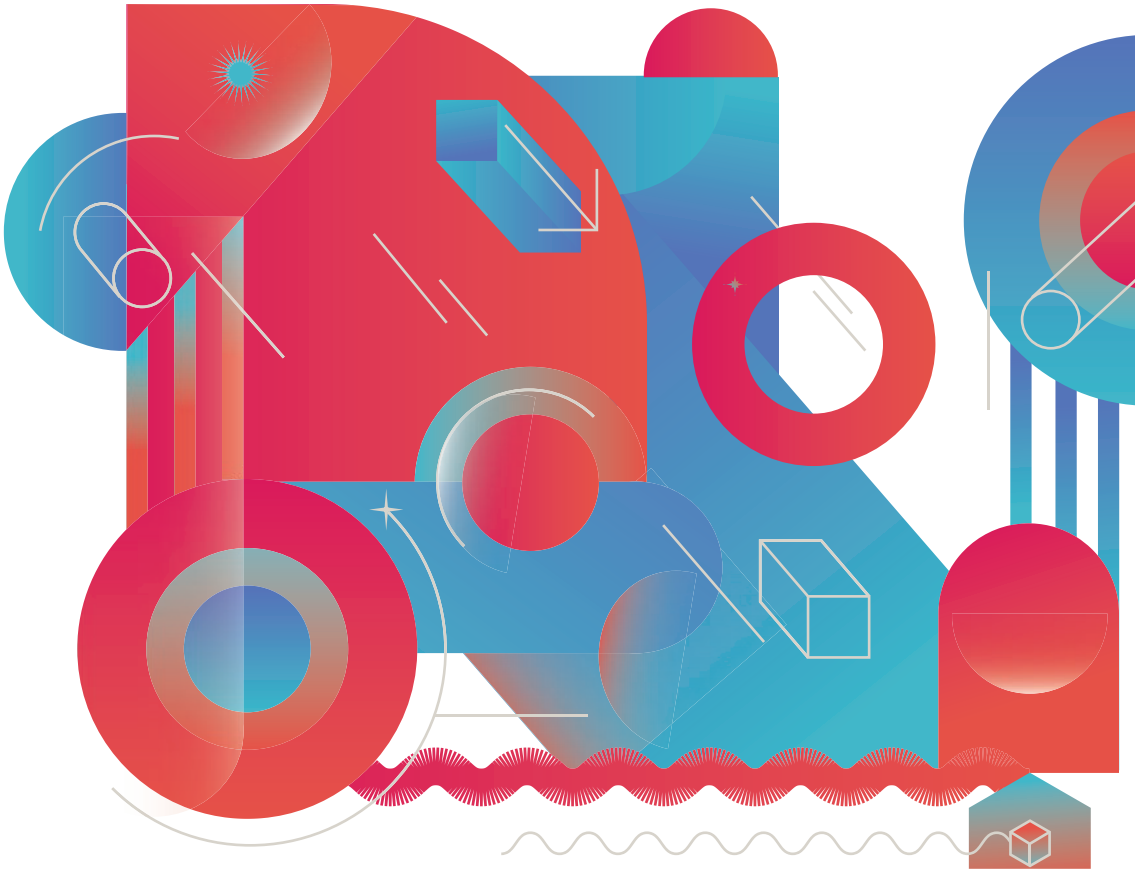
EMBEDDING INTELLIGENCE

Designerly reflections on AI-infused products

edited by Davide Spallazzo, Martina Sciannamè



D.I. FrancoAngeli
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Conclusions

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Notoriously, the field of AI has been characterized by multiple interpretations and perspectives, fueling diverse research strands and approaches that marked the evolution of such an ambitious and disruptive technology. At the same time, however, this results in definitions that are not universally agreed upon, already within computer scientists' circles. The ambiguity in understanding is inevitably amplified when AI theories move from algorithm experimentations in academic and research contexts to spread in the broader and more complex socio-technical reality, with implications ranging from everyday pragmatism to the more abstract making sense of what AI-infused artifacts are and represent.

The collection of essays represents an initial exploration of how the design discipline, with its mediating role between people and their artificial world, can face the embodiment of AI capabilities within industrial products.

Of course, the book cannot be exhaustive: the design issues surrounding AI-infused products are manifold, and there can be many standpoints from which to approach the subject. Nevertheless, the essays clarify that the design discipline is looking for an approach to deal with AI and the complexity of embedding intelligence into everyday products.

Machine learning, in particular, introduces abilities beyond the traditional interaction model "input-elaboration-output," where the same input always has an identical output. It paves the way for more flexible, reactive, adaptive, and even proactive artifacts, challenging our perception of objects as mere instruments and suggesting their intelligent

entity. This disorienting paradigm shift found designers – practitioners and researchers – unprepared.

The first chapter photographs this disorientation, evident in industrial products that, driven by the push of the technological hype, have forgotten decades of usability studies, with several leaks in terms of smooth basic interaction.

Uncertainty and confusion – both for users and designers – are even increased when the ambivalence of machines mimicking human behaviors, rooted in the origins of the AI discipline, comes into play. The introduction of objects that seemingly have or emulate human capabilities profoundly affect interaction modalities, bringing to light relevant controversies. For instance, today, talking to objects is an expected feature, but it is not without dark sides. As suggested in chapter four, conversational interfaces are an open field of experimentation for designers. However, their implementation often overwhelms traditional interfaces – at least in the imagination of users – but they are still not reliable enough to allow a smooth experience.

The essays portray AI-infused products as devices with a high potential for end-users but underexploited. At least in the materialization of AI capabilities, the fascination for this groundbreaking technology has not allowed going further than employing CUIs to control connected devices and services. Accordingly, they may play the role of mere gadgets that do not go beyond their toy phase.

From these considerations, an urge for mapping and systematizing the characteristics of AI-infused artifacts emerges as a way to facilitate designers' understanding of the current panorama. The approach explored in the volume relies on UX assessment as a pillar for the design discipline to appraise and make sense of things. Chapters two and three show the lack of methods to analyze the complexity of such products and present a first attempt to introduce new UX dimensions specific to this category of appliances.

Traditional qualities of the UX experience (e.g., usability, aesthetics) are losing ground to more sophisticated dimensions (e.g., trustworthiness, intelligence), which simultaneously indicate people's attraction to the new possibilities unlocked by the thriving technology but also their rising awareness of the complexity and lack of transparency of such products. For instance, end-users are beginning to question the ethical implications of employing massive data to provide a service, at least

from a UX standpoint. Furthermore, their perception and expectations of the intelligence of these devices affect the quality of the interaction as much as the capabilities of AI systems to understand users' commands and needs.

Indeed, questioning the meaning and meaningfulness of AI-infused products in our daily life (see chapter 5) entails opening a debate on the very core of these devices and their perceived utility and quality.

After all, assessing the user experience of these innovative products becomes an urgent need not only for providing end-users with a better UX but also to guide designers and companies in developing more helpful, satisfactory, and trustworthy products.

In line with this reasoning, developing a UX evaluation method specific to AI-infused systems is a consistent and necessary follow-up. In fact, it is the core output of the Meet-AI research project, which created AIXE (AI user eXperience Evaluation), a statistically validated questionnaire for assessing the UX of AI-infused systems.

However, evaluating is just one way of coping with poor UX in such systems and understanding their limits in terms of UX does not automatically entail their solutions.

For that, more radical actions should be implemented. For example, there is a pressing need to form a new generation of designers that master (at least) basic knowledge of AI and ML. They may help envision novel solutions that fully exploit the technological potential and include human needs, desires, relations, