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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
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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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Framing the change(s) in interaction design

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The discipline of interaction design is witnessing a growing diversification of forms of interactions and the emergence of novel design guidelines. In relation to the contributions presented in the Changing Interactions track of IASDR202 we summarize some of the most pressing challenges that the discipline is currently facing. The discussed topics include the following ones. Conversational and intelligent agents designed to act in several different areas that include automotive and the realm of more than human. Socio-technical systems that respond to human diversity, implementing meaningful experiences that go beyond efficiency and automation. The integration of artificial intelligence in everyday activities with the preservation of human self-efficacy and control. The emergence of matured VR/AR technology, and the contribution brought by design in the creation of virtual worlds. Further reflections are also dedicated to the paradigm of experience, that shifts away from the values of form and function that prevailed in the past century; to the necessity of investigating more thoroughly the possibilities in interacting with AI; and to the research work that could be performed in relation to information visualization, to design more transparently and extend literacy of audiences.

Keywords: interaction design; behaviour change; physical-digital experiences; AR-VR

1 Introduction

Chairing a conference track is always an intense activity, requiring attention and energy, but also and mainly offering new cultural stimuli and the opportunity to make a point on the state of the art of contemporary research foci. As matters of interest, the call for contributions to the track Interaction included three specific topics: interaction design and behaviour change, digital technologies and sustainability, and mixed and extended reality. The call received many submissions, confirming the importance paid by design researchers to the investigation of the applications of digital technologies in the broadest sense.



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The overview of the submitted documents outlines the state of the art of contemporary research in interaction design, the maturity of the discipline, and the common values shared by the community of researchers. The first driver concerns the values and objectives of the research. For the authors of several works, design based on digital and interactive technologies aims at producing wellbeing and at improving the quality of life of all people, including older adults. However, creating meaningful and effective solutions is a very complex goal: robust design methodologies based on user studies, prototyping, testing with users, and several iterations before reaching the objective are now standard, but this is not enough. The development of innovative devices and the creation of new socio-technical systems must cope with the complexity of human minds and mind-body organizations, the changes in priorities and behaviours, with local cultures and context evolution. In other words, interaction design confirms itself as the discipline where the potentials of technologies meet with the individual and collective human journeys to create something new, which proceeds partly by intuition, partly through planning and co-planning processes, and partly through experiments conducted with rigorous approaches.

With positive expectations about the opportunities offered by technologies and design, but with the awareness of the frictions that can interfere with the best intentions, the research papers submitted to the track Interaction deal with various topics: from foldable keyboards to interactive artistic environments, from virtual and augmented reality to smartphone applications for inclusive health care, and comprehend, of course, artificial intelligence and autonomous vehicles.

The following chapters of this document highlight some of the main issues animating the realm of research on interaction design extracted from the track papers. Each part expresses a specific perspective and answers a question on the evolution of interaction design captured from a specific point of view.

2 Widening the realm of Interaction Design beyond the digital and electronics borders

Stephanidis et al. (2019) describe seven grand challenges in the field of human-computer interaction, one of which concerns the interaction with artificial agents. They argue that researchers should find ways of integrating intelligence into human activities while preserving human self-efficacy and control and better understanding how to design human-agent collaboration. These aims are becoming increasingly urgent given the recent developments in artificial intelligence, which may make it necessary to reconceptualize the interactions between humans and artificial agents. Regarding the domestic environment, “How smart is the Italian domestic environment? A quantitative study” by Vacanti reports on an online survey that examined the penetration of smart home devices in Italy. While she argues that smart home devices have not yet been fully adopted in Italian households, she notes how voice-based assistants are relatively widespread and can be instrumental in converting users. As integrators for other IoT devices, voice-based assistants are often the first smart home purchase for many households. Importantly, she notes that full integration of voice-enabled smart home devices requires that designers address the relationships among human users, animal users, and technological entities.

Another of the challenges identified by Stephanidis et al. (2019) concerns how to support learning and creativity. The advances in AI, especially regarding large language models, have brought questions

about creativity and how creative workers should use artificial intelligence. While much of the creativity research and AI is conducted in the computer science framework, design research also needs to identify ways to take advantage of recent developments and define how designers can be co-creative with artificial intelligence technologies (Wingström et al. 2023).

The papers submitted in this track explored emerging interaction modalities and put forward guidelines and frameworks that can aid the design of such interactions.

