For example, Niu et al. investigated the use of camera-based apps, such as Be My Eyes or Seeing AI, by interviewing 14 visually impaired individuals and identified specific challenges that designers can respond to including integrating opportunities for more social interaction. Results indicated that app acceptance hinges on internal aspects like self-efficacy and emotions, as well as external factors such as learning behavior and attitudes. Mil-

ton et al. documented the design process fo a mobile interface for aging population, LifeTomorrow. The application serves both the elderly and their caregivers and demonstrates visual design considerations that responds to the usability needs of aging populations.

The design and development of assistive technologies are closely related to addressing individuals' vision problems. Hung & Lin investigated the impact of aging on vision, which is crucial for independence and mobility. Their paper identifies opportunities for eyewear designs that improve the daily lives of the elderly and informs the development of visual-assistance products. On another side, smart products and technologies often come with privacy issues. Vaidya et al. examined preferences for data privacy among adults over 50 regarding smart home products and their sustained use. Participants reviewed different privacy policy designs, underscoring the need to embed privacy communication early in the development of smart technologies. Recommendations for privacy communications are discussed to build user trust and support aging-in-place, contributing to a sustainable tech ecosystem.

3. Longevity-friendly city: urban, data, and workspace

How does D4L impact the development of and policy for collective urban experiences, such as housing, workplaces, and spaces of care?

Lee et al. reviewed the term D4L across product lifecycle, financial planning, and gerontology, synthesizing academic sources (n=24) to pay a foundation to envision the longevity-friendly city. In addition, Palmieri et al. advocated for wider-ranging design strategies in services for senior demographic, particularly suggested the design directions for age-friendly urban solutions. Thoring et al discussed the future of workspaces designed for an aging population. They presented a speculative design for a future office environment, anticipating an increase in older employees with cognitive challenges by 2048.

Developing a longevity-friendly city can experimentally incorporate a big data approach. For instance, Lin et al. analyzed Taiwan's aging population using the 2022 Ministry of the Interior database, geospatial techniques, and machine learning, focusing on the distribution of solo elderly and evaluating "Community Care Stations." Key findings show urban aging concentration, dual aging of people and their homes in cities, a pattern of urban single elderly women and suburban men, varied socioeconomic status among solo elderly in metropolitan areas, and service gaps at care stations. Recommendations include policy adjustments for housing and care and optimizing service distribution for "Aging-in-place" in response to Taiwan's anticipated super-aging status by 2025.

4. Longevity community: social structure and identity

How does D4L help designers create products, services, and experiences for meaningful social connection and self-confidence in aging communities?

The success of healthy longevity communities relies on a high rate of literacy in longevity-related knowledge. Lee et al. introduces a new framework to adapt financial education to

longer lifespans and shifting demographics. It presents the Service-Behavior-Engagement (SBE) model to improve financial literacy in early life stages through engaging, multisensory tools, such as the D4L kit featuring interactive elements like planning blocks and cards, promotes playful learning and open dialogue. In addition to the product design level, Branco & Quaresma highlighted the importance of how intelligent communities contribute to elderly social connections, focusing on how technology and social projects in such settings can boost seniors' quality of life and emotional health. For instance, the design of urban spaces may reflect the social structure as it pertains to promoting active aging. Nicholas et al. focused on developing urban spaces conducive to Aging-in-Place and the aim is to create a blueprint for age-friendly urban modifications and transform community spaces creatively.

The increase in global longevity has significant implications for identity within the context of well-being in extended lifespans and quality health spans. For example, Borghi & Selloni demonstrated a case study on sexual wellness in older women, reframing the issue from a marginalized topic to a mainstream concern through service design and the idea of D4L. Shore et al. explored the impacts of menopause and peri-menopause on the stages of life, focusing on women juggling family and career duties. They created and implemented a codesign workshop to support and educate woman about physical and emotional well-being during this time.

5. Conclusion

The Design Research Society (DRS) 2024 track "Design for Longevity (D4L): Project Your Future Self Through Service and Technology" presents D4L as a lens that can empower designers across a variety of industries and services. By analyzing 24 submissions, the track chairs present 13 papers grouped by three main themes: 1) LongevityTech: assistive technology, interface, and privacy; 2) Longevity-friendly city: urban, data, and workspace; and 3) Longevity community: social structure and identity.

Each theme proposes a unique question that the track papers collectively respond to. These questions are, respectively: 1) How does D4L impact the need for and development of products, wearables, and other technological interventions related to the smart home?; 2) How does D4L impact the development of and policy for collective urban experiences, such as housing, workplaces, and spaces of care?; and 3) How does D4L help designers create products, services, and experiences for meaningful social connection and self-confidence in aging communities? For reference, the tracks papers are organized in table 2 by the three main themes and potential D4L research directions. In summary, these papers offer us case studies, methods, theories, and frameworks to help us project our future selves as designers immersed in services and technologies.

Table 2. Track papers (indicated by authors and years) are mapped to the potential D4L research topics, which are intersected by the three D4L track themes. Although some papers may touch upon several research areas, this table is designed to spotlight their primary contribution.

	LongevityTech: assistive technology, interface, and privacy	**Longevity-friendly city:** urban, data, and workspace	**Longevity community:** social structure and identity
D4L in **Wealth**		Lee et al.	Lee et al.
D4L in **Health**	Hung & Lin		Shore et al.
D4L in **Mobility**	Niu et al.		Branco & Quaresma
D4L in **Place**		Thoring et al	Nicholas et al.
D4L in **Technology**	Milton et al.	Lin et al.	
D4L in **Service**	Vaidya et al.	Palmieri et al.	Borghi & Selloni

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About the Authors:

Sheng-Hung Lee is a designer and PhD researcher at Massachusetts Institute of Technology (MIT) AgeLab and Ideation Lab and Board Director at Industrial Designers Society of America (IDSA). He is inspired by multiple domains of knowledge and perspectives while working at IDEO. Lee serves as Adjunct Associate Professor at Shih Chien University, Taiwan.

Joseph Coughlin is Director of the Massachusetts Institute of Technology AgeLab. He teaches in MIT's Department of Urban Studies & Planning and the Sloan School's Advanced Management Program. Coughlin conducts research on the impact of global demographic change and technology trends on consumer behavior and business strategy.

Sofie Hodara is an Assistant Teaching Professor in the College of Arts, Media, and Design at Northeastern University. She holds a BA in Fine Arts from the University of Pennsylvania (Philadelphia, PA) and a MFA in Dynamic Media from Massachusetts College of Art and Design (Boston, MA). Her multimedia work sits at the intersection of the art and design disciplines and integrates traditional and emerging media in service of social critique.

Anna Meroni is is Full Professor in Design and Deputy Dean of the School of Design of Politecnico di Milano. She is co-founder of the DESIS Network Association and honorary member of its International Coordination Committee Her research focus is service and strategic design for sustainability to foster social innovation, participation and placemaking. She has developed a specific expertise in co-design strategies, methods and tools and originated the concept of community-centred design.

Carla Sedini is an Assistant Professor at the Design Department of Politecnico di Milano and PhD in Sociologist. She is a member of the D+S research group at Polimi, where she combines and integrates social research and design. She has been researching and teaching issues related to Territorial Development, Social Innovation, and Quality of Life, with specific attention to fragile populations. She published a book titled “Collectively Designing Social Worlds. History and Potential of Social Innovation”.