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Proceedings of IASDR 2023: Life-changing Design

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THE 2023

IASDR Congress

Life-
changing
design

Milan 9th–13th October

PROCEEDINGS OF IASDR 2023

EDITORS:

Daniela De Sainz Molestina

Laura Galluzzo

Francesca Rizzo

Davide Spallazzo



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Life-Changing Design

Proceedings of the 10th Congress of the
International Association of Societies of
Design Research (IASDR 2023)

EDITORS:

Daniela de Sainz Molestina

Laura Galluzzo

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The Tenth IASDR congress. An Introductory Address from the IASDR Board

IASDR 2023 is the 10th biennial congress of IASDR, and the first to take place after the crisis of COVID-19. With this congress we re-confirm the importance of discussion and debate for the network of researchers in design, as well as the importance of developing younger researchers for the future of the Association.

The International Association for Societies of Design Research (IASDR) was established in 2005 through a collaboration of four academic societies: Chinese Institute of Design (CID), the Design Research Society (DRS), Korean Society for Design Science (KSDS) and Japanese Society for the Science of Design (JSSD).

The history of international collaboration in Design Research in the Asian region can be traced back to 1996 when JSSD organized the first Japan-China Industrial Design Symposium which was hosted by Beihang University in Beijing, 1996. This started a series of international conferences in design research known as the Asian Design Conference. Conferences took place in 1997 (Daejeon, Korea at KAIST), 1998 (Taichung, Taiwan at National Taichung University of Science and Technology), 1999 (Nagaoka, Japan at Nagaoka University of Technology), 2001 (Seoul by National Seoul University), and 2003 (Tsukuba, Japan at Tsukuba International Congress Center). At the 2003 congress – the 6th Asian Design Conference – the three Asian academic societies agreed to welcome the Design Research Society into a new association.

We thus began the International Association of Societies of Design Research for the field of design research in 2005, in Taiwan. Since that time, we have enhanced the network of researchers and fields of design research and promoted design research education. We will continue to build this incomparable network of design research as we move towards our 2025 congress, at Tapei, Taiwan.

Our deepest thanks go to Luisa Collina, and the entire Politecnico Milano team who have worked so hard, as hosts for IASDR2023, to ensure its success. Your leadership throughout the process has been excellent and we think the result will be much appreciated by the IASDR design research community.

Toshimasa Yamanaka
President

On behalf of the IASDR Board
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Life-Changing Design.

Introduction to the Tenth IASDR congress

The International Association of Societies of Design Research (IASDR) has long been at the forefront of advancing design research, providing an international platform for researchers, scholars, and practitioners to engage in robust discussions, share insights, and explore the ever-evolving landscape of design research. IASDR 2023, the association's 10th Congress, stands as a pivotal juncture in the trajectory of design research, offering a comprehensive perspective on its current state while charting its future directions.

Over the past decade, design research has witnessed a remarkable transformation. From its roots in aesthetic considerations and form-centric approaches, design research has evolved into a multifaceted discipline, extending its influence beyond traditional boundaries. Contemporary design literature now encompasses a wide array of facets, each addressing critical aspects of design's impact on diverse domains, including organisational culture, public policies, product development, and the creation of immersive spaces, services and systems. This transformation underscores the dynamic nature of design research, as it continuously adapts to our society's changing demands and challenges.

The central theme of IASDR 2023, "Life-Changing Design", resonates profoundly in the wake of global events, particularly the unprecedented disruptions caused by the COVID-19 pandemic. This theme invites us to reflect on the profound transformations that have unfolded and continue to reshape our world. The pandemic has brought to the forefront questions about the role of design in navigating these changes, challenging us to explore how design can facilitate adaptation, resilience, and innovation in a rapidly changing world.

IASDR 2023 has been organised and host by Politecnico di Milano, where design keeps strong roots in the made in Italy tradition and where at the same time design opens up to the new territories of design research and to the new trajectories of innovation.

IASDR 2023 encompasses an array of thematic tracks, each dedicated to exploring critical dimensions of design research. These tracks serve as focal points for discussions and investigations, providing a framework for researchers to delve into specific areas of interest.

The following thematic tracks guide our exploration:

[Changing] Organizations and Policies

This track examines the transformative potential of design in the realm of public sector organisations and policies. It aims to foster social justice and sustainability by challenging traditional notions of prosperity. Researchers investigate how design equips itself with tools, methods, and frameworks to support systemic transformation, thereby promoting well-being and addressing complex societal challenges.

[Changing] Products and Production

This track focuses on the transformation of manufacturing processes and their impact on products and

systems. It explores the proliferation of digital fabrication and digital craft, analysing their potential to revolutionise product development, sustainability, and business models. Researchers delve into how design can envision emerging materials, artefacts, and future scenarios from a sustainable perspective.

Identities and [Changing] Identities

Cultural identities and their evolution in an increasingly multicultural world take center stage in this track. Researchers delve into the roots of design's influence on identity, considering factors such as authorial identities, identity hegemony, and the implications of design on gender, class, and religion. Additionally, this track explores the role of design in translation processes, which involve revising systems, tools, and programs for communicating and preserving identity.

[Changing] Ecosystems

Addressing the imperative transition toward sustainability, this track examines how design contributes to the socio-ethical and economic dimensions of sustainability. It explores design for sustainable materials, energy, business models, and transitions, focusing on fostering positive environmental and social change.

[Changing] Communities

Community empowerment and sustainable behavioural change through design interventions are central to this track. Researchers investigate how design can enhance collaborative processes, co-design knowledge, and tools while addressing urgent public interest issues. The track emphasises shared decision-making, democratic participation, and the evolving roles of individuals, communities, and entities in supporting systemic transitions.

[Changing] Education

This track reflects on the evolving landscape of design education, recognising the complexities and challenges inherent in this domain. Researchers explore the inspirations for change in design education, the transformations it engenders, and the existing gaps and issues. This track seeks to foster clarity, identity, and adaptability in designing educational goals while embracing diversity and differentiation.

[Changing] Spaces and Services

Integrating spatial and service design to create innovative living environments and services is the central concern of this track. It explores how design interventions across various scales, from micro to macro, can drive transformative actions, enhance public participation, and guarantee inclusivity and diversity in service offerings.

[Changing] Interactions

The dynamic interplay between technology, social changes, and design forms the core of this track. Researchers investigate how digital technologies, augmented reality, virtual reality, and mixed environments impact interactions, communities, processes, and professions. This track emphasises the role of Interaction Design in shaping technology-based innovations responsive to social and contextual changes.

[Changing] Heritage

Preserving and reinterpreting cultural heritage in the face of global change is the central focus of this track. Researchers explore how design research can offer novel approaches to knowledge preservation and cultural experiences related to tangible and intangible heritage. This track seeks to activate participation dynamics that reintegrate relevant portions of cultural heritage excluded from current development paradigms.

IASDR 2023, with its overarching theme of "Life-Changing Design" and its diverse thematic tracks, presents an exceptional opportunity for researchers, scholars, and practitioners to engage with the dynamic landscape of design research. The conference serves as a platform for robust discussions, knowledge sharing, and the exploration of innovative solutions to society's complex challenges.

By examining these thematic tracks and their intersection with the central theme, “Life-Changing Design,” we aim to contribute to the ongoing dialogue surrounding design research and its transformative potential, fostering a deeper understanding of design’s role in shaping our world.

Luisa Collina
Alessandro Deserti
Francesco Zurlo

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Exploring the design applications of key emerging materials from natural Sciences through a design ideation workshop

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Exploring the effect of softness and weight of materials on positive emotion regulation: a case study of LEGO

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Forming bacterial cellulose: a research activity exploiting digital fabrication technologies

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From Bio-inspired Design to Microbiology-inspired Design: a Conceptual Model-based Case Study on biological Materials informed by Emotions

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Haptic aesthetics in product design: designing headphones that feel beautiful

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Head shape design of Chinese 450 km/h high-speed trains based on pedigree feature parameterization

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Prototyping a 7-meter frameless dome as emergency shelter: Test build viability and devise team strategies

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Raising the ceiling: the impact of design-based differentiation on product pricing

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<https://doi.org/10.21606/iasdr.2023.128>**Shifting Spaces in Fashion: Approaching digitised design spaces from a bodily perspective**

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<https://doi.org/10.21606/iasdr.2023.507>**Identities and [Changing] Identities****Front Matter**

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<https://doi.org/10.21606/iasdr.2023.894>**Community voices in visual identity. A reflection on the social significance of dynamism in Visual Identity Design**

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<https://doi.org/10.21606/iasdr.2023.373>**Contributions of Slow Design to the valorization of local identities in sustainable processes**

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<https://doi.org/10.21606/iasdr.2023.569>**Decolonizing creativity in the digital era**

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<https://doi.org/10.21606/iasdr.2023.307>**Evolving Identity: A Study on changing choices in the Clothing of Tribal Women of Tripura India**

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<https://doi.org/10.21606/iasdr.2023.499>**Fictional Brand Design. Evolution, Strategies, and an Attempt to a History of Visual Identities in Audiovisual Narratives**

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Lorenzo Bernini, Politecnico di Milano, Italy

<https://doi.org/10.21606/iasdr.2023.278>**Is gift a token of gratitude or an imposition of identity? Facilitating positive consequences of gift-giving with receiver-centred design**

Houjiang Liu, The University of Texas at Austin, USA

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<https://doi.org/10.21606/iasdr.2023.329>**Pursuing positionality in design**

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Shifting identities: new materialities of power and control

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Speculating gender in conversational interfaces

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Textile Autobiographies: Crafting shifting identities with refugee communities

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The Brand as a Place. For a Model Interpreting Identity in the Digital Age

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The impact of identity construction and diversification of Chinese craftspeople on the design innovation of traditional handicrafts – a case study of Dong Brocade in Tongdao, Hunan

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Wearing Black when feeling Blue: An exploration of the relationship between clothing and mood

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[Changing] Ecosystems**Front Matter**

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An explorative multiple case study of smart-circular PSS – status quo in industry

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An investigation into the product attachment between single-person household and their home appliances

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Aqueous logics: Towards a hydro feminism approach to sustainability

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Arousing “Arts of Making” in design: cultivating growing material societal meanings for sustainable transitions

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Bio-Brutalism; five case studies framing the emergence of new raw aesthetics at the intersection of material regeneration, environmental design, and craft

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Circular Futures: how can design nurture more sustainable production and delivery systems for social micro enterprises?

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Collaborating with an Amazonian tree: a bio-product design experiment with ancestral references

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Creating national strategy for circular design through co-design: An Australian perspective

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Digital transition, Sustainable Product-Service System (S.PSS), and environmental sustainability - A systematic review

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Exploring a framework in designing smart circular ecosystems in the waterborne passenger mobility

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Exploring and facilitating Daoism's contributions to design prototype, a case study from a "More-than-Human" social innovation project: Hokkhi

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Global goals, local future stories: unpacking contrasts and visions of circular economy activities in neighbourhood makerspaces

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Material connaissance as a tacit knowledge co-creation method

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More than human empathy: a caring approach to ecosystemic design

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Navigating circularity in practice: proposing a decision-making tool for guiding circular product development

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Out with the new, in with the old: Future directions for Design for Sustainability

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Planet-Oriented Design: a proposal for new ethical transitions in Design Education

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Small fish in a big pond: Product Longevity Design Strategies for Smart Speakers

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**Sustainable design strategy of Chinese old Town community based on landscape ontology:
A case study of Daojiao Community in Chongqing**

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The social influences of digital technologies in the Design of S.PSS and DE: A literature review

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The use of life cycle assessment for lightweight product design based on functional unit

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Emerging decentralized infrastructure networks

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**User decision making for end of use product: Exploring the reasons for keeping and care
motivations for responsible sharing**

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[Changing] Communities

Front Matter

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**A design-driven approach to distributed ledger technologies for small farmers communities:
A case study in Portugal**

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Against the norms: designing violence prevention through engaging men

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**Approach or Avoid Away from Kiosks for the Elderly? A Study on Acceptance and Behavioral
Intention of Self-Service in Hospitals**

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'Becommoning': a design-framework for the initiation of new commons

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Breaking barriers to sustainable costume design: a community-driven approach with German theatres

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Can't spell 'medicine' without 'me': Finding the spirit of co-design in multidisciplinary collaboration

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Co-design for interdisciplinary research communities

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Co-designing for whom? Exploring the benefits of city-led participatory art practices in disadvantaged neighbourhoods of Madrid

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Co-designing strategic ritual in craft beer: Churches, Denominations, Sects, and Mystics

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Community Empowerment: Lessons learned from a Local Health Programme

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Design activating agency: a study on rural community co-creation in China under non-anthropocentrism

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Embedding and embodying narratives in the collaborative development of life-changing healthcare technologies

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Design for social imagination

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Design Interventions are not Received Equally: SSI and Mediated Influences in Decision-Making

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Design sprints for assistive technology; a discussion advocating co-creation between design, lived experience and occupational therapy

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Design teams' behaviors and idea development in using "IDEATOR"

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Designing chatbot as observation media of elders' cognitive health in daily activities

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Developing a child-friendly outdoor public playground for children aged 4-8, through co-creation mindset

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Developing a community-engaged homemaking approach to elicit a sense of belonging in people with dementia

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Dualities of co-design in the context of dementia: Can handover approaches provide an answer?

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Embedded actors in design objects: reflexivity in design for social innovation

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Fostering social inclusion: empathic approaches for migrant-centred design

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Future Systemic and Value Mapping as a Tool for Peace and Deliberation

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Immigrant Integration through Codesign – A Journey Map of integration into working life

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Inclusive harmonies: Co-creating accessible music experiences with deaf or blind advisors through interdisciplinary design workshop

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Increasing preventive care through increased access to healthy foods

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Innovative collaboration and co-designing with Santhal and Mohli tribes of Dumka, India

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Offline and online collaboration in providing service design projects for social innovation to villages: a co-creative action in Quanzhou

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Relational design practices in design for social innovation: a place-centred approach

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Seniors with early AD in China: study of a Design for All (DfA) approach for a transformed, happier family life

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Shaping Social Design with communities

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Social innovation for climate neutrality in cities: actionable pathways for policymakers

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Social innovation through regenerative perspectives: a theoretical approach on gender-based violence system

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Systemic design for sustainable community care for older adults: A case study in Turin, Piedmont, Italy

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The role of participatory transition design in mitigating erosion of participatory democracy

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Transformative effects of co-design: The case of the “My Architect And I” project

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[Changing] Education**Front Matter**

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A production pipeline for an AI-powered design course

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An analysis of international design education programs training students' competencies and skills for tackling complex social challenges

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An interdisciplinary design framework for creative collaboration

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Building design agency through bodystorming

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Climate Adaptation in Design Education: Applying a four-step Research by Design Strategy

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Combination of Experiential Learning to investigate design students' design thinking ability

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Compass for the Voyage of Ideation: Unlocking the Stimulation Potential of Service Design Heuristics

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Confidence and doubt in doctoral research: The temptation of certainty

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Design Education 4.0: Technology-driven design futures & the future of design education

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Design fiction and the art of anticipation

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Design Futures to support Sustainable Food practices

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Design laboratories system as a tool to enable interdisciplinary design learning: analysis of common approaches and new perspectives

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Designerly activity theory supporting research-through-design

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Designing collective racial healing spaces

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DIP into the Future: Building a Design Curriculum to Enable Design Students to Work with Machine Learning

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Enhancing design competencies for students with special educational needs for future career development

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Explore the online interdisciplinary co-design in higher education

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Exploring an innovative apprenticeship model in design education : a case study in transportation design

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Guiding into the unknown. A dialogue between design and yoga for mindful design education

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How might we design alternative worldviews? Assessing a design education program for business professionals

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How students perceive lecturers' gestures? An exploration in gesture-meaning matching toward embodied pedagogical agent design

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Investigation of creativity and Experiential learning composition in design teams

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Learning technology with beginner-friendly software: design students' on attitude towards software alternatives

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Next generation textile designers. A research project to connect the textile-knitwear manufacturing system with future design talents and its impact on education

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PhotoReflexivity: supporting Reflexivity for Students in Design Education

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ProVi – a transforming vision emerging from reflective practice

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<https://doi.org/10.21606/iasdr.2023.361>**Teaching to transfer causal layered analysis from futures thinking to design thinking**

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<https://doi.org/10.21606/iasdr.2023.383>**The challenge of facilitating short-term Design Thinking Workshops for Higher Education in the New Normal Era**

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<https://doi.org/10.21606/iasdr.2023.461>**The challenge of hyperdistraction for Design Education**

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<https://doi.org/10.21606/iasdr.2023.247>**The problems of design-based interdisciplinary learning**

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<https://doi.org/10.21606/iasdr.2023.289>**The role of human-centred design in promoting understanding of local contexts: a study of Japanese students addressing social issues in Bangladesh**

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<https://doi.org/10.21606/iasdr.2023.508>**Towards a Design Observatory in Portugal – results, reflections and future steps**

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<https://doi.org/10.21606/iasdr.2023.314>**Uncovering key aspects of process gains and losses in team-based design thinking workshops**

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<https://doi.org/10.21606/iasdr.2023.323>**Unleashing a creative explosion: channeling expert strategy into Service Design Heuristic Cards**

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Unlocking creative potential: idea generation training for design students

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<https://doi.org/10.21606/iasdr.2023.409>**Usage of Service Design Pattern Language as a method for beginners to effectively acquire their behaviors towards design**

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<https://doi.org/10.21606/iasdr.2023.505>**[Changing] Spaces and Services****Front Matter**

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<https://doi.org/10.21606/iasdr.2023.892>**Data Challenge. Re-thinking the library as a learning space to intersect youth, culture and gender diversity**

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<https://doi.org/10.21606/iasdr.2023.471>**Design Characteristics in Outdoor Seating Areas – A study of coffee shops in Hong Kong and Copenhagen**

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<https://doi.org/10.21606/iasdr.2023.216>**Designing therapeutic and social spaces for older adults facing Mild Cognitive Impairment: Priorities in spatial and furniture layout**

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<https://doi.org/10.21606/iasdr.2023.174>**Mapping urban regeneration through multiple dimensions of temporality: A visual analysis of three approaches to Theory of Change**

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<https://doi.org/10.21606/iasdr.2023.105>**Metro interior design to reduce the occurrence of metro congestion**

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<https://doi.org/10.21606/iasdr.2023.548>

Office space design based on Kano Model, AHP, QFD Methods

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<https://doi.org/10.21606/iasdr.2023.166>**Visual and spatial design for proximity healthcare: the meta-design book of “Case e Ospedali di Comunità” of Regione Lombardia**

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<https://doi.org/10.21606/iasdr.2023.430>**Yearning for Revival_Using Healing as the Linking Strategy to Recreate Emotionally Resilient Communities**

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<https://doi.org/10.21606/iasdr.2023.148>**[Changing] Interactions****Front Matter**

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<https://doi.org/10.21606/iasdr.2023.887>**A personality-centred design approach for virtual humans on correspondence with roles and behaviors**

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<https://doi.org/10.21606/iasdr.2023.411>**A Study on the Sense of Being Alive Expressed in Motion**

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<https://doi.org/10.21606/iasdr.2023.463>**AIXE. Building a scale to evaluate the UX of AI-infused products**

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<https://doi.org/10.21606/iasdr.2023.355>**Colour in virtual classroom: Effects of colour schemes and interior elements on students' preference and attention**

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Design considerations for supporting social interaction in algorithmic social media feed

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Designer Empathy in Virtual Reality: transforming the Designer Experience closer to the User

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Designing an interactive system based on pose-estimation to support rhythmic gymnastics basic coaches in enhancing their learning

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Designing interfaces for text-to-image prompt engineering using stable diffusion models: a human-AI interaction approach

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Designing the interaction between humans and autonomous systems: The role of behavioral science

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<https://doi.org/10.21606/iasdr.2023.457>

Designing the prosthetic appearance in virtual reality with the collaboration of participants and users

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<https://doi.org/10.21606/iasdr.2023.177>

Designing visuo-haptic illusions for Virtual Reality applications using floor-based shape-changing displays

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<https://doi.org/10.21606/iasdr.2023.466>

E-Motioning: Exploring the Effects of Emotional Generative Visuals on Creativity and Connectedness during Videoconferencing

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<https://doi.org/10.21606/iasdr.2023.101>

Elderly's Perceptions of a Meaningful Interaction with Voice-Based Conversational Agents: Integrate into daily routines, Support relatedness, But do not hamper autonomy

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<https://doi.org/10.21606/iasdr.2023.344>

Embracing digital offboarding as a design challenge

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<https://doi.org/10.21606/iasdr.2023.393>**Examining the affordance effect of shifting symbols on the virtual buttons of smartphones**

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Hsi-Jen Chen, National Cheng Kung University, Taiwan

<https://doi.org/10.21606/iasdr.2023.482>**Exploring multimodal technologies to engage elderly people in remote communication with their family**

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<https://doi.org/10.21606/iasdr.2023.441>**Fixing the Future: Cultivating a Capacity to Repair IoT Devices through Experiential Futures**

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Thomas Macpherson-Pope, The Making Rooms

<https://doi.org/10.21606/iasdr.2023.474>**For who page? TikTok creators' algorithmic dependencies**

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<https://doi.org/10.21606/iasdr.2023.576>**How smart is the Italian domestic environment? A quantitative study**

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<https://doi.org/10.21606/iasdr.2023.206>**How to promote consumption in city metaverse? Research on XR experience design and consumer behavior of commercial streets**

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<https://doi.org/10.21606/iasdr.2023.103>**Human-AI system co-creativity for building narrative worlds**

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<https://doi.org/10.21606/iasdr.2023.293>**Identifying meaningful user experiences with autonomous products: a case study in fundamental user needs in fully autonomous vehicles**

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<https://doi.org/10.21606/iasdr.2023.434>**Improving the healthcare experience: Developing a comprehensive patient health record (PHR)**

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<https://doi.org/10.21606/iasdr.2023.311>

Introducing the third space of design for well-being: Exploring the intersection between problem- and possibility-driven design through a design case on online dating experience

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Investigating the effectiveness of Peripheral Vision in reading digital speed limit information displayed in AR-HUD technology

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Multi-view visualization layout design method for large displays based on quantitative analysis of situation awareness

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Olfactory Stimulus as Design Material: designing an engaging interaction between user and AI chatbot

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Performance evaluation of QWERTY keyboards on foldable smartphones: keyboard layout and phrase complexity

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Plant Playmate: exploring effects of interactive plants for mental wellness microbreaks during knowledge-based work

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Play with data: Using haptic properties of artifacts to augment data representation

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Post-pandemic era: evaluation of Quality of Life and Usability Testing for elderly rehabilitation app design

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Preserving theoretically-grounded functions across media platforms in interaction design

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Research on user needs for gesture interaction of foldable smartphones: comparison between current and potential users

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Rethinking designer agency: A case study of co-creation between designers and AI

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Scalable eHMI: Automated vehicles-pedestrian interactions design based on gestalt principles

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Techno-social correlations in responsive environments

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The Dronetic Moment: Future of drone light show & lighting design in concerts

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The Russia-Ukraine war and climate change: Analysis of one year of data-visualisations

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Threshold space design: Using water element for phase transition from physical space to virtual space with different law of gravity

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Touchy-feely: A designerly exploration of haptic representations of three mood states

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Transforming resilient healthcare systems: mapping the pathway forward with healthcare 4.0 technologies

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<https://doi.org/10.21606/iasdr.2023.133>

Understanding the relationship between in-car agent's embodiments and information with different criticality

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<https://doi.org/10.21606/iasdr.2023.579>

Using AR HMD in exhibition: Effects of guidance methods and spatial relative positions

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<https://doi.org/10.21606/iasdr.2023.143>

What's the Social Trust Mechanism Blending Virtual and Reality in the Context of Digital Media?

Yunlu Liu, Kingston University of London, UK
Yuqi Liu, Tsinghua University, China
Tongwen Sun, Soochow University, China
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<https://doi.org/10.21606/iasdr.2023.425>

When to say bye: A qualitative study of older adults' discontinuation of technology use after the pandemic

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<https://doi.org/10.21606/iasdr.2023.351>

[Changing] Heritage**Front Matter**

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<https://doi.org/10.21606/iasdr.2023.896>

AI Promotes the Inheritance and Dissemination of Chinese Boneless Painting—Research on Design Practice from Interdisciplinary Collaboration

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Applying generative art to cultural and creative product design to construct human-product relationship

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Design and the reframing of participatory approaches in Cultural Heritage and museums beyond pandemic crisis

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Digital for Heritage and Museums: Design-Driven Changes and Challenges

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Educating the attention of museum visitors through non-verbal art mediation

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GIAHS Metaverse: innovative digital transformation of agricultural heritage

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Graphic standards in graphic heritage: Scope, scale, and unity through multiplicity in Islamic design

Robert George Harland, Loughborough University, UK

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Inheriting the Intangible Cultural Heritage and embracing innovation: Digital Rubbing leads a new Experience of Audience Interaction in museums

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Museums at a crossroads

Licia Calvi, Breda University of Applied Sciences, The Netherlands

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Museums on-chain? A designerly contribution in the development of blockchain-based digital strategies in cultural institutions

Federica Rubino, Politecnico di Milano, Italy

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Places of worship digital information dissemination design strategy in communication ritual view

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Product design proposal for a relaxation space with 'Mindfulness' meditation

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<https://doi.org/10.21606/iasdr.2023.524>

Research on Urban Brownfield Landscape Design from the Perspective of Environmental Interaction - Taking the Former Site of Jiangnan Cement Factory as an Example

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<https://doi.org/10.21606/iasdr.2023.267>

Review: design reshape the relationship between museum collections and visitors in digital age

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Danhua Zhao, Hunan University, China

Shizhu Lu, Hunan University, China

<https://doi.org/10.21606/iasdr.2023.556>

Service co-design to envision the transformation of museums

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Study on key elements of kids cartoon design in Min-nam (Hokkien) language

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<https://doi.org/10.21606/iasdr.2023.157>

Study on the development strategy of HuiShan clay figurine from the perspective of urban symbolism-taking the design strategy of NANIMOMO blind box series as an example

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Bo Pang, School of Arts, Tiangong University, China

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Study on the Status Quo and Sustainable Renewal Strategies of the Zhoutie Historic District in Wuxi, China

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<https://doi.org/10.21606/iasdr.2023.193>

Pictorials**Front Matter**

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<https://doi.org/10.21606/iasdr.2023.889>

Convergence research and participatory design of a study furniture system for small living environments

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Domestic infrastructure of food: thoughts on community engagement through food, furniture, and architectural exhibition

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Exploiting co-design, game thinking and citizen science in a workshop-like experience for stimulating reflections with teens

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<https://doi.org/10.21606/iasdr.2023.846>

From Urban Development to the Pluriverse – Ontological Design for Natural and Cultural Heritage

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Glitch Pluriverse

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<https://doi.org/10.21606/iasdr.2023.606>

Hitonami: Speculative design for overcrowded mobility arenas in the 6G era

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<https://doi.org/10.21606/iasdr.2023.813>

Hydrogen aviation: Imagining future air travel experience scenarios

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Jeremy Kerr, Queensland University of Technology, Australia
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Bob Criner, Stralis Aircraft, Australia
Heather McKinnon, Queensland University of Technology, Australia
<https://doi.org/10.21606/iasdr.2023.746>

Making a scene: Representing and annotating enacted interfaces in co-performances using the screenplay

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Stella Boess, Delft University of Technology, The Netherlands
Alessandro Bozzon, Delft University of Technology, The Netherlands
<https://doi.org/10.21606/iasdr.2023.788>

Pedagogy of Experimental Design: Scientific research methods in architectural education

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<https://doi.org/10.21606/iasdr.2023.833>

Picturing interactivity: design exploration of a highly interactive picturebook

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Kristy Wright, Thomas Wright Design, New Zealand
<https://doi.org/10.21606/iasdr.2023.695>

ShapeChips: Value formation in material ecosystem using buffer materials generated from wood chips

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<https://doi.org/10.21606/iasdr.2023.694>

Stories from an unfinished prototype: a seemingly never-ending loop of practice and research

Daniel Echeverri, Masaryk University, Czech Republic
<https://doi.org/10.21606/iasdr.2023.131>

Sync: Novel BCI design for neural synchrony, connectedness, and empathy

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<https://doi.org/10.21606/iasdr.2023.820>

The full and the empty. A dialogue between Chinese painting and design

Estelle Berger, Strate - School of design, France

Dominique Christian, Independent researcher

<https://doi.org/10.21606/iasdr.2023.609>

The future archives: a speculative approach for visualising the impacts of 6G-enabled infrastructure in Japan

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Federico Trucchia, University of Tokyo, Japan

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Tools for a Warming Planet

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Towards a Design Toolkit for Exploring and Specifying Close-proximity Human-robot Collaboration as Leader and Follower: the Case of Collaborative Drawing

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Using cultural probes to understand students' mental wellbeing

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<https://doi.org/10.21606/iasdr.2023.744>

UX design approach to guide parametric product customization: a case for eyeglass frame design

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Brigid O'Kane, University of Cincinnati, USA

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Short Papers**Front Matter**

Erminia D'Itria, Politecnico di Milano, Italy

Silvia Maria Gramegna, Politecnico di Milano, Italy

Xue Pei, Politecnico di Milano, Italy

<https://doi.org/10.21606/iasdr.2023.885>

A field guide to visualisation-supported information disorders for media and information literacy

Elena Aversa, Politecnico di Milano, Italy

<https://doi.org/10.21606/iasdr.2023.786>

A holistic co-design model engaging multi-stakeholders for the rural revitalization in China — A case study of Qingshan Village, Hangzhou

Liqi Ren, Duke Kunshan University, China

Tingting Chen, Wuhan University, China

Yinan Du, California Institute of the Arts, USA
Jia Long, Duke Kunshan University, China
Xinran Lai, Duke Kunshan University, China
<https://doi.org/10.21606/iasdr.2023.710>

A study on Technology Acceptance Model of AI speakers among middle-aged people

Yun Jing, Graduate School of Design, Kyushu University, Japan
Ryoichi Tamura, Faculty of Design, Kyushu University, Japan
<https://doi.org/10.21606/iasdr.2023.491>

A systematic thinking on evaluation of community service facilities in the context of design

Mao-en He, College of Design and Innovation, Tongji University, China
Chang Liu, College of Design and Innovation, Tongji University, China
<https://doi.org/10.21606/iasdr.2023.557>

A systemic perspective on designing for well-being in dementia care: learning from the case of Dementia Friendly Communities

Xiaolin Shen, Politecnico di Milano, Italy
Daniela Sangiorgi, Politecnico di Milano, Italy
<https://doi.org/10.21606/iasdr.2023.774>

A systems thinking approach to codesign at a Montessori School

Anna Chekhman, York University, Canada
Martin J. Bunch, York University, Canada
Shital Desai, York University, Canada
<https://doi.org/10.21606/iasdr.2023.748>

Adapting future designer curricula: A comparative analysis of design future skills in learning outcomes

Emily Wright, Swinburne University of Technology, Australia
<https://doi.org/10.21606/iasdr.2023.852>

An investigation of empathy in face-to-face and remote co-creative design processes

Namgyu Kang, Future University Hakodate, Japan
Thongphun Khongthat, Chiang Mai University, Thailand
<https://doi.org/10.21606/iasdr.2023.709>

Archives of dyeing katagami used in the inheritance and creation of traditional patterns

Minako Ikeda, Kyushu University, Japan
<https://doi.org/10.21606/iasdr.2023.703>

Are all Pokémons created equal? Assessing the value-neutrality of Pokémon TCG design process

Minoru Matsui, Advanced Institute of Industrial Technology, Japan
<https://doi.org/10.21606/iasdr.2023.875>

Changing the Narrative: Co-designing awareness about Environmental Sustainability with children in Denmark

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Marie Kremer, Design School Kolding, Denmark
Craig Native, Aarhus Municipality, Denmark
<https://doi.org/10.21606/iasdr.2023.660>

Co-Designing Mental Health Futures: A case study on the development of a Residential Eating Disorders Facility

Troy McGee, Monash University, Australia
Leah Heiss, Monash University, Australia
Myra Thiessen, Monash University, Australia

Gretchen Coombs, Monash University, Australia
Eden Potter, Monash University, Australia
Olivia Hamilton, RMIT University, Australia
Cate O’Kane, Alfred Health, Australia
<https://doi.org/10.21606/iasdr.2023.541>

Co-designing with children with cerebral palsy: context and co-design principles

Ganna Borzenkova, Manchester Metropolitan University, UK
Jingshu Tang, Manchester Metropolitan University, UK
Kristina Niedderer, Manchester Metropolitan University, United Kingdom
<https://doi.org/10.21606/iasdr.2023.614>

Cocreate: a co-design toolkit to design with and for adolescents together

Claire Vos, Eindhoven University of Technology, The Netherlands
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<https://doi.org/10.21606/iasdr.2023.729>

Combining Evaluation Grid Method to investigate the attractions of traditional crafts in Taiwan

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<https://doi.org/10.21606/iasdr.2023.445>

Cross-device system design based on stylized 3D map for intangible cultural heritage in Yunnan of China

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<https://doi.org/10.21606/iasdr.2023.724>

Design for expanding interaction and cognitive enhancement in virtual reality

Youngil Cho, Hokkaido University of Science, Japan
<https://doi.org/10.21606/iasdr.2023.866>

Design intervention to aid young Indians in identifying triggers of generalised anxiety disorder (GAD)

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<https://doi.org/10.21606/iasdr.2023.299>

Designer-researcher’s positionality; materialities matter

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<https://doi.org/10.21606/iasdr.2023.732>

Designing adaptable consumption: a new practice to foster food system transitions

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Nynke Tromp, Delft University of Technology, The Netherlands
Rick Schifferstein, Delft University of Technology, The Netherlands
<https://doi.org/10.21606/iasdr.2023.678>

Designing effective interventions to encourage older adults proactively participate in physical activity and promote sustainable behaviour change

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<https://doi.org/10.21606/iasdr.2023.739>

Developing future kitchen for older adults: a model and participatory design approach based on literature review and ethics framework

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Hua Dong, Brunel Design School, Brunel University London, UK
<https://doi.org/10.21606/iasdr.2023.798>

Development of “Amamizu Drink” as a Tool for Awareness regarding Rainwater conservation, and Investigation of the Effectiveness of Different Label Designs

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Toshihiro Kasai, Fukui University of Technology, Japan
Jun Mitera, Fukui University of Technology, Japan
<https://doi.org/10.21606/iasdr.2023.655>

Development of a “Facial Rock-Paper-Scissors” Program for Rehabilitation of Swallowing and Cognitive Functions that Has Psychological Effects

Kiyomi Yoshioka, Meisei University, Japan
<https://doi.org/10.21606/iasdr.2023.251>

Development of an interactive teaching tool for woodworking course on components arrangement and sawing techniques using Augmented Reality technology

Chia Lin Yang, National Cheng Kung University, Taiwan
Chien-Hsu Chen, National Cheng Kung University, Taiwan
<https://doi.org/10.21606/iasdr.2023.853>

Digital cultural heritage conservation: sampling stilt houses in Tai O Village

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Norah Xiaolu Wang, The Hong Kong Polytechnic University, Hong Kong
Wai Yeung Yan, The Hong Kong Polytechnic University, Hong Kong
<https://doi.org/10.21606/iasdr.2023.212>

Digitalized intangible cultural heritage preservation – reinventing the design practice of Hong Kong men’s cheongsam

Haze Ng, The Hong Kong Polytechnic University, Hong Kong
<https://doi.org/10.21606/iasdr.2023.800>

Educating the mindful designer: Exploring Mindfulness Practices in Design Education

Alberto Iberbuden, Anhalt University of Applied Sciences, Germany
<https://doi.org/10.21606/iasdr.2023.764>

Enhancing elderly with Communication impairments: Exploring visual and voice communication tools

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Hong-Chun Shi, Faculty of Innovation and Design, City University of Macau
<https://doi.org/10.21606/iasdr.2023.436>

Envisioning sustainable smartphone alternatives: a plurishop approach

Ines Petra Junge, University of Oslo, Norway
Alma Leora Culén, University of Oslo, Norway
<https://doi.org/10.21606/iasdr.2023.799>

Expanding the boundaries of service design to assist re-design the short-term strategy for sustainable development

Tong Liu, Tsinghua University, China
Cai Jun, Tsinghua University, China
<https://doi.org/10.21606/iasdr.2023.873>

Exploring the Influence of Aesthetic interaction using Personal Information Devices at Work

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Chajoong Kim, Ulsan National Institute of Science and Technology, South Korea
<https://doi.org/10.21606/iasdr.2023.861>

Exploring the use of a digital twin in theatre stage design

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Matilda Kalving, University of Lapland, Finland
Juri Etto, University of Lapland, Finland
Ashley Colley, University of Lapland, Finland
<https://doi.org/10.21606/iasdr.2023.806>

Fears, Desires and Visions of Prague Residents: Transition to Age-Friendly Community Centres in 2050

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<https://doi.org/10.21606/iasdr.2023.700>

Fostering collaboration between start-ups and students for mutually beneficial inspiring learning

Morgan Ricard, Politecnico di Milano, Italy
Anna Meroni, Politecnico di Milano, Italy
<https://doi.org/10.21606/iasdr.2023.829>

From Bodies in Technology to Digital Subjectivity: Research on the Identity Construction of Digital Humans

Yixuan Tai, Tongji University, China
Jie Wu, Tongji University, China
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From the mothers' movement to cradlr: an interaction design for refugee children

Jing Zhou, Monmouth University, USA
<https://doi.org/10.21606/iasdr.2023.839>

Generative AI in creative design processes: a dive into possible cognitive biases

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Alice Schut, The Hague University of Applied Sciences, The Netherlands
<https://doi.org/10.21606/iasdr.2023.784>

How the GenAI sex education advisor became feasible: exploring the future design principles for child sex education in the community

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Xuan He, Hunan University, China
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<https://doi.org/10.21606/iasdr.2023.791>

How to adopt Design Thinking within organizations? Mapping facilitators to activate an organisational transformation path

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<https://doi.org/10.21606/iasdr.2023.683>

Ideal model and everyday life: interior decoration of the modern home in early twentieth-century Shanghai

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<https://doi.org/10.21606/iasdr.2023.638>

(im)Mobile gendered identities: The relationship between mobility and identity

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<https://doi.org/10.21606/iasdr.2023.741>

Improving the patient-doctor relationship to fight antimicrobial resistance through data literacy promoted by a women-centred participatory practice

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How to adopt Design Thinking within organizations? Mapping facilitators to activate an organisational transformation path

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Design Thinking is increasingly at the centre of organisations' discussions: more and more are trying to implement it. However, it has been seen that adopting Design Thinking requires deep processes of organisational change that many companies often fail to do. Over the years, the scientific community debated the benefits of Design Thinking and the barriers that companies may face during its adoption. On the other side, few and embryonic contributions have been made on how to support companies in this adoption. Through an exploratory analysis, analysing ten companies that have been adopting Design Thinking for several years and with tangible results, this research identifies four macro categories of facilitators for the adoption of Design Thinking and a set of related actions. The aim is to support companies to really achieve the benefits that Design Thinking can give, but if adopted fully and not only partially as is often the case.

Keywords: *design thinking; adoption facilitators; organisational change*

1 Theoretical background

Private organizations are becoming more interested in implementing strategies and tactics from the design disciplines. They are paying close attention to how Design Thinking (DT) may be applied to innovative projects.

For a long time, Design Thinking has been the subject of intense discussion among academics who have also attempted to define it. In literature, there is currently no clear meaning of the term. Zurlo (2019) states that Design Thinking represents “the phenomenon that, more than others, marks the encounter between design and management”.

The focus on the topic stems from the fact that it has been consolidated how Design Thinking brings positive implications for organisational transformation and innovation (Brown, 2009), better decision-



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making (Liedtka, 2015), customer orientation (Kumar and Whitney, 2007) and competitive advantage (Martin & Martin, 2009).

Companies want to adopt Design Thinking because it can represent a significant opportunity for business and innovation challenges (Seidel & Fixson, 2013; Verganti, 2008), helping to improve customer experiences significantly (Gruber et al., 2015; Kolko, 2015). The possibility to deliver superior customer value is one of the biggest levers of businesses that want to sustain a competitive advantage (Woodruff, 1997).

Organizations use Design Thinking for a variety of purposes, such as to foster innovation, particularly disruptive innovation, and internal changes in mindsets, perspectives, and behaviors (i.e., a change in organizational culture) to improve customer experiences, foster internal teamwork, break down silos, attract and retain highly creative employees, and effect fundamental changes in organizational and social systems (Dunne, 2018).

Organizations have experimented with a variety of methods to encourage the adoption of design, including creating innovation laboratories with designers, hiring designers for strategic roles, and requiring staff to participate in training sessions, frequently offered by design consultancies (Van Der Bijl-Brouwer et al., 2019).

The literature shows that the adoption of Design Thinking faces several barriers to adoption. Among the most established is the uncertainty produced by change (Weeks et al., 2004; Kilman, 1984; Ackoff, 1974; Tetenbaum, 1998; Hutchison, 2001; Martin, 2009). Companies are afraid to leave routine processes that bring constant benefits to move on to something they do not know what kind of impact it will have. In addition, another big barrier discussed for adopting Design Thinking is leadership (Carlgren et al. 2014; Dunne, 2018a; Dunne, 2018b; Beckman & Barry, 2007; Kimbell, 2011; Junginger, 2009). Managers are often unfamiliar with the method, which is why they do not see the benefits it can bring. Moreover, not knowing it, they have no idea how to implement it, causing various problems and slowdowns. Another major barrier to the adoption of Design Thinking is the incompatibility of the language and approaches of Design Thinking (Kupp et al., 2017; Björklund et al., 2020; Stephens & Boland, 2015; Avital et al., 2007, Boland et al., 2008, Dunne, 2018a; Dunne, 2018b; Zurlo, 2019). The terms are not those in common use, just as the tools are not standard ones. This often causes employees to be hostile to adoption and to look at the method without understanding it. According to Björklund et al. (2020), as organizations attempt to include design, they commonly encounter conflicts brought on by differences between the methodologies and approaches of Design Thinking and those of engineers and management. Finally, another major barrier discussed in the literature is the simplification and misunderstanding of the method (Ersoy, 2018; Zurlo, 2019; Björklund et al., 2020; Dunne, 2018a). It is often thought that Design Thinking is linked to tools, that it has no real benefits and methods, reducing the idea of it. This leads to prejudice against Design Thinking.

Even though obstacles are well recognized in the scientific community and countless studies have examined this issue, the same cannot be said about enabling factors. Facilitators are not clearly clustered in the literature - so it could be defined as being in an embryonic stage. In fact, very few studies, mainly from the last two years, are trying to go into this definition, reporting “tentative results” about the discussion of possible facilitators to implementing Design Thinking inside organisations.

2 Research methodology

This study aims to understand how to effectively adopt Design Thinking to achieve better organisational results and performance. Considering that the issue of the benefits of Design Thinking has long been debated in the literature, as well as the different barriers to adoption that companies encounter when they want to adopt it, it was decided to focus on where there is a gap in the literature: the facilitators to be put in place when adopting Design Thinking.

For this reason, an exploratory case study methodology is appropriate (Eisenhardt 1989; Yin, 2009), because it provides answers to the questions "how" and "what." Any time a certain phenomenon is novel and mostly unexplored and there aren't enough theories to establish hypotheses before the examination, an exploratory case study might be used. The exploratory case study technique seems to be the most suitable for this research, given the need to identify enablers (in terms of "how" and "what") that allow the overcoming of barriers to adopting Design Thinking.

2.1 Empirical setting

The analysis was conducted through 10 case studies of large-sized (more than 300 employees) for-profit organisations in different sectors that have been adopting Design Thinking for several years. Organisations in different sectors were chosen to have as broad a view as possible and to understand whether there are any recurrences in the facilitators to be adopted. The ten organisations were chosen by selecting organisations that have stated that they have achieved tangible results (which have also been publicised in various media) thanks to the adoption of Design Thinking. The list of the different organisations, their sector and the year they started adopting Design Thinking can be found in Table 1.

Table 1. List of organisations used as sample, their sectors and year of DT adoption

	Sector	Year of DT adoption
Organisation 1	Multinational conglomerate corporation	2015
Organisation 2	Telecommunications	2010
Organisation 3	Smart energy solutions	2019
Organisation 4	Finance	2019
Organisation 5	Electrical appliance	2012
Organisation 6	Food and beverage	2012
Organisation 7	IT service management	2018
Organisation 8	Technological components	2015
Organisation 9	Insurance	2017
Organisation 10	Telecommunications	2017

A series of semistructured interviews were conducted to gain an understanding of the facilitators adopted and the relative benefits found.

2.2 Data collection

The analysis was carried out through semi-structured interviews conducted by two researchers and lasting about one hour per company. Semi-structured interviews are used because they make it possible to get rich data needed for case study research (Edwards & Talbot, 1999; Gillham, 2000). The different interviewees were all people in key roles within the chosen organisations. This was important in order to receive as much data as possible and also to be able to discuss the implications and benefits of the different facilitators adopted. The questions in fact sought to understand (as required by the exploratory analysis) what different facilitators were put in place to enable the adoption of design thinking and how they were put in place through practical actions. All the interviews were recorded and transcribed.

The protocol was structured into three main sections:

- General information: The first section aimed to collect information on the organisation, when they started to adopt design thinking and the key figure who suggested its adoption;
- Understanding the different facilitators (what): The second section included questions on what different facilitators were put in place to facilitate the adoption of design thinking;
- Understanding the implementation of the different facilitators (how): The third section was useful to understand how the different facilitators identified to overcome the most common obstacles in companies were deployed (through which actions).

The complete protocol of the semi-structured interviews is provided in Appendix 1.

2.3 Data analysis

All the interviews were recorded and transcribed, allowing the researcher to fully analyze the data (Braun & Clarke, 2006). Moreover, full transcription is essential to start an accurate analysis (Lapadat & Lindsay, 1999). Once transcribed, the data were analysed by MaxQda to have a more structured way to perform the data analysis. MaxQda software supported thematic analysis (Braun & Clarke, 2006) by identifying, analyzing and reporting patterns within data. The analysis was made by two researchers. After a firsthand discussion, the research team invited two external researchers to consolidate the insights and enrich the statistical results with further comments.

3 Results

The various interviews, their coding and the subsequent analysis have allowed to identify four main macro facilitators that need to be put in place when adopting Design Thinking. During the thematic analysis, a second level of coding was also identified. This second level represents the practical actions that companies must put in place to facilitate the adoption of Design Thinking. Below are presented the four macro facilitators (first level of coding) and for each of them the relevant practical actions identified (second level of coding), also represented inside Figure 1.

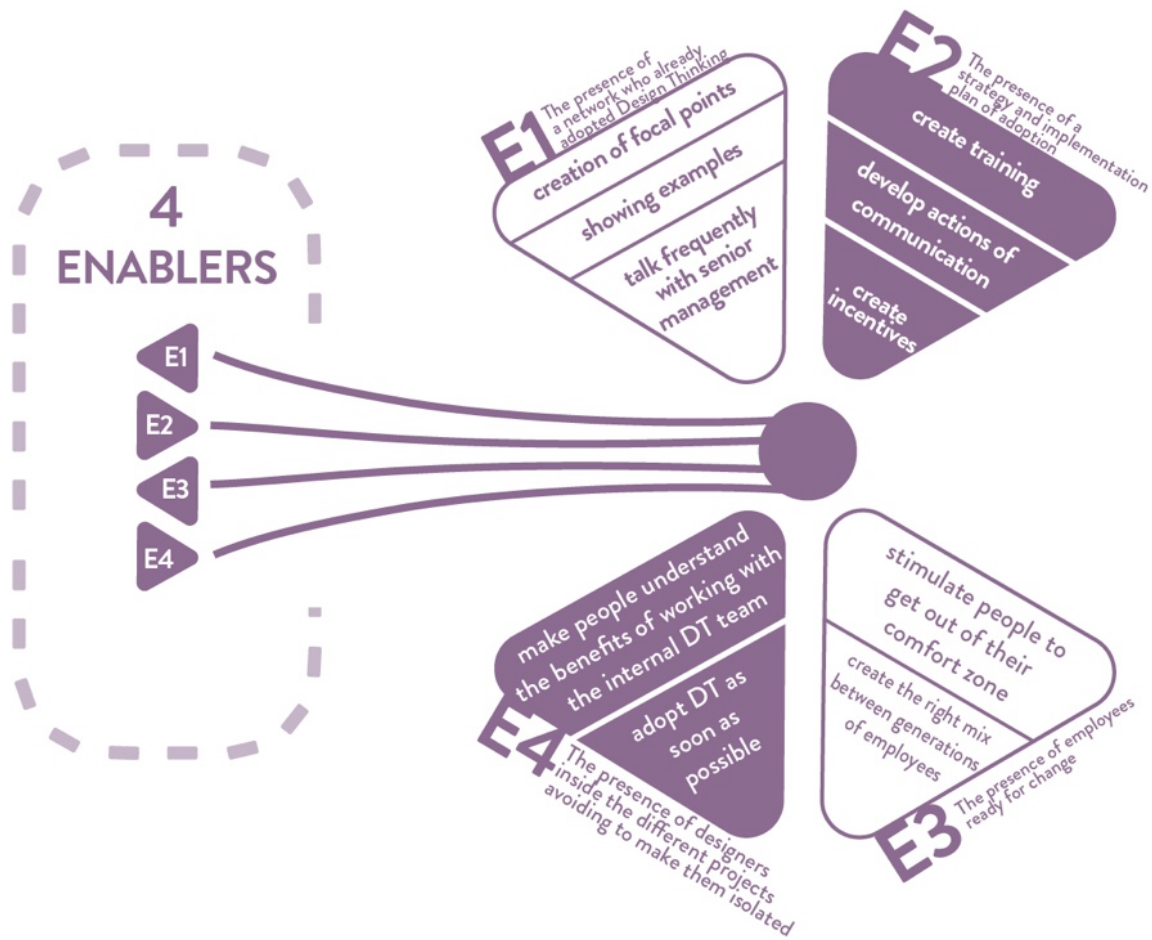


Figure 1. Contribution of this study: Four macro categories of facilitators for Design Thinking adoption identified and related actions to implement.

3.1 Macro category one: the presence of a network who already adopted Design Thinking

The first macro category that emerged is associated with the existence of Design Thinking experts within or outside the organisation supporting the adoption process. Creating a network of people to act as a catalyst and to solve questions on the topic appeared to be a key moment in the various companies interviewed.

The “creation of focal points” (element 1.1) to be always present inside the company appeared as the first significant action to implement. Focal points are represented by individuals who are exceptionally knowledgeable about the topic, hold various positions, and are especially eager to assist those who are unsure or uncertain and encourage the adoption of Design Thinking across the organization. The existence of focal points appears to be significant and crucial in many ways because these individuals serve as a catalyst for the "Design Thinking virus," which allows many of the created prejudices to be overcome.

A second important action to put into practice for the first macro facilitator that emerged is "showing examples" (element 1.2). All of the interviews revealed that there are frequently initial misconceptions regarding the method's applicability and advantages that come from both the management and other

departments of the business. One strategy that was successful in each situation was to provide real-world examples of situations where it is being used. This activity drew people's attention and made the advantages tangible.

The last practical action connected to the first macro category of facilitator is represented by "talk frequently with the company's senior" (element 1.3). Speaking with senior management to demonstrate the advantages and persuade them to embrace more is crucial. Because they stand in for people who oversee finances and can thus provide room for Design Thinking experimentation, this activity proved to be crucial.

3.2 Macro category two: the presence of a strategy and implementation plan of adoption

The second macro category that emerged is connected to the necessity of have a precise plan of actions with effects on different levels that could then involve the company's different stakeholders.

The first important action to be developed is "create training" (element 2.1). It was seen in the various interviews how training was organised in different formats, but all to make the method known and try to put it into practice. There are those who have adopted in-house training with external experts; those who have developed outsourced courses; those who have had employees participate in external initiatives on the subject in order to be able to start discussing it with other professionals.

A second important action to put into practice for the second macro facilitator that emerged is to "develop actions for communication" (element 2.2). Communication is about communicating Design Thinking internally and what is being done externally. It was indeed possible to trace that some organisations organised various communication actions both with printed formats and on the intranet, in order to attract employees. Furthermore, it emerged that communicating externally the actions that were being taken to implement Design Thinking was also useful. In fact, this created moments of discussion on social medias between people inside and outside the company. Faced with this phenomenon, employees began to participate in discussions on social media stimulated by different people's attention on Design Thinking and began to be intrigued by the method and wanted to try it.

The last practical action connected to the second macro category of facilitator is represented by the "creation of incentives" (element 2.3). Incentives do not only refer to cash prizes. Among the different cases it emerged how giving visibility to people because they do something that generates interest, that leads to different results, becomes an enabler to adoption. Moreover, people were happy and proud to be part of projects that received awards. This is because it has often been seen in different companies how Design Thinking-driven projects have led to awards.

3.3 Macro category three: the presence of employees ready for change

The third macro category that emerged affects the realm of the individual employee. One of the major obstacles to the adoption of Design Thinking is employees.

The first action that emerged as most important is to "stimulate people to get out of their comfort zone" (element 3.1). Here, it seems crucial to help employees relate to novel stimuli, which draw them in, pique their curiosity, and let them realize how crucial it is to stay current. It also seemed crucial to educate employees to be ready for the changing dynamics of the market.

A second important action to put into practice for the third macro facilitator that emerged is the importance to “create the right mix between generations of employees” (element 3.2). For some of the respondents, young people have a greater workforce and a big propensity for change, more than those who have already been in the company for several years and work routinely. The mix would allow for both fresh air and for young people to stimulate (and pull) those who are older.

3.4 Macro category four: the presence of designers inside the different projects avoiding to make them isolated

The fourth (and last) macro category that It highlights the importance of having designers actively participate in various projects throughout the organization rather than isolating the Design Thinking team.

The first action that emerged as most important is to put into practice for the fourth macro facilitator that emerged is “adopt design thinking the soon as possible” (element 4.1) to enable the Design Thinking team to participate early in projects and offer new ways of conducting it. In several cases, if employees involve the Design Thinking team in the project from the beginning, they appreciate the benefits, considering the great contribution DT can make in the problem-framing part.

A second important action to take is to “make people understand the benefits of working with the internal Design Thinking team” (element 4.2). This is because it emerged that results in shorter project timelines and a lower risk of information spillovers. It is a simpler and more cost-effective choice than outsourcing where there is also technical time to transfer the information and bring outsiders into the project.

4 Contribution of the study

This study contributes to the understanding of how Design Thinking may be supported in organizations. Design Thinking represents a method for companies to achieve competitive advantage and other benefits discussed in the literature review. However, companies do not really succeed in integrating it. In this study, mapped were macro facilitators and various doable practical actions that might be implemented in the organization to promote the development of Design Thinking. Through the literature review for this study, we learned how businesses are increasingly operating in an unpredictable environment.

In this environment, innovation and performance enhancement are more important than ever for any organization to be competitive. (Gino and Staat, 2015) Among the many factors that could contribute to gaining a competitive advantage, it was observed that Design Thinking can be a legitimate strategy for fostering innovation in businesses and setting them apart from rivals.

Unfortunately, there are many obstacles to the adoption of design thinking.

The four macro-categories of facilitators are fundamental for all cases, but not the different actions mapped in the study. This is a fact that emerges as a further contribution of this study, comparing the different elements (recalling the elements traced in brackets in the results chapter) that emerged in the results, as shown in Table 2.

Table 2. Comparison of the different macro facilitators and related actions obtained from the analysis of interviews.

	The presence of a network who already adopted Design Thinking			The presence of a strategy and implementation plan of adoption			The presence of employees ready for change		The presence of designers inside the different projects avoiding to make them isolated	
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	4.1	4.2
Organisation 1	X	X	X	X	X		X		X	X
Organisation 2	X	X	X	X	X		X		X	X
Organisation 3	X	X	X	X	X	X	X		X	X
Organisation 4	X	X		X	X		X	X		
Organisation 5	X	X		X	X	X	X	X	X	
Organisation 6	X	X			X	X	X		X	X
Organisation 7	X	X		X	X				X	X
Organisation 8	X	X	X	X	X	X	X	X	X	
Organisation 9	X	X	X	X	X	X		X	X	X
Organisation 10	X	X	X	X	X	X			X	
	10	10	6	9	10	6	7	4	9	5

It became clear from the different interviews that focal points, the use of examples, training activities, communication actions and the contamination of teams with internal Design Thinking teams appeared to be always valid and required for immediate adoption. So, businesses should be aware of how to use those facilitators right away.

Incentives, the mix of generations, and the presence of employees ready to change, on the other hand, found to be important in the early phases of adoption but should not be taken into account in the later stages.

This study, therefore, stands as a support for those organisations that want to use Design Thinking to transform their organisation and properly develop a process of organisational change.

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Appendix 1: Protocol for semi-structure interviews

Section 1 – General information

1. When was the first time you heard about Design Thinking within your organisation?
2. How was it introduced?
3. What was the enabler / figure / reason why DT was introduced in the company?
4. What was your initial idea about the benefits DT could bring to your company? Has it remained the same or has it evolved over time?

Section 2 – Understanding the different facilitators (what)

5. What were the main adoption problems you encountered?
6. With respect to the problems encountered, what facilitators have you put in place?
7. Who decided which facilitators to undertake to counter the Design Thinking adoption barriers encountered?

Section 3 - Understanding the implementation of the different facilitators (how)

8. According to the different barriers reported and the related facilitators implemented, can you try to list what actions have been implemented by the management to foster the adoption of DT within the organisation?
9. What was the most immediate effect of these enablers on the organisation?
10. How were those facilitators practically applied inside the company?