Van Dirk in “Designing the interaction between humans and autonomous systems: The role of behavioral science” draws links to behavioural economics to propose design strategies for how people and autonomous systems can work together. At the same time, in “Human-AI system co-creativity for building narrative worlds”, Serbanescu and Nack discuss the creative collaboration between humans and AI for creating interactive digital narratives. They argue that AI systems should be a tool that helps designers develop novel ideas for writing stories, accelerating the storytelling process. At the same time, they also sketch a design space in terms of narrative elements.

Conversational user interfaces are typically designed for efficient and effective interactions, emphasizing pragmatic quality. Focusing on chatbots, Haugeland et al. (2022) argue that it is necessary to understand how to make these more pleasant and engaging, enhancing their hedonic quality. More generally, such an emphasis on hedonic and aesthetic aspects of human-agent interaction is needed. Regarding voice-based conversational agents, Şahin, Günay, and Töre in “Elderly’s Perceptions of a Meaningful Interaction with Voice-Based Conversational Agents: Integrate into daily routines, Support relatedness, But do not hamper autonomy” also argue for shifting the emphasis of design research from the functional to the hedonic aspects of the interaction. The reports on a study of how elderly users experience voice-based conversational agents and propose design guidelines aligned with the main constructs of self-determination theory (Deci & Ryan 2012). First, voice conversational agents should be designed to enhance the elderly user's autonomy and ability to act independently rather than aid them in laziness and dependency. Secondly, they can help older people learn and understand digital technology and increase their competence with it; then, they can take the role of a companion, playmate and even as a support in social interaction with other people. Similarly, exploring the hedonic aspects of the interaction with conversational agents, Sahin et al. explore the enhancement of chatbots with olfactory stimuli, demonstrating how such stimuli can be successfully used as a design material to enhance user engagement for human-chatbot interaction. It proposes a design framework for guiding the augmentation of interactivity with olfactory senses.

Interactions with intelligent agents are becoming increasingly relevant in the automotive domain. The car represents a sociotechnical environment where the interaction between humans and artificial agents presents multiple challenges that combine utilitarian and hedonic perspectives. Riener has argued that user experience is one of the most critically important open issues for the acceptance of automated driving (Riener et al., 2022) and suggests that user experience design is a powerful tool for ensuring the success of automated driving solutions. Several contributions to this version of IASDR contribute to this endeavour.

The paper “Scalable eHMI: Automated vehicles-pedestrian interactions design based on gestalt principles” by Gao, Wang, and Zhang examines how to effectively communicate to pedestrians the intentions of autonomous vehicles, such as driving, decelerating, and stopping. By leveraging Gestalt

grouping principles, such as common fate, synchrony, common region, element connectedness, and uniform connectedness, designers can group visual elements and integrate display areas on the car to provide a unified representation of the vehicle's intentions. An experimental evaluation confirmed that interfaces designed following the Gestalt principles improved how pedestrians could perceive the automated vehicle's intention to yield to pedestrians at a crossing.

The paper “Understanding the relationship between in-car agent’s embodiments and information with different criticality” by Ku, Cho, and Nam examines how the driver's understanding of information is affected by the visual embodiment of in-car agents. They show how the embodiment of an in-car agent can not only convey information but can also express the level of enforcement associated with that information. Such an embodiment can make alerts more salient than 2D displays.

Physical embodiment can create a significant difference even if it has a similar size and movement as digital embodiment; this widening the realm of Interaction Design beyond the traditional digital and electronic borders to consider interactions with more than humans is an important emerging trend. An emerging field of inquiry in design research concerns interactive plants or smart plants, where a digital control system allows interaction with a living plant. The added layer of interactivity can enhance the user's engagement with the plant and enhance some of the benefits that plants can provide to people, potentially alleviating fatigue, and stress.

“Plant Playmate: exploring effects of interactive plants for mental wellness microbreaks during knowledge-based work” proposes empathic interactions, anthropomorphism, and gamification as design strategies for designing interactive plants, showing how they enhance the resulting interactive experience.

In short, we note a growing diversification in the types of interactions considered and the emergence of design guidelines for these novel fields of inquiry for interaction design. The works presented in IASDR present exciting new developments that can be consolidated in future research with further design and empirical research.

3 The experience as a paradigm is still a pole star in the design of interactive solutions

One of the main innovations in the design culture brought by interaction design to other and oldest branches of the discipline is the paradigm of experience: a shift from the values of form-function orienting most design of products in the past century. Findeli and Bousbaci (Findeli 2005) described the change in the paradigms orienting the designers and the growing interest in the aesthetic of the activities (the act of use) instead of the objects' formal material quality. Forlizzi (Forlizzi 2000), Garrett (2011), and other authors identified human experience as the main pivot to refer to in the commitment toward creating valuable interactive solutions. Authors such as David Benion (Benion 2019) pointed out the importance of basing the design of interactive products and services on preliminary user studies. They contributed to structuring the interaction design process through rigorous user-centred methodologies. Since the dawn of interaction design and the first studies on human-computer interaction, an impressive number of research activities concern user studies, as Auernhammer reported (Auernhammer, 2022). These studies contribute to making the design processes sounder but do not reduce the need to conduct research on or with the final users for each

innovative project. The concept of experience is still the one better representing the intricacy of human evaluations and the tangle of perception, cognitive, emotional, practical, and non-tangible factors playing in the desirability and suitability of the interactive solutions we can design.

A look at some of the papers in the track Interaction confirms the centrality of the experience as a main reference for contemporary design.

The paper "Research on user needs for gesture interaction of foldable smartphones: comparison between current and potential users" by Tan et al. is evidence of the complexities associated with creating new gestures and forms of interactions. The authors report that their research focused on understanding user needs associated with gesture and touch-based interactions with foldable smartphones. The study delves into the ample variety of needs that emerged in the experiments of users, and it marks the differences in attitudes between the groups of potential and current users, confirming the importance of considering both cultural (habits) and innate factors of ergonomics.

Human beings are complex from emotional and cognitive points of view; not only: human moods are changeable, ephemeral, and articulated. Furthermore, human moods and their dynamics significantly affect the interpretations of sensorial stimuli. The paper "Touchy-feely: A designerly exploration of haptic representations of three mood states" by Xue et al. moves into the (still) fuzzy area where moods and non-linguistic experiences intertwine. The authors investigate the possibility of creating material objects whose haptic characteristics can enable nonverbal communication of human moods. The study is based on engaging people in interviews to ascertain the factors composing their experience during the haptic interaction with material samples, including memories and recalls.

Another case study, illustrating how complex it is to provide value through innovation in interaction design, describes a contribution to the development of QWERTY keyboards for foldable smartphones capable of satisfying the ergonomics of text input. The paper "Performance evaluation of QWERTY keyboards on foldable smartphones: keyboard layout and phrase complexity" by Dai et al. proposes research outcomes that reveal that the expected advantages of foldable devices are controversial and confirm the necessity of new approaches in the design of keyboards. The study also focuses on the issues related to using QWERTY keyboards by Chinese users that should be better investigated in academic research for interaction design.

Innovative tech-based systems entangle people in complex ways, and the capability of predicting the real impacts of digitally enhanced environments on people simply through desk work is still limited; furthermore, interaction designers are progressively committed to developing the capability of suitably responding to human diversity. Developing socio-technical systems and meaningful experiences involving users beyond efficiency and automation requires prototyping to investigate how humans evaluate the so-created situation from conscious and non-aware perspectives. The paper "Techno-Social Correlations in Responsive Environments "by Torpus and other authors reports an interesting experiment based on implementing a large and complex spatial environment created with the principles of ubiquitous computing. Analysing the data produced by monitoring users' experiences reveals differences in the evaluations of groups characterized by different socio-graphic factors.

The changes in the design approaches and foci naturally reflect the changes in individual and collective behaviours and the mutable attitudes of people using technological solutions.

Paper "E-Motioning: Effects of Emotional Generative Visuals on Creativity and Connectedness during Videoconferencing" by Lu and others is a meaningful example of the contemporary attention paid to the goal of refining and improving the quality of digital applications that are now pervasively part of our daily life. The research focuses on videoconferencing and aims to experiment with solutions to compensate for the absence of non-verbal cues in communication at a distance. The solution proposed by the authors focuses on generating geometrical visuals reflecting the emotions of the people involved in the conversation at a distance. The artistic patterns animate the videoconference background and creatively generate metaphoric cues whose impacts require testing on a sample of users. The multidisciplinary research background includes studies on artistic visualization of emotions, references on brain science, and research on the impacts of visuals on creativity.

