

TANGIBILITY

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PURPOSE

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LONGEVITY

COMMUNITY

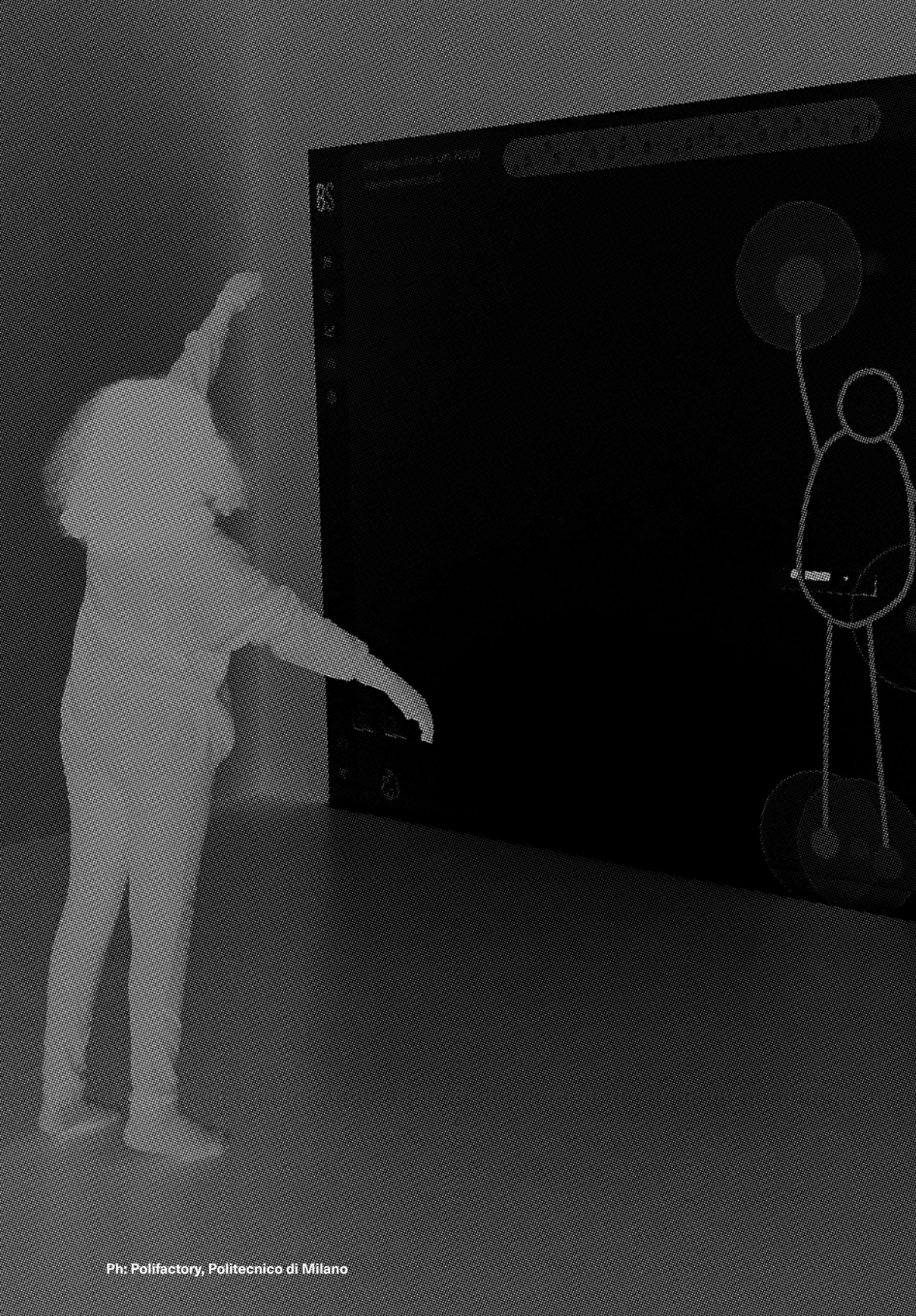
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Cover image
Composition of images
from the project Design for
longevity (Sheng-Hung Lee).

Memory Navigator

Hey there



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Editorial

In this issue of the Journal, the Open Debate section curated by Sheng-Hung Lee and Andreas Sicklinger gathers contributions on the theme of demographics, with particular reference to the opportunities and problems that ageing and longevity bring to design. This may well be the first time in the evolution of *homo sapiens* on Planet Earth that the average age has more than doubled in the space of a century, and that in many long-modernised areas there are now more elderly people than young. The consequences of this context very clearly pervade many of the spheres in which the contemporary designer operates, but it is perhaps even more interesting to explore what sorts of problems this revolution raises in new form.

diid moves forward in its mission to constantly explore change and how it relates to the cultures and practices of design, in its many tangible and intangible, cultural and productive forms and expressions. We are now entering the fourth year of the new edition of the Journal and the number of contributions we receive reward us for the editorial and productive effort it has entailed. I apologise to the Authors for the growing delay in responding to their proposals, the current number of pages and the organisational and qualitative approach that we pursue forces this rhythm upon us. We would especially like to thank the significant and growing number of Reviewers who are the heart and soul of the editing and selection process. We trust that the overall quality that we have achieved (which for us remains just one step upwards in the very long ladder that we must climb) might make them feel pride in the overall expressed result, of which they are a fundamental part.

Flaviano Celaschi
Editor-in-chief

Open Debate

A real challenge for societies, perhaps in the very near future, is dealing with an ageing society. The field of design, with its capacity for a systemic and holistic approach, brings its significant contribution to this discourse by not only examining the impact of the independence demonstrated by the elderly in their environment, as they prolong their autonomous activities and social-cognitive engagement, but also by studying lifestyle approaches for longevity at a much earlier stage in life. Hence, the Open Debate section of this issue introduces the concept of Design for Longevity (D4L), which incorporates comprehensive considerations encompassing family dynamics, housing, community engagement, health, education, investment and risk, and advocates for living the individual's multiple life stages with purpose and respect. The Open Debate section seeks to offer insights from five distinct contributions to provide a deeper understanding of the D4L concept across multiple domains, including education, data privacy, underserved communities, and digital transformation. In light of all this, we present four thought-provoking challenges from contributors with various backgrounds.

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Design for Longevity: People, Process, and Platform

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Abstract

This experimental research study explores the concept of longevity in the context of design. It emphasises the importance of creating meaningful and impactful solutions to complex social-technological challenges posed by an ageing population and the longevity economy. In the context of the *diid* issue, different authors discuss the role and influence of design and the creative process in addressing issues related to longevity, and celebrating people's independence, health, finance, and quality of life through innovative products, processes, places, and platforms. It introduces the concept of Design for Longevity (D4L), which incorporates comprehensive considerations encompassing family dynamics, housing, community engagement, health, education, investment, risk, and advocating for the individual's multiple life stages with purpose and respect. The introductory paper also highlights the contribution of D4L in the ongoing discourse on the social impact of design in fostering community building, social interaction, and engagement among older adults to enhance longevity, literacy, fitness, and well-being.

Keywords

Design for Longevity

Longevity planning

Service system

Third space

We need to learn how to live meaningfully, not just survive, in the era of a longevity economy and to re-frame and solve the complicated, systemic social-technological problems associated with population ageing.
(Lee et al., 2023d)

Design for Longevity

The world's population is getting older and in industrialised Western countries, the number of older people outnumbers younger generations. This has so far led to serious problems in financing these parts of the ageing population who desire to have a meaningful, quality life rather than staying locked up at home. Design plays a crucial role in this context, from the conception of new accessible products to the planning of services, interfaces and many other intangible elements that make up our increasingly digitised world. With the exploration of the "Longevity Economy", Coughlin (2017) points out the collective sum of all economic activity driven by the needs and desires of older adults. He asserts that this market is not limited to traditional senior-focused industries such as healthcare and retirement services, but also includes sectors such as technology, fashion, and entertainment. The longevity economy, according to Coughlin, is fueled by older adults' desire to maintain independence, health, and quality of life well into their later years. The current issue of *diid* uses selected examples to explore the complexity of this topic in the current design discourse, selected by the authors of this introductory essay to establish a discussion around the systemic approach that Life-Centred Design (LCD) strategies need to create.

By elaborating a framework with some of the core elements that make up the living conditions for people to age in the best psychological and physiological conditions, comparing "age" and "longevity," the authors aim to create an overall scenario of the influences underlying the discourse. Ageing is the natural and gradual process of growing old and the physical and functional changes that occur in an organism over time. It is a universal process that occurs in all living organisms, including humans. With ageing, various physiological functions decline and susceptibility to diseases and age-related problems increases. Longevity, on the other hand, refers to the length of an individual's lifespan or the duration of life. In this context it refers to the potential extension of the lifespan of humans. It is influenced throughout the entire lifespan by actors such as genetics, lifestyle, environment and healthcare. While genetics form the basis, the environment as a whole can play a crucial role in influencing the speed and quality of ageing. A healthy lifestyle and minimising exposure to harmful environmental factors can help promote healthy ageing.

Scheme 1: The tangible and intangible differences between Aging and Longevity

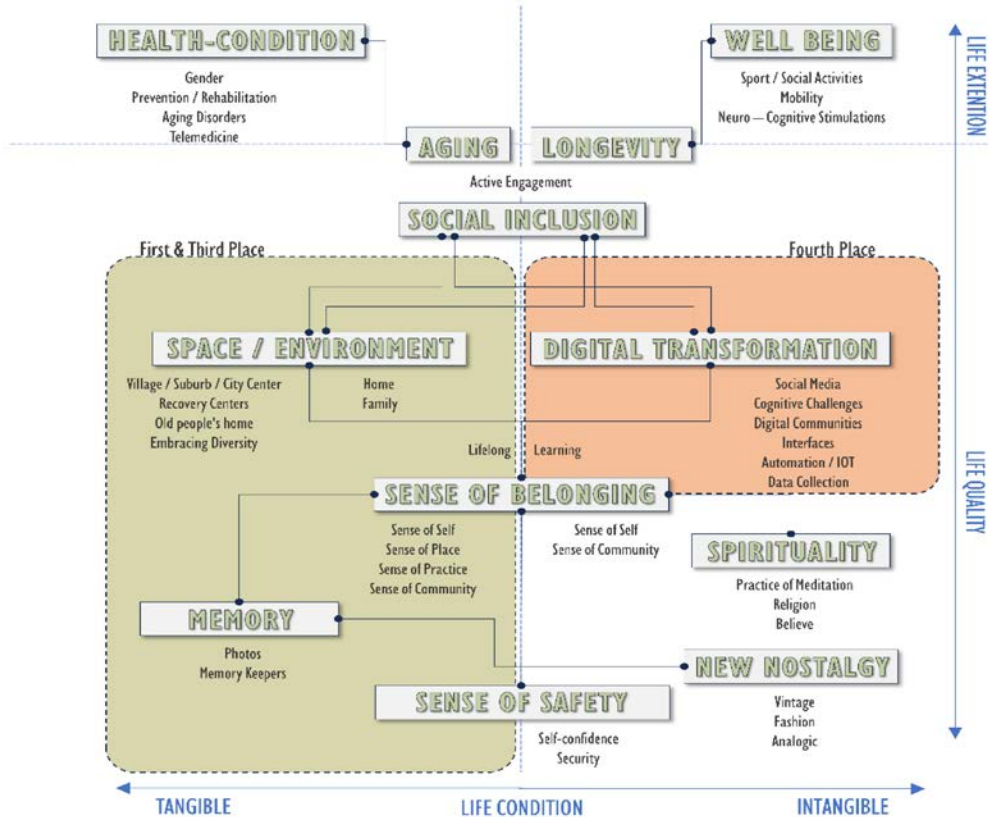


Fig. 1 seeks to illustrate the merging contexts between tangible and intangible life conditions that influence lifelong strategies related to social inclusion, the sense of belonging and sense of safety. These concepts relate to the person in an active and passive way: for example, safety is built up during a lifetime aiming for longevity, while in ageing this safety is considered as the result.

Fig. 1 The tangible and intangible in relation to ageing and longevity.

Third Place and Fourth Place

The rise of longevity economics and services- and experience-driven industries has significantly promoted the concept of Design for Longevity — D4L (Lee et al., 2023a). D4L provides a holistic lens to reframe, comprehend, and solve complex socioeconomic challenges and systems (Lee et al., 2023c; 2023b), incorporating a wide range of considerations such as family dynamics, housing, community engagement, transportation, financial planning, risk management, healthcare, education, and more. Consequently, the adoption and understanding of D4L signify a paradigm shift in how individuals perceive their life journey, moving away from the traditional three-stage model of birth, learning, and retirement to embracing a life composed of multiple stages with purpose and respect. This shift

not only redefines our stages of life but also challenges our conventional views of our surroundings—home, workplace, and so called third place.

The third place theory, proposed by sociologist Ray Oldenburg (1999), refers to places where people spend time in addition to their “first” place (home) and their “second” place (work). When people retire, the “second” place is no longer part of everyday life, which is why the importance of third places enlarges significantly besides the home: they are characterised by the feeling of community, social interaction and the commitment they convey. Traditionally associated with cafes, parks, and other informal gathering places, it is associated with longevity and ageing in the following ways.

- 1 Social inclusion: As people age, maintaining social connections becomes crucial for well-being and longevity. Third places can serve as vital community hubs for older adults, fostering relationships, friendship, and a sense of belonging.
- 2 Active engagement: The Third Place Theory emphasises the importance of active participation and engagement. Creating third places that offer activities for the ageing population, such as book clubs, art workshops, game nights, or exercise groups, can continue to help them stay engaged and maintain their cognitive and physical abilities.
- 3 Lifelong learning: Many third places provide opportunities for informal learning and knowledge sharing. Continued learning can enhance cognitive function, improve quality of life, and potentially promote longevity.
- 4 Sense of self, belonging and purpose: Third places often offer a sense of purpose and community involvement. This can be especially important for Creating third places that encourage volunteering, mentoring, or intergenerational activities can help transitioning into retirement or experiencing changes in their roles and responsibilities.
- 5 Embracing diversity: Third places are known for their inclusivity and ability to bring people from various backgrounds together. By creating third places that are inclusive and cater to diverse needs, older adults can find a sense of connection, reduce ageism, and promote intergenerational interactions, ultimately contributing to healthier ageing.

Overall, longevity regards the entire lifespan of an individual, but especially the last part of life, after retirement, poses greater risk to humans of a faster decline in psychological and physical performance, which leads rapidly to death, as daily activities are constantly reduced.

Today’s environment is primarily a man-made, artificially built environment: it is anthropocene in all its aspects. People move in these physical environments, in the spaces they create, and by doing so, they attribute a personal meaning to the surroundings: the living space remains understood as the first place and home, as Proshansky et al. (1983) quote Relph’s 1976 *Place and Placelessness*: “The home is invariably considered the place with the greatest personal meaning in a person’s life, the central reference point of human existence”. However, the needs of older adults need to be considered as an extended space beyond the four walls of the home. The concept of living is not limited to the private place to which a person retreats

to sleep and eat, but also includes the environment in which s/he lives, consisting of neighbourhood, the streets leading there, weekly markets and supermarkets, the post office and much more.

Proshansky's theory of place-identity highlights the significance of the physical world in shaping our socialisation and self-identity. By understanding how individuals interact with and attach meaning to the places they occupy, we can gain insights into the complexities of human behaviour, social connections, and the ways in which our environment influences our sense of self. This extended space is a vivid integration of physical spaces with their participants and service providers, but is also understood as the digital online communities that expand social interaction.

Scheme 2: How much the different Community Lives are influencing Longevity

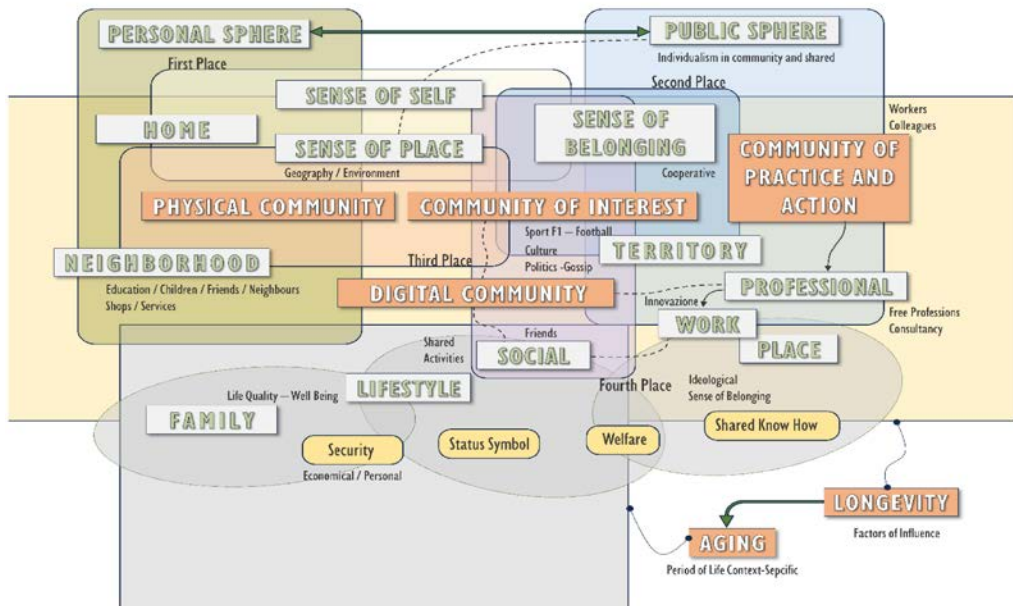


Fig. 2 shows the interaction of self-perception on the one hand, and the aggregations of different kinds of communities that can enhance the quality of life and extend life for elderly people on the other hand, where digital communities offer a wealth of information and resources specifically catering to the needs of the elderly. Through online support groups, forums, and websites, they can access information on healthcare, financial planning, retirement, leisure activities, and more. This access to relevant and reliable information empowers them to make informed decisions, enhance their knowledge, and improve their overall quality of life. They can interact with others, reducing feelings of isolation and loneliness, provide a space for the elderly to seek and offer emotional support.

But within this digital transformation with all its opportunities lies hidden the neglect of a need, which becomes especially important for the elderly: memory. As Flaviano Celaschi (2020) suggests,

Fig. 2 How much the different parts of community life influence longevity.

“on social media, objects exist for the time of their mention, in the dizziness of the list, immediately eclipsed by faces and kittens”. In a digital environment, beloved objects, those classic memory keepers that represent lived experience, change in an insignificant period of time based on a continuous request from the metaverse that constantly stimulates us with new inputs. The memory of our lives is erased with one click.

“The radical changes that new digital tools bring are shortening access times to content and therefore people’s ability to store and organise the knowledge that arises from the flow of information that we consume every day through the media” (Zannoni, 2022). This is how Michele Zannoni analyses our declining ability to store memories: too much visual material to remember and memorise in too short a time. This also illustrates the degree to which memory is related to the physicality of things, right down to the extent of their ability to be recalled in their physical presence in our environment. Physical objects take time to be placed, remembered, and examined. They are tied to the places of our lives. They are part of the sense of place. The memory of physical objects and our Anthropocene spaces represents the world, is shaped by what we have built, and is solidified by anchoring the time of our lives as part of a narrative. This narrative is linked to memory, which in turn is linked to emotions. Therefore, choosing not to renovate the apartment or to reduce the number of items on the sideboard to make cleaning easier is not a form of laziness: objects are memory keepers and emotional anchors for well-being, especially for the elderly.

We can affirm that D4L deals with a complex system of factors that are interrelated in daily life habits and expectations that contribute to the wellbeing and extended life expectancy of people in a continuously transforming environment.

LCD Approach as a Tool for D4L

In this special edition, we have integrated insights from five distinct submissions to deepen our understanding of the D4L concept across multiple domains, including education, data privacy, underserved communities, and digital transformation. In light of this, we present four thought-provoking challenges in this special *diid* issue with contributors across various backgrounds:

- 1 How can we tackle socioeconomic design challenges through the lens of D4L, while also amplifying the impact of creative learning (Resnick, 2017)?
- 2 How can we harness data analytics to conduct a scientific inquiry into the requirements and challenges associated with D4L?
- 3 How might we utilise D4L toolkits and design approaches to empower vulnerable youth in preparing for their future? Through the lens of Gender Equality, the aim of research and experimentation is to highlight the need for social stability from an early age, as this permanently and in the long term influences the well-being of underestimated social groups, such as young girls who need to struggle for their rights. Using participatory design strategy methods, the involvement of the participants showed initial results in promoting D4L principles.

4 How do we increase our longevity literacy, fitness, and well-being on the levels of individuals, communities, and societies? The scholars have found that exploring the specific implications of trust, confidence, and willingness to adopt AI integration in decision-making processes is crucial for the design of financial planning services. The promotion of technology in the living environment as a tool for self-protection and immediate-continuous connection will be a longevity game-changer for future generations.

Moreover, we recognize the multifaceted nature and complexity of these research themes as they intertwine with overall well-being, encompassing financial and health considerations, as well as social connectivity, mobility, educational opportunities, and a range of other influential factors.

Norman (2024) introduces the concept of LCD, which advocates for a comprehensive approach to considering multiple life stages. LCD diverges from Human-Centred Design (IDEO, 2015) by integrating systems thinking, acknowledging the interconnectedness of systems, which share guiding principles similar to those of Human-Centred Systems Design (Lee, 2024). This philosophy is integral to the curriculum at institutions such as the Life-Centered Design School (Spoelstra, 2022) or Stanford University (Burnett & Evans, 2016). As we navigate through a transformative era, the question arises: How can we equip ourselves not only with technical expertise but also with vital soft skills? For instance, these might include enlightened leadership, effective teamwork, creative confidence (Kelley & Kelley, 2013) along with mentorship and communication abilities. However, these complex socioeconomic transformational D4L challenges are only the tip of the iceberg. By incorporating the D4L lens, individuals can gain more comprehensive insights and knowledge about the built environment and mother nature, enhancing our ability to navigate and utilise these spaces effectively and meaningfully: home, workplace, and the third space. D4L advocates for the thoughtful design of our physical surroundings to be inclusive, longevity-friendly, and respectful, while also urging us to cultivate our cognitive space, mental health, and psychological well-being in the context of longevity and LCD.

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Part 1 was written by Andreas Sicklinger, Part 3 by Sheng-Hung Lee, while Part 2 by both Authors.

Sheng-Hung Lee

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Andreas Sicklinger

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Projecting the Future Self: Methodological Approaches in Identity-Centered Design for Sustainable Behavior

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Abstract

Identity-Centered Design facilitates the creation of products and services that align with users' personal and social identities, enhancing user engagement and product longevity. To successfully design for longevity, designers require user research methodologies that accurately forecast the needs of future users. This case study examines the development and application of two specific tools for user research within Identity-Centered Design for Sustainable Behavior, emphasising the importance of understanding the future self and integrating insights from behavioural psychology into sustainable design practices. The first tool, the Eco-Identity Indicator, utilises principles from behavioural psychology to assess dimensions of identity and pro-environmental behaviours. This tool aids in predicting future behaviours and developing products that cater to future user needs. The second tool, a Virtual Reality Time Machine, allows users to visualise and interactively modify projected future scenarios. This approach leverages immersive technology to identify design opportunities to address discrepancies between the projected and ideal future.

Keywords

Human-centered design

Sustainability

Pro-environmental behaviours

Behavioural design

Environmental psychology

Introduction

Design for longevity is simultaneously empirical and speculative. The foundations of successful ageing are verified and universal: maintaining health, functionality, and engagement in life (Rowe & Kahn, 1997; Netuveli & Blane, 2008; Rowe & Kahn, 2015). However, designing for longevity is predicated upon speculation. While designers can evaluate the user's present needs and sociocultural context, we can only form predictions on future needs and contexts.

Designing for longevity is designing for both the present and future users. The future self is a projection of one's self-perception into the future; it is the continuity, not consistency, of personal identity (Parfit, 1971; Hershfield, 2011). Accurately predicting the future self is impossible due to the malleability of personal identity and the unpredictability of the larger sociocultural context.

A lack of precise understanding and tangible representation of the future user diminishes the efficacy of design interventions and adversely affects the user. As illustrated in Temporal Self-Appraisal Theory, an individual's perception of their future self influences their decision-making today (Peetz & Wilson, 2008). An unclear vision of the future self results in inadequate financial and wellness planning, which impacts the individual's future physical, psychological, and social well-being (Ersner-Hershfield et al., 2009a; Ersner-Hershfield et al., 2009b; Urminsky, 2017).

The projected future is shaped by the continuation of present behaviours without design intervention. A significant challenge in design for longevity is bridging the gap between the projected future and the ideal future, where effective design and planning maintain quality of life. This discrepancy often has negative psychological ramifications, as highlighted in Self-Discrepancy Theory, which posits that discrepancies between the projected and ideal selves significantly affect emotions (Higgins, 1987).

Addressing this challenge requires a clear vision of the projected future user. The design process must extend beyond human-centered approaches of empathetic need-finding to understand facets of the user's identity. These facets — both personal and social — predict behaviours that shape the well-being of the future self (Hoyle & Sherrill, 2006).

To design for longevity, I propose adopting and evolving a nascent design framework: Identity-Centered Design. Originally proposed by Dudek and Heiser (2017) and further expanded by Cerini (2022), Identity-Centered Design explores research tools to express, communicate, and curate identities. These tools enable designers to make informed design decisions to serve the various personas and roles individuals identify with across different contexts.

To expand upon the definition of Identity-Centered Design to explore the future self, I will first outline the psychological foundations of this design strategy. Then, I will explore its application in design for sustainable behaviour through two methodologies: identity indicators and immersive technology. With the development and implementation of Identity-Centered Design methods, designers can effectively project and shape the future self to achieve the ideal future in practice.

Psychological Underpinnings of Identity-Centered Design

Understanding the interplay between personal and social identity is central to illuminating the future self. Personal identity is rooted in self-conception and individual attributes, while social identity emerges from affiliations with social groups (Onorato & Turner, 2004).

The Value-Belief-Norm (VBN) Theory posits values, beliefs, and norms are the core components of personal identity (Stern et al., 1999). According to this theory, values shape beliefs; these beliefs then influence one's self-efficacy and subsequently guide behaviour through established norms. Moreover, unifying the Theory of Planned Behavior by Ajzen (1991) with VBN Theory provides a robust framework for understanding how values and beliefs translate into behaviour. This integration is supported by research from Kaiser et al. (2005) and Gkargkavouzi et al. (2019), demonstrating that the interplay of values, beliefs, and social norms influences behavioural intentions and perceived behavioural control. Consequently, the proposed user research strategies in Identity-Centered Design assess personal and social values, beliefs, and norms to determine a user's projected behaviours.

Identity-Centered strategies ensure that design interventions align with and build upon personal and cultural values, beliefs, and norms, enabling design solutions that are more readily embraced and integrated into daily routines. By placing identity at the core of the design process, Identity-Centered Design seeks to create effective, respectful interventions that reflect the diversity of human identities.

Case Study: Identity-Centered Design for Sustainable Behavior

Identity-Centered Design is central to my research process in design for sustainable behaviour. I employ identity-centered user research methodologies to identify user behaviours that exacerbate discrepancies between the projected and ideal future environment. These insights are crucial for crafting design interventions to prevent or redirect behaviours directly linked to environmental degradation.

The objectives of designing sustainable behaviour align closely with those of design for longevity. Longevity and sustainability hinge upon aligning products' actual service life with users' evolving needs and preferences (Carlsson et al., 2021; Jensen et al., 2021). This alignment necessitates designing products for ease of maintenance, durability, and emotional significance, ensuring they remain relevant and valued over time (Hebrok, 2014; Haines-Gadd et al., 2018). The concept of product longevity, therefore, is not static but evolves with the user, emphasising adaptability and emotional connection.

The goal of design for longevity is to sustain a high quality of life across stages of life. Unfortunately, as climate change intensifies, its impact on human longevity becomes increasingly detrimental. In the short term, it manifests through natural disasters that harm communities, causing displacement, financial strain, and emotional distress (Bland et al., 1996; Dass-Brailsford, 2009; Beaglehole et al., 2018). Over the long term, it contributes to gradual changes like sea-level rise, eroding quality of life, and human resilience (Albouy,

2016; Estoque et al., 2019). Furthermore, climate change amplifies existing vulnerabilities, such as economic hardships, by affecting food prices and water availability, exacerbating financial and well-being challenges (Tol, 2018; Lu et al., 2019). Marginalised and ageing populations are disproportionately affected, facing increased health risks and stability disruptions (Yoon, 2012; Singh et al., 2014; Maltz, 2019). Strategic foresight through identity-centered methodology is instrumental in ensuring that designs are effective in the short term and adaptive to future changes.

User Research Method 1: Eco-Identity Indicator

Elucidating the projected future self requires understanding the present self. Identity Indicators are psychometrically validated tools designed to assess various facets of an individual's identity across personal and social dimensions. Notable examples of identity indicators include the Myers-Briggs Type Indicator (MBTI), which categorises personality types based on perceptual preferences and decision-making processes (Myers & McCaulley, 1985). The NEO Personality Inventory (NEO-PI) evaluates the Five-Factor Model of personality: openness, conscientiousness, extraversion, agreeableness, and neuroticism (Costa & McCrae, 1985).

Developing an Identity Indicator for design research involves selecting a variety of tools that accurately capture and analyse the complex facets of users' identities. Indicators include quantitative tools like surveys and scales, validated through pilot testing with diverse user groups to ensure reliability and accuracy.

In my research on design for sustainable behaviour, I have curated an Eco-Identity Indicator by integrating existing paradigms and scales for pro-environmental values, beliefs, norms, and behaviours. Via a user survey, the Eco-Identity Indicator evaluates four critical facets of identity: general environmental concern, specific sectors of ecological concern, behavioural preferences, and behavioural motives. It categorises users' pro-environmental behaviours into nine personas, an expansion upon the six categories defined by Ghazali et al. (2019): activist, educator, green consumer, green eater, green traveller, green passenger, recycler, utility saver, technology advocate. Personas are categorised by preferred mode of engagement Fig. 1.

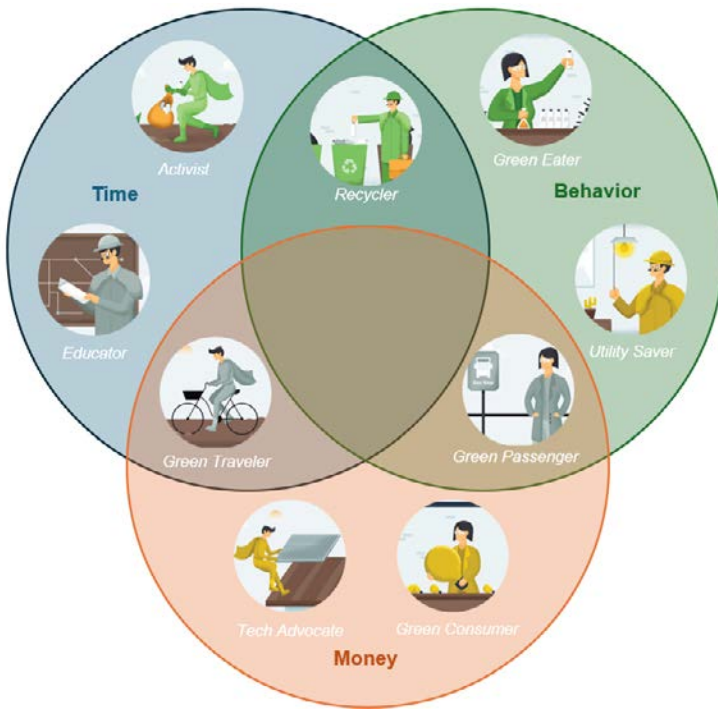


Fig. 1
The nine user personas in the Eco-Identity Indicator are categorised by their preferred mode of pro-environmental engagement: time investment, monetary investment, or behavioural change.

Key components of the Eco-Identity Indicator include scales such as the New Ecological Paradigm (NEP) and the Pro-Environmental Behavior Scale (PEBS). The NEP scale measures the user’s understanding of and concern for anthropogenic impacts (Stern et al., 1995). The PEBS pinpoints users’ pre-existing behaviours in sectors such as conservation, environmental citizenship, food choices, and transportation preferences (Markle, 2013). Furthermore, the Eco-Identity Indicator analyses the egoistic, altruistic, and biospheric values that drive environmental behaviours.

The Eco-Identity Indicator is a predictive mechanism for user’s receptivity to specific design strategies. To illustrate how designers can use the Eco-Identity Indicator to create detailed personas of the future self, we can consider user scenarios:

Suppose the Eco-Identity Indicator identifies a user as a “green consumer” who primarily values biospheric and altruistic motives. Designers can forecast how this persona will adapt to future technological advances that facilitate more sustainable consumption patterns. This projection might include the persona’s receptiveness to innovations like biodegradable materials or energy-efficient technologies, providing designers with actionable insights to tailor products that appeal to the user.

Conversely, a user identified as a “utility saver”, primarily motivated by egoistic values such as cost savings, could be projected to adopt increasingly sophisticated home automation systems that optimise energy use. This persona’s future self might be particularly receptive to new IoT devices that reduce costs and provide real-time feedback on consumption patterns. Designers could focus

on creating more integrated and user-friendly home energy management systems that appeal to this persona's desire for efficiency and financial savings.

Applying the Eco-Identity Indicator to project behavioural paths enables designers to create forward-looking solutions that cater to users' evolving needs. This ensures that the design interventions remain effective and relevant as individuals progress towards their ideal future selves.

User Research Method 2: Virtual Reality Time Machine

Immersive technology, encompassing virtual reality (VR), augmented reality (AR), and mixed reality (MR), offers designers a platform to simulate and visualise long-term consequences. VR enables users to directly experience potential future scenarios influenced by their current lifestyle choices, effectively bridging the gap between abstract environmental issues and personal action (Scurati et al., 2021; Wienrich et al., 2021). This method enhances user engagement and emotional investment by increasing immediacy and tangibility of consequences. For example, VR has successfully motivated real-life recycling and monetary saving behaviours by improving users' ability to visualise and emotionally connect with their future selves (Hershfield et al., 2011; Chirico et al., 2021).

The technical implementation of scenario immersion involves selecting the platform that suits the desired degree of immersion (VR, AR, or MR), the design elements (realistic or symbolic), and the behavioural dimensions (rational, practical, or emotional) (Scurati et al., 2021). For VR, this could involve creating fully immersive 3D environments where users can interact with digital prototypes or future environments. AR could overlay digital information onto the real world to show how a product could function in different settings (Riva et al., 2016; Ayer et al., 2016).

For my research in design for sustainable behaviour, scenario immersion in VR bridges the temporal gap between present actions and future environmental consequences. Collaborating with game designer and developer Supreetha Krishnan, we created a VR Time Machine in Unreal Engine to visualise a user's projected and ideal future environments [Fig. 2](#). This user research tool creates detailed, data-driven scenarios that reflect the potential long-term consequences of various user behaviours. By integrating findings from the Eco-Identity Indicator into the VR Time Machine, the projected scenario mirrors the cumulative effect of the user's behaviours, thereby emphasising the collective impact of individual actions.

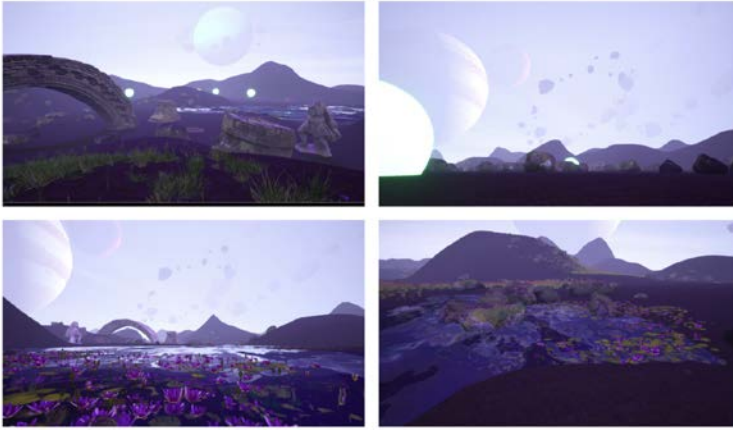


Fig. 2
Visualisations of a projected future in the Virtual Reality Time Machine. Courtesy of Supreetha Krishnan, game developer and designer.

User research in the VR Time Machine is conducted in two phases. The user is immersed in their projected future scenario in the first interaction phase. In the second phase of interaction, the VR Time Machine enables the user to improve upon the projected future by actively designing their ideal future environment. It offers tools that allow modifications such as increasing wildlife presence to mitigate biodiversity loss, incorporating public transit options to reduce transportation emissions, and promoting the use of solar panels for clean-energy transitions.

The VR Time Machine serves as a co-creative design tool, enabling users to shape their future environments through immersive simulations. Comparing the projected future with the user-modified ideal future highlights discrepancies and presents clear opportunities for targeted design interventions.

For example, suppose the VR Time Machine projects an urban environment heavily affected by air pollution due to high vehicle emissions. However, the user's ideal future shows a clean, green urban space. In that case, the gap underscores an apparent demand for sustainable urban transport solutions. In response, designers could focus on developing more efficient public transportation networks or enhancing infrastructure for electric vehicles. The design strategy could include multi-use lanes that promote safe cycling and walking options, effectively reducing reliance on traditional combustion engines.

Additionally, in a scenario where the projected future shows a decline in local biodiversity and green spaces while the user's ideal future includes lush, vibrant community parks and gardens, this gap can direct design strategies toward sustainable urban planning. Designers could explore the creation of bio-corridors, vertical gardens, and community green spaces that enhance biodiversity and improve the quality of urban life. These green infrastructures can serve dual purposes, like managing stormwater and reducing urban heat islands, aligning with broader environmental and social sustainability goals.

Recommendations

The advancement of the Identity-Centered Design framework necessitates developing and refining identity-centered design research tools. Future work should explore advanced tools for effectively assessing users' "future self" by accounting for changes in their sociocultural context and integrating theories from behavioural psychology to predict behavioural shifts. Social Identity Theory by Tajfel and Turner (2004) and Self-Categorization Theory by Turner et al. (1987) propose that group values, beliefs, and norms integrate into personal identity, motivating behaviour congruent with group dynamics (Deschamps and Devos, 1998). Therefore, as groups and contexts evolve, so does personal identity. Designers could use dynamic scenario planning tools to simulate how shifts in economic conditions, cultural trends, or environmental policies might impact user behaviours and preferences. This approach might involve creating adaptable personas that evolve based on emerging sociocultural trends identified through ongoing data collection and analysis.

Enriching Identity-Centered Design with insights from behavioural psychology and developing sophisticated tools that anticipate the evolving nature of the future self will enable designers to create solutions that resonate more deeply with users by aligning with their identity and sociocultural contexts. These solutions will be adaptable to future changes, ensuring longevity and relevance in a rapidly evolving world.

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Navigating AI Integration in Longevity Planning: Design Implications

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Abstract

The increasing integration of Artificial Intelligence (AI) into areas like financial planning has spurred interest in how various demographic groups, notably older adults, perceive and adopt this technology. This paper aims to identify personas and explore how factors like age, gender, and knowledge impact AI acceptance. The data shows varying levels of willingness to adopt AI in finance across demographics. Younger, more educated individuals demonstrate greater trust and usage of AI-enabled financial tools, raising concerns about inclusivity and potential barriers for older or less educated individuals. The paper will delve into these disparities, exploring the underlying reasons for resistance, such as perceived risks or lack of education about AI. To ensure equitable distribution of AI's benefits, we recommend enhancing AI literacy and designing more inclusive AI, as this approach paves the way for a society in which AI empowers all ages with its potential.

Keywords

Aging

Longevity planning

Artificial Intelligence

Finance

Introduction

Artificial Intelligence (AI) has become an integral part of our everyday life (Long et al., 2019). AI is often seen as an add-on service that facilitates convenience and makes daily tasks efficient (e.g., by providing users with personalised recommendations while shopping; Ricci & Smyth, 2002; Soni, 2020) rather than as a transformative force (Nanduri et al., 2020). AI has proven to be a groundbreaking phenomenon (Vaswani et al., 2017) that has already transformed numerous industries, ranging from healthcare to entertainment. For example, in the healthcare sector, it has also been known to help in early diagnosis (Shen et al., 2019) whereas in the financial sector AI is being heavily used in fraud detection.

Yet AI's powers may also extend to helping us live better as we live longer. While good health is a key component of living well in older age, planning effectively for longevity requires a comprehensive approach across multiple dimensions, addressing not only physical health, but also financial security, social connections and connectedness, and caregiving, some of which are often overlooked aspects that contribute to a high quality of life (Coughlin, 2024). Recent studies have shown that AI has a role to play in all of these industries, but AI tools may move rapidly to be more broadly and publicly available in the financial planning space; as such, this piece focuses on AI's potential and public perceptions in this domain, and how designers can navigate and design for people's concerns.

The potential of AI systems to extract insights from vast datasets has resulted in their integration with humans across a range of decision-making fields such as healthcare, business, military, and design (Buch et al., 2018; Patel et al., 2019; Zhang et al., 2021). The extensive inferential and predictive capacities of AI as it works with large datasets, as exemplified in applications such as large language models (LLM) (Radford et al., 2021), offer a distinctive advantage in the domain of financial planning. By analysing vast quantities of financial data and trends (Perry et al., 2023), such models can furnish personalised recommendations that not only align with established financial best practices—widely acknowledged principles or guidelines deemed effective for personal finance management—but also harmonise with individual user preferences. The integration of AI-driven recommendations with econometric models in financial planning yields economically sound budget plans aligned with financial goals, representing a novel approach potentially influencing human behaviour through AI agents, enhancing accessibility and effectiveness (de Zarzà et al., 2024).

Recent surveys indicate that 42% of respondents exhibit a general lack of trust in AI, and 49% of participants were unable to identify any AI product they trust (Dujmovic, 2017). People's self-confidence often tends to play an important role in deciding whether or not to adopt AI suggestions and recommendations (Chong et al., 2022). Given the impacts of trust, confidence, and adoption willingness on the integration of AI into decision-making processes, it becomes crucial to explore the implications for the design of technology-based services. Therefore, the following research questions aim to delve into the intricacies of this intersection:

- RQ1: Do levels of trust, confidence in technology, and willingness to adopt technology have specific implications for the design of technology-based services incorporating AI?
- RQ2: What considerations need to be taken into account as AI is integrated into reimagined financial services aimed at supporting longevity planning?

Method

In this study, data were collected from an online survey conducted with participants recruited online from Qualtrics Panels. The analysis only considers responses from the 911 participants who fully completed the survey.

Most of the questions in the survey were closed-ended, but there were several open-ended items. One such question asked participants: “What do you think are some of the possible risks associated with the development and implementation of AI?” Selected verbatim responses to these questions were incorporated into the personas to aid in understanding the participants’ behavioural thought processes.

To develop the personas in the results section, we focused on behavioural data from the survey responses instead of building them from a more traditional demographic-based segmentation. This approach is predicated on an understanding of the actions individuals take in relation to adopting and using products or services and offers more dynamic and actionable insights into users’ needs and preferences. When these behaviourally focused personas are used in product development, we expect them to address actual user behaviours and preferences, rather than making assumptions about behaviours or preferences based purely on demographic stereotypes.

In the analysis the following question items and corresponding response options were used.

Questions	Response Options
How would you rate your overall trust in technology?	Very low trust Low trust Some trust High trust Very high trust
In general, how comfortable are you with using new technology?	Not comfortable at all A little comfortable Somewhat comfortable Quite comfortable Very comfortable
In general, how interested are you in learning about new technologies?	Not interested at all A little interested Somewhat interested Quite interested Very interested
Please rate your level of knowledge in AI	No knowledge at all Little knowledge Some knowledge A great deal of knowledge
In general, how risky do you think it is to develop and implement AI?	Not risky at all A little risky Somewhat risky Quite risky Extremely risky

Tab. 1
Question Items and
Corresponding Response
Items.

What do you think are some of the risks associated with the development and implementation of AI?	Open response
Please indicate how much you agree or disagree with the following statements regarding your use of AI. 1 I would trust insights generated by AI applications. 2 I believe I have a lot of choice in deciding whether or not to use AI. 3 If I were to stop using services that use AI, my life would look pretty similar to the way it looks today. 4 For me, the benefits of using AI in my life outweigh potential risks.	Strongly agree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree
How much confidence do you have in AI to work effectively in the following finance-related applications? 1 Use of AI to manage retirement savings portfolios. 2 Use of AI to analyse consumer financial habits and make personalised savings recommendations. 3 Use of AI to provide customer service when clients have small inquiries relating to their retirement accounts. (e.g. checking balance, retrieving account information) 4 Use of AI to provide customer service when clients have intermediate to large inquiries relating to their retirement accounts (e.g. detecting fraud, changing allocation). 5 Use of AI to evaluate creditworthiness when it comes to taking out a loan or applying for a credit card.	No confidence A little confidence A fair amount of confidence A great deal of confidence
If given a choice, how willing would you be to use/adopt AI in the following finance related contexts? 1 Use of AI to manage my retirement savings portfolios. 2 Use of AI to analyse my financial habits and make personalised savings recommendations. 3 Use of AI to provide customer service when clients have small inquiries relating to their retirement accounts. (e.g. checking balance, retrieving account information) 4 Use of AI to provide customer service when clients have intermediate to large inquiries relating to their retirement accounts. (e.g. detecting fraud, changing allocation) 6 Use of AI to evaluate creditworthiness when it comes to taking out a loan or applying for a credit card. 1 Use of AI in place of a financial advisor. 2 Use of AI to develop short-term financial plans. 3 Use of AI to develop long-term financial plans related to retirement. 4 Use of AI to develop long-term financial plans unrelated to retirement.	Not willing at all A little willing Somewhat willing Very willing
Please indicate your willingness to use a robo-advisor.	Not willing at all A little willing Somewhat willing Very willing

Participant Demographics

Gender was evenly distributed in the sample, with 51% (n=465) identifying as male, 48.6% (n=443) identifying as female, and 0.3% (n=3) identifying as other. The distribution across generations (Dimock, 2019) was as follows: Silent Generation (born on or before 1945): 13.5% (n=123), Baby Boomers (born 1946-1964): 27.2% (n=248), Generation X (born 1965-1980): 25.2% (n=230), Millennials (born 1981-1997): 24.1% (n=220), and Generation Z (born 1998 or later): 9.9% (n=90).

Technology Experience

Overall experience with technology was extremely high among Generation X and Millennial members with 40% and 40.9% of them respectively rating themselves as 'very experienced', while it was on the lower end among the Silent Generation and Baby Boomers with

just 2.4% and 7.7% members from each group respectively rating themselves as 'very experienced' (Chi-square = 244.2, $p < 0.001$, $N = 911$).

Adoption of New Technology

A plurality of the two older generations, 39.8% ($n=49$) of the Silent Generation and 34.4% ($n=85$) of the Baby Boomers, placed themselves in the 'try after many others have tried' bucket. On the other hand, a plurality of the younger populations placed themselves in the 'try as soon as possible' bucket category (with 43.9% ($n=101$) of the Generation X and 45.9% ($n=101$) of the Millennials (Chi-square = 207.2, $p < 0.001$, $N = 911$).

Level of Trust in Technology

While almost half of the participants in the two older generations selected having 'some trust' in technology, a large number of participants from the younger generations had either 'high trust' or 'very high trust' in technology. A stark difference between the younger vs. two older generations was in the 'very high trust' in technology category, with a total number of 5.7% ($n=21$) of the two oldest generations selecting this option compared with a total number of 30.9% ($n=158$) of the younger generations (Chi-square = 144.4, $p < 0.001$, $N = 911$).

Comfort with Using New Technology

A large number of participants from the Silent and Baby Boomer Generations rated themselves as being 'somewhat comfortable' in using new technologies while almost half of the participants from the younger generations rated themselves as being 'very comfortable' learning new technologies. (Chi-square = 213.8, $p < 0.001$, $N = 911$).

Interest in Learning New Technology

More than 50% of the Generation X and Millennials rated themselves as being 'very interested' in learning new technologies while a total number of just 11.3% of the older generations rated themselves as being 'very interested' in learning new technologies. AI, as a new and different technology, is going to require a significant amount of learning to make the most of its benefits. The interest in learning new technologies was, however, very dependent on generations, with enthusiasm lower among older participants (Chi-square = 205.3, $p < 0.001$, $N = 911$).

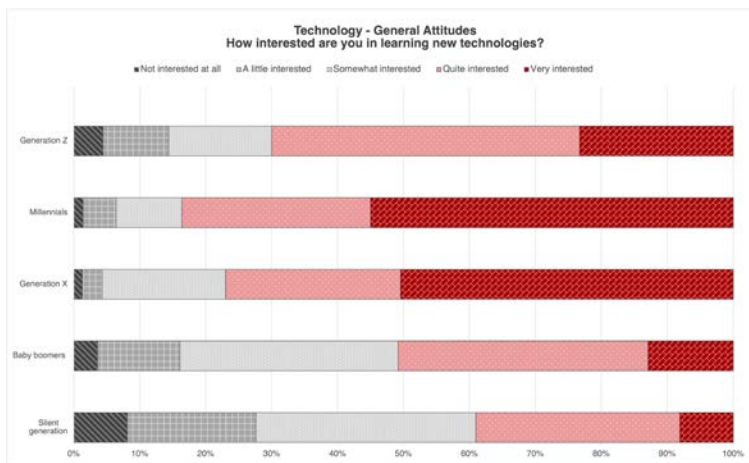


Fig. 1
This image shows a stacked bar graph with a distribution of responses from different generations regarding their interest in learning new technologies (as explained above).

Results

General Attitudes Towards AI Usage in the Finance Industry

Participants were surveyed on their perceptions regarding the potential benefits of developing and implementing AI in finance-related applications. The two older generations tended to lean towards responses of 'not beneficial at all' or 'a little beneficial', while younger age groups expressed stronger beliefs in its potential, rating it as 'quite beneficial' or 'extremely beneficial' (Chi-square = 162.1, $p < .001$, $N = 910$). A third of the participants felt that it was either 'quite risky' or 'extremely risky' to develop and implement AI in finance-related applications (Chi-square = 44.2, $p < .001$, $N = 911$).

A significant proportion of participants from older generations expressed the view that the development and implementation of AI for finance-related applications should 'continue at its current rate'. In contrast, nearly 50% of younger generations advocated for a 'greatly accelerated' pace in this regard, reflecting their heightened enthusiasm for AI integration in finance (Chi-square = 145.9, $p < .001$, $N = 844$). When participants were asked about their thoughts on the regulation of AI in the finance space, there was consistency in the responses received across generations as most people believed that it should be 'highly regulated'.

Trust in AI

More participants from the older generations tended not to trust insights generated by AI applications; six times the number of participants from the younger generations 'strongly agreed' that they trusted AI-generated insights compared to older generations (Chi-square = 139.2, $p < 0.001$, $N = 911$). Over half of people within each generation 'agree' or 'strongly agree' that they have 'a lot of choice in deciding whether or not to use AI'.

Self-rated AI Knowledge and Perceived Risk

In this study, participants were generally of the opinion that it is 'somewhat risky' or 'a little risky' to develop and implement AI. The responses from participants were related to which generation they were from; higher numbers from the younger generations think it is 'extremely risky' or 'quite risky' probably resulting from the knowledge they have about AI and what could go wrong if it is not implemented correctly following safety procedures and general knowledge about AI (Chi-square = 33.2, $p = 0.007$, $N = 911$). When participants were asked about whether they believe that the benefits of using AI outweigh the potential risks for them, while around a quarter of them said they neither agreed or disagreed, those from the two older generations were more likely to strongly disagree while those from the younger generations were more likely to strongly agree (Chi-square = 92.7, $p = <.001$, $N = 911$).

Gender was also related to self-rated AI knowledge and its perceived risks, as more males think it is either 'not risky at all' or 'extremely risky', while more females think it is 'a little risky', 'somewhat risky', or 'quite risky' to develop and implement AI (Chi-square = 19.9, $p = 0.01$, $N = 911$). On the other hand, significantly more females disagree that the benefits of using AI in their lives outweigh the potential risks associated with it (Chi-square = 43.1, $p = <.001$, $N = 911$).

Confidence Levels and Willingness to Use AI

A majority of the Silent generation and Baby Boomer generation lacks confidence in technology and AI's decision-making capabilities, and an even greater percentage are unwilling to use this technology. The study shows that while these two older generations lack confidence in AI and technology when it comes to allowing it to make high-impact decisions, they are slightly more open to the idea of using AI and have higher confidence when it comes to lower-impact decisions like having confidence in the ability of AI to provide customer service when clients have small inquiries relating to their retirement accounts (e.g., checking balance, retrieving account information), or having confidence in AI to work effectively to evaluate creditworthiness when it comes to taking out a loan or applying for a credit card. Older generations were also more willing to adopt AI and technology for making smaller decisions and receiving assistance from AI for lower impact decisions.

The Influence of Education on AI Perception

Education was related to the ability to see benefits or the ability to make informed decisions regarding when and when not to accept recommendations made by AI (Chi-square = 69.5, $p = <0.001$, $N = 910$).

The two older generations showcase a pronounced lack of confidence in AI's ability to handle such crucial financial responsibilities such as managing their retirement savings portfolios. On the other hand, there is a stark contrast as younger populations show a considerable level of confidence through their responses in relying on AI for managing their retirement savings portfolios (Chi-square = 149.4, $p < 0.001$, $N = 911$). The scepticism exhibited by the Silent Generation and the Baby Boomer generation could be rooted in a combination of factors such as their potential unfamiliarity with various AI technologies and their potential preference for traditional financial management methods.

As a result, communication and education strategies that discuss how to address the concerns of the older generations may require specific efforts to demystify AI, explain its benefits, and build confidence in its reliability for managing retirement savings. Exploring what implications are present for financial institutions and financial service providers is extremely important to ensure generational differences that can inform the design of AI-powered financial services are understood, as this would allow them to provide tailored approaches that resonate with the preferences, confidence levels, and trust levels of each generation.

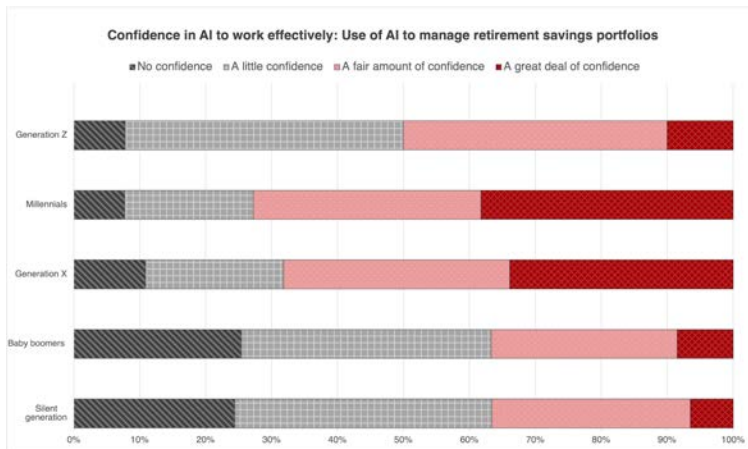


Fig. 2

This image shows a stacked bar graph of the distribution of responses across different generations when they were asked about the amount of confidence they had in AI working effectively to manage their retirement savings portfolios. Most older populations had no confidence, while most younger populations had a great deal of confidence.

Discussion

Tailored AI Adoption in Finance

Based on the analysis of participant responses in this study, there are significant variations in confidence levels and in the willingness to utilise AI for longevity planning and financial services. These differences are influenced by factors such as self-perceived knowledge, age, attitudes towards the perceived risks and benefits of AI, prior technology experience, and overall trust in technology. The insights gleaned from this study enable the development of personas. These personas can serve as valuable tools for technologists, financial consultants, designers, and software engineers during the ideation and testing phases of service development. Incorporating personas

into the technology's developmental stages, educational materials, targeted communication, and marketing strategies can help to more effectively address the concerns of each demographic group and enhance overall outcomes.

Personas

The personas outline the diverse measures that companies offering financial and longevity planning services can implement to effectively incorporate AI into their current operations. These measures are categorised into three distinct personas and are accompanied by typical goals, challenges, and what we can do to enable AI integration specific to each group.

Persona 1: Tradition Steward (Traditionalists)

Tradition Steward (Traditionalists)

A wise and experienced individual who embraces technological advancements cautiously, valuing traditional approaches to financial planning while exploring AI with a thoughtful curiosity.

Challenges

- Overwhelmed by the new technologies in the industry today. Many members of this group are born between 1928-1945.
- Not too comfortable learning new technologies but banks and other industries keep replacing humans with AI and they find this very frustrating.
- Not at all willing to accept AI-recommendations on their retirement savings portfolios.
- Very small percentage is sometimes okay with AI being a part of small decision making like checking creditworthiness or interacting with it for small inquiries at the bank.

Goals

- Complete financial and health related tasks with the help of human help, have a conversation before making any major decisions and ask questions to clarify any doubts.
- Participate in technology learning initiatives organized by banks and institutions from other initiatives to ensure older populations have the knowledge to continue using their ever evolving services.
- To get a human financial advisor, but maybe open to interacting with AI assistants for making smaller decisions.
- Age in their homes and prevent moving out due to health related reasons.

What we can do about it

- Provide the option to continue receiving support from human financial advisors even though AI-enabled advisors and robo advisors are increasing.
- Think about older adults and the challenges they may face given their unfamiliarity and reluctance to use newer technologies and confidence and trust levels with AI, this will help in coming up with ideas and alternate solutions for this demographic such that they feel comfortable and remain loyal customers.

“Information entered into the machine may be hacked by someone else.”

“I’m not sure about AI making decisions for me, but I don’t want something else thinking for me. I prefer to make my own decisions.”

“We are seeing the death of brick and mortar retail. People do not look you in the eye any more due to having the constant use of their hand helds. Without human interaction society could have permanent damage.”

Fig. 3
This image describes the persona of a wise and experienced individual who embraces technological advancements cautiously, valuing traditional approaches to financial planning while exploring AI with a thoughtful curiosity. A list of goals, challenges, and what we can do to navigate the same are presented in the persona.

Persona 2: Financial Sentinel (Sceptics)

Financial Sentinel (Skeptics)

A seasoned navigator of financial landscapes, open to incorporating AI for longevity and retirement planning, seeking a balance between time-tested financial strategies and cutting-edge technological solutions, but with a lot of caution.

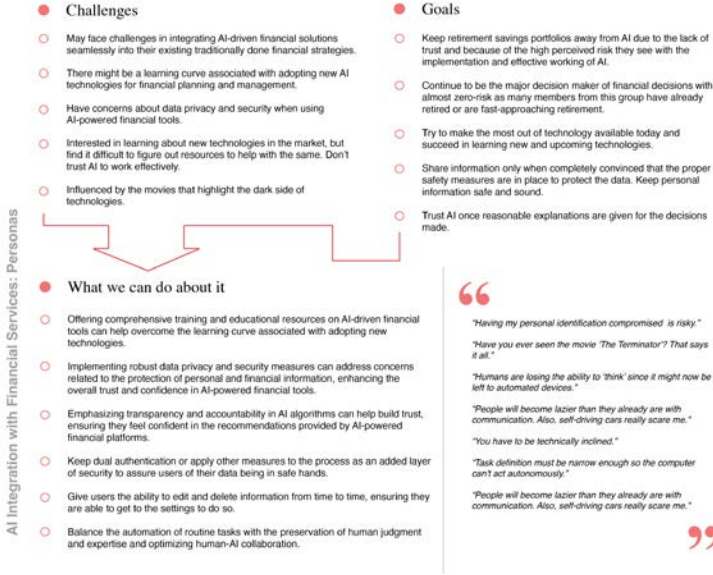


Fig. 4 This image describes the persona of a seasoned navigator of financial landscapes, open to incorporating AI for longevity and retirement planning, seeking a balance between time-tested financial strategies and cutting-edge technological solutions, but with a great deal of caution. A list of goals, challenges, and what we can do to navigate the same are presented in the persona.

Persona 3: Tech Pioneer (Pragmatists)

Tech Pioneer (Pragmatists)

A forward-thinking individual who sees the potential of AI for longevity and financial planning. This persona is comfortable blending technology with established financial wisdom to carve out a unique path for the future.

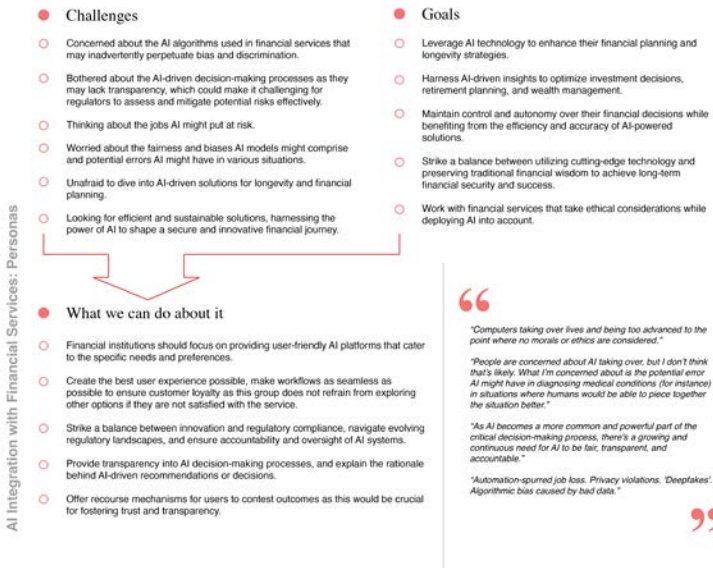


Fig. 5 This image describes the persona of a tradition steward, a forward-thinking group of individuals who see the potential of AI for longevity and financial planning. This persona is comfortable blending technology with established financial wisdom to carve out a unique path for the future. A list of goals, challenges, and what we can do to navigate the same are presented in the persona.

Conclusion

This study unveils a complex landscape of attitudes toward AI, with age-related factors playing a crucial role in shaping perceptions, trust levels, and willingness to embrace AI in various financial and health-care contexts. Understanding these nuances is pivotal for tailoring AI adoption strategies in the finance sector. When new financial services powered by AI are launched into the market, the preferences of various generations and their confidence levels in using AI for financial and longevity planning must be considered.

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Research Scientist at the MIT AgeLab. She directs and participates in numerous different projects around understanding how to support people better in preparing for longer lives. Her work has included research around financial planning and preparedness, caregiving, transportation and mobility, and technology use and adoption.

Joseph Coughlin

Founder and Director of the MIT AgeLab. Researcher, teacher, advisor, and speaker, Joe's work explores how global demographics, technology and changing behaviours are transforming business and society.

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Prototyping Future Visions of Vulnerable Youth Through Design for Longevity and Gender Equity

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Abstract

This paper presents recent findings from research conducted in Budapest, Hungary, focusing on future well-being and visions of vulnerable youth from a gendered perspective. This collaborative inquiry between the Social Design Hub of Moholy-Nagy University of Art and Design Budapest (MOME), Massachusetts Institute of Technology (MIT) AgeLab, and MIT Ideation Lab explores the concept of Design for Longevity (D4L) in a gender-sensitive context with vulnerable youth groups. Through the application of the 4Es framework: Ensure, Evolve, Empower, and Enjoy, the study aims to empower vulnerable youth by integrating design processes and making into alternative school curriculum pedagogy. Participants from Belvárosi Tanoda Foundation Secondary School engage in workshops to explore gender-sensitive approaches to longevity and well-being. The study emphasises a vulnerability-informed approach and observes the impact of gender identity on group dynamics and ideation processes, outlining the importance of a gender-inclusive approach in building future visions among youth. The preliminary study's impact extends beyond the benefit to vulnerable youth (workshop participants), encompassing valuable academic contributions. These include broadening the application of ethnographic approaches, employing participatory methodologies with disadvantaged communities, and highlighting the significance of gender equity and D4L.

Keywords

Design for longevity
Social design
Gender equity
Participatory design

Introduction

This paper presents recent findings of a research conducted in Budapest, Hungary, focusing on future well-being and visions of vulnerable youth through a gendered perspective. In what follows, recent explorations are presented on how teaching design and prototyping skills can empower vulnerable communities, enabling them to express their future selves creatively. The scope of the research was defined by the target group of vulnerable youth, whose future visions in well-being were placed at the centre of inquiry through their involvement in inclusive and participatory design processes. The inquiry was initiated as a collaboration between the Social Design Hub (SDHub) of the Moholy-Nagy University of Art and Design Budapest (MOME) and the Massachusetts Institute of Technology (MIT) AgeLab under the working title *Design for Longevity through the Lens of Gender Equity* (D4L for GE). The D4L for GE research aimed at integrating previous research findings from both institutions, such as the topic of gender equity at MOME SDHub and design for longevity at MIT AgeLab. Fig. 1

The MOME SDHub conducts practice-based research at the intersection of social and environmental sustainability, seeking solutions to reduce inequality and foster resilience. A central aim of its ongoing research projects is to develop and support practice-based design inquiry in order to seek opportunities for a more sustainable lifestyle and economy. A recent research project, FRUSKA, investigated how disadvantaged girl groups can be supported through design tools (Anonymous et al., 2023). The FRUSKA method and workshop series enables girls aged 10-18 to engage in a creative learning process, while providing the framework for a participatory research and self-assessment. Through different workshops, participants master technological skills and experience the freedom of choice through the customization of the items they create. Based on participatory design and mutual learning, the program is designed to enhance the girls' self-esteem, sense of autonomy and empowerment to give them better chances later in life and in work. The FRUSKA Handbook offers a methodological framework, a recommendation for a workshop series, and an array of impact measurement tools such as pre- and post-workshop surveys and self-assessment tools. The FRUSKA Handbook served as a baseline for building up the framework of the D4L for GE research both in terms of participatory inquiry, assessment and a gender-sensitive approach.

As people live longer and aspire to have better quality of life, disruptive demographic shifts (Coughlin, 2014), advances in medical and healthcare systems, and the emergence of innovative technologies (Etkin, 2021) have propelled most developed countries into the era of longevity economics (Coughlin, 2017). Particularly within service- and experience-dominated industries (Lee, Yang, et al., 2023; Lee, Patskanick, et al., 2023), the concept of D4L has gained paramount importance, expanding beyond conventional financial planning to encompass various domains including education, family, community, risk, investment, mobility, and future considerations. The concept of D4L and 4E frameworks, inspired and co-developed in collaboration with the MIT AgeLab, aims to explore longevity planning in response to disruptive demographic changes, the longevity

economy, and shifting perceptions of life stages. D4L offers a novel perspective for comprehending, exploring, and celebrating the individual's diverse stages of life, inclusive environments, dynamic workforces, and various cultures across generations. The traditional three-stage model of life — birth, education, and retirement — is being redefined (Golden, 2022). Through the lens of D4L, researchers and designers can address complex socio-technological challenges holistically, centred around the experiences and needs of individuals throughout their lives. In this study, we utilised the D4L framework (Lee, Coughlin et al., 2023) through four participatory workshops and four semi-structured interviews to comprehensively examine, explore, and discuss the research topic of future visions of vulnerable youth through a gendered lens.

GE as a larger aim appears in this domain through its wider relevance in youth's future visions. It is widely established that male and female students' future visions are influenced by social bias especially when choosing a career path, which is particularly visible in STEM or careers perceived as more family-friendly (Weisgram & Diekman, 2017), such as caretaking careers. The gender stereotype of science has been analysed via a variety of quantitative and qualitative methods (Makarova & Herzog, 2015; Cooper & Radonjic, 2016). Applying a gender-sensitive research approach was crucial throughout the research not only by choosing appropriate methods and tools, but by making sure that the participation was inclusive of male, female and non-binary students. Choosing the right language, inquiry method and group selection was suggested by the students, based on the ratio of 10 female, 8 male and 3 non-binary participants. A conscious choice was made not to divide participants by their gender identity, creating mixed groups and emphasising this lens in the survey and interviews instead.

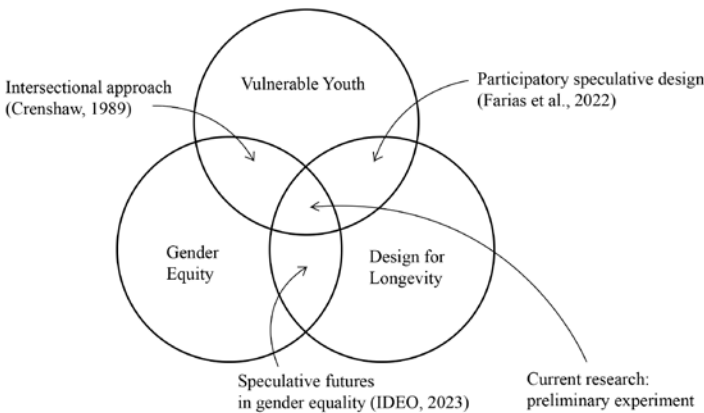


Fig. 1
The relationship between vulnerable youth, Design for Longevity (D4L), and Gender Equity (GE).
Source: Authors.

Research Question

Based on the previous research project FRUSKA, the study focuses on exploring, integrating, and creating the concept of D4L in a gender-sensitive context with vulnerable youth groups. Therefore, the proposed 4E questions were applied as a medium to connect FRUSKA with the concept of D4L. The 4Es framework is a tool to help participants form the target group, brainstorm concepts and ideas for tangible and actionable answers that address issues of longevity. There are four stages to the framework: ensure, evolve, empower, and enjoy. Each stage offers a question to guide participants to think more dimensionally about the challenges and opportunities of longevity.

The overarching research question touched on whether we can use design and making to empower vulnerable youth groups with creative confidence through a gendered lens, and aimed to explore the value and the process of implementing design thinking and making for the alternative school curriculum pedagogy. However, several further research questions were formulated in a participatory way by student participants in a group format, which further led their inquiry into their own future visions. These questions were generated by applying the D4L cards in the form of template questions and are further elaborated in the Methodology section.

Target Group: Vulnerable Youth

The target group of the inquiry was broader: vulnerable youth, defined by a specific school educational context. Participants were all students enrolled in the Belvárosi Tanoda Foundation Secondary School, a foundation-based institution that aims to create the opportunity for a fresh start for high-school dropouts between the ages of 16 and 25, to earn their diploma.

The vulnerability of these students usually stems from their social position, previous educational background, occasional mental health and substance abuse issues, and challenges in the home. The school's pedagogical methodology is designed to serve the unique needs of its students while creating a sustainable, loving and open-minded community.

The personalised learning programme is customised together with the student. The curriculum is organised into thematic courses, with a credit system that supports individual progress. Students work on part of the curriculum using a project approach, which also helps them develop a wide range of key competences. Students are supported in their school life — and, if necessary, in their personal life — by a mentor or support pair of their choice. Student-mentor pairs prepare the student's timetable and exam schedule, regularly assessing the progress and adapting the established learning programme as necessary. Each term ends with an assessment interview, with a strong emphasis on self-evaluation. Organising school work is collaborative. The school is run on a democratic, consensual basis, which helps build a strong sense of community. The mentors' work is supported by weekly case discussion meetings. In the small school community, open communication is encouraged among tutors and students alike.

Looking at the school's target group, several significant characteristics may be observed. According to the surveys conducted by the school, students aged 16-17 who are new to the school feel less developed in terms of self-esteem and confidence (Szebényi, 2021). 18-19 year olds, who have been in the school for an average of 1.6 years and are planning to take their school-leaving exams this year or next, scored lower than the others on their preparation for studies, course exams, school-leaving exams and entrance exams. Above the age of 20, the average scores clearly increase with age. In particular, 20-22 year olds score significantly higher on preparation for studies, examinations, school-leaving exams, entrance exams and on developing problem-solving skills.

Most students completed the four in-person workshop sessions with the researchers and shared their learning and feedback through post-surveys and post-workshop interviews. Student participation was voluntary but the timeframe was defined within the students' Social Studies classes.

Design for Longevity Through a Gendered Lens.

Exploring D4L Through the Lens of 4ES Framework and GE

Based on the FRUSKA and D4L research project, the study was dedicated to the exploration and integration of GE. To achieve this, the authors leveraged the proposed 4Es framework, utilising them to link FRUSKA with D4L and GE. The 12 D4L cards were crafted based on the 4Es framework. These cards served as an inspirational tool, aiding participants in brainstorming concepts and ideas that could be transformed into tangible, actionable solutions addressing issues of longevity and gender equality. The 4Es framework, structured around four stages—ensure, evolve, empower, and enjoy—provided a series of questions aimed at guiding participants to think more expansively about the challenges and opportunities related to longevity *Tab. 1.*

4Es	Ensure	Evolve	Empower	Enjoy
Explanation	Foundation	Transformation	Extension	Outcome
Guiding questions	What do you need to ensure ? What is basic to your future wellbeing?	What needs to evolve with you? What transforms with you over time?	What can empower you? How can you extend your impact?	What do you enjoy ? What outcomes do you benefit from?

Tab. 1
The 4Es framework explanation, guiding questions, keywords, and examples.
Source: Authors.

In this experimental research, the authors employed the D4L framework and insights learnt from the FRUSKA project to comprehend GE by reframing, researching, translating, and prototyping solutions specifically aimed at the participants from the Belvárosi Tanoda Foundation Secondary School as the target group. This initiative sought to envision a future through a gendered lens that is more inclusive, ethical, delightful, and respectful, with a focus on designing services, systems, and strategies that cater to the needs and aspirations of vulnerable communities.

Based on previous research in the domain of gender equity in social design with vulnerable youth, a gender-sensitive framework and research focus was drawn up (Csernák et al., 2023).

This framework was based on Intersectional Theory (Crenshaw, 1989) and Critical Feminist Theory (Krumer-Nevo & Komem, 2015) and Critical Participatory Action Research methods (Aziz, 2011). Gender as a concept was integrated into the pre- and post-workshop surveys in order to identify possible differences in future concepts within the target group. Furthermore, the introductory class during Week 0 raised the question of group organisation. Originally, it was suggested to form two groups based on the gender binary, but in the end mixed groups were established, following the suggestions of cis-gendered members with respect to several non-binary classmates who were not present at that time, but planned on joining at a later stage. Therefore, a sensitive, inclusive framework and language was established by the group members themselves, creating a safe environment for an authentic array of gender expressions, especially in the context of the inquiry. In verbal feedback sessions at the end of each workshop, a frequently expressed thought was the feeling of trust (within the group), and a climate that encouraged opening up.

Methodology

The D4L for GE research aimed to integrate pre-existing methodical elements of the aforementioned research results into a broader design thinking process, with a strong emphasis on a gender-sensitive and vulnerability-informed approach. This approach is characterised by voluntary participation (which can be stopped anytime), a mindset reactive to the gender characteristics of the class (participants voted to not divide groups by gender, including instead a non-binary category in the surveys), and regular feedback loops. The workshop design process was transparent and respectful. We recognized the needs of vulnerable communities and collaborated closely with their class teacher to understand the class dynamics, privacy concerns, and the situation regarding grouping and exercise design.

The research was based on a primarily qualitative measurement framework. During the study, a primary desktop research was conducted, which focused on the analysis of existing literature and previously conducted workshops on longevity, prototyping, and gender equity for vulnerable communities.

This was followed by the formulation of the workshop programme structure as a form of inquiry. The inquiry was further informed by data collection through pre- and post-workshop surveys, resulting in a comparative analysis of the participants' self-evaluations, integrating their ongoing recorded feedback and the design concepts they presented. In the case of the pre- and post-workshop survey results and semi-structured interviews conducted with participants and tutors, ATLAS.ti was used for semantic analysis (Stewart, 2023). Main research goals include creating additional elements for expanding the FRUSKA and D4L in different scale applications, developing a gender-sensitive understanding of the target group and their future perspective on wellbeing, and refining the definition and applications of D4L (4Es framework) in the context of disadvantaged communities, further applicable to Tanoda or other alternative schools.

Research questions were formulated by students in a participatory manner in group work settings. In order to help the group reach a consensus in their future vision, the D4L cards and research question templates were applied. The questions were modelled after the following structure: Card A + Card B + Card C = Design Challenge / Design Problems Fig. 2. As an example for the students to build their own questions, were the cards Community, Health and Communication to be picked, the research question would have sounded something like *How might we design a communication product to provide physical/mental health services for/to/with my local communities?*. Based on this, three distinct How Might We (HMW) questions were formulated by the groups: “HMW design a community-centred service to solve future financial challenges?”; “HMW design an educational tool for community use that helps multi-generational financial planning?”; and “HMW design a future for communication to solve problems at home?”.



Fig. 2
Participants used D4L cards as a tool of inspiration to explore and formulate their group challenges.

The workshops were conducted so as to create a space for the vulnerable youth to articulate their future visions in the form of co-created design concepts, based on their own research questions over the course of three weeks, followed by a presentation session in which final concepts were presented by the groups to a wider audience, as shown in the timeline in Fig 3. The case study below presents the matrix of the series of three workshops with three participating groups, focusing on the aspect of the process instead of the design outcome. The applied research framework informed the activities towards a structure that combined frontal and non-frontal learning environments. The four-workshop experience was designed to foster a respectful, open-minded, and creative environment that encourages vulnerable communities to express themselves freely. Each workshop included a 15-minute lecture, 60-minute hands-on activities, and a 10-minute reflection session to conclude.

Overview: Case Study

As discussed earlier, the research flow was characterised by the fieldwork as the most intense period. This phase spanned over 1+4 weeks, with an introductory class on Week 0, followed by a trimester break, 3 weeks of workshops and a final presentation on week 4 Fig. 3.

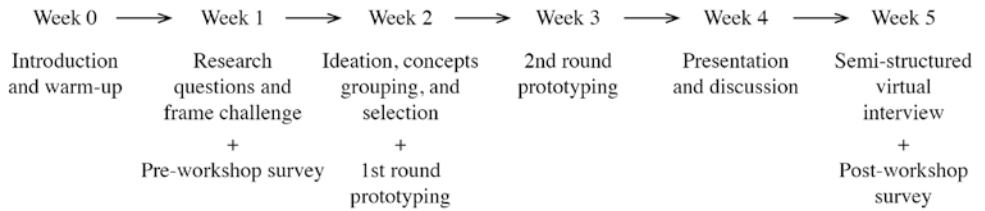


Fig. 3
The 6-week workshop research flow. Source: Authors.

In what follows, a case study of the fieldwork process is described through a matrix of workflow [Tab. II](#) and group work. The workshop series were divided into three different moments and preceded by week 0 as an introductory class consisting of a briefing, icebreakers and a co-creative team building exercise. Week 1-3 followed a largely typical design thinking process, which brought together certain tools from the previous D4L- and GE-focused research, such as the D4L card set, and assessment tools developed during FRUSKA.

Week 1 featured an introduction, a briefing, and time dedicated for a survey, followed by a structured brainstorming session using the D4L cards and the template question (HMW + Card A + Card B + Card C). Groups were asked to select three cards and formulate their research question based on shared interest and future visions, both reflecting on their individual and group preferences and on wider societal needs. These questions were later used in Week 2, when groups were asked to further reflect upon how to respond to their design challenge. They came up with at least 10 ideas per group, which were later narrowed down to 2-3 each. After the groups elaborated on their topic, a short explanation of high and low resolution prototypes was provided, allowing them to start prototyping for the sake of storytelling. A variety of materials were provided for this purpose (soft fabric, wood samples, paper, markers, glue, LEGO, building blocks, etc.).

Prototyping also helped them narrow their ideas down to a final concept each, based on their ability to express or visualise their narratives. While this medium-based restriction might have prevented some good ideas from blossoming, it also helped the group to settle on a shared vision that everybody could contribute to in a clear and understandable way. In Week 3, groups were asked to further refine their prototypes. At this stage, each group was offered two distinct design directions in order to clearly define outcome expectations.

For the presentation on Week 4, all groups were asked to frame the process through their research question, presenting the design concept and concluding with a summary based on the five questions (What-Why-Who-Where-How?). For the final presentation, each group completed an assignment during the last week that further developed their design concept, each team choosing a format that was the best fit to describe their process and results.

The matrix below [Tab. II](#) provides a structured description of the workshop process.

GROUPS	Week 0. Workshop Preparation	Week 1. Workshop Research question	Week 2. Workshop Low-res prototype	Week 3. Workshop Hi-res prototype	Week 4. Presentation
GROUP 1	Introduction, briefing, research outline, ice-breaker exercises Structured ideation in 2 groups on valued personal qualities through symbolic language (imaginary hybrid animals as embodiments of adjectives)	HMW design an educational tool for community use that helps multi-generational financial planning?	New educational model based on solidarity economy	Manifesto of a new model school, Poster with main slogan	Vision board, manifesto of a new model school
GROUP 2	Structured ideation in 2 groups on valued personal qualities through symbolic language (imaginary hybrid animals as embodiments of adjectives)	HMW design a future for communication to solve problems at home?	Tutorials for better communication at home	Floor plan and small-scale model for a family retreat supporting mental health and communication	Concept presentation and brochure for the facility and its functions
GROUP 3		HMW design a community-centred service to solve future financial challenges?	An app for multi-generational financial planning and education	Wireframe and content for an online platform of the app	Visual identity for the app, short testimonial video

Research Medium

Four research mediums were prepared, consisting of physical assets and methodological components: 1. the medium for understanding (pre- and post-workshop surveys); 2. medium for inspiration (D4L cards); 3. medium for creation (prototyping tools), and 4. medium for reflection and discussion (semi-structured interview). Due to the project's scope, this paper will not address the findings from the surveys and interviews.

Medium for understanding: pre- and post-workshop surveys. The survey design comprises four main sections: 1. Self-Expression: delves into participants' perceptions of themselves and their communication patterns within their families, social circles, and communities. 2. Creative Confidence: aims to uncover the participants' unique strengths or "superpowers," such as their areas of expertise and the sources of their confidence in life. 3. Problem-Solving: seeks to explore the participants' understanding of the prototyping and design processes. 4. Demographics: gathers basic demographic information about the participants. The purpose of using both pre- and post-workshop surveys is to gain insights into our participants. These surveys help us understand their comprehension of design and prototyping concepts, their interests, expertise, expectations, and concerns. Additionally, by comparing the pre- and post-workshop survey results, we can identify potential research challenges and comprehend individual learning objectives and needs effectively.

Medium for inspiration: D4L cards. During the initial two weeks of the workshop, the utilisation of D4L cards serves as an inspirational tool aimed at empowering participants to envision their future selves. These cards prompt participants to envision various aspects of their lives, including family, community, education, mobility, finance, investment, risk, and many other future directions. The D4L cards feature 12 broad directions, each accompanied by four actionable verbs—ensure, evolve, empower, and enjoy—providing guidance to help them grasp and embrace the concept of D4L within the context of longevity planning and gender equity.

Tab. II
Matrix of the workshop process, describing each group's design journey (HMW = How Might We).
Source: Authors.

Medium for creation: prototyping assets. During Weeks 3 and 4, we provided participants with a range of accessible and low-cost prototyping materials (Buchenau & Suri, 2000), such as LEGO, wooden blocks, thick paper, magazines, markers, Post-its, scissors, metal wire, and glue Fig. 4. These resources were provided to facilitate hands-on learning and enable participants to fully engage with the spirit of prototyping. By actively creating prototypes, participants learned to think with their hands, gaining practical experience in translating ideas into tangible artefacts. Moreover, these physical materials served as tools for enhancing team communication and enriching collaborative brainstorming.



Medium for reflection and discussion: semi-structured interview. We employed virtual interviews with three groups and one-course lecturer in the fifth week. Each interview was conducted in a conversational format for approximately 15-20 minutes. The four interview videos were recorded in Hungarian and translated into English transcripts for qualitative synthesis by applying ATLAS.ti, a computer-assisted qualitative data analysis software (CAQDAS).

The four key research mediums were utilised to understand our participants, inspire exploration, facilitate creation for prototyping, and encourage reflection for discussion. These media played a crucial role in fostering trust between the researchers and the participants, particularly in the case of vulnerable youth. Furthermore, the medium contributed to the establishment of a participant-friendly and safe research environment, conducive to open dialogue and meaningful engagement.

Fig. 4
The prototyping workshop in weeks 3 and 4, during which participants, divided into three groups, transformed their conceptual ideas into tangible models. Source: Authors.

Reflection and Analysis

Workshop Grouping

As discussed above in section 1.3., gender identity played a crucial role in group dynamics and overall content during ideation and prototyping. Though the participants decided not to create groups based on gender categories, this distinction could be maintained through their reflection in surveys and interviews. This also led to an opportunity to observe a more realistic, life-centred strategy in shared vision-building, where even gendered tendencies were encouraged to merge for a mutually approved concept. In general, the above-mentioned biases were both observed by the authors and

articulated regularly in feedback sessions, relating topics such as Care, Family, or Home to female terrain and topics such as Investment, Risk, or Mobility to male terrain. Topics of Health, Education, or Communication were deemed important by participants of both genders, and non-binary participants were more strongly inclined towards topics favoured by female participants. These observations were further confirmed by participant reflections in the interviews.

Moreover, as articulated by participants when reflecting upon internal group dynamics, different gender expressions and their inclinations toward certain topics were collectively shaped to form consensus in a democratic decision-making process in order to reach a shared future vision integrating all the priorities of group members. When asked to reflect upon this community-based decision-making process, participants admitted to learning a lot about each other through their priorities, goals, and insights during mutual persuasion. As a wider reflection upon the design process, creating concepts based on these shared values can be assumed to have a beneficial effect on gender-inclusive future visions among youth, although the results presented here certainly cannot be considered representative.

The challenges that were encountered during the workshops arose from the novelty of the topic of design and prototyping for vulnerable communities. For many, this may be their first exposure to prototyping skills to explore and discuss the concept of longevity. Additionally, the target group's specificities sometimes resulted in a short attention span, difficulty focusing during classes, and stimuli-seeking behaviour (such as moving around during classes or scrolling on their phones). Negative group dynamics were detectable at the beginning of the process (such as bullying), but they stopped as the process progressed, as students' focus was diverted toward productive activities.

Workshop Engagement

Throughout the process of four in-person workshops and group virtual interviews, we reflected on the nuances of individual engagement levels concerning object prototyping, peer interaction, and virtual interfaces.

Engagement through objects. Utilising tangible prototypes proved instrumental in stimulating concept generation, facilitating team communication, and empowering participants to manifest their perspectives on sensitive topics, future scenarios, or personal narratives with regard to longevity. For instance, one participant articulated her vision of a learning environment by constructing a traditional classroom using wooden blocks, complete with a blackboard, five chairs, and a stage.

Engagement through peers. The workshop's objectives and structure were crafted to foster collaborative group learning. As a result, most design exercises necessitated active participation through teamwork. Despite varying levels of engagement among participants, a spirit of openness and willingness to share ideas fostered a collaborative atmosphere. Various team dynamics emerged as three groups tackled diverse design challenges, demonstrating the versatility of collaborative problem-solving with peers.

Engagement through interface. Comparing in-person presentations and virtual interviews has helped us gain insight into the behavioural side of vulnerable youth. Differences in participants' willingness to engage and share their reflections when interacting with peers versus through a virtual environment, highlighted variations in perceived levels of trust and safety. For instance, while some individuals may feel reserved or nervous speaking in front of their peers, they might become more expressive once the interface transitions to a virtual format.

Conclusion

During this three-month preliminary research phase, we applied qualitative research, which involved the facilitation of five in-person participatory workshops across five consecutive weeks, conducting four semi-structured group interviews with students and a tutor, and administering pre- and post-workshop surveys. Applying the lens of gender equity, the FRUSKA project, the Design for Longevity (D4L) concept, the D4L cards, and the 4E questions — Ensure, Evolve, Empower, and Enjoy — have been instrumental in aiding vulnerable youth from the Belvárosi Tanoda Foundation Secondary School to envisage their future selves. This was achieved by fostering an understanding of the design process, encouraging hands-on problem-solving, promoting collaboration, and facilitating storytelling as a means of projecting their aspirations and overcoming challenges.

As a first-hand reflection, we conclude the field-based section of the research with the validation of several experimental research tools, such as using participatory research tools during research question formulation, testing the D4L cards in a novel setting, or adapting gender-sensitive visionary prototyping in a different target group of vulnerable youth. Based on participant feedback and the authors' observations, these methods turned out to be not only effective but meaningful in the given context, resulting in a heightened sense of empowerment among participants, a stronger hold on crafting future visions, and a more aligned and community-centred vision within group members.

The contribution of the research resides in our inclusive and respectful strategy for engaging vulnerable youth via prototyping, facilitating their empowerment to envision their future selves for longevity through the application of design processes. This innovative and participatory approach benefits the vulnerable youth and brings academic value by extending the implication of ethnographic research, employing a participatory methodology with disadvantaged communities, and emphasising the importance of gender equity, thus laying the groundwork for future studies.

Data analysis at a later stage of the research will conclude whether working with vulnerable youth through design can enhance their creative confidence and whether applying a gendered lens can shine a light on the process of implementing design thinking and making for an alternative school pedagogy and for envisioning more equitable future visions. Further studies could explore how different group settings can affect the participatory research or the co-creation process during prototyping, especially whether gender identity influences decision-making, prioritising or refining the details.

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New Technologies, Old Professors: Notes on Labor Ageing in Design Programs

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Abstract

This paper discusses why higher education professors are not retiring in due time and how economic programmes play a role in such a decision. We discuss public policies of higher education institutions to understand 1) why labour ageing occurs and 2) the challenges faced by professors and institutions. Our discussion focuses on showing how a series of policies and organisation-led rules can condition practices, thus contributing to labour ageing, by discussing the case of a country: Mexico. Due to public and university policies, labour ageing presents a challenge for university education. In that case, these policies must be accompanied by training processes for the lifelong productivity of professors. This paper shows the need to reevaluate practices to constantly address labour ageing in design academia, so that it might evolve and remain up-to-date with emerging trends and technologies.

Keywords

Design
Educational innovation
Future of education
Higher education
Tec 21 Educative Model

Introduction

The workforce has looked different, sounded different, and grown older in the past few years. Labour ageing has continued to be a reality among higher education professors in academia due to several factors, including decreased income and increased debt, the need to maintain an extended family, and the ability to feel productive. This prolonged retirement could affect some fields and cause challenges if training older employees in newer trends and technologies becomes an issue.

According to the Organization for Economic Cooperation and Development's (OECD) Policy Brief on Ageing and Employment and their Council Recommendation on Ageing and Employment, labour ageing can be somewhat complex since it "is a boon for individuals [but it] can be challenging for societies" (2018, p. 1). Additionally, one of the recommendations by the OECD calls upon employers to implement good practices regarding the "sharing of knowledge and experience across different age groups and adjusting work responsibilities" (2018, p. 4). The latter suggestion often falls short in some fields.

Some studies have mentioned that "keeping older employees in the workforce longer [can address] the growing skills shortage and balance social insurance funds in many developed economies" (Ruhose et al., 2020, p. 31). Still, the debate on whether labour ageing reduces production in some industries continues among stakeholders. However, as noted by some studies, "negative effects of population ageing on economic growth operate through several channels. [Ageing] may lead to a diminishing working population, which lowers labour input growth. [Also] ageing [...] can lead to less capital accumulation and hence a growth slowdown. [And additionally], ageing can also lower labour productivity growth" (Lee & Shin, 2021, p. 139).

In education, "in the presence of population ageing, the average worker will have had older professors, who would have been teaching older knowledge. [To some], this is [...] a reason why ageing will lead to a technologically out-of-date workforce" (Berk & Weil, 2015, p. 662). Still, with world organisations providing blueprints and recommendations for such populations in the workforce, the need for constant training among professors persists.

In Mexico in particular, design education has faced challenges due to issues of technology acceptance for teaching and learning that could be linked to labour ageing. For instance, the use of Learning Management Systems (LMS) in education has resulted in a change in the way of communicating with students, but hasn't had an impact as an innovative practice to boost design education, mostly because of traditional methods of teaching through workshops, in open spaces that drive creativity in an old-fashioned way (González-Bello & Morales-Holguín, 2021). However, the landscape is changing, and technology trends are leading to professors being better prepared to address design education needs.

As Rodríguez, Trejo & Hernández (2020) state, technological development has an impact on design; in the labour market, designers must face complex resolution problems, and as a consequence, they must take advantage of every technology, not only to ensure efficient processes but also to enhance the creative phase. To accomplish this, a profound analysis should be conducted on the formative

processes of professors, to counter the reticence to using technology when traditional teaching methods prevail, due to age or not.

In this paper, we analyse documents that allow us to interpret the consequences of labour ageing in education and, partially, in design. From there, we infer that the challenges and obstacles in this knowledge field are yet to be explored.

Methodology

We conducted a qualitative exploratory research approach and analysed policies related to higher education, and design education. This approach aided us in understanding the state of policies regarding ageing in academia. The documents were collected by analysing historical policies related to higher education, institutional statutes, reports, and previous studies related to the matter.

We selected the documents to analyse by using purposive sampling, which “are strategies to make sure that specific kinds of [data] of those that could possibly be included are part of the final sample in the research study” (Campbell et al., 2020, p. 654). We used thematic analysis to identify recurring themes among the documents and grouped them.

Discussion

Labour Ageing in Education

The once “linear life plan” expected of a worker was questioned years ago, leaving the labour force without job security. According to the Organisation for Economic Co-operation and Development (OECD, 2019), “the ratio of older people aged 65 and over to people of working age (15-64) is projected to increase from [...] [2 to 5] in 2050”. This new reality should be embraced with the proper consideration for the ageing population, their perspectives, and their appropriate inclusion in society and the workforce (Gieben-Gamal, 2021).

Nonetheless, by pushing back on retirement, some higher education professors age in parallel with the syllabus, the content, the practices, and the methodology in their field. In some cases, this may hinder student learning with regard to emerging trends, technology, and possible innovations in higher education. In particular, design programs should promote what the design industry looks like outside the classroom: modern, ever-evolving, and flexible. This should also apply to current teaching methodologies. Now more than ever, design programs require merging traditional knowledge with technology such as Artificial intelligence (AI). As E. Martin notes (2022):

To some critics, postponed retirement has been seen as an action that can “hurt employment opportunities for younger people” (Hernaes et al., 2023, p. 11). In education, labour ageing in some countries is seen as an economic need rather than a prestigious academic move. Regardless, the race to retire has been delayed in several countries.

In design programs, labour ageing can look different: it can be an opportunity to share accumulated experience, but can also be experienced by others as resistance to change and adaptability. To some extent, this resistance with regard to the use of technology has diminished, as could be noted during the pandemic, even though this progress continues to fall short, because it represented only a minor improvement after two decades of promoting the use of virtual environments (González-Bello & Morales-Holguín, 2021). It becomes clear that strategic training in emerging technologies should be provided to professors to foster design education that meets the needs of a fast-paced world.

With the boom of AI design software in the past five years, programmes have had to reevaluate their contents, promote modifications to teaching practices, and cater to digital-age students. As a result, training and updating faculty in such technologies has sometimes resulted in enriched design programs, with new and proper information to prepare students accordingly. Nonetheless, in the case of research professors, programmes such as the National Researchers System (SNI, for its initials in Spanish) and other scientific funding in the country can pave the way for practices that, rather than aiming toward new technologies and trends in education, condition and limit innovation and design in higher education programs.

For research professors in Mexico, being a member of the SNI is seen by many as a symbol of status within the national research community, and as an economic incentive as well. There are different levels one can aspire to within the system: candidate, Level I, Level II, Level III, and Emeritus. The competition for achieving one of the levels in this system, and remaining in it, can be intense; all the more so if younger researchers are disadvantaged in qualifying for another level to begin with. For example, to be part of SNI, research professors must hold a Ph.D., and have published in Q1, Q2, or Q3 journals, among other criteria.

However, to aspire to the higher levels such as Level 1, researchers must have directed an undergraduate or graduate thesis, or hold a teaching position in a higher education institution. To comply with Level 1 requisites, young research professors often compete or are overlooked by academia in their institutions. This in turn makes the task of achieving a higher level in the system even more difficult.

The guidelines that dictate access to the SNI seem to be directed towards standardising research work, when in reality each discipline adheres to certain types of contributions that enhance the scientific profile. As a result, there is a significant difference between the number of researchers from the exact sciences that belong to SNI, and those that contribute in fields such as the humanities and the arts. This is to say, there is a lower percentage of researchers that belong to the SNI in soft sciences.

In Mexico, professors in design programmes who make the transition from practice to teaching at higher education institutions often do not have a solid foundation for conducting research. For most, teaching practices in higher education are normally complemented by conducting research, and entering the SNI system. In this sense, for design programme professors, the complexities involved in gaining access to a more desirable salary and proper retirement benefits increase.

Design Education in Higher Education

In design programmes, there is a need to push boundaries for the future of education and research in the field, from teaching practices to trending research topics. As Norman (2016) noted, in order “to transform schools to lead the future of design, educators must encourage students to explore and learn more about technology, the social sciences, the complexities of the world, and the economic, political, and environmental issues that design professionals will have to work on” (p. 345). To sum up, labour ageing in the field could hamper innovation and up-to-date learning if not properly managed by institutions and professors alike.

Design education has seen several transitions in paradigms and curricular models over time. As some studies have noted, “the signature pedagogy of design [education focuses] directly on applied work under project-based learning experiences. Through this pedagogy, students [...] build confidence in taking tangible action on goal-driven ideas, [among other skills]” (Davis & Dubberly, 2023, p. 111). Just as design education has undergone changes, the field itself has its complexities. To some, “it is both practice and academic discipline. Each category encompasses numerous specialised disciplines [...], with several different design societies dedicated to them” (Meyer & Norman, 2020, p.14).

Even though design continues to transform itself with developing technologies, there could be a growing gap in design education between theory and practice if the issue of proper training among professors is not addressed. With the industry’s constant evolution, higher education institutions and professors should consider adding or improving training and course material. Some studies have promoted the idea that “schools of design [need to] cover a set of core principles, but then offer advanced courses that might be unique to the special talents of the school or that might lead to [...] specialties within design” (Meyer, & Norman, 2020, p. 14).

Despite understanding that the market continues to shift towards a constantly changing culture, only “a few schools offer analytics studies, [and] design students are generally unfamiliar with data-collecting technology, measurement, and machine learning prediction” (Davis & Dubberly, 2023, p. 113). Redesigning undergraduate and graduate design programs is an essential part of preparing students for the technological environments they will work in. Bearing this in mind, labour-ageing professors in higher education should continue to learn and stay up-to-date on training and trends in design education and technologies.

Challenges for Professors and Design Programmes in Higher Education

Even though there are workshops and instruction aimed at continuing education for professors, there are roadblocks as far as design programme content is concerned. Training is one of these challenges. Regardless, there are vast programmes designed for professors to acquire skills and knowledge of new design technologies, but training does not necessarily translate into practice in the classroom.

The higher education system in the country burdens its scholars with teaching, research, and administrative workloads, leading them to experience greater challenges when faced with new content to use, learn, and teach.

Institutions have also slowly begun pushing for lifelong learning initiatives among the students and faculty as well. In Mexico, some higher education institutions such as the Tecnológico de Monterrey have embraced the idea that this should be seen as part of a healthy practice for individuals, and for institutions to promote among their populations. According to the report on lifelong learning (2024) by the Institute for the Future of Education, the “next few years will be vital in preparing ourselves for [...] an increasingly ageing world population. We will have to assume these challenges [...] and be aware that the scope of [them] goes far beyond the demands of the labour market” (p. 27).

The last initiative also involves graphic design curricula, which have now been converted into graphic design and animation, teaching skills that focus on designing, developing, and implementing advertising products, cinema, video games, interfaces, editorials, and marketing. Topics that require intergenerational dialogue to learn together.

An additional obstacle faced by professors lies in the acquisition of new software and technologies. Even though this can be considered an institutional challenge, the lack of funding destined for technology affects professors' training and development, especially in academic programmes such as design. This could cause a significant distance between practice and theory, where students would not receive the proper training or tools that the design market looks for.

This leads us to the challenges institutions face. Labour ageing in higher education institutions in Mexico is often an economic need rather than an academic endeavour. That being said, universities could benefit greatly if they would provide their ageing faculty with the resources, tools, and knowledge necessary to provide quality and up-to-date design content to enrich their students and institutions alike.

As noted by Pereno et al. (2022), design tools should consider educational resources that promote sustainability in their products, designs, and outcomes. Considering the alignment with the United Nations' 17 Sustainable Development Goals, design education should continuously look forward to updating its processes and methodologies to offer students this global approach. As mentioned by Linfante & Manciaracina (2022), “traditional design education needs to be “updated” by introducing and experimenting with new teaching methodologies that can provide students with an open-ended approach to even the most complex problems” (p. 161).

Furthermore, design education continues to be disrupted by emerging trends and technologies, creating a hurdle for designers. Therefore, it is important that we “not only consider what the designers can give to the future of education, but what education, in the form of schooling, can provide” (Zreika & Fanzini, 2023, p. 925). Likewise, design education should “re-imagine learning [...] [and propose] a design for critical, collected, community discussion, a tool” (Martin, 2022, p. 935).

Conclusion

This paper addressed certain conceptions and challenges in academia concerning labour ageing in higher education, particularly in design education. In this sense, higher education institutions provide constant training for their professors and update syllabi in design programmes to provide them with real-life solutions in the market. In design, labour ageing can be an opportunity to share accumulated experience, but it can also be seen as resistance to change and adaptability.

Furthermore, standardised policies can be obstacles and challenges in some countries, such as Mexico. Labour ageing in higher education can hamper innovation and up-to-date learning; hence, institutions and professors must manage it appropriately, and training processes must accompany these policies to promote the lifelong productivity of professors.

As previously noted, “design education has an opportunity to create more value to society, to connect novices with experts, link professionals, and make schools centres for lifelong learning” (Davis & Dubberly, 2023, p. 114). Mainly, design education should embrace challenges, change, and modify or eliminate practices that rather than teach students traditions, teach the knowledge and tools required for today’s industry 4.0 and 5.0.

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Stories



Longevitytech: Bridging Immersive Media and Design for Longevity

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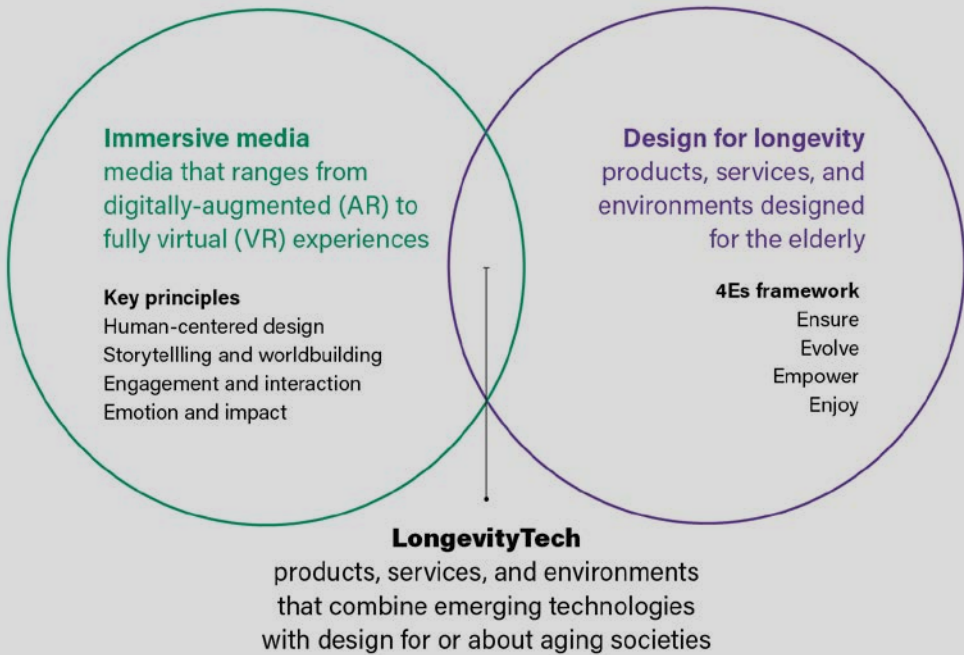
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“The present was an egg laid by the past that had the future inside its shell”.
Zora Neale Hurston, *Their Eyes Were Watching God*, 1937

Abstract

In fall 2023, I taught the undergraduate course *Introduction to Immersive Media* at Northeastern University (Boston, MA), where I've been an Assistant Teaching Professor in Design since 2021. My fascination with emerging technologies, particularly immersive media, dates back to my Master's thesis in 2012. Since that time, I have been interested in how artists and designers currently use and will use technology, and I'm excited about encouraging my students to reflect on the same and envision the products, services, and experiences they want to see in the world. This past fall, I decided to teach a special section of my *Immersive Media* course that would combine a newer interest of mine with the world of immersive technologies: design for longevity (D4L). While preparing for the course, I explored how immersive media intersects with D4L. This led to the creation of the LongevityTech pedagogy, merging the four key design principles of immersive media with the 4Es framework for D4L. Fig. 1

Stories cover image:
Image of *Enchanted Pencil*, an augmented reality experience by Northeastern University student Meng Un (Class 2024), shown in *Making Sense* at CyberArts Gallery, Boston MA (December, 2023).



What Is D4L?

I was first exposed to D4L when I started working on a project at the MIT AgeLab (Cambridge, MA). I was brought on as a visual designer to help redesign a financial planning service that responds to ageing demographics. For the project, we used the *Four Retirement* framework developed by Joseph Coughlin (2019), the lab's founder and director, to design a longevity coaching service that facilitates conversations between financial advisors, whom we call longevity coaches, and first-time clients.

According to the WHO (2022), the world's population of people aged 80 and older is expected to triple by 2050 and reach 426 million. Longevity offers a holistic response to ageing populations. It combines the physical health of an older individual with the well-being of a society that is responding to these transformative demographics. The impact of D4L reaches an ecosystem of neighbours, family members, home and community environments, transportation systems, and policy.

D4L goes beyond designing for the elderly. Think of toilet seat risers that help the mobility-impaired (The Home Depot, 2024) or *Magna Magic Magnetic Clasp Converters* (eBay, 2024), which use magnets to replace difficult closures on necklaces and bracelets. D4L should be far-reaching in proposing solutions for age-friendly societies. For example, Beacon Hill Village (Beacon Hill Village, 2024), a grassroots organisation in Boston, MA, offers ageing-in-place support for adults over 50, including medical transport and care arrangements, as well as social activities that build community

Fig. 1
LongevityTech Pedagogy: definition of terms. Immersive media is a field that represents an entire spectrum of mediated realities, and design for longevity (D4L) explores the objects, products, services, and environments developed to meet the unique needs of elderly populations.

and foster independence. And Bridge Meadows (Bridge Meadows, 2024), a multigenerational community in Portland, Oregon, brings “grandparents” together with foster children to create affordable and stable housing solutions.

The 4Es Framework for D4L

The 4Es framework offers designers a series of questions to assist them in catering to ageing demographics and creating designs that promote a healthy lifestyle, independence, and enjoyment through-out ageing. It centres on four key verbs, each beginning with the letter “E” (Lee et al., 2023a; 2023b). D4L means addressing essential needs and also cultivating meaningful experiences that enrich lives across various ages. To illustrate, let’s envision longevity akin to tending a garden, with designers as the nurturing gardeners.

Ensure: How can your design ensure essentials? What forms the bedrock of future well-being? Just as a garden requires a conducive environment, supportive climate, and fertile soil to flourish, there are foundational elements crucial designers can assess for healthy ageing: mental and physical health, caregiving support, intellectual engagement, safe living spaces, access to local resources, and social connection.

Evolve: How can your design evolve over time? Recognizing the evolution from seedlings to blooming flowers, gardeners should adapt their care regimen in response to plant growth and changing seasons. Likewise, designers should anticipate and accommodate the shifting needs of an ageing society, ensuring their products and services remain relevant and effective.

Empower: How can your design empower your user? How can gardening empower society? The impact of a garden can extend beyond its walls to foster community connections and environmental stewardship. Neighbours, insects, and local animal friends can share the harvest and appreciate the beauty the plants provide. Designers should explore how their creations empower broader networks of caregivers, family members, and future generations to navigate ageing with resilience and support.

Enjoy: How can your design bring joy to users? Imagine enhancing the gardening experience with comfortable benches, accessible tools, and soothing wind chimes. Similarly, D4L entails infusing moments of joy, comfort, and encouragement into products and services. Think of customizable canes or hearing aids that look like jewellery. Or a visit to the doctor: What about the initial moment of entry and interaction at the reception desk might ease anxieties and even bring comfort?

What Is Immersive Media?

When teaching immersive media, I often start with Milgrim et al.’s virtuality continuum (Kishino & Milgram, 1994). This continuum represents a spectrum of technologically mediated environments, from the entirely real, to augmented reality (AR), augmented virtuality (AV), and finally to the entirely virtual (VR). Though the continuum has

been iterated upon many times since 1994 (IxDF, 2024; Skarbez et al., 2021), it clarifies the ways that immersive media blurs the boundaries between the physical and digital worlds. In immersive media experiences, users can interact with and become part of a digital environment, often feeling as though they are physically present within it. This technology is commonly used in entertainment, education, training, healthcare, and various other fields to create engaging and interactive experiences.

Over the years, I've noticed that immersive media practitioners hail from various backgrounds, such as film or media studies, and game or interaction design. Drawing inspiration from this diverse field of practitioners, I, along with colleague and visual artist Jamal Thorne (Northeastern University), have developed four essential design principles tailored specifically for our immersive media students.

Human-centred design. To create meaningful experiences, designers building immersive media experiences should address audience-specific needs in terms of content, accessibility, and inclusivity. They should use a human-centred design process and ask themselves: What do I want to build? Who is it for? What unmet need or market gap does it respond to?

Storytelling and worldbuilding. Designers should work with compelling stories and relatable characters and build plausible, specific worlds to create a sustained sense of presence. They should consider: How do users enter the experience? Where do they go? Whom do they meet?

Engagement and interaction. Designers should employ best practices for interface design, spatial sound, gesture recognition, and haptic feedback to create a sense of embodiment for users. They should ask: What do users do in my story? How do they know how to do it? How does the storyworld respond?

Emotion and impact. Meaningful immersive media will evoke positive or profound emotions in users to create memorable experiences. Designers should consider: What makes my user stay?

What is LongevityTech

LongevityTech refers to products, services, and environments that use emerging technologies, i.e., immersive media, and Artificial Intelligence (AI), when designing for aging societies. LongevityTech is not to be confused with longevity technology, which generally refers to any technology that can help us live longer in terms of preventative treatments, advancement in diagnostic tools, treatment of damage caused by aging, and reversal of natural aging processes (Zavoronkov, 2022). LongevityTech is broader in goal than longevity technology.

LongevityTech is also an exercise in envisioning the future. Since LongevityTech projects must use emerging technologies—technologies for which there are not yet industry standard workflows—there is a greater emphasis on concept development and rapid prototyping than development workflows. Therefore, LongevityTech is an exercise in envisioning the future: the future use of technology goes hand in hand with envisioning the future needs of an ageing society.

I'm reminded of something I recently heard while listening to my favourite podcast, Search Engine. The millennial-aged host P. J. Vogt stated his belief that: "the invention of the internet might mean that my generation of adults contains the most people who do jobs that did not exist when they were kids: social media manager, viral TikTok personality, dropshipper, podcaster" (2024). Designer of smartphone apps. Mixed reality storyteller. And so on.

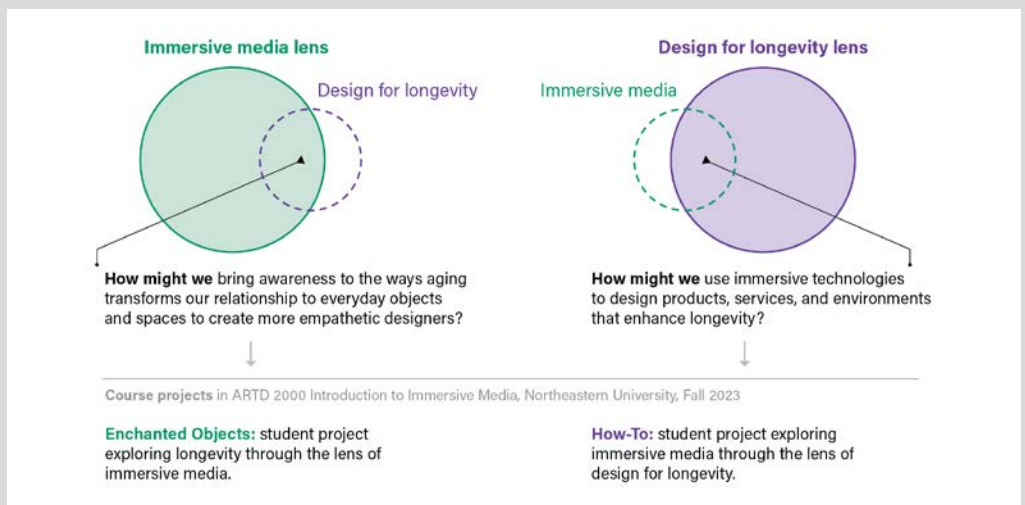
My students must be prepared to design for interfaces and work in roles that they can't imagine existing. To further complicate the matter, they should be prepared to design not just for unfamiliar audiences, but for societies with unprecedented population demographics. Because they will witness great social and technological evolutions in their lifetimes, the goal is to prepare design students for working within the discomfort of unknowing.

Recognizing the need for students to navigate uncertain spaces and anticipate future design challenges, I emphasise a human-centred design process, which means looking at and listening to how human behaviour can shed insight into design work. In this case, to develop relevant project work, I came up with two questions that mirror the relationship between immersive media and D4L. Fig. 2

If we look at D4L through the lens of immersive media, we can ask: **How might we bring awareness to the ways that ageing transforms our relationship to everyday objects and spaces to create more empathetic designers?** In response, I assigned my students a project, Enchanted Objects, that asked them to consider how their relationship to everyday objects might change across different life stages. My goal was that their projects would raise awareness about the challenges elderly populations face in common interactions with everyday products.

On the flip side, if we look at immersive media through the lens of D4L, we can ask: **How might we use immersive technologies to design products, services, and experiences that enhance longevity?** Can we use immersive media to serve the needs of an ageing population? In this project, How-To, students used the Microsoft HoloLens to design an instructional experience to teach older users how to accomplish a simple tabletop task.

Fig. 2
LongevityTech Pedagogy: Possible research lenses and applications. This diagram demonstrates what type of research questions, and therefore project work, we can explore in a LongevityTech curriculum.



In summary, the projects asked students to use immersive media to explore the impact of ageing demographics on themselves and their communities. The projects also examined the role that designers, even college-aged ones, can play in raising awareness about ageing demographics and extending quality of life for those who live longer as well as their extended communities of caregivers and family members.

Enchanted Objects: D4L through immersive media

Enchanted Objects project prompt

How might we bring awareness to the ways that ageing transforms our relationship to everyday objects and spaces to create more empathetic designers?

Use augmented reality (AR) to demonstrate how the role and design of an object can evolve to serve the needs of users across multiple life stages. In other words, use AR to tell the story of how our behaviour around an object, product, or activity changes over time. You must be able to bring the object, product, or activity, e.g., a cup, game, etc., to class and subsequently to the exhibition space. Consider how this object, product, or activity is used in at least three different stages of life, from babyhood, toddlerhood, childhood, teens, to young adulthood, adulthood, older adult, and elderly. And describe your choice relates to longevity by answering the following questions:

How does your object, product, or activity evolve over time?

At each stage, how does the object, product, or activity empower or disempower the user?

At each stage, what makes the object, product, or activity enjoyable or challenging for the user?



Fig. 3
Documentation from Making Sense, at Cyber-Arts Gallery, Boston, MA (December, 2023), an interdisciplinary exhibition by Northeastern University students from the College of Arts, Media, and Design.

Project highlight: Enchanted Toothbrush

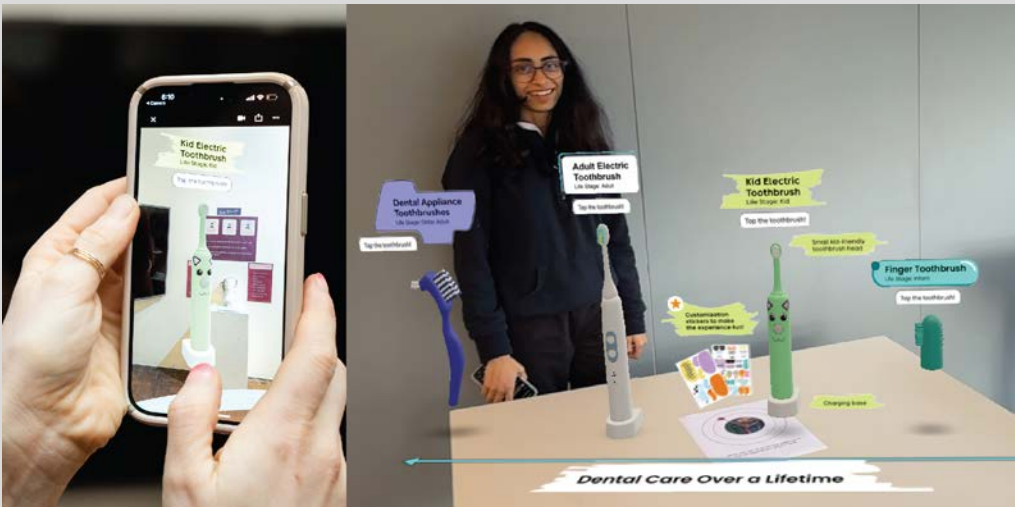
The final deliverable for this project was an AR experience designed for an off-campus, public exhibition at a nearby gallery. Fig. 3 The project began with students selecting objects, products, or activities and documenting, through user interviews with peers, colleagues, and family members, how human behaviour around their objects, projects, or activities changes over time. Students then created an AR timeline showcasing their research. They were asked to consider the trigger or the viewer's entry point into the experience: How did the trigger or entry point attract attention? Was it a poster with a QR code or a visual marker on the ground? And what instructions were needed? Did users need to download an app? Put in their earphones? And once the viewer was in the experience, students had to account for their height and perspective. How could they use digital wayfinding or animation to direct a viewer to their points of interactions?

Trisha Iyer, a fourth-year Design BFA, selected an electric toothbrush. She looked at a variety of electric toothbrushes to better understand how they worked. Then she talked with extended family members about the increasing demands of dental care with age, the accessibility challenges encountered by different demographics of electric toothbrush users, and how age impacts the satisfaction of using an electric toothbrush. Table 1 For her project, she used Adobe Aero, Adobe's mobile AR software, to create a sit-down experience that allowed viewers to explore the affordances of different toothbrushes by clicking on 3D models that hovered above a tabletop Fig. 4. Each toothbrush represented a different phase of life, and when clicked, it animated (grew, jumped, or spun), before a voiceover and supportive text appeared detailing the unique characteristics the brush offered. During the exhibition, we installed toothbrushes on a shelf to draw attention to the project; this worked particularly well with younger gallery-goers.

Project proposal			
A toothbrush is an important tool in our everyday lives, and it is essential for our overall health and quality of life. As we age and gain more independence, we also take increased responsibility for our wellness. In this immersive and interactive learning experience, people can experience how toothbrush features and dental care change over a lifetime and learn about dental care in a fun and memorable way.			
Lifestages			
Infant/Toddler	Childhood	Adult	Older adult
Descriptions			
Even before a toothbrush, parents use a finger toothbrush to care for their baby's gum and new teeth.	There are kid-sized, colourful electric toothbrushes that have playful sound effects to entice children to brush for longer.	Electric toothbrushes are more sustainable than regular toothbrushes, provide less abrasion, and prevent gum disease and plaque buildup.	Electric toothbrushes with extensive customizations , including feedback when brushing too hard or softly and extra-soft bristles to prevent irritation.

Underlying Trisha's enchanted toothbrush project is a story about responsibility and independence. In the beginning, our parents are responsible for our dental care, and as we grow, we learn to take care of our own teeth, gums, and tongues. Until we can't anymore. In older age, when our dexterity, mobility, and memory start to present new challenges, we look to objects that extend our independence and our ability to continue to care for ourselves, in this case our teeth.

Tab. 1
An overview of Trisha's process for her Enchanted Toothbrush project.



How-To: Immersive media through D4L

How-To project prompt

How might we use immersive technologies to design products, services, and experiences that enhance longevity?

In this assignment, you will teach a behaviour, skill, or ritual involving a product or object(s) in response to the theme of longevity. Plan and develop an immersive learning experience that uses a combination of physical materials/space and augmented digital elements from a Microsoft HoloLens 2. In this process, you will acquire or make the physical objects you need, write a set of instructions, design original assets using 2D and 3D software, and assemble your instructions using Microsoft Guides in the HoloLens. Be intentional about your audience: You can design an experience for elderly people, caregivers, young people, or anyone in between. You may work in groups or individually.

Your “How-To” must:

Provide a set of instructions to accomplish a task in a ~2’x2’ tabletop space;

Use found or original physical objects;

Use found or original moving, still, and/or 3D digital assets.

Fig. 4
Documentation of
Enchanted Toothbrush, by
Trisha Iyer, a student from
Introduction to Immersive
Media Fall 2023.



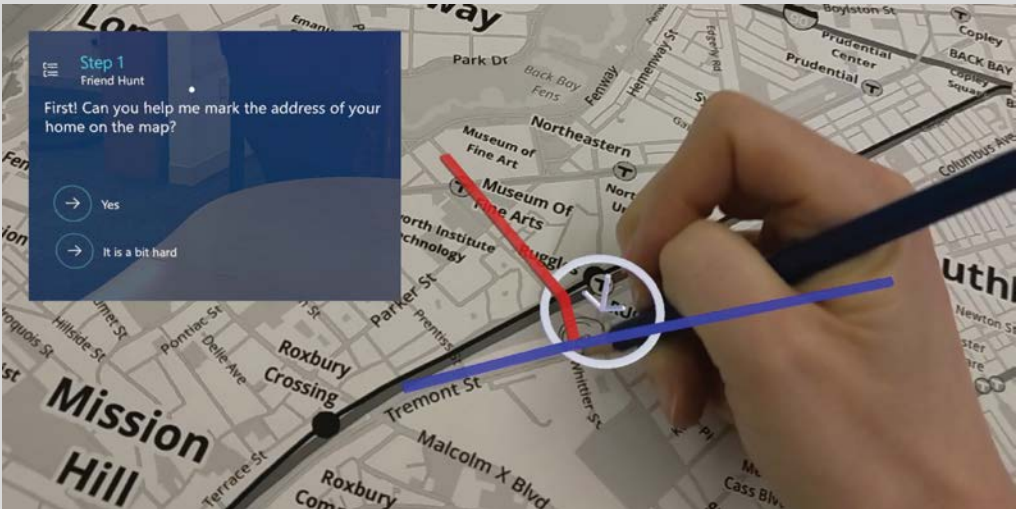
Project highlight: Memory Navigator

Fig. 5
Documentation of Memory Navigator, by Shanshan Lai, a student from Introduction to Immersive Media Fall 2023.

In this assignment, students needed to create a tutorial for a task that used physical objects and could be completed on a small tabletop. They needed to watch people complete the task, paying attention to where things might go wrong. Based on their observations, they outlined a series of sequential or branching steps. At each step, they wrote a short instructional text and created or found a visual asset (video, 2D image, or 3D graphic). Instructions, warnings, and visuals were compiled in the HoloLens using an off-the-shelf software, Microsoft Dynamics 365 Guides (Microsoft, 2024).

Shanshan Lai, an exchange student in Interaction Design from China, proposed *Memory Navigator: How To Remember Your Way Back Home*. Fig. 5 She designed a map-based experience to help with memory deterioration. In practice, each client would have a personalised map experience that their caregivers would help coordinate by providing the designer the locations of important resources in their neighbourhoods, including supermarkets, hospitals, doctors offices, and friends' houses. Users were asked to remember and identify the location and routes to various places on a large map.

Shanshan prototyped an experience for the HoloLens about an elderly man who lived in the Roxbury area of Boston. In the experience, he was prompted to remember the location of his home Fig. 6, the home of his “pal the fishing bro,” and his favourite fishing spot at the Jamaica Plain Pond. If he couldn’t remember how to navigate from place to place, the HoloLens would project the route onto the map, which he could copy with a marker. Hypothetically, the marked-up map could be used to study, or even as a physical aid to bring with him on outings.



Later in the experience, he could explore local resources for different types of assistance by tapping colourful digital markers on the map. In Fig. 7, a user has selected the senior centre. This triggers digital pictures of the senior centre to appear in the headset, including descriptive text about and contact for the centre itself.

Fig. 6 Documentation of Memory Navigator in use. In this image, a user references digital cues that Shanshan designed to help identify and mark the location of their home on a physical map.



Shanshan named the map a “personalised safety map” and introduced a self-scoring system that allowed users to assess task difficulty. In potential applications of this project, such information could be useful for medical professionals or caregivers monitoring the cognitive wellbeing of patients or loved ones.

Fig. 7 Documentation of Memory Navigator. In this image, a user explores brightly coloured digital markers to learn about the assistance that is available in their community, like the senior centre, “a lively community waiting to welcome you. Mark it on your map, and you’ll be joining in on the fun and laughter in no time”.

LongevityTech Pyramid: A Visual Aid

As a result of observing students complete their projects, I combined the 4Es framework with the four key principles of immersive media to create the LongevityTech Pyramid Fig. 8, a conceptual map of the design process and considerations for successful project work.

The Pyramid acts as a bird's-eye view of the LongevityTech design process. It can be used to guide project development and facilitate critical dialogue. Starting horizontally, the Pyramid is divided by the foundational principles of immersive media. Starting at the bottom, each level forms a solid foundation for the next and can, if desired, be used as a design process. At each level, from left to right, the Pyramid is further divided by the 4E verbs. These subdivisions allow us to tailor the 4E questions to specific principles of immersive media. For example, What does a human-centred approach teach us about what our service, product, or experience needs to ensure? Or How does storytelling and worldbuilding evolve over time? Each question presents an opportunity for reframing and analysis.

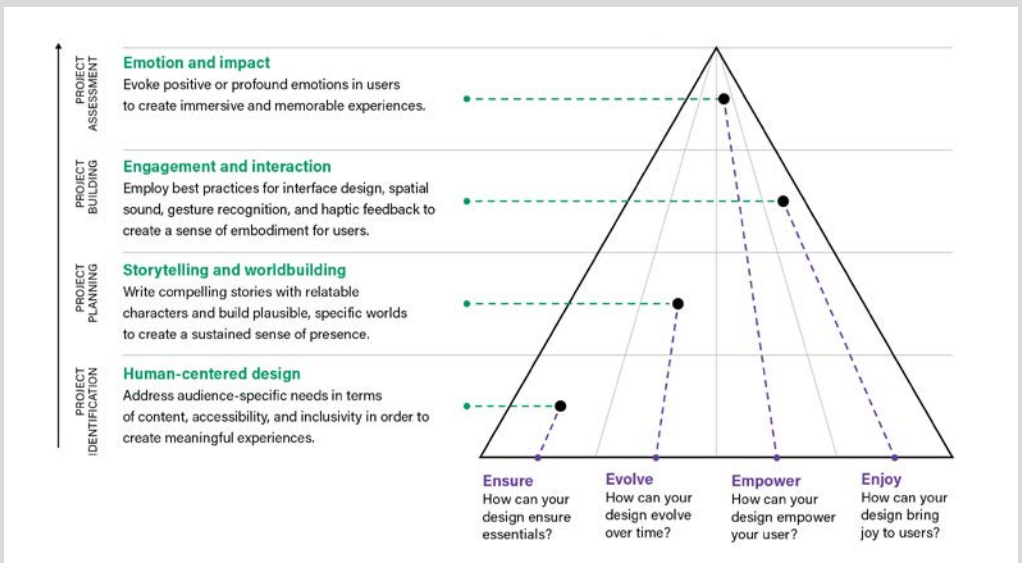


Fig. 8
LongevityTech Pyramid: a visualisation of the design process and criteria for creating meaningful immersive media experiences for longevity.

Essentially, the Pyramid can be used as a critique tool. In Fig. 8, each intersecting pair of dotted lines represents an opportunity for critical reflection that we can, for example, apply to Shanshan's Memory Navigator.

- 1 Human-centred design x Ensure: *How might we apply human-centred design methods to better understand what our design must ensure to be longevity-friendly?* In the development of the Memory Navigator, Shanshan looked at the challenges faced by individuals with memory deterioration and at the supporting role of caregivers and medical professionals. This ensured that the Memory Navigator not only addressed the immediate needs of its users, but also provided valuable support systems for their communities.

- 2 Storytelling and worldbuilding x Evolve: *How might our narratives and environments evolve alongside the changing needs of older users?* Shanshan's design of a personalised map demonstrates an adaptable narrative approach capable of evolving over time to accommodate changing cognitive abilities and environmental factors.
- 3 Engagement and interaction x Enjoy: *How might we create moments of interaction that can evoke delight?* In the Memory Navigator, Shanshan utilised a prefabricated 3D model of a digital hand to create a "high five" trigger. Rather than simply placing the hand on the table, she strategically rotated and positioned it within the user's line of sight and incorporated on-screen text that read 'High five!'. Shanshan transformed the moment into an intuitive, joyful, and physically engaging experience.
- 4 Emotion and impact x Empower: *How might we create emotional resonance and impact that empowers communities after the experience is over?* By enabling users to identify customised locations, the Memory Navigator empowers them to better connect to their surroundings. This impact extends to caregivers and medical professionals who can utilise the system to monitor cognitive states and provide support.

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Conclusion. Envisioning a Longevity-Friendly and Immersive Future

In my exploration of D4L, I've come to recognize its dual focus: adapting to the changing needs of individuals over time and addressing the broader societal implications of an ageing population. This entails not only designing products and spaces that accommodate age-related changes, but also reimagining societal structures and systems, like education, career paths, and social relationships, to support diverse and ageing demographics. Creating longevity-friendly cities and communities with accessible infrastructure and inclusive spaces is essential for promoting well-being and social inclusion among older adults. Moreover, it's crucial to equip young designers with the awareness and skills needed to address the unique needs of ageing populations and design for a more inclusive future. By integrating this with emerging technologies such as immersive media, we have the potential to revolutionise how we approach ageing and enhance the quality of life for individuals of all ages.

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Designrama

The Designrama section is open to international debate and is not characterized by any specific theme. It is conceived as a space for the scientific community to give evidence of where research is heading worldwide.

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Co-create and Co-develop With Children. The BODY SOUND Engagement Model

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Abstract

The article explores the use of participatory design processes, methods, and tools to develop interactive healthcare and wellbeing solutions involving children with motor disabilities and their caregiving system. This contribution provides a theoretical framework focused on the engagement roles that children participating in co-design processes can play, providing the description of BODY SOUND, a pilot project developed within the SISCODE H2020 European project. We will present the co-design process divided into two main phases: co-creation and co-development. For each of these phases, we carried out iterative design actions that will be presented according to the role with which children are engaged, the targets involved, and methods to collect data. All of these were subjected to the primary goal of each design action. The final part systematizes the results of the analysis and identifies different goals and methods for children's participation according to specific design phases.

Keywords

Co-design
Patient Innovation
Children engagement
Boundary objects
Makerspaces

Introduction

The article presents co-design practices developed by involving children in the specific domain of digital artifacts for healthcare and wellbeing sectors. Involving children with special needs in these processes is not without its challenges, and requires extreme flexibility and adaptability, but studies show that including them in technology development processes can become a way of including them in society (Kärnä et al., 2010). In our work, we consider co-design a collective noun that includes co-creation and co-development. The definition of co-creation as “collective creativity produced” (Sanders & Stappers, 2008, p. 3) is applicable to the phase of idea generation and refinement. Instead, co-development happens in a later phase of idea development, the prototyping phase. They are both defined by the active involvement of final users and stakeholders. In the following section, we will frame our research theoretically, focusing on the role of children involved in co-design processes. Afterwards, we will introduce the BODY SOUND pilot project considering the various design phases, the levels of the children’s involvement, evaluation focus, and methodologies. Ultimately, we categorize and distinguish various objectives and approaches for the involvement of children, based on specific phases of the design process.

Theoretical Framework for Co-designing With Children With Disabilities

While a large body of research has been conducted on co-design with kids, relatively little of it has examined kids with cerebral palsy (CP) and their involvement in creating new designs (Borzenkova et al., 2023; Benton & Johnson, 2015; Börjesson et al., 2015). Jenkin et al. (2019) propose a decolonized approach to the involvement of children with disabilities, according to which they are not just described by their impairments, seen as disadvantages to be fixed, but also by a variety of human and social factors. Moreover, their involvement can increase self-esteem and confidence (Constantin et al., 2019; Bolster et al., 2021). However, the use of formal methods for involving children with disabilities in research might not be effective, especially when severe health conditions are present.

Markopoulos et al. (2008), using the approaches provided by Druin (2002) and Scaife and Rogers (1999), develop a model explaining the different levels of children’s involvement, in which participation ranges from a minimum to a maximum level of involvement, from the stage in which the product is already developed and ready to be used through the ideation of the product itself at the very beginning of the design process. Children can be involved as end users of products with no engagement in their design; they can be testers of products and participants in their evaluation; they can be informants (Druin, 2002; Scaife & Rogers, 1999), and/or design partners (Druin, 2002) engaged throughout the whole design process, to which they contributed with their own ideas and opinions. The key difference between the roles of informant and design partner lies in their level of involvement. Informant children contribute at specific stages when researchers seek their input, such as observing their inter-

actions with existing technologies or reviewing design sketches. In contrast, design partner children are equal stakeholders throughout the entire design process, collaborating fully in the creation of new technologies (Druin, 2002).

The BODYSOUND Pilot Project: Engagement Model

Polifactory, makerspace and fablab of the Politecnico di Milano carried out a pilot project as part of the EU project SISCOE (Co-design for Society in Innovation and Science) H2020 European project, aimed at stimulating the use of co-creation methodologies to experiment on public engagement and RRI to integrate co-design and bottom-up co-creation initiatives (Deserti et al., 2022).

Polifactory's pilot project sought to investigate the various physical-motor needs of children diagnosed with infantile CP based on the principles of proprioception (Bordoloi & Sharma, 2012), with a specific focus on the translation of movement into sound stimuli. The Design research area of interest identified by the researchers has been that of wellbeing in relation to physical activity and the related improvement of motor capabilities. Indeed, studies show that, compared to their peers, children with CP engage in less physical activity (Yoon et al., 2022; Carlon et al., 2013); those who engage in physical exercise have higher levels of satisfaction and a higher quality of life, reducing the level of parenting stress. This highlights the need for professional care and research on interventions targeted at helping children with CP become more physically active (Maher et al., 2015), to involve them in more than just rehabilitation sessions, usually located in hospitals or healthcare centers. Lai et al. (2021) highlight that effective interventions include recreational activities, active video games, behavioral coaching, and motor skill training. For these reasons, the researchers worked to combine rehabilitation and Leisure-Time Physical Activities (LTPA) to escape the strict health and caring areas of action.

The process described below involved several making and rapid prototyping technologies. The focus on advanced technologies was dictated by the need to operate iteratively and quickly during development, following the co-creation and co-design phases and the related feedback. The researcher's approach responds to the "use low-tech interactions to design high-tech" principle of designing with children who have severe motor impairments suggested in Hornof (2009). These technologies, which are often open-source, are useful tools for the reproducibility of the process, and many of them are extremely versatile and have a very low learning curve. These characteristics make them accessible to children and the other stakeholders involved, who can use and test them without knowing how to use them in advance. Indeed, as will be presented in the following paragraphs, prototypes were used as technology probes (Hutchinson, 2003), to experience sound via other senses as well, such as touch or sight (Kucirkova & Kamola, 2022). Moreover, the process followed the deep engagement principle (Hourcade et al., 2012) defined as co-designing with individuals who spend much time with the main user, such as parents, caregivers, and practitioners (Borzenkova et al., 2023; Hornof, 2009).

The result is BODY SOUND, a product-service system based on a co-design process carried out with children, caregivers and therapists, and with the support of the FightTheStroke (FTS) foundation. Through a virtual avatar, the BODY SOUND system offers users visible movement directions that they can follow to create melodies, obtain points, and progress to new levels. The service was developed for pediatric psychomotory and motor rehabilitation professionals, to provide a “high level of personalization” tool for home rehabilitation sessions intended to help the kids maintain their training and monitor their development.

In the image below, the model of engagement for children and other stakeholders according to different participatory research phases is also exemplified based on the methods used to gather information, feedback, and insights from the participants.

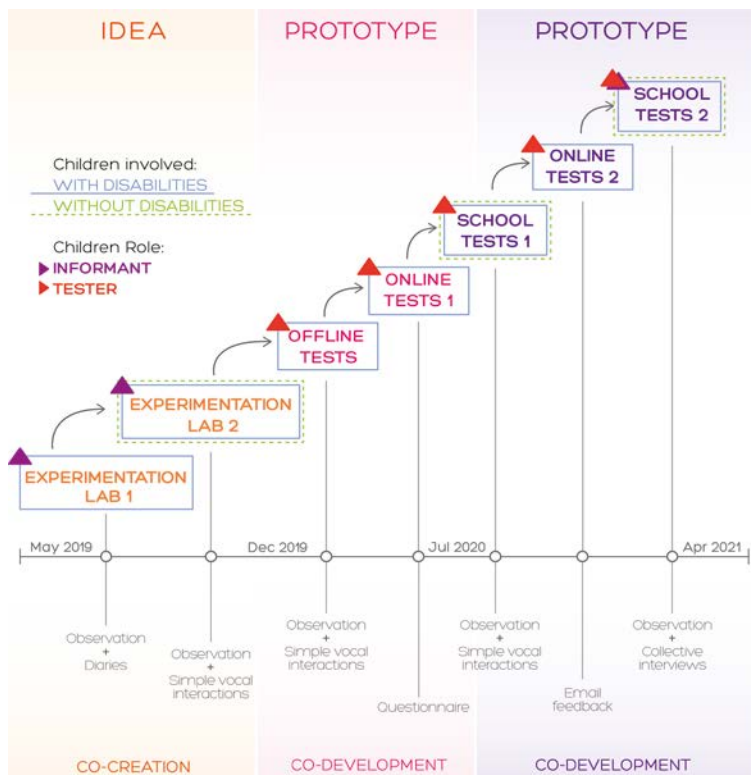


Fig. 1 Polifactory, BODY SOUND Children engagement model. Credits: Polifactory, Politecnico di Milano.

The step-by-step process model will be presented in the following pages.

Children as Informants: The Experimentation Labs

Conducted concurrently with the co-creation workshops with the children's families, the Experimentation Labs represented the initial endeavour, involving children as informants in the co-creation of the BODY SOUND solution.

Specifically, the research team carried out two Experimentation Labs:

- Experimentation Lab 1 (May-June 2019): 6 children (4-8 y.o.)
- Experimentation Lab 2 (October 2019): 20 children (4-8 y.o.)

Some raw technology was tested in both the Experimentation Labs, and the children's interaction and use of existing or prototyped products were observed. Specifically, the aim of these Labs was to observe how children interacted with different technologies and interfaces for playing music, ranging from touch to touchless.



Fig. 2
Polifactory, BODY SOUND,
Experimentation Lab 1.
Photo Credits: Polifactory,
Politecnico di Milano.

The primary outcome of this first lab was “relational”. Trust was built between families, children, and researchers. Feedback from the cultural probe diaries (Gaver et al., 1999) indicated that for families this moment was a valuable stimulus for activities that could be re-created at home. They identified accessible and engaging technologies and discovered solutions that could be adapted to meet some of their children's needs.

Experimentation Lab 2 was aimed at children experiencing the intangibility of sound through the tangibility of movement. Children with and without PC were involved and played with three main roles during the activity: the deejays reproduced sound with an enlarged interface based on littleBits synth modules; the choreographers instructed the dancers on the movements to be performed; and the dancers performed the choreography.

This workshop was valuable in understanding the differences and similarities between the children, which is crucial in developing solutions that could be stimulating for all children.

Observation was the principal method of investigation and, in Experimentation Lab 1, the participants were also given a diary to report the pros and cons of the experience.

The results of our co-creation activities influenced researchers in assessing the idea of developing a digital game and establishing the essential features of the final solution, like portability in a non-care context and adaptability to a wide variety of needs and diseases.

From Informants to Testers: Offline and Online Engagement

The role of a child as a tester is focused on helping both with learnability, usability, and enjoyment, aiming to revise the prototype's releases. A gamification system was used to make the software interface platform more attractive and consistent in training, which was fundamental for our purpose of motor reactivation. Both offline and online tests were conducted iteratively (December 2019-November 2020) with 10 children (4-8 y.o.). Offline tests on the first prototype releases of the solution were carried out in a lab environment (at Polifactory). Online tests focused on the use of the solutions from home and on verifying elements that made the game pleasurable.

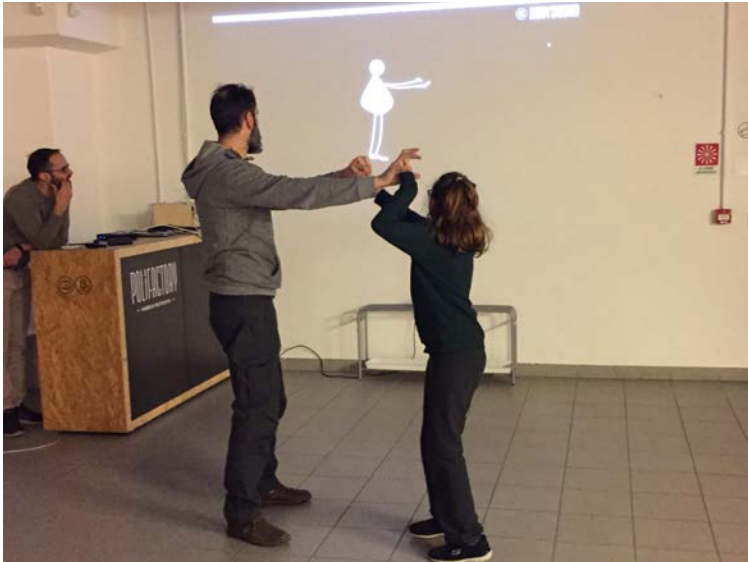


Fig. 3
Polifactory, BODY SOUND,
First offline test session.
Photo Credits: Polifactory,
Politecnico di Milano.

Offline tests were organised in small groups of 2-3 children. Through these iterative sessions, the efficacy of the selected technology was tested, and the pleasing appearance of the game's interface, the visual representations, the efficiency of the sound feedback, and the chosen set of melodies were verified. Three researchers managed these sessions: one in a technical role, another focused on child engagement and the third dedicated to observing the behaviour and reactions of the children. The children were always accompanied by one parent and sometimes by their siblings too.

These sessions revealed that the children liked the chosen representation (avatar) very much. They enjoyed dancing to the songs

because they could see their movements reflected in the avatar. The kids created “figures” with other players in the multiplayer game.

This offline testing phase was interrupted by the COVID-19 lockdown which influenced our decision to deploy BODY SOUND directly at home, under the supervision of parents.

The very first online test was developed using a tool to validate the graphics and sound feedback, and to keep in contact with the families and children. A board on the Padlet platform was shared with the families, and the children could easily provide their feedback with their parents’ support.

BODY SOUND was transferred to personal computers to conduct the second online test, and an exercise recording tool was deployed. Motor rehabilitation specialists were asked to record their movements while listening to suggested melodies and to save the recordings, assigning a level of difficulty to each exercise. At the same time, the software was developed by integrating the ability to perform body tracking through a webcam, using Google open-source algorithms. A website containing a simple instruction manual and the BODY SOUND game customised for Halloween was designed and shared with 10 families. Participants encountered some difficulties since their computers were not very performing, and the setting did not allow the proper child recognition and tracking. This influenced our decision to go on with the development of BODY SOUND both for computers (in view of future technological improvements) and Kinect. For this test, evaluations were conducted via email, requiring us to depend on the parents’ feedback without the benefit of direct observation or verbal interaction with the child testers.

Children as Testers: Verifying the Solution Scalability

After the prototype was developed new tests were carried out in a real-life context (school). The BODY SOUND prototype could thus be tested with a higher number of children who did not have any disability in most cases.

Two rounds of testing were conducted:

- School tests 1 (July 2020): 20 children (4-12 y.o.).
- School tests 2 (April 2021): 40 children (8-10 y.o.).

In School tests 1, the school environment was slightly different than usual because children were attending a summer camp. One room of the institute was set up for the tests.

A similar organisation was also put in place for School tests 2, during which the prototype final release was tested. In this second session, the testing activity was conducted during class hours, and was supervised by the children’s regular teachers. This real-life setting influenced the children to pay more attention and behave as they do in class.

Common elements between the two testing sessions were the organisation in small groups, the presence of children without disabilities, the organisation of the research team, the evaluation through direct and indirect (video-recording) observations, the use of scoring as a way to engage the children even more. The BODY SOUND system was able to autonomously calibrate according to the

child's body (e.g. height, arms opening) and offered just-above-level challenging movements. Scoring followed the same principle: given that the exercises were normalised according to each child's peculiarities, the final score depended on each player's ability.



Fig. 4
Polifactory, BODY SOUND,
School test 1. Photo Credits:
Polifactory, Politecnico
di Milano.

Differences between the two testing phases were connected with the level of development of the prototype. In the first case, the visual and graphic elements were simpler, mainstream songs were featured, and the computer webcam was used; in the second, additional movement guides were added to facilitate the exercise, new songs were composed, and the Kinect was used. The typology of interaction also changed from one version to the other. In the first case, the song was divided into multiple track instruments, which were played if the child performed the movement correctly; in the second case, additional tracks were added to the song track base if the child performed the movement correctly.

These activities highlighted the limitations in tracking accuracy and the challenges of using the system in uncontrolled environments. As a result, the option to use either a single colour camera or a combination of a colour camera and a depth camera was integrated to enhance tracking reliability when needed. For the final testing phase, "movement guides" were integrated and refined to pre-trace and suggest the movements children were invited to perform with their limbs to receive sound feedback.

As previously explained, the research team consisted of three researchers each with different roles. In both circumstances, the children's tests were recorded; group interviews were conducted only in the second test because the children were older and could express their opinions more readily. It was interesting to observe that even though the kids were competing, they continuously encouraged and offered suggestions to their peers.

No previous instruction was provided to test the learnability of BODY SOUND; therefore, the first child using it had to understand how the game worked and what the rules were. After the first child's test, we asked all the children if they understood the rules of the game, and then proceeded with the other tests. All the children, including those presenting a disability, could play the game without difficulties. Once every child had finished their test, they were asked

about several graphic aspects, sound and play elements of the game, the enjoyment and pleurability of the visual graphics and music, and the BODY SOUND game overall. This final interaction with the children was very positive since in many cases they spontaneously played the role of informants and not only testers, giving us additional suggestions for the further development of BODY SOUND, and asking questions about features that they were interested in understanding.

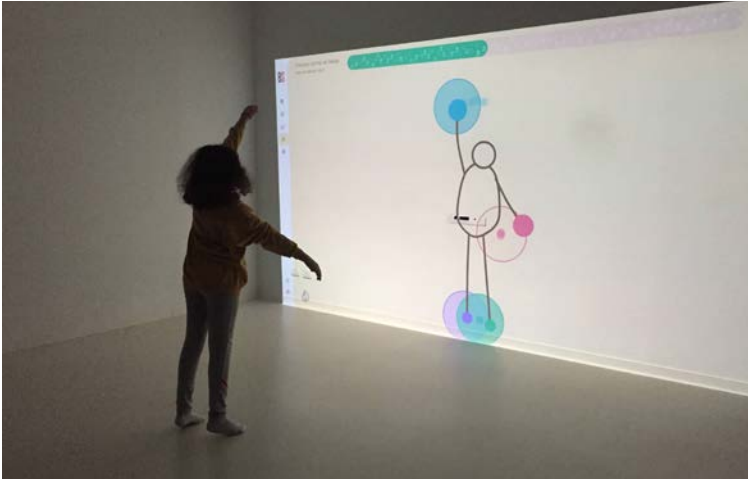


Fig. 5
Polifactory, BODY SOUND,
Final school tests. Photo
Credits: Polifactory,
Politecnico di Milano.

Discussion

The BODY SOUND research experience indicates that a co-design process, particularly when involving children in the development of a digital solution, can be divided into distinct collaborative moments having different i) purposes and outputs, ii) targets and engagement roles, iii) methods of engagement and evaluation. In particular:

The co-creation phase is conducted to generate the idea, and this takes place during the first stage of the process. Only the main target is engaged at the beginning of the process and plays an informant role. However, to improve the first rough idea generated during this phase, the engagement can be extended to the next moment, which could include a secondary target and an informant role as well. Working with children in the co-creation phase requires a practical-tangible approach that concretizes elements which would otherwise be too abstract for them to understand. For this reason, the use of so-called boundary objects can facilitate the children's involvement. This means that even if the focus is the development of a digital interface, this very first phase should also include tangible artefacts to evaluate both the learnability and enjoyability of specific elements which might already be identified as peculiar to the final prototype (in our case, sound, music, and movement). The main method of evaluation and verification is through joint observation, which can eventually be accompanied by a voting/scoring method carried out by means of cultural probes. The co-creation phase of BODY SOUND helped to obtain demonstrators for the use of rapid prototyping technologies during activities focused on idea generation and not actual prototyping. This opens up possibilities for

developing methods and tools to support designers in giving tangibility to idea generation through technology and creating opportunities for discussion about its use. It also allows children to be involved quickly in safe, controlled, and replicable tests and experiences, activating various engagement activities with different roles. It would be interesting for future research to consider children as co-creators of technological boundary objects as well, to become an active and generative part of a process. The use of machine learning and AI tools could further facilitate this transition.

As the name suggests, the co-development phase aims to develop the idea into a prototype. In this case, two different co-development macro-stages are recommended (there might also be more than two, depending on the level of readiness that the prototyped solution is expected to achieve). The first co-development stage should include the project's main target, which will be involved as a tester of specific features and elements of the prototype solution. In this case, the prototype's learnability, enjoyability, and functionalities are evaluated. The first co-development round should still be in person, while the second can be conducted remotely (in our case, this became necessary due to the pandemic). In this case too, the most relevant method for evaluating the children's experiences and prototype performances is observation (both direct and in video recordings). However, researchers can use quick and simple verbal interactions to acquire additional information on the prototype's effectiveness if the main target can answer basic questions (dependent on their age and mental conditions, for example). The second stage of co-development should be conducted in a real-life setting. The children involved attain mainly the secondary target; therefore, more children should be involved in playing both tester and informant roles. The third and fourth rounds include observations (direct and video-recorded) and collective interviews.

This phase of the children's development and involvement was undoubtedly complex. As the technology became invisible, imagining how children could actively intervene in its development was not easy. The research team, therefore, chose to involve children in developmental decision-making processes rather than in the development itself, as in the previous phase. This still allowed for good interaction with them. For future developments, even taking into account the very rapid advancement of technologies, it would be interesting to think of an open way to integrate the children's feedback into the software or co-develop it with them.

Conclusions

The article presented an overview of the different roles that children can play in co-design processes to develop technological solutions in the domain of healthcare and well-being. Based on the BODY-SOUND case study, we identified an iterative process to involve children according to the different development phases.

Building on Druin's (2002) roles for children's involvement and Markopoulos et al.'s (2008) evaluation methods, BODY SOUND adopted an informant-tester-informant involvement model.

The iterative co-design process described here highlights the significant role that children can play both in idea generation and prototype development, demonstrating the value of incorporating their feedback and involvement to create effective and engaging digital solutions. Structuring the process into distinct collaborative moments, each defined by specific purposes, targets, and methods of engagement, can ensure meaningful and impactful contributions from children.

The use of tangible artefacts and boundary objects during the co-creation phase facilitates the children's understanding and engagement, making abstract concepts more concrete. Moreover, the integration of rapid prototyping technologies and the potential use of machine learning and AI tools further enhance the process, allowing for more dynamic and responsive development. Despite the complexity of involving children with CP in technological development, their participation in decision-making processes has proven valuable, paving the way for more inclusive and innovative design practices.

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Communication Design Strategies for Raising Awareness and Driving Change in Achieving the SDGs

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Abstract

Communication has great potential: it connects people and ideas, inspires action and influences thinking. However, its potential also depends on its quality and its ability to be accurate, truthful and inclusive. Communication Design takes up the ethical responsibility of this potential, systemizing the knowledge and the skills of the discipline, transforming them into methodologies and techniques for constructing a message through the code of visual language.

In this contribution, through a matrix analysis of case studies, useful communication strategies will be identified and described as powerful tools to raise awareness towards the achievement of some of the SDGs. After outlining the status of the literature on the ethical dimension that has characterised communication design as a lever for sustainable development, the research provides a systematic review of selected case studies relating to the discipline, which experience and bear witness to the systemic transition for sustainable development, encouraging social inclusion, awareness, and environmental sustainability.

Keywords

Communication design
Ethical responsibility
Communication strategies
SDGs
Sustainable development

(Communication) Design to Drive the Change

One of the most urgent and intricate challenges in the early twenty-first century revolves around finding ways to encourage the behavioural changes essential for establishing a sustainable society (Barr, 2008). The concept of sustainable development originates from “Our Common Future”, the report published by the World Commission on Environment and Development in 1987. It stated that sustainable development should “ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs” (World Commission, 1987). Over the years, the concept of sustainability has gained recognition as a source of possible remedies for a diverse array of challenges and issues, spanning from global to local contexts and impacting nearly every facet of life (Jones et al., 2017). In 2015, the United Nations General Assembly (UNGA) established 17 Sustainable Development Goals (SDGs).

In this context, by virtue of its distinctive ability to transform complex concepts into accessible messages, appealing, persuasive and easily understandable by the public (Shaorong & Pang-Soong, 2022), communication design can be identified as a significant vector for promoting the UN SDGs. Indeed, it can use specific tools and different approaches to raise public awareness of complex issues and promote consciousness, action, and change towards a more sustainable future.

Considerations on the relationship between design and ethics are part of a much broader and rooted framework of analysis and disciplinary critique, within the debate on global challenges. Communication, and with-it communication design, is a social fact (Piscitelli, 2018) that concerns not only the design community. Both object languages (Sudjic, 2009), and communication strategies (Mauri, 1996) act as a vector of sense, meaning and relationships (Celaschi, 2016) balancing form and utility (Rand, 1970) as “the product is only a semi-finished product that needs other elements of communication, distribution, service, identity to become a global offer” (Mauri, 1996). The relationship between design and society was also widely discussed at the XXII Triennale di Milano in 2019, *Broken Nature: Design Takes on Human Survival*: “When a new situation requires or reflects major adjustments in human behaviour, (designers) translate their analysis into objects that people can understand and use, ready to steer our planet towards better living conditions for all.” (Antonelli, 2019). Today, the UN 2030 Agenda for Sustainable Development stimulates society to participate in “design for the real world” (Papaneek, 2019) for a participatory and inclusive social innovation (Manzini, 2015).

Starting from these assumptions, the objective of this paper is to highlight some successful communication strategies which, using different tools, have led communication campaigns in support of the SDGs to be effective and engaging for a wide target.

Communication Design Strategies for Sdgs: Three Different Approaches

Communication designers perform a situational analysis and set objectives leading to the development of a coherent set of strategies, and implement campaigns by creating informational and persuasive messages and storytelling that are disseminated via traditional mass media, new technologies, and interpersonal networks (Rice & Atkins, 2012).

Engaging and authentic stories can inspire and motivate change, also on a multi and cross-sectoral level, involving different organisations, institutions, businesses and civil society to increase the impact of communication, reaching a broader range of people and promoting synergies between different actors, on an educational and training level as well. Furthermore, adopting inclusive design methodologies makes it possible to constantly monitor, evaluate and maximise the impact and effectiveness of communication campaigns, thanks to the feedback and results obtained (Jones et al., 2017).

Communicating SDGs requires strategies in which the reliability and the authenticity of the companies, institutions, or non-profit organisations are essential. Their commitment to the environment, the sustainability of processes, and the wellbeing of workers become a key element that enriches and gives value to the message they aim to convey, preventing its trivialization or, worse, its distorted and deceptive use. The credibility of the message sender becomes an integral part of the message itself and strengthens its effectiveness.

The case study analysis, reported in the following paragraph, considers three categories of subjects engaged in the communication of SDGs: firstly, profit companies that create (or adopt) corporate guidelines for communication, not only about the product features but also about the sustainability of the entire supply chain, eco-friendly production methods, sustainable packaging, and the sustainable production goals to be achieved in the medium and long term, the engagement of internal and external stakeholders, and the communication of economic, social, and environmental benefits that come from such practices (Brereton, 2022). Secondly, non-profit NGOs and institutions that spread the SDGs to inform or prompt action. Lastly, companies that go further by committing to more stringent and detailed protocols to gain sustainability recognition, such as the B-Corp certification, which represents a concrete and measurable commitment in the field of corporate social responsibility integrated into corporate practices (Honeyman & Jana, 2019).

A B-Corporation is a company that has obtained the certification bestowing that appellation, i.e. the *B-Corp Certification* issued by B Lab, an NGO created with the mission of spreading a new business model. In addition to having profit objectives, B-Corp are regularly measured to meet the highest standards of social and environmental performance, transparency and accountability. In this way, the company not only distinguishes itself through its practices, it also adopts a work and production model that potentially makes a positive contribution to the social and economic fabric in which it operates.

Communication Design and SDGs. The Matrix-Analysis Methodology and the Selected Case Studies

According to McGuire (2012), the main objective of campaign designers is to persuade: the persuasive impact depending on the message that the campaign wants to send will lead to certain objectives. Therefore, to achieve effective persuasive impact, a series of factors are needed which, when combined, determine the success or failure of the campaign.

The selection of case studies for the identification of communication campaigns relating to the Sustainable Development Goals (SDGs) requires a rigorous and well-defined methodology to guarantee the representativeness and the diversity of the examples taken into consideration.

In the present study, a mixed approach was adopted, combining an exhaustive search of the literature (Galan-Ladero & Alves, 2023; Chinie et al., 2023) with an analysis of major online campaign databases (last visit: 01-24) focused on those related to SDGs, such as the Cannes Lions Winners archive (www.adforum.com/award-organization/6650183/showcase), Advertising archive (adsspot.me/) and B-Corp archive (<https://bcorporation.eu/resources/case-studies/>). All the campaigns analysed aim to promote the SDGs and raise awareness of the multiplicity of congruent environmental and social issues. The campaigns were selected to offer a broad overview of budget, media-mix strategies, dissemination period, resonance and persistence on the various communication channels.

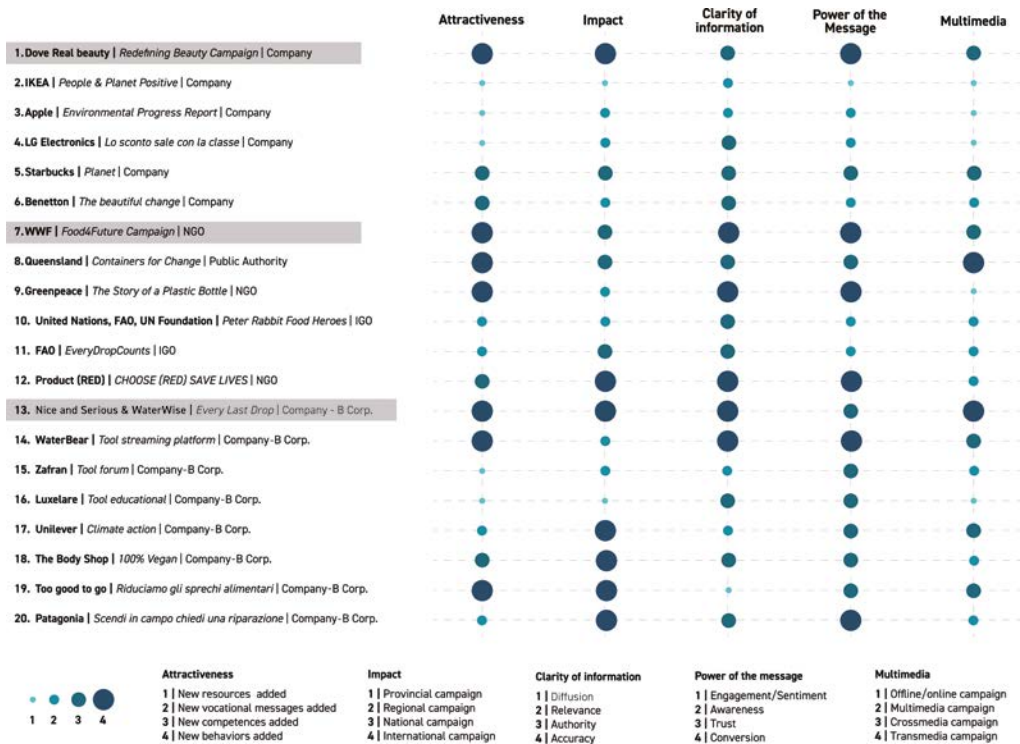
The case studies were then selected on the basis of the five criteria formulated in the text by Rice and Atkins (2012) to evaluate the quality of the campaign: attractiveness, clarity of information, emotional power of the message, multimedia and impact. Attractiveness derives from qualities such as the source's pleasantness, beauty, familiarity, and similarity (Hatfield & Sprecher, 1986). The clarity of the information and the power of the message are closely related to levels of learning, performance and behaviour. Users exposed to information can process, learn, acquire and subsequently implement a certain behaviour and this depends both on the clarity of the information received and on the emotion that the communication campaign arouses in the public (McGuire, 2012).

The multimedia aspect encompasses the fundamental transmission medium (e.g., television, social media, web), content modes (e.g., news items, public service announcements), and the specific media outlets (e.g., radio station, magazine, website). Finally, the impact of the campaign is a parameter that can be evaluated over time; it refers to the importance that the campaign has created on the topic, whether it has won awards, whether it has been replicated in other languages/countries and whether it has been re-proposed for a long period of time.

After an initial broader analysis, 20 case studies were selected and evaluated considering these five criteria, related to the most acknowledged communication campaigns created to increase awareness on issues relating to the SDGs Fig 1. The selected case studies differ from one another depending on the media they used to spread the message: press material, social posts, videos for the web and television, web platforms or applications. But they all have the aim

of raising awareness among users, with different methods and tools, of the objectives of the 2030 agenda relating to the SDGs. Particular attention was paid to representing campaigns led by profit, non-profit and B-Corp organisations to capture a comprehensive overview of the communication strategies employed to promote the SDGs.

The case studies which follow in this section highlight projects in which the expressive potential of Communication Design could be exploited in significant terms and in compliance with the goals that the United Nations has set for itself in terms of sustainable development for social inclusion and environmental sustainability. Foremost among them are the following: Goal 3 - Good health and wellbeing; Goal 5 - Gender equality; Goal 6 - Clean water and sanitation for all; Goal 10 - Reduce Inequalities; Goal 12 - Responsible Consumption and Production; Goal 13 - Climate Action; Goal 15 - Life on Land.



**Dove Redefining Beauty Campaign. SDGs 3,5,10.
Sender: Profit Company**

Fig. 1
Matrix analysis of the case studies examined, edited by the Authors.

Back in the spring of 2004, Dove launched an advertising campaign in England in which the British photographer John Rankin Waddell portrayed six ordinary women, with bodies of different shapes and sizes and with all their imperfections, happily posing in underwear. The message behind the campaign was the wish to test the new product on real curves, belonging to women who were not models by profession.

The advertising campaign attracted media attention and triggered a debate on society's narrow view of female beauty, consequently opening the debate on the role of women in contemporary society, and the related engagement with cosmetic products or procedures (Rodgers et al., 2024). At that time, to support the campaign, Dove commissioned StrategyOne, an applied research company (now Edelman Data & Intelligence) in collaboration with Massachusetts General Hospital-Harvard University and The London School of Economics, to study what the term beauty meant to contemporary women. The results (Etcoff et al., 2004) indicated that only 2% of women worldwide choose beautiful to describe their appearance, even fewer than those who choose "attractive" (9%), "feminine" (8%) or "nice" (7%).

Stimulated by the success of this local initiative, Dove launched an international campaign (*Real Beauty*) in collaboration with the American agency Ogilvy & Mather. The campaign was organised in a variety of initiatives and media. Videos and billboards showed naked, old, fat, freckled and wrinkled bodies with a clear message: real beauty is natural beauty.

While on the one hand the campaign has attracted criticism (Dye, 2009) regarding the real objective of the campaign, which was commercial and not social, it is undeniable that Authentic Beauty, still active today under the broader name of the Redefining Beauty campaign, has experienced no setbacks, addressing the debate on inclusion early in the opening years of the third millennium with initiatives both at the international and local level, opening up to inclusive issues such as racial equity, self-esteem in young people, parenting, positive masculinity and product traceability and sustainability.

The first initiative initially developed in the UK and then internationally, created an emotional connection with the brand with a clear commercial focus. But, in the same way, by comparing female role models promoted by the media with real women to oppose overly literal definitions of beauty and femininity, it contributed to driving the change and raised public awareness, stimulating the birth of other campaigns and remarkably anticipating -by more than a decade- issues later addressed by the UN SDG 5 on inclusion, gender equality and women's empowerment. Today it is expanding to issues such as reducing inequalities (SDG 10), mental health and mental well-being of the youngest (*Self-Esteem Project*, 2020) Fig. 2, prevention of mental disorders and support for access to care for those in need (*Under Pressure - Postpartum support* campaign 2022) (SDG 3).



Face editing removes blemishes, freckles and confidence.

This is a representation of how far retouching apps can distort beauty. Harmful and readily available, 80% of girls are already using them by the age of 13. It's no wonder their perception of beauty and their self-esteem are so distorted. Help reverse the damage. Download our new Social Media Confidence Kit. [Dove.com/confidence](https://www.dove.com/confidence)



Let's Change Beauty

Fig. 2
Dove Real Beauty - Redefining Beauty Campaign (2004-ongoing). <https://www.dove.com/us/en/stories/about-dove/change-beauty.html>. In this picture, the specific Self-Esteem Project, 2020.

**WWF Food4Future Campaign. SDGs 12,13,15.
Sender: No-Profit NGO**

WWF's *Food4Future* Campaign in 2021 aims to change food systems, from production to consumption, to make them more resilient, inclusive, healthier and sustainable, considering human needs and the limits of the Planet. The international campaign focuses on the urgency for action to safeguard our planet: the objectives of the communication strategy focus on raising awareness of environmental issues, promoting sustainable actions and engaging a diverse worldwide audience.

Of all the human systems that use natural resources, the one most accountable for the current ecological crisis is our food system. 80 percent of global biodiversity is lost due to agriculture and the global food system: we have lost about 8 out of 10 living beings that populated rivers, lakes, the seas and the land. In terms of evolution, this has never happened before in history (Benton et al., 2021).

The main claim used in the campaign is that there are foods that "are the end of the world": the dichotomy is used to bring the user-spectator's mind back to the common understanding of foods that are considered incredibly good; however, this statement is contrasted with the true reference of the campaign, i.e., that they may literally be responsible for pollution, damage to biodiversity, and climate change.

The campaign's main commercial also fully represents this dichotomy from a visual point of view: the visual montage is based on the gimmick of the split screen; succulent grilled hamburgers, popping popcorn, crispy fried fish, knife-proof dairy products leave half the screen to images of forest fires, entire swarms of bees found dead or scenes of intensive fishing Fig. 3.

The association's choice is to focus on a strategy of quality digital content: partnerships with cooking magazines, campaigns with influencers committed to sustainability and testimonial chefs sensitive to a more respectful approach to nature. All the contents of the multimedia communication are shared with specific hashtags such as #doeatbetter, already used in the past by the association when dealing with the impact of individual food choices, or #food4you and #food4future, more directly linked to the campaign's objectives and capable of generating participation.

Food4Future has multiple objectives to achieve, for which the association has strategically focused on storytelling with great visual impact and effectiveness spread across multiple media, social profiles, video-sharing platforms and a website that provides further information about the issues addressed in the campaign.



Every last drop. SDG 6. Sender: B-Corp

The environmental communication campaign *Every Last Drop – An Interactive Website about Water Saving* (everylastdrop.co.uk), created in London in 2013 by the Nice and Serious agency in partnership with the Waterwise Project organisation, focuses on the importance of saving water and on the objective of universal and equitable access to drinking water. It is a website for desktop and mobile phone, with a strategic use of illustration and animation linked to interaction. A parallax website in which the user triggers the animation by scrolling and starting off a character's day doing normal things like bathing and preparing food. By following his typical day and reading the practical advice that appears during the interaction, it is possible to understand how small changes in daily habits can make a big difference in water consumption Fig. 4.

The campaign extends beyond the website, including video and graphic elements on social media to reinforce the message and encourage the sharing of water-saving practices. The creative and visually stimulating approach contributed significantly to the echo and shareability of the message. The website earned numerous hon-

Fig. 3
An example of the split-screen device used in the video campaign, WWF *Food4Futures* 2021. <https://www.wwf.it/cosa-facciamo/campagne/food4future/> (accessed on 28 December 2022).

ours in 2013, reaching over one million individual visitors worldwide and generating extensive interaction on social media on the topic of saving water.

The *Every Last Drop* campaign promotes the importance of saving water, but the most interesting and relevant aspect of this campaign, which justifies its analysis as a case study, is that it is an emblem of *Green Branding*: the substance of the message being transmitted is amplified by the coherence and integrity of the entities and companies involved in embodying the sustainability principles they promote. Waterwise Project is an independent, non-profit NGO dedicated to reducing water consumption in the UK, and the advertising agency Nice and Serious is a B-Corp certified entity. Both subject their activities to constant checks against sustainability values. Though the agency is a business, it has chosen to collaborate only with brands, organisations, and projects that can have a positive environmental impact. The agency subjects its organisational and business choices to procedures such as the “B Impact Assessment,” verifying the impact of the company’s operations and business model on workers, the community, the environment, and customers. It adopts process verification tools such as *Make Better Decisions, Together*, voluntarily adhering to protocols that focus on the use of collaborative and democratic tools to make decisions that are aligned with shared ethical values and purposes.

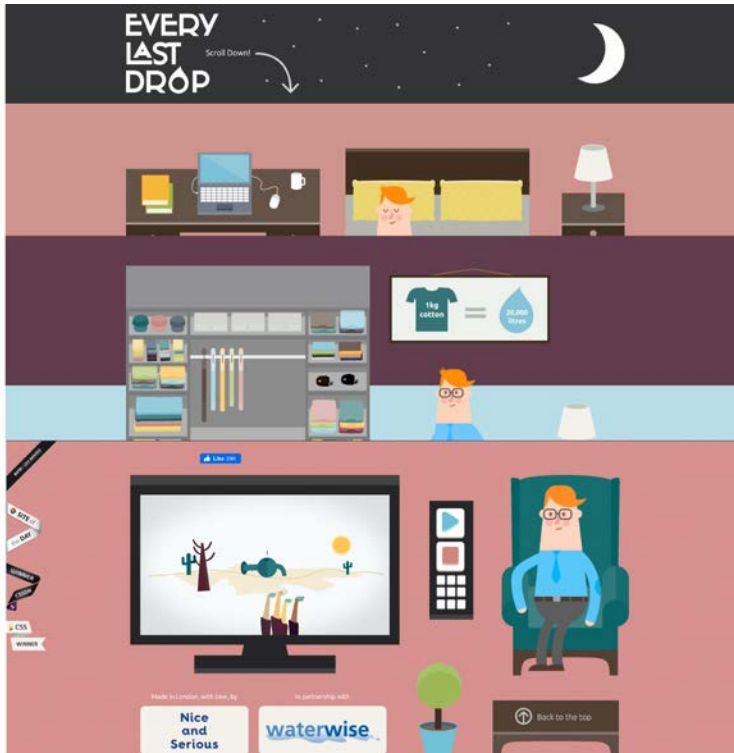


Fig. 4
Every Last Drop website:
Home ATF area. Content:
to produce 1 kg of cotton
it takes 20,000 litres of
water. Footer: [https://
everylastdrop.co.uk](https://everylastdrop.co.uk)

Conclusions

In this contribution, case studies were selected according to the typology of senders and the objectives pursued: for-profit companies, non-profit organisations (including NGOs and other institutions) and companies that have chosen to measure their environmental and social impact (B - Corp) which implement campaigns with the aim of promoting the SDGs.

Though it predates the definition of the SDGs, the first case study presented, the *Redefining Beauty* campaign, surprisingly anticipates many of the issues at the forefront in recent years, using provocative communication that seeks to hit the mark by overturning all the stereotypes linked to the world of personal care products.

The WWF's international *Food4Future campaign*, deals with the environmental issue using an oxymoron applied to the campaign's visuals, effective in showing the contrast between the copy describing idyllic products and images of a planet in the process of destruction, which constitutes the creative crux of the project.

The *Clean water and sanitation* SDG is addressed by the *Every Last Drop* communication campaign, based on narrative immediacy to create a direct connection with the user, who becomes a leading actor, safe, self-involved, and aware of following certified advice. This campaign marks the need for companies and organisations to avoid misleading environmental declarations and green-washing, in order to build their own green brand.

In conclusion, the contribution that emerges from the study presented here lies precisely in identifying overall recommendations and strategic design guidelines to pursue and achieve the SDGs, even if applied in different contexts. The campaigns analysed here, both those organised on a large scale by multinationals and those arising from initiatives by individual companies, are in fact based on shared principles with particular declinations that can be summarised as follows:

Attractiveness, to set up communication with the aim of facilitating the diffusion of virtuous behaviours and explaining the possibility of introducing new habits.

Impact, using issues of international scope, but with an approach that can also be reflected at a local level.

Clarity of information, to explain the problems precisely but without being overly technical, encouraging access to and understanding of the data, to show the authority and solidity of the issuing entity and the transparency of its objectives.

Power of the message, to spread the message concretely, starting from the real world, without abstraction and focusing the communication by telling a story that allows identification, understanding, and urges you to act personally.

Multimedia, as the wide-ranging communication channels available today play a key role in differentiating the target audience, which is why multimedia, crossmedia and transmedia campaigns undoubtedly constitute an essential condition of contemporary communication.

Communication design can therefore play a truly central role in the journey towards the SDGs, not only transforming complex information into engaging and effective messages, but also promot-

ing emotional connections with an ethical approach (and through recognized certifications such as B-Corp), which can aim at effective change and conversion, at the accuracy of information, at an openness to differentiated targets and the possibility of debate and dialogue at the international level, to support and guide the behavioural changes necessary to build a more sustainable and resilient future.

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This article is the result of a joint discussion and elaboration process, but the authorship of the paragraphs may be attributed as follows: Rossana Gaddi (1. (Communication) Design to drive change; 3.1 Dove *Redefining Beauty* Campaign), Raffaella Massacesi (2. Communication Design strategies for SDGs; 3.3 *Every last drop*) and Giulia Panadisi (3. Communication Design and SDGs. The matrix-analysis methodology and the selected case studies; 3.2 WWF *Food4Future* Campaign). Paragraph 4, dedicated to the conclusions, is the result of a joint effort by the Authors.

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DIYR: The Do-It-Yourself-Revolution

A Project to Democratised Design and Electronics

Towards a Sustainable Future

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Abstract

In times of multiple crises, embracing alternative and sustainable solutions for materials, products, and manufacturing systems becomes increasingly crucial and urgent. Constant improvements and innovations in technology and science, together with consumer demand for the new, encourage an ever-growing production of electronic goods, consequently leading to a broad and multi-levelled scope of problems. While incremental growth follows unsustainable production patterns, the democratisation of technology on the contrary gives rise to contrasting paradigms and ways of production that could shift the power back to the consumer. Starting from the principles of transparency and openness, the Do-It-Yourself-Revolution (DIYR) project aims for a more sustainable product world, where environmentally conscious production raises the value and care for things while at the same time formulating a new contemporary product language.

This project aims to create novel products and product ecosystems with a localised production focus, wherein users are motivated to transition into proDusers (producer-users). This transformation is facilitated through instruction, acquiring additional knowledge, and cultivating skills via immersion in the worlds of making, crafting, and design.

Keywords

DIY (Do-It-Yourself)
Open design
Sustainability
ProDuse
Social electronics

Introduction

“Openness” is a crucial concept for coping with the societal or environmental complex problems we have faced in the last decades (Thackara et al., 2011). Thus, designing with environmental awareness requires a fundamentally different attitude. One that is no longer aligned with linear growth and constant consumption, but applies this openness on a systemic level to propose alternative and sustainable solutions (Bakırlioğlu & Kohtala, 2019). Do-it-yourself is a concept at the heart of open design. It thrives on personal initiatives and empowers creativity, promotes the conscious handling and repairing of goods, gives a sense of emotional durability (Chapman, 2005), and keeps both the designer and the user engaged in sustainable behaviour. Since the eighteenth century, a divergence between organised industrial processes guided by control and accuracy and the loose semi-accurate processes of traditional crafts continues to exist. The beginning of the 20th century ushered in a new approach, such as that of Louis Brigham (1909), which highlighted the potential of recycling and self-production. During the post-war periods and due to scarcity and labour shortage, Do-It-Yourself practices gained acceptance amongst most people as a democratising outcome that allowed them to create their own goods (Science Museum, 2020). DIY is a term amplified by design during the twentieth century, when the rise of crises jeopardised industry production and logistics. During the 1970s, designers engaged in DIY design to counteract such crises, as in the case of the nomadic furniture by Papanek & Hennessey, or as a manifesto for creativity in search of the pure nature of making, empowering users to make themselves, like Enzo Mari (Nannini, 2023). Later on, when the market became oversaturated with industrially produced goods, the term prosumer appeared on the scene as society began to give DIY practices the possibility to value creation by involving the consumer in the co-creation of a project (Toffler, 1980; Wolf & McQuitty, 2010; 2013; Xie et al., 2008).

Delving deeper into the definition, Kotler (2010) describes a specific form of prosumption as Do-it-yourself. The author defines DIY as “activities in which individuals engage raw and semi-raw materials and component parts to produce, transform, or reconstruct material possessions, including those drawn from the natural environment” (p. 57). Nowadays, DIY practices are being reinforced by the technological open-sourced access that is emerging to give prosumers full control over these activities (Anderson, 2012). The renaissance of craftsmanship (Sennet, 2008) enables self-production by combining the making, crafting and personal fabrication processes. New crafters are supported by a mix of analogue and digital tools (Gershenfeld, 2005; 2012). DIY practices respond to wicked problems (Rittel & Webber, 1973). The DIY subculture can do things that work in the same way or better than the traditional infrastructure of society (Lukens, 2013). Designers are activists of DIY practices as they deal with human interactions. This interaction attempts to build a new series of socio-ethical systems.

The DIY Movement

DIY practices are typically rooted outside professional activities such as design or architecture (Edwards, 2006). It is considered an individual activity, but some scholars argue that it has evolved as a social activity thanks to the knowledge-sharing trends via web platforms (Bean & Rosner, 2012; Torrey et al., 2009; Kuznetsov & Paulos, 2010). These initiatives do not represent a threat to industrial manufacturing and large-scale production. Still, they are an alternative to mass consumerism and democratic innovation through information sharing (Mellis & Buechelly, 2014). In the design field, they provide another option to what is mainly considered Industrial Design. The DIY design movement (Camburn & Wood, 2018) is highly influenced by the user instead of market trends, mostly because the designer is often the final user. This change of perspective allows personal fabrication to reach the market with free modelling software (Mota, 2011), distributed manufacturing networks accessing components and materials directly from suppliers (Anderson, 2012) and large online selling platforms. This phenomenon creates alternative means of production and transforms behaviour with regard to the consumption of goods.

In addition, openness counteracts industry's unsustainable consumption-boosting methods, such as planned obsolescence (Latouche, 2012). Obsolescence, a term that can refer to the (artificial) ageing of products (Prakash et al., 2016, p. 64), is a recurring phenomenon today, especially in the sphere of electronics, because those appliances often demonstrate a restricted lifespan. According to the annual Global E-Waste Monitor, in 2019, the amount of e-waste rose to nearly 54 million tons (Berthold, 2021). In contrast, sustainable, repairable, alternative electrical products are incredibly scarce.

“Design itself has been (and still is) a fertile ground for social innovation” (Manzini, 2015, p. 30). Questioning current industrial production conventions, a redefined DIY approach offers an alternative concept that empowers users and incorporates educational values.

The Do-It-Yourself-Revolution – DIYR

DIYR is a project that seeks to rethink, recycle, repurpose, and use common materials to self-produce more sustainable alternatives to what industry and the market are currently offering. It innovatively suggests a new breed of “social electronics” that anyone can reproduce, repair, or customise. It offers an ecosystem of objects that will live as long as the user keeps them alive and, at the same time, supports changing or upgrading them as much as possible (Bakker et al., 2014) Fig. 1.

Fig. 1
DIYR Collection.



All DIYR products are developed to be part of an ecosystem feeding on the social principles of interchangeability and compatibility. The different components are developed and tested in an iterative process to give the proDusers elements that can easily be found in stores or are easy to fabricate in a Fablab. The methodology applied during the development of the DIYR project follows the principle of design-build-test-learn (DBTL), where constant iteration between what is conceived is improved during testing phases (Wheelwright & Clark, 1992, p. 224, 284) before performing tests with users. Overall, the project focuses on user-oriented perspectives, awareness, and longevity to the detriment of appliances (Gutiérrez et al., 2011) and planned obsolescence.

During the initial development of the products, after testing the different components and how to manufacture and assemble them, the team emphasised using the simplest materials and processes and repurposing valuable resources. For example, special instructions enable the repurposing of used rechargeable batteries found in different outdated products, promoting second life (Dataset 1). Another aspect that emerged during the initial phase of development deals with the opportunity to use the face of technology as product characteristics. The project highlights the looks of bare circuits and components. Honesty and transparency work as part of the aesthetic development. All parts are as visible as possible, promoting “formal nudity” and “naked electronics” Fig. 2.

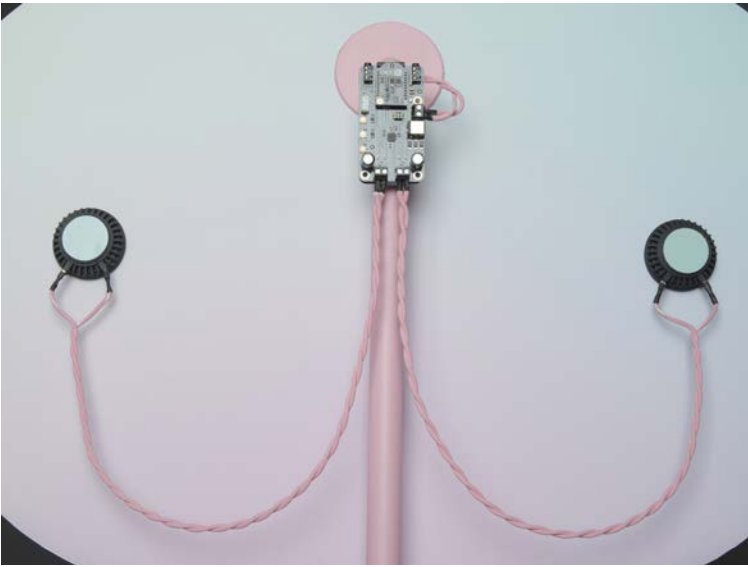


Fig. 2
The formal nudity and
naked electronics of DIYR
products.

The project commits to counter planned obsolescence and curtail e-waste by promoting a mindful approach to conscious design, repurposing components and empowering people to become active and acquire skills by making the things they need, like and keep.

Self-gained knowledge of an object's construction promotes a different relationship and attaches emotional value to any product, combining emotions with function and purpose. The presented project intends to provide an ecosystem of social electronics for anyone to build, hack, rethink, personalise, share, and fix. We expect that the designed objects will last longer because they will never become obsolete; they are guiltless because people know where all the components came from since they were recycled and repurposed; they are dear (DIYR) because the ProDuser makes them.

Method

DIYR (pronounced "dear") is designed to be a growing ecosystem of innovative, playful, and highly purposeful social electronics. The project's development followed a DBTL iterative process for the entire ecosystem of products. Such a method is crucial to the project, as it provides a clear roadmap of the project during the phases of development.

Design: During this phase, the team engaged in the creation of the artefacts researching on-site and online the electronic components available on the DIY marketplace (e.g. LED lights, controllers, sensors).

Build: During this phase, the different housing components are explored following the above mentioned principles. Nudity or capacity to hold but not hide the inner components, matching the DIYR

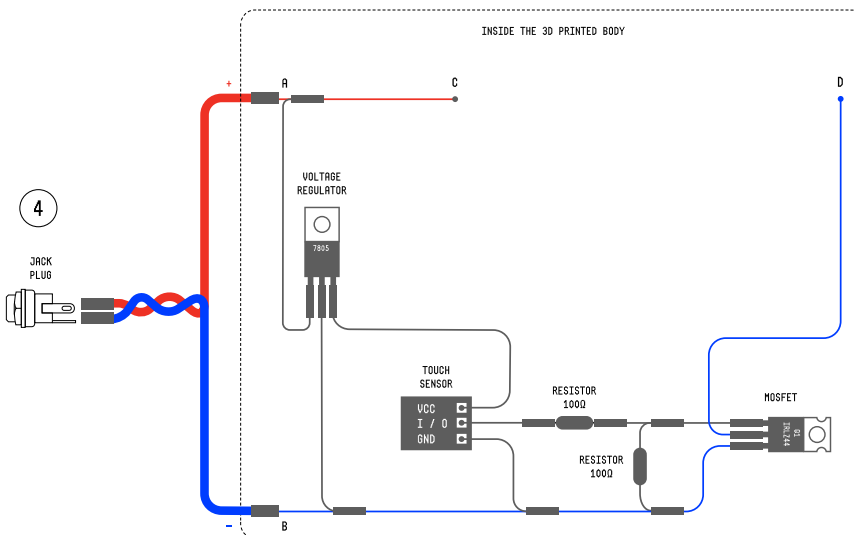
concept's product language and enhancing the capacities of printing technology.

Test: Each product is tested in extreme conditions of use (eg. Seven-day running, impact tests, heat control) (Dataset 2). Doing so makes it possible to ensure in the instructions and platform provided to the proDusers that the products they are building meet a minimum standard of use and durability. It is important to note that, as the project is also embedded in a Repair-yourself scheme, eventual damage or malfunctions of components are easy for the proDusers to address to extend the lifespan of the products.

Learn: The different tests performed in the lab became evolutionary improvements to the products, making it possible to easily include the design changes or updates in the platform. The platform also became easy to update as a tool, given that the DBTL methodology is performed not only inside the design team but can also be performed by the end user, who in turn submits feedback on problems and highlights strategies on how to solve them, in a sort of dedicated wiki (Leuf & Cunningham, 2001).

Parallel to the development of the products, a set of instructions following the same principle is drafted. The instructions aim to offer simplified and assisted access to making personalised electronic appliances; they are considered part of the ecosystem and are improved together with the products. This is an essential and strategic decision, as instructions enable a proDuser to actively explore, gradually understand, adapt, produce, and use the object in a participatory and conscious manner Figs. 3, 4. A growing understanding of the person making the products leads to more conscious and responsible interaction with electronic devices and much beyond. Through the interactions of this project, technology can be experienced differently; it serves to pave the way to a new approach to the design of technology-enabled objects. Everyday items, such as luminaires or audio equipment, can be produced, better understood, and subsequently used.

Fig. 3
Simplified and accessible instructions to make the DIYR products.



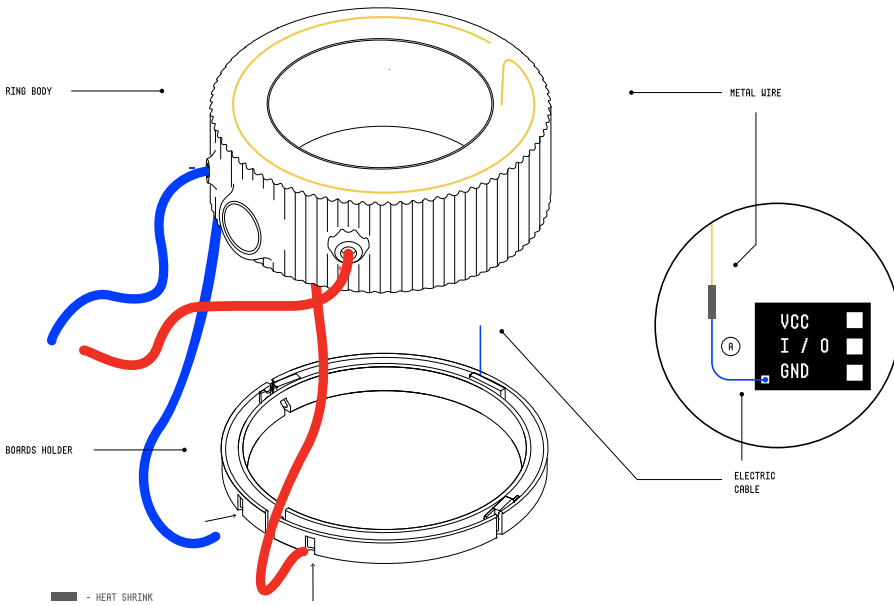


Fig. 4
Simplified and accessible
instructions to make the
DIYR products.

The project is designed to counter opaque and obsolete product development by elevating user involvement and understanding. This approach gives the proDuser more precise expectations and acceptance of the product during all phases of development.

The project establishes an additional methodological approach with the “second life” recycling of batteries. In 2020, the global demand for batteries was around 282,000,000 kilowatts, equivalent to 282 gigawatts/ hours (GWh), and it is expected to increase by a factor of ten by 2030. This massive growth in expected demand is mainly due to the shift to e-mobility. Finding a secondary use for batteries after their initial application is essential to the DIYR approach. Detailed instructions are created for second-life battery utilisation when fabricating the products. While a completely different dogma prevails in the industry than in DIY, the concept of DIYR defuses the manufacturing process of a product and, thereby, allows some of the components to be sourced locally and assembled by the creator (Bonvoisin, 2016). That sharpens awareness of sustainable consumption.

Through the process of making a DIYR product, the creator’s personal attachment to the product grows. The process generates more comprehension of the different steps behind the elaboration of an artefact and culminates in caring for materiality and the thing being made (Ingold, 2012). A conscious merging of production and usage makes the proDuser responsible for the resources and the goods they produce. Pride, success, and learning value motivate and support the proDuser and culminate in the personal growth of the creator (Sennett, 2008). Moreover, participation in the creative process generates confidence and self-initiative.

Currently, as the project is in its launch phase, there is not enough feedback to improve the products available now.

Results

During the initial development phase of the DYR project, 13 products were designed following the DBTL method. Different iterations were tested for how to build the components, electronics were integrated as part of the product features, and finishes were developed to take advantage of the emerging language of the open-source technologies of 3D printing.

Making and manufacturing

Each product of the collection went through a series of phases of evolution based on the results of the different tests that were performed [Tab. I](#). Once the question of function was fulfilled and re-tested, an almost parallel phase of aesthetic development and manufacturing was conducted to align the concept of the DIYR collection and the individual features of the product. A series of instructions followed each phase of the development using tools such as Think Aloud Protocol-TAP (Ericsson & Simon, 1993; Dumas & Redish, 1999) and documenting the different steps photographically [Fig. 5](#). The iterative process of evolution for the different products was tested in collaboration with the BITZ Fablab in the city of Bolzano. A total of 17 people engaged in building the objects provided feedback on the instructions and how they overcame manufacturing difficulties.

Stages of Evolution of DIYR products					
	First stage	Second stage	Third stage	Fourth stage	Fifth stage
Fans	Finding the correct motors with the right speed, working on the shape of the propellers, and developing 3D-printed housing.	Testing different electrical motors for consumption and speed. Product language development, propeller graphical patterns.	3D-printing feasibility to make one complex piece.	Rework 3D pieces to improve thermal dissipation and electronic control of the motor. Motor efficiency and energy consumption improvements.	Introduction of touch sensor switches through microprocessor insertion.
Speakers	Research on current speaker technology. Both in sound reproduction and amplification.	Adoption of transducer technology and custom-made speaker membranes.	Research on materials for speaker membranes. Measurements of sound quality.	Finding optimal shape for clear sound diffusion.	Graphic and finishes development.
Lights	Research on current lightning technology from halogen to LED.	Testing LEDs, light spectrum, and development of battery-based light technology.	Development of switches and transformation from switching to touch sensor.	Development of lamp support structures with magnetic connections, hinge design, with flexible and non-flexible materials.	CMF development

Tab. I
Phases of evolution based on the results of the different tests performed.



Electronics development and optimisation

Similarly to the making and manufacturing phase, part of the team was dedicated to integrating the electronics into the products following the principles of DIYR nakedness. This phase aimed to transform circuit boards, aggregate sensors, and controls to fit the object's housing. However, instead of doing so following the traditional cross-functional integration of consumer electronics development (Wheelwright & Clark, 1992), all the electronics architecture was designed for Do-It-Yourself integration while manufacturing the products. This decision made it possible to address both processes in one set of instructions for each product, so that the pieces can be manufactured by the proDuser while soldering and testing the circuits at the same time.

Fig. 5
The iterative process of evolution for the different products and components.

Platform launch

In January 2024, the platform was officially launched and diffused through media, inviting young enthusiasts to actively engage in the manufacturing of DIYR products that could match their interests. At the moment of publication of this article, the total number of OS feedback responses from proDusers, both the successful construction of a DIYR product or the submission of a suggestion for improvement, is shown in Tab. II. We will continue to improve both the design and instructions with a curated follow-up of valuable community suggestions and the design of other products to join the family. The following permalink shows the updated values for users' follow-up at the date of consultation.

<https://diy.dev/usersfup>

Improvements and suggestions from ProDusers					
	ProDuser 1	ProDuser 2	ProDuser 3	ProDuser 4	ProDuser 5
Fans	I would like to have an on/off switch for the fan. The fan also gets hot after use.			The power supply is difficult to find, and it is an old technology. The fan does not have an on/off switch.	
Speakers		If I put too much pressure, the support piece for the membrane breaks.			The support for the amplifier breaks in the hinge as the thickness is insufficient.
Lights			The transistor you use inside to switch the LED on and off should be replaced with a misfit to improve product longevity.		You should modify the instructions of the Light Stick S product to include the soldering joint to change the behaviour of the touch switch module.

Conclusions

Tab. II
Suggestions for improvement by initial proDusers.

This article presents the research project titled DIYR, which is the acronym for Do-It-Yourself-Revolution.

The project is dedicated to cultivating sophisticated product design while embracing an open-source ethos and a culture of sharing. This approach enhances the joy and value of making and empowers individuals within a thriving and expansive community of proDusers. It serves as a catalyst for democratising knowledge, enabling everyone to participate actively in co-creating and appreciating diverse electronic innovations.

The project is developed to counter planned obsolescence and opaque production in the product's function by elevating user involvement and understanding. The project's primary goal is to provide accessible entry into electronic appliances. It empowers proDusers to actively explore, progressively comprehend, customise, manufacture, and employ these appliances in a participatory and informed manner.

DIYR aspires to form a new brand, shifting the focus from monetary gain to values such as knowledge, quality, sustainability, and consciousness. In a subversive twist, it seeks to challenge conventions by appearing as a brand on par with its competitors while refraining from selling any products. Promoting self-construction and encouraging engagement with the intricacies of production is a potent catalyst for a paradigm shift.

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Data Availability

Data Availability

osf.io/9eqjh

Open Science Framework: DIYR – Data.

(Ayala-Garcia et al., 2024).

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A Methodology for Intercultural Design

A Case Study for a New Cultural Centre in Turin

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Abstract

Issues concerning integration and the relations between different ethnic groups within a changing contemporary society are becoming increasingly prominent in the social and scientific debate. Design skills can be employed as a tool to systematise this multiplicity, promoting innovation that respects diversity, comparison, and interaction between people and cultures.

The purpose of this paper is to provide a synthesis of a research experience, the development of a new Islamic Cultural Centre in the city of Turin (Italy), in which the intercultural design approach constitutes the founding theoretical and methodological basis for the development of the project.

Starting from the analysis of experiences developed in the field of national and international research, the authors developed a methodological approach to the theme of designing to promote intercultural dialogue, furthermore establishing collaboration agreements with local authorities for the development of the Cultural Centre.

Keywords

Design methodology
Cultural centre
Multicultural society
Intercultural design
Cultural identity

Due to its unique geographical location, stretching into the Mediterranean Sea and serving as a bridge between Europe and Africa, Italy has always been a land of migration. As a result, it is one of the highest-ranking countries in Europe and the world for the individual registration of new asylum seekers (UNHCR, 2022).

In light of the increasing multiculturalism of society, issues concerning integration and relationships between ethnic groups and different communities are receiving great attention in the social and scientific debate. Cultural diversity provides a fertile ground for the emergence of novel insights and innovative approaches across a range of cultural domains, including education, politics and research agendas, museums, art, and the design discipline (Nemo, 2016).

From a design perspective, the rapidity and inevitability of these changes call for a re-evaluation of educational and design practices to effectively adapt accessibility policies aimed at the inclusion (social, cultural and economic) of people with a migratory background¹.

As a result, a proactive way of thinking is required to create communication channels that can give value to people's experiences in relation to the territories they inhabit and their personal cultural identity.

Indeed, intercultural factors become important issues for the design field in the global and local economy (Lin et al., 2007), especially for the development of new products and services and the definition of widespread graphic interfaces.

The design discipline, consistent with its sphere of action, can and *must* question the evolution of its own research and tools, actively engaging in these contemporary debates. This is in line with the fact that this discipline has always placed individuals at the centre of its action, focusing its analysis on the observation of the needs, culture, habits and lifestyles that characterise the context in which it operates, and seeking to "activate social processes to negotiate solutions, meanings, technologies, materials and forms" (Lupo et al., 2018, p. 67).

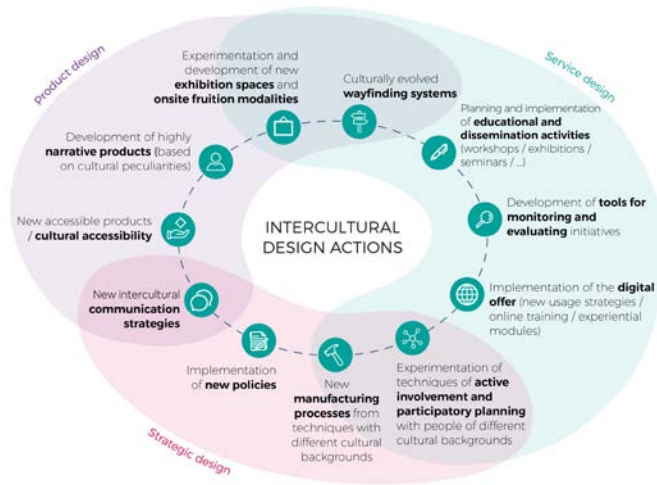
Moreover, as observed by Celaschi and Vai (2021), in 2007 the European Commission adopted the first European Agenda for Culture, which emphasised "that culture and creativity are important drivers for personal development, social cohesion, economic growth, job creation, innovation and competitiveness" (European Commission, 2007).

The relationship between design and a multicultural society can be analysed through different keys of interpretation, which extend across several design fields: product design, design for social innovation, communication design, interior design, systemic design, anthropodesign, design for food, design for cultural heritage, etc.

Is it then possible to identify a methodological approach — that goes beyond the individual fields of action — to support designers in the development of intercultural projects?

¹ The term "person with a migratory background" is used in the literature to encompass a wide range of individuals and groups. It includes those who have crossed national borders involuntarily, such as asylum seekers, as well as those who have migrated voluntarily, such as economic migrants, but also the so-called *second generations* (Ambrosini, 2005).

To date, in the scientific landscape of the design discipline – at the national and international level – it is possible to identify experimental reflections of particular value, which nevertheless maintain a discontinuity in application and research. Among these experiences, we can mention the reflections developed on intercultural design (Lotti, 2015; Radtke, 2021), cross-cultural design (Akpem, 2020; Choong et al., 2021), design for migration (Gasparotto & Ziliani, 2019; Moretti, 2019), design for “The Global South” (Brignoni, 2014; Fry, 2017), design for the Mediterranean (Balsamo, 2004).



2
From a semantic perspective, the intention in this essay is to consider an *intercultural approach* to be consistent, based on its dialogic and pluralist component (Nicola, 2004). It differs from the term *multicultural*, which is used to refer to a society in which several cultures “are co-present, but relatively separate in different ways and for different reasons” (Demorgon 1998, p. 29). Similarly, the term *cross-cultural* refers to the “communication process of a comparative nature” (Ting-Toomey, 1999). The latter approach, which has been more thoroughly investigated from a methodological point of view, emphasises the differences between cultures by adapting design choices to these different characteristics.

Fig. 1
Possible intercultural design actions. Credits: Authors.

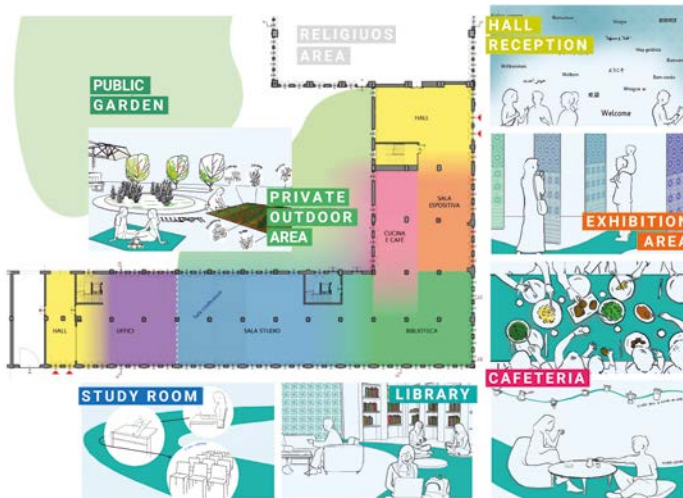
With regard to the many levels of action at which design operates Fig.1, it is possible to consider a wide variety of implementations, including products, services, and strategies - not always strictly distinct - for which design takes the role of a multidimensional operational tool (Dal Palù et al., 2018), able to develop project actions aimed at building an intercultural dialogue².

Awareness of cultural repercussions in design is certainly a key concern today, especially in the domain of Design for Cultural Heritage, which in this case converges toward Social Design, describing a common territory of study for these two strands of design research. In this perspective, therefore, we can continue to reflect on the need, in certain contexts characterised by considerable cultural complexity, to delineate a new figure of designer to support the definition of critical actions: an *intercultural-mediator designer*, who can collaborate with figures from the technical-scientific disciplines and the human and social sciences to navigate cultural complexities and create spaces of design interaction between one’s own culture and foreign cultures, working on their mutual influence in the form of acquisition, fusion and overlapping (Nemo, 2016).

The purpose of this article is to summarise an experimental research experience in which the intercultural design approach contributes to the theoretical and methodological basis for the development of the project, but at the same time provides an in-the-field opportunity for critical reflection on the methodological approach itself.

The work described here refers to the development of a new Islamic Cultural Centre in the city of Turin (Italy), a territory with a strong multicultural matrix characterised by policies aimed at fostering intercultural experiences³. The task of the Research Group was to accompany the Italian Islamic Confederation (the commissioner) in focusing the overall scientific project in order to guide actions in a philologically correct and effective direction, by developing the system of requirements and guidelines in particular for the implementation of the Centre's visual communication system.

Starting from the analysis of various experiences developed at the national and international levels (through case studies, literature reviews, field research), the authors reflect on a methodological approach to the topic of designing to promote intercultural dialogue, including establishing cooperation agreements with local authorities for the development of the Cultural Centre.



The purpose expressed by the Confederation was to build a new Cultural Centre in the former Nebiolo Foundry⁴ in Turin — one of the most important Italian typeface and press manufacturers of the 20th century— in which, following its complete renovation, more than 80 per cent of the area would be allocated to public services open to citizens, identified on the basis of the needs expressed by the Confederation itself Fig.2: a library, an area for exhibitions and cultural initiatives, a student residence and study rooms — thus adding to the system of public and private services offered by the city. A space would also be dedicated to the religious needs of Muslim believers⁵. In addition, discussions between the commissioner and the research team led to the identification of the outdoor space (a public garden over which the building looks out) as a place of focus. This could be developed into a space accessible to citizens, where gardening and small-scale horticultural activities (e.g. aromatic plants) could be undertaken for the benefit of the guests of the Centre, the District and the City. This proposal was subsequently formalised through an agreement with the District, which permitted the use of the space for external events and activities in exchange for its maintenance.

3
Indeed in 2018 the “Linee guida per il Coordinamento alle Politiche per l’Interculturalità e alla Partecipazione della Città di Torino” (Guidelines for the Coordination of Interculturality and Participation Policies of the City of Turin) were approved. The document outlined three main goals: increasing participation in the management of public affairs, eliminating racial discrimination, and creating a stronger and more inclusive sense of community that leaves no one and no one behind.

4
The Ex Fonderia Caratteri Nebiolo (1880-1993) is remembered today mainly for its contributions to the field of type design. Furthermore, this foundry played a central role in the socio-economic development of the neighbourhoods in which it is located.

5
In 2020, the number of Muslims in Italy was estimated at 2.7 million, or 4.9% of the total resident population in Italy - both Italian citizens and residents with foreign citizenship. It is not a “monolithic block”: the community is constituted by many sub-communities fragmented internally by national, ethnic, cultural, and linguistic differences. Source: <https://www.openpolis.it/la-presenza-dei-musulmani-in-italia/>, consulted in September 2022.

Fig. 2
Main activities inside the Cultural Centre. Credits: Authors.

This project will represent a novelty for the city and a point of reference not only on the level of the city but on the national scale as well, and would be part of a best practice scenario on the international level. A multicultural place open to the citizenry that could offer a shared space available to the community, providing services to citizens and contributing to the narration of the territory and its multiculturality.

Methodology and Practical Implementation

The reflections presented here do not seek to offer a work methodology *ex novo*. Instead, they aim to identify a design approach for the promotion of intercultural dialogue that enriches the plurality of cognitive models and enables professionals to perform different types of problem-solving in complex situations.

One of the main objectives is to identify a network of stakeholders and to encourage and create a project terrain capable of activating their direct participation in the development process of the initiative. It enables the assessment of territorial and community needs and resources, and the evaluation of the cultural coherence of the transformative solutions to be implemented (Bosso, 2021).

This section presents an analysis highlighting the results of the method and approach applied to the development of the project for the Cultural Centre.

The main challenge in converting this historic building (the former Nebiolo Foundry) into a place with a very different cultural matrix was to preserve its memory in a tangible way, while at the same time clearly attesting to its new identity.

The design work, developed in close cooperation with the Islamic Confederation and the group of researchers at the Politecnico di Torino aimed to translate these needs in a tangible key.

The collaboration between the Muslim community and the design team was structured through the establishment of a working table, which brought together representatives of the Islamic Confederation, their interlocutors (architectural studios, institutional and political figures, members of associations and cultural realities in the area), and the design team, of which the undersigned were members.

Furthermore, during the more desk-based research and design phase, the work could also rely on the collaboration (through a specially activated scholarship) of an Iranian research scholar, which allowed the research group to gather direct feedback and suggestions on the cultural coherence of the project.

The architectural intervention will return the image of a culturally coherent place, according to the principles of preservation and enhancement of its historical identity (typeface factory) and its future cultural role (cultural centre).

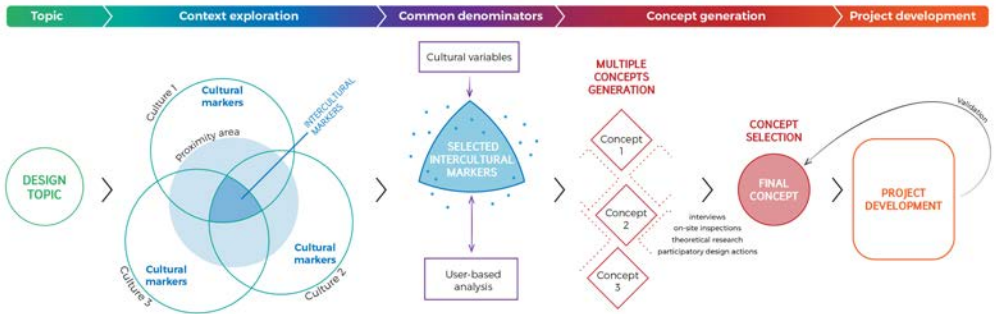
The project will be guided by a communication system that will act as the “narrative voice” of the new Centre in terms of identity and dialogue with the territory, capturing the formal and conceptual assonances between the art and technique of printing and Islamic decorative art, and conveying them through tangible and communicative actions to enhance them. This is in accordance with the above-mentioned methodological approach Fig.3, which consists, first, in extracting distinctive *intercultural markers*⁶ from specific

cultural contexts, then translating these characteristics into highly representative products or services (Lin et al., 2007).

A procedural clarification — which concerns a crucial aspect for the success of these intercultural projects — is to establish a relationship based on in-depth knowledge of the cultural background of the entity promoting a specific action. In the case described here it was necessary, in order to prevent any obstacles to the dialogue, to acquire awareness of certain basic cultural variables relating to the management of interpersonal relationships and actions over time (Meyer, 2014): from the type of interpersonal communication adopted, to the perception and planning of time, the decision-making processes.

To ensure the most effective and appropriate approach, it is essential to consider adopting an open-minded, collaborative and receptive approach, which involves listening and dialogue. It is also important to recognise that the scientific and methodological process will necessarily have to be applied with some flexibility, given that contextual variables may lead to delays, the need for design revisions and the necessity of multi-level confrontations.

6
The *intercultural markers* are elements that are most prevalent within a particular cultural group and are considered surprising and remarkable by another cultural group (Brunns et al., 2012). They might include aspects related to appearance, modes of interaction, associated values and meanings, rituality, material culture, gestures, functional and behavioural factors.



Context exploration. A careful analysis of the contexts and collective histories related to the topic of investigation have been carried out, along with the mapping and analysis of international case studies. The creation of a basic framework is essential to understand subjective interpretations and the social role of possible cultural behaviours. It is also necessary to recognise the key principles shared by different cultures coexisting in a given area in order to avoid conceptual and interpretative errors.

Several Islamic Cultural Centres located in non-Muslim-dominated countries were thus mapped and analysed. About 30 cultural centres were examined at the international level, focusing on the settlement processes, the integration policies that were adopted, and the communication systems that were developed.

A preliminary analysis of this data was crucial for the formulation of a comprehensive design intervention strategy that aligns with the *urban regeneration* objectives of the City of Turin.

Subsequently, the socio-cultural context within which the Centre will be located was carefully analysed, as were the religious and cultural needs of the Confederation and the Muslim faithful. Regarding the overall scenario, it was essential to create a cross-disciplinary research approach (Muratowsky, 2016), involving

Fig. 3
Methodological approach.
Credits: Authors.

experts in areas other than design, such as architects, sociologists, and historians. The different actors were gradually involved in the above-mentioned working table. The involvement of historical expertise — structured through participation in seminars and interviews and direct discussions with research groups and specialised parties, such as the Nebiolo History Project research team⁷ and the Archivio Tipografico⁸ — was one of the starting points for defining the project context. In-depth knowledge of the history and culture of the Nebiolo factory and the neighbourhood allowed a full understanding of the socio-cultural repercussions of the development of a new Islamic Centre. To reinforce this analysis, a sociologist was brought in to help the team better frame certain project perspectives, especially in relation to possible participatory actions by citizens in the centre's development activities.

7
<http://nebiolohistory.org/>

8
<https://archiviotipografico.it/it-IT/>

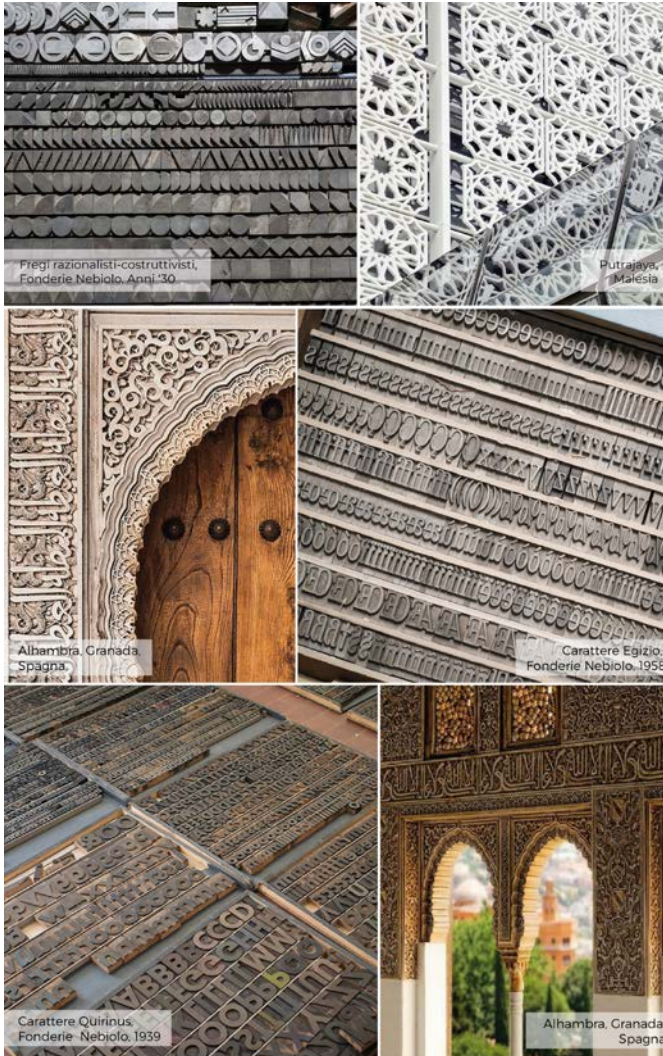


Fig. 4
 The formal assonance
 with the geometric carved
 friezes of Islamic architec-
 tural buildings. Credits:
 Authors.

Common denominators. The next step consisted in identifying a common denominator system, that represented the cultural markers (tangible, intangible or behavioural) shared by the two cultures we analysed (the Islamic and industrial/typographical cultures) — the aforementioned *intercultural markers* — but also by all those elements that, although similar in certain respects, take on nuances of meaning depending on the culture of reference (elements that we could place within an "area of proximity").

The initial analysis focused on a comprehensive examination of the elements of material culture that defined the industrial history of the Nebiolo Foundry. This part of the investigation was developed through a combination of desk research (books, papers, digital archives) and structured dialogue and discussion with the experts on the Foundry's industrial history.

The industrial past of the architectural complex has offered interesting insights into typographic history and Islamic culture. By analysing the Nebiolo typefaces available in some Piedmontese and national archives, it is possible to observe their assonance with the geometric carved friezes on the facades of Islamic architecture Fig. 4, both from a decorative and conceptual point of view, which is linked to the profound sense and value of the written word.

Moreover, a further element reinforcing this comparison is the fact that both forms of writing are read from right to left. In fact, Arabic is among the Semitic languages that are read from right to left (*sinistroverse*), while typographic matrices are assembled with the characters mirrored, so that once printed, the print is read from left to right.

The different meanings that the identified *intercultural markers* assume in the context of different cultures and the related social implications were further investigated in interviews with members of the Confederation and discussions with other professionals (e.g. sociologists, to scientifically support the work through the application of analysis tools such as needs analysis, target identification and categorisation, risk factor assessment, etc.).

The next phase of the research involved a cross-analysis and conceptual overlapping of the elements of identity deemed useful to define guidelines for the future development of the concept.

Generating design guidelines. Various conceptual responses were then developed through the definition of possible solutions and approaches through theoretical research, interviews, on-site inspections, feedback, discussions.

On the basis of the defined scenario and the relevant element extracted from the intersection of different cultural features, the decision was made to work on typefaces as a decorative apparatus, thus creating decorative motifs reminiscent of arabesque patterns, but resulting from the structured juxtaposition of different typefaces Fig. 5.

Furthermore, this project was also an opportunity to start a didactic exploration with the aim of validating the methodology and implementing the practice of design thinking in the teaching of intercultural competences⁹.

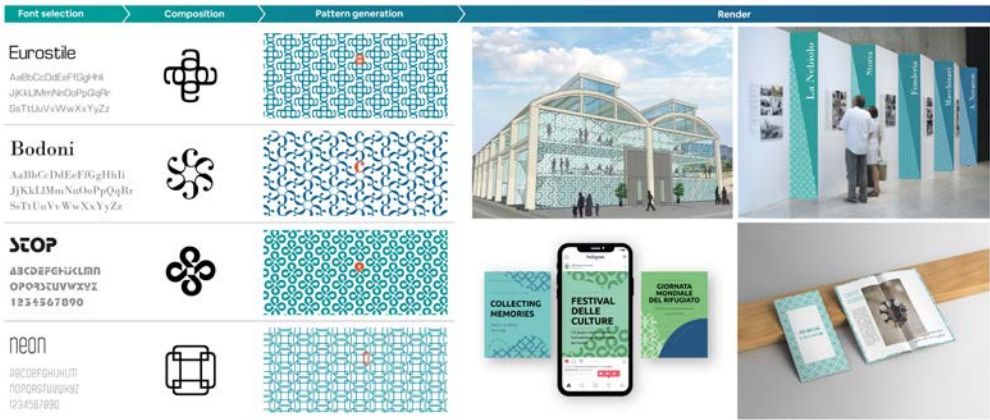


Fig. 5
Typographic pattern creation process and possible applications. Credits: Authors.

Project development. The identity of the Centre, as a complex and multifaceted concept, will have to be conveyed through communication actions on different scales of intervention and implemented through the involvement of different subjects (both stakeholders in the area and the citizenry itself). The different levels of action include the development of the visual identity framework; as well as the modalities of direct and indirect interaction with the public — such as the signage system, digital communication and so on Fig. 6.

COMMUNICATION ACTIONS									
	INSTRUMENTS	CULTURAL CENTRE NAME	CULTURAL CENTRE LOGO	VISUAL IDENTITY	SIGNAGE SYSTEM	SOCIAL NETWORK	WEBSITE	EVENTS	APP
GOALS	Path of reflection and co-design with the citizens and the realities active in the neighbourhood to develop a dialogue with the territory.	Defining the name of the Cultural Centre through internal discussion.	Definition of the Cultural Centre logo through internal discussion and confirmation through questionnaires/ brainstorming with schools and citizens.	Development of the set of graphic-visual elements that will communicate the Centre to the public.	Information system that provides users with information on the external identification of the centre and also on possible routes within the space.	Choice of social channels through which the centre will communicate (or co-project) its activities and events.	Development of a website to convey the centres objectives, initiatives and services.	Design of a series of events and exhibitions to be realised within a predefined time frame, also in collaboration with some local realities.	Development of an app to convey some specific information about the Centre (timeslots, services available...) and facilitate access to some services (bookings, guided tours...)
STRUCTURERS	- Politecnico di Torino - Cultural Centre - Sociologist - Citizenship - Schools - Local associations	- Politecnico di Torino - Cultural Centre	- Politecnico di Torino - Cultural Centre - Graphic studio - Citizenship - Schools - 132 local associations	- Politecnico di Torino - Graphic studio - Typography	- Politecnico di Torino - Graphic studio - Sign-making agency	- Politecnico di Torino - Cultural Centre - Communication agency - Social media manager	- Politecnico di Torino - Communication agency	- Politecnico di Torino - Schools - Local associations - Private institutions (museums, foundations...)	- Web agency - Cultural Centre
OUTPUT	- Development of questionnaires and participatory planning - Definition of a series of opportunities for meeting.	- Brainstorming - Name definition	- Brainstorming - Initiative with schools/ associations - Logo design	- Logo definition, colours - Fonts, patterns, etc. - Development of other elements (business cards, letterheads, brochures, flyers...)	- Development of an executive design of the internal signage system - External signage concept	- Choice of suitable social media - Definition of the copy strategy for each social - Definition of an internal content curator	- Choice of information to be conveyed - Development of the website	- Choice of time frame - Definition of objectives - Structuring some initiatives - Identification of a collaboration format with external entities	- Defining the specific objectives of the app (added value to the user experience) - App development

Fig. 6
Overview of the communication actions for the Cultural Centre. Credits: Authors.

The communication approach is intended as a *fil rouge* to take up at different levels, from the graphic to the architectural level. At present, the project continues with the development of the architectural design in collaboration with a Turin-based architecture Studio, while the graphic and visual design will be entrusted to a communication studio specialising in heritage issues and in particular the Nebiolo reality. Furthermore, in collaboration with the Confederation itself and various realities active in the area, a calendar is being outlined of events and activities with a cross-cultural matrix that will be realised within the Centre Fig. 7.

The value of this project consists, beyond the positive social impact expected at the neighbourhood and urban scale, of its aim to become a good practice in which the field of design plays a fundamental role precisely because it mediates between different cultural needs.

In a context of cultural and social openness linked to a concrete historical need, the design approach does not merely “take note” of social transformations, but makes them its own. It shapes and transforms them into a resource for preserving heritage values, designing new domains whose meanings can be expressed through innovative forms and content, seeking to seize opportunities for exchange, for the cross-fertilisation of cultures, knowledge and technical skills.

Today, alongside a necessary strengthening of the commitment to environmental issues, the main concept of sustainability is charged with new values of a social and cultural nature, orienting its action essentially toward inclusion and cultural accessibility.

The proposed methodological approach applied to this project offers some food for thought on the possible scalability of the adopted methodology applied to the reconversion of cultural heritage as a medium for dialogue and acceptance between different communities that coexist and shape territories.

The example of the Cultural Centre in Turin responds to a widespread territorial need across the entire neighbourhood (the need for a meeting and prayer point for Muslims) but at the same time renews the industrial history that has strongly shaped the area's cultural and social identity over time. In the same way, many Italian territories can lend themselves to similar actions of enhancement. Territorial mapping by municipal administrations of abandoned architectural cultural assets in strongly multicultural neighbourhoods could provide an excellent starting point for suggesting participatory projects in which the involvement of professionals could serve as a tool to synthesise the needs of the citizens and make them explicit, and for trying to build proposals together through intercultural design actions.

Intercultural dialogue, which is prodromal to open and non-conflictual multicultural societies, is also built by a dialogue through design about the contexts in which they can express themselves: this is a responsibility intrinsic to design in particular as a discipline epistemologically innervated by discussion, dialogue and collaboration. In these terms, the designer presents himself as a professional figure and researcher capable of placing his sensitivity as a receptor of demands, facilitator of relations and accelerator of virtuous and ethically evolved processes at the service of the project team and society.

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Over the Mainstream

Cultural and Creative Industries

**The Practice of Anticipation as a Skill for
Designing Possible and Preferable Futures**

Ana Cristina Borba da Cunha, Carlo Franzato,

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At the beginning of May, 2024, a series of floods struck the Brazilian state of Rio Grande do Sul. It is now the end of May, and we are still waiting for the water to go away.

Our governors were taken by surprise. However, this was a widely announced tragedy. In 1941, a flood left deep marks in the memory of the city of Porto Alegre and for a long time the collective imagination assumed that another flood would come sooner or later and there was a discussion about what infrastructure and measures would be necessary. Even so, the city

advanced along the riverbank (and beyond it through land reclamation) expanding the airport, trains, highways, stadiums, building administrative centres and entire neighbourhoods with extensive government and business investment. In the hope of containing the waters in case of another flood as severe as the one in 1941, a complex was built consisting of the Mauá Avenue wall with 14 floodgates, 68 kilometres of dykes, and 23 pumping stations.

In recent years, in addition to the memory of the great flood, there have been several

local and international signs of the impact that another event of this magnitude would have on a city which had grown even larger and more complex. A few years earlier, floods with considerable impact in other cities and even in some neighbourhoods in the capital of the state of Rio Grande do Sul gave advance warning of the scale of the challenge that would arise. In 2023, three floods struck the state, causing 75 deaths. Today, we are experiencing this flood, which is greater than the one in 1941, and has caused at least 157 deaths. The complex did not work.

Similar episodes are happening all over the world. In 2023, the floods in the Emilia-Romagna region of Italy offered a preview of the complexity of dealing with an event such as this one that simultaneously cast a large area of countryside, cities, and entire metropolitan regions in an immediate and long-term tragedy, in which the ability of human beings to adapt, trained for millennia, is subjected to sudden stresses of change, also due now to unpredictable climatic conditions.

In all these examples, in addition to the most essential human urgency, what is not anticipated carries with it a serious social and economic cost. And efforts to reverse the impact of these events come at a much greater cost than would be necessary to avoid them - in addition to the other benefits that early efforts could bring to life in our cities.

In this framework, the Cultural and Creative Industries Days Brazil 2024, initially scheduled to be held in Porto Alegre from June 18th to 20th, faced several unforeseen changes. The programme for the event, one of the focuses of which was precisely the discussion of future scenarios, included the arrival of several researchers from Italy, Colombia, as well as other Brazilian states. In addition to the impact on daily life and the direct engagement of the event organisers in volunteering efforts, a series of uncertainties instantly arose regarding the arrival and stay of participants from outside the city, as the city's infrastructure will continue to be impacted for months. But this undeniable setback reinforced not only the solidarity of the researchers involved in CCID Brazil 2024, but also their common purpose to share

local expertise and best practices for collecting knowledge and the premises for writing a collective manifesto.

In line with this purpose, these preliminary reflections are undersigned collectively because the dynamics of thinking and projecting futures, and practising anticipation, are something that needs to be experienced and developed collectively. This perspective develops from a logic that aims to empower people about what they want for themselves, their families, friends and communities. Therefore, this open contribution is also an invitation to anyone who wants/desires to rethink the ideas and actions that concern the reconstruction of the city of Porto Alegre, the state of Rio Grande do Sul and, of course, their futures.

To do this, we need to talk about the present, because yes, it could have been anticipated — and in a way it was by many people and earlier studies. If this present we are experiencing could have been anticipated in advance, what was left out of consideration for so many people to be impacted in such a destructive way?

The climate crisis is a fact and adds to other crises. However, the relationship of consonance and convergence between these different crises, which mark our daily lives and are a global phenomenon, has been constantly neglected by almost everyone, and, mainly, by those who obtain the rights to represent and decide for us.

The effects of this sum of global crises and neglect produce effects that are local — hyper local, in fact. We are experiencing this collectively and it seems like we don't have the tools to deal with it all. Realising the destructive force of the sum of these systemic crises involves looking at many layers that overlap and become confused in a tangle of invisible webs, yet still exercise a very concrete action in our lives. Interpersonal relationships, trust in sociocultural and political institutions, experiences in social communities (whether mediated by technologies or not), the search for new paradigms of growth (or degrowth), infodemic and its corrosive effects on global democracy, the new stage of the market and capital (even more exclusionary and virtual), the lack of equity whether social, economic or gender etc., this constellation of elements not only

adds to the climate crisis, but also imprints other results on its structure, in a logic that ends up feeding back to all crises at the same time. The consequences include the plurality of systemic instabilities, which also have devastating effects on our shared emotions and sensibilities, and, of course, the impact on each person's mental health. Uncertainty about the future(s) slowly erodes our ability to (re)imagine and transform our city, our state, our Planet and, of course, ourselves.

That said, this text seeks to present a proposal to undertake a reflection on the process of (re)designing futures: demanding access to knowledge for each of us that allows us to carry out transformations that are also systemic and at different levels, at the same time. Our futures can no longer be territories colonised by visions that were created on the basis of desires that do not include everyone, and that do not converge on sensibilities that are not based on domination and/or exclusivity as values managed by the current state. General things. Furthermore, we also propose (re)designing our relationship with technologies, calling for the construction of a relationship that is not based on technological determinism (which so characterises the imagination of the so-called New World); but, in opening up possibilities based on access, democratisation and awareness of collectivised technical-scientific knowledge.

Ultimately, we are talking about establishing other paradigms for the reconstruction of our city, our state and our Planet. There is no way to contain nature, since we have already altered entire ecosystems so profoundly, impacting changes that can no longer be neglected. So, why not (re)build by seeking to embrace the elements underlying the climate crisis and, thus, establish other means of assimilating its effects and the effects of different crises? This may be a radical proposal, but it is radically urgent to find new and different ways to preserve nature and our Planet. This proposal could be the beginning of another relationship with the future(s), collectively participatory and effectively proactive, making anticipation a practice as common and routine as eating, writing, reading, communicating and expressing ideas and opinions. After all, if the future cannot

be postponed, practice in anticipation can empower people and give them the knowledge necessary to know what to do, who or what to count on and, of course, who to hold responsible when future presents do not include collectivised and shared visions.

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The Open Debate section gathers contributions on the theme of demographics, with particular reference to the opportunities and problems that ageing and longevity bring to design. This may well be the first time in the evolution of homo sapiens on Planet Earth that the average age has more than doubled in the space of a century, and that in many long-modernised areas there are now more elderly people than young. The consequences of this context very clearly pervade many of the spheres in which the contemporary designer operates, but it is perhaps even more interesting to explore what sorts of problems this revolution raises in new form.

Flaviano Celaschi