Are we to the point when the trend of continuous growing and pervasive expansion of ICTs and digital will change direction? Are expectations of continuous growth and development beginning to decline? And if yes, why, and how? How are the issues related to the digital divide evolving? These questions are relevant to the purpose of designing technology-based systems and solutions that are inclusive and correspond to the principles and goals of social sustainability. The authors of the paper "When to Say Bye: A Qualitative Study of Older Adults' Discontinuation of Technology Use after the Pandemic," by Chang and others, investigate the reasons for discontinuation in the use of communication technologies in older adults after the COVID-19 time. The research deals with in-depth interviews; it reveals the multifaced factors playing a part in discontinuing or losing motivation in use, fertilizing the creation of hints for designing interactive solutions aimed at durable inclusivity.

Older adults are the main reference users for other track papers, illustrating the complexity of producing satisfactory solutions for an ageing society.

According to the authors of the paper "Post-pandemic Era: Evaluation of Improvement in Quality of Life and Usability of App for Older Adult Rehabilitation", usability is not the main bottleneck in the design of applications for older adults. The most important factor conditioning the acceptance and desirability of digital applications is, also for ageing people, the perception of real advantages and improvements in quality of life. The potential of digital technologies for healing at a distance or, in a more general way, to improve the quality of life requires creating suitable expectations and understanding of the new solutions.

Good health and well-being are the focus of goal 3 in the UN 2030 Agenda for Sustainable Development. It includes severe and cogent challenges: risks of pandemics, unequal access to care, and non-communicable diseases are just some examples of the issues considered by UN Goal 3. Digital technologies are central in implementing innovative, more effective, and efficient approaches to care and prevention. Therefore, we are witnessing a flowering of research that, with different approaches and objectives, aims to contribute to creating new solutions for health and well-being. The importance of the goal calls for research aimed at the systematization of the findings in this sector. The paper "Transforming resilient healthcare systems: mapping the pathway forward with Healthcare 4.0 Technologies", by Rosa and others, reports an interesting mapping of the impacts of Information and Communications Technologies on the resilience of healthcare systems, where resilience includes monitor, anticipating, responding, and learning. The documents highlight the broad spectrum of digital technologies involved in resilient socio-technical systems, from cloud computing to robotics, machine learning, and augmented reality. It also includes a survey with experts highlighting the

importance of further developing the capability of learning from past successes and failures and the potential of data analysis.

4 Exploring AI new experiences and going beyond consolidated mental schemes

Considering how artificial intelligence is beginning to pervade everyday life (Weiser 1991), between misunderstandings, uncertainty, and mistrust, it is time for design to raise questions and take a leading role in the dialogue between the latest technological innovations and their users.

AI, most broadly defined as a system capable of learning, reasoning, and acting autonomously, is rapidly augmenting the potential of products, interfaces and services typically included in the design area, introducing new ways of interacting that designers have yet to investigate thoroughly. In the sphere of AI, the most interesting potential design intervention areas can be found in Machine Learning (ML): a process of constant learning based on the statistical analysis of enormous amounts of data in order to recognize patterns used to formulate predictions that then influence the machine's response to the inputs it receives. Currently, learning can be "supervised", based on administering data categorized by humans; "reinforced", learning from errors and being given rewards (enhancements) on achieving set goals; or "unsupervised", in which the machine interprets uncategorized data in complete freedom, developing skills and behaviours as a result (Hao, 2018). While the unpredictability of this last model makes it less interesting to designers, there are more and more cases in which ML is integrated into industrial products or services intended for the public to be used at home, in the workplace or the public sphere.

The proactivity and partial unpredictability of devices enhanced by AI pose designers with what Rittel and Webber (1973) would define as a "wicked problem": a complex challenge that is difficult to define and solve. Imagining the use scenarios of a product by outlining the so-called User Experience (UX) involves knowing how the product will behave in every possible condition. This certainty is inconceivable in the case of artificial intelligence, which can learn over time and eventually display different responses to the same input.

To pave the way to design a better experience for human interaction with technologies, Sciannamè and Spallazzo in "AIXE. Building a scale to evaluate the UX of AI-infused products" describe a research project that developed a new method to evaluate UX and assess AI-infused systems, typically domestic smart assistants, providing UX researchers, designers and companies to understand user' point of view to implement better solutions and customize user interface better on a side while defining qualities that can describe artefacts integrating AI and providing a new method to assess them. The project's output is a scale with descriptors and dimensions for evaluating UX artefacts and products at an early design stage to refine them better.

From the same asset that the latest technological developments enabled the incorporation of autonomous features into a wide range of products, the authors of "Identifying meaningful user experiences with autonomous products: a case study in fundamental user needs in fully autonomous vehicles" focus on defining a meaningful user experience with fully autonomous vehicles FAVS. The work describes co-creation workshops to explore how fundamental needs can be a starting point for designing meaningful user experiences with emerging autonomous devices. After data collection and

analysis, thirteen scenarios conceptualize the car as a space that could provide a unique experience to fulfil the user's needs. The findings provide designers with new opportunities to design meaningful UX and interaction with FAVs.

Without any doubt, we can assume that AI has been covertly pervading tools that we use daily, enhancing systems capable of suggestions for making choices, reminding us via smartphone when we ought to leave to avoid traffic on the way home, and in many other ways that we hardly notice.

Personal assistants recently joined the ranks of these systems. These smart devices can learn through continuous conversation with their owners, thus representing a frontier that draws ever closer to the idea traditionally associated with AI, that of sentient robots capable of simulating human behaviour to a believable degree.

“Exploring multimodal technologies to engage elderly people in remote communication with their family” by Baihui and Xueliang discusses the use of multimodal technologies to improve remote communication for older people, exploring the benefits of collaborative social activities and the use of novel technologies, such as immersive technologies, social robots, and the Internet of Things and their potential to engage elderly individuals in remote communication with their families. The authors’ research provides examples to analyse the advantages and disadvantages of these approaches and recommendations and directions to designers for developing proper intergenerational remote applications. At the same time, Junginger S. in “Is It Time to Plan for Digital Exit Strategies As We Age? Positioning Digital Offboarding as a Design Challenge” analyses digital offboarding in an ageing society that is overexposed and dependent on public services provided digitally and through AI. A consequence of the pervasive digitalization process in everyday life could make people dependent on technology. The risk is that smart devices and enhanced technologies services could become a problem if the user can no longer interact with them properly.

Engelbart’s concept of augmentation views AI as an instrument capable of enhancing the human intellect and potential rather than replacing them (Engelbart, 1962): an approach much more similar to those historically expressed in the field of Human-Computer Interaction (HCI), more focused on the user than the machine (Grudin, 2006). Then we could consider the world of AI closer to interaction design. This field considers interaction holistically and more inclusively than HCI as the mutual influence among people, artefacts, and the contexts in which they are positioned as dialogue, connection, and social involvement (Kolko, 2011).

Digital technologies engage people even dealing with social interactions through different digital media. Social media represents a way to connect and interact with others in the virtual world. They became part of the daily activities: personal data, information and behaviours are shared with a wide audience involving moral and ethical issues.

“What’s the Social Trust Mechanism Blending Virtual and Reality in the Context of Digital Media?” by Liu et al. explores the concept of trust in social media. In particular, it focuses on establishing a trust mechanism based on users' social behaviour in virtual and real environments in sports socialisation during the COVID-19 epidemic. The study employs literature analysis, user interviews, and questionnaires to investigate how online social platforms can facilitate the establishment of a trust mechanism for integrating virtual and real sports socialisation in an epidemic environment. The final

output is a framework that led to the design of an app, still in the prototyping phase, to implement the principles of social trust mechanism to enhance user satisfaction and experience.

Online data also deals with problems of representation in an effective way to let users understand and interpret them easily through interactive and novel visualisation strategies.

“Play with data: Using haptic properties of artifacts to augment data representation” deals with data physicalization to represent data through artefacts with haptic properties so that the user can handle data with empathy and better understand and interpret them. Interacting with haptic and tangible interfaces facilitates data representation making the user perceive information and enhancing exploration through direct manipulation of a physical interface. Through a practical workshop, the research group was able to define user preferences to interpret haptic properties and their connection to represent data type.

Effective communication is crucial to help the audience understand complex topics. Ferreira et al. describe a study to reveal the connection between Ukraine War and climate change and the multiple ways used to represent this connection. As a result, the design community could benefit from recommendations for a better contextualization of quantitative data, alternative visualization format and explore novel narrative strategies so that designers could represent data more effectively.

Pakans Soojin, describes the potential and impact of drone light shows performed during concerts to create a better atmosphere in an immersive environment. Contextual communication, outstanding drone formation, and dynamic motions are the main constraints to better suit for conveying emotions and designing an engaging and immersive concert experience.

Considering Interaction Design as the art of facilitating interaction among human beings through products and services (Saffer, 2009), AI appears to fall fully within the scope of designers’ activity now and in the coming years (Antonelli, 2018).

5 Is virtual still virtual? Exploring the edges of VR, AR and XR

As the recent advancement of VR devices overcome various usability-related barriers, we are facing a new turning point in the application of VR/AR in our daily lives (Apple Inc., 2023). Design research, in its effort to understand and apply the new media in various circumstances, is given a revived rationale and a new scope for its continuation. As the early researchers noted, the realm of design research on VR/AR includes at least that of the traditional design media: colour, font, visualization, animation, layout, etc. (Alger, 2015). With the emergence of matured technology, it is imperative that design research provide not only the guides for the creation of virtual worlds but also its potential in domain applications.

In the current issue of IASDR, submissions on VR/AR applications were divided largely into three categories: (1) design methodologies using VR as a novel design medium, (2) rules and guidelines for constructing virtual worlds, and (3) studies on the cognitive gap during the transition and interaction between the virtual and real worlds.

As to the first category, three papers explored the potential of VR/AR as a new design medium. Lin & Lee, in “Designing the prosthetic appearance in virtual reality with the collaboration of participants and users” tested the collaborative nature of VR when designing wearable assistive devices for

patients with shoulder amputation and hand deformity. It revealed the efficacy of the VR medium in co-creative design processes. Similarly, in “Designer Empathy in Virtual Reality: transforming the Designer Experience closer to the User” by Grech et al. investigated VR’s capability in achieving empathetic design, particularly the communication and resource components during the process. Lin, Lee, Lin, and Lu in “Advantage of virtual reality tool for helping personal sketch modeling” examined the pros and cons of a VR-based sketching tool in product design. The VR tool was suitable for handling the preliminary design ideas but also required high precision which reduced the speed and abstractness of sketching.

Papers “How to promote consumption in city metaverse? Research on RAR experience design and consumer behavior of commercial streets”, “Investigating the effectiveness of Peripheral Vision in reading digital speed limit information displayed in AR-HUD technology”, “Using AR HMD in exhibition: Effects of guidance methods and spatial relative positions”, and “A personality-centred design approach for virtual humans on correspondence with roles and behaviors” belong to the same category in that they construct the design rules of the virtual world. The second one focused on the lower-level feature of font design, particularly on where and how to put the texts within the AR-based Head-Up Display of a car. The third also studied design for AR but in a museum context: it compared three different guidance methods and compared users’ search time and task load. The other two, on the other hand, investigated higher-level features of VR design, such as creating virtual humans with humane personalities and promoting consumer purchases through hybrid urban spaces combining both virtual and real worlds.

Lastly, “Threshold space design: Using water element for phase transition from physical space to virtual space with different law of gravity” by Kwon and Jung, “Designing visuo-haptic illusions for Virtual Reality applications using floor-based shape-changing displays” by Askarbekkyzy et al., and “Preserving theoretically-grounded functions across media platforms in interaction design” by Sekelsky et al. emphasize the need to handle the transition and interaction between the real and virtual worlds gracefully. For example, Kwon & Jung, in an effort to introduce spaces with different gravity, used water simulation with varying degrees of gravity force, fluid viscosity, and surface tension. Askarbekkyzy et al. interestingly showed how sensing with the foot can be manipulated to convey the sense of distance and orientation in a virtual world. Lastly, Sekelsky et al. suggests how the essential experience of digital content may be preserved across CAVE, HMD, and web-based media by deriving the core feature of digital content.

In short, we are finding the various effects of VR/AR, particularly as an extension to the existing media. Whereas we expect to see more unique features in different domains, we should also encourage systematic reflection as well as forecasts concerning this unprecedented technology.

The gold rush for the uncharted territories in VR has now officially begun. The difference is the size of the reserve depends also on the creativity of the rushers themselves. Academic research has been in the driver’s seat in the history of the births of legendary user interfaces (Sutherland, 1965; Engelbart, 1968). Design discipline has the power to discover its hidden values at the layer closest to everyday human lives.

6 Changing use and customs of information visualization

As described previously, only a few of the submitted proposals focused on information visualization, although the topic is very sensitive from a design perspective and interests contingent fields of communication studies and HCI. Visualization is primarily an aesthetic device that allows to extend our perception “by making perceptible what would otherwise be imperceptible to the human sensorium” (Hinrichs et al., 2018). It simplifies the comprehension of information by giving it a graphical form (Kirk, 2016) and, when it is quantitative information, it unlocks a better reasoning (Tufte, 1999). Research in the field of information visualization, and more specifically in data visualization, has mostly focused on introducing new data exploration techniques for speeding up tasks and increasing efficiency. While creating visualizations, however, we often overlook the fact that we are used to leverage a series of rhetorical conventions of a graphical nature that “imbue visualizations with the quality of objectivity (which brings together other qualities such as transparency, scientific-ness and facticity)” (Kennedy et al., 2016). This can be problematic because visualizations designed to appear objective fail in communicating the personality of the work of data manipulation. Concealing subjectivity has the result of not communicating that “the data produced by any model is only an expression of that model and that the visualization is of the data model, not the phenomenon from which it was extracted” (Drucker, 2020). This may result in frictions in the adoption of visualization techniques in fields that embrace qualitative and situated forms of knowledge, such as it happens in the Humanities, or in the concealing and perpetration of power unbalances (D’Ignazio and Klein, 2020). In other contexts, the rhetoric power of visualization may bring readers to believe without questioning reliability. In moments of crisis, given the powerful role visualization covers in media, we can easily observe what the WHO defines as an “Infodemic”, namely the diffusion of misinformation and disinformation about an issue, caused by a too abundant availability of information (Aversa & Mauri, 2023). People may trust more what aligns with their political identity (Peck et al., 2019) and it may be possible, in this and other scenarios, to consider the minimization of point of view as a misguided practice (Viégas & Wattenberg, 2007). Researchers active in the field of interaction design can sensibly contribute to the identification of better practices, in the way in which humans consume data, especially if in dynamic interactive ways, in particular by giving a more predominant space to the situated nature of visualizations, reflecting on their fruition, and creating solutions to extend the literacy of their audience appear as wicked problems that remain still largely to be grappled with.

7 Conclusions

In the article we presented contributions from the Changing Interaction track of IASDR 2023 and we discussed them in relation to pressing challenges that the discipline of interaction design is facing. In light of the latest technological developments and in a rush that shows no signs of slowing its pace, it is useful to hold to a concept of technology that enhances, without replacing, user’s agencies. Academic research has played a pivotal role throughout the history of the development of iconic user interfaces and the design discipline has the power to discover opportunities for improvement and innovation in relation to everyday human lives. Interaction design, with its focus on users and its efforts in being inclusive in respect to diversities, occupies a key position in heading towards the social sustainability that is desirable in the design of technology-based systems.

References

- Alger, M. (2015). *Visual Design Methods for Virtual Reality*. London: Ravensbourne.
- Antonelli, P. (2018). AI Is Design's Latest Material. Retrieved from <https://design.google/library/ai-designs-latest-material>.
- Apple Inc. (2023). Introducing Apple Vision Pro: Apple's first spatial computer. (n.d.). Apple Newsroom. Retrieved 2 July 2023, from <https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/>
- Auernhammer, J., Zallio, M., Domingo, L., Leifer, L. J.: Facets of Human-centered Design: The Evolution of Designing by, with, and for People. Auernhammer, J. et al. Preprint on Research Gate. <https://www.researchgate.net/publication/355796639>. (2022).
- Aversa, E., & Mauri, M. (2023). Does seeing entail believing? Visualising information during societal crises. In S. Holmlid, V. Rodrigues, C. Westin, P. G. Krogh, M. Mäkelä, D. Svanaes, & Å. Wikberg-Nilsson (Eds.), *Nordes 2023: This Space Intentionally Left Blank*. Linköping University. <https://doi.org/10.21606/nordes.2023.63>
- Benion, D.: *Designing User Experience*. Pearson Education Limited (2019).
- D'Ignazio, C., & Klein, L. F. (2020). *Data feminism*. The MIT Press.
- Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. *Handbook of theories of social psychology*, 1(20), 416-436.
- Drucker, J. (2020). *Visualization and interpretation: Humanistic approaches to display*. The MIT Press.
- Engelbart, D. (1962). *Augmenting Human Intellect: A Conceptual Framework*. Retrieved 2 July 2023, from <https://www.dougenelbart.org/pubs/augment-3906.html>.
- Engelbart, D. et al. (December 9, 1968). "SRI-ARC. A technical session presentation at the Fall Joint Computer Conference in San Francisco". NLS Demo '68: The Computer Mouse Debut. Engelbart Collection. Menlo Park, CA: Stanford University Library.
- Findeli, A., & Bousbaci, R. (2005). L'Eclipse De L'Objet Dans Les Théories Du Projet En Design. *The Design Journal*, 8(3), 35–49. <https://doi.org/10.2752/146069205789331574>
- J. Forlizzi and S. Ford, "The Building Blocks of Experience: An Early Framework for Interaction Designers," In: D. Boyarski and W. A. Kellogg, Eds., *Processes, Practices, Methods, and Techniques*, Proceedings of the 3rd conference on Designing Interactive Systems, New York, 17-19 August 2000, pp. 419-423.
- Garrett, J.J.: *The elements of User Experience*. New Riders ed. (2011). Grudin, J. (2006). "Turing Maturing: The Separation of Artificial Intelligence and Human-computer Interaction". *Interactions*, 13(5), pp. 54-57. doi:10.1145/1151314.1151346.
- Hao, K. (2018). What is machine learning? MIT Technology Review. Retrieved 2 July 2023, from <https://www.technologyreview.com/2018/11/17/103781/what-is-machine-learning-we-drew-you-another-flowchart/>.
- Haugeland, I. K. F., Følstad, A., Taylor, C., & Bjørkli, C. A. (2022). Understanding the user experience of customer service chatbots: An experimental study of chatbot interaction design. *International Journal of Human-Computer Studies*, 161(Complete). <https://doi.org/10.1016/j.ijhcs.2022.102788>
- Hinrichs, U., Forlini, S., & Moynihan, B. (2018). In defense of sandcastles: Research thinking through visualization in digital humanities. *Digital Scholarship in the Humanities*, 1–20.
- Kennedy, H., Hill, R. L., Aiello, G., & Allen, W. (2016). The work that visualisation conventions do. *Information, Communication & Society*, 19(6), 715–735. <https://doi.org/10.1080/1369118X.2016.1153126>
- Kirk, A. (2016). *Data Visualisation. A handbook for Data Driven Design*. SAGE Publications Ltd.
- Kolko, J. (2011). *Thoughts on Interaction Design* (2. ed.). Burlington, Massachusetts: MK Publications.
- Lambe, F., Ran, Y., Jürisoo, M., Holmlid, S., Muhoza, C., Johnson, O. and Osborne, M. (2020). Embracing complexity: A transdisciplinary conceptual framework for understanding behavior change in the context of development-focused interventions. *World Development*, 126. 104703. <https://dx.doi.org/10.1016/j.worlddev.2019.104703>
- Peck, E. M., Ayuso, S. E., & El-Etr, O. (2019). Data is Personal: Attitudes and Perceptions of Data Visualization in Rural Pennsylvania. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–12. <https://doi.org/10.1145/3290605.3300474>
- Riener, A., Jeon, M., & Alvarez, I. (Eds.). (2022). *User experience design in the era of automated driving*. Springer.
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), 155–169.

- Saffer, D. (2009). *Designing for Interaction: Creating Innovative Applications and Devices* (2 edizione). Berkeley, CA: New Riders Pub.
- Schuler (Ed.), *Online Communities and Social Computing* (pp. 182–191). Springer Berlin Heidelberg.
- Stephanidis, Constantine, Gavriel Salvendy, Margherita Antona, Jessie YC Chen, Jianming Dong, Vincent G. Duffy, Xiaowen Fang et al. "Seven HCI grand challenges." *International Journal of Human–Computer Interaction* 35, no. 14 (2019): 1229-1269.
- Sutherland, I. E. (1965). "The Ultimate Display". *Proceedings of IFIP Congress*. pp. 506–508.
- Tufte, E. R. (1999). *The visual display of quantitative information* (17. print). Graphics Press.
- Viégas, F. B., & Wattenberg, M. (2007). *Artistic Data Visualization: Beyond Visual Analytics*. In D. Schuler (Ed.), *Online Communities and Social Computing* (pp. 182–191). Springer Berlin Heidelberg.
- Weiser, M. (1991). "The Computer for the 21st Century". *Scientific American*, 3(265), pp. 94-104.
- Wingström, R., Hautala J., and Lundman, L. (2023). "Redefining creativity in the era of AI? Perspectives of computer scientists and new media artists." *Creativity Research Journal*: 1-17.

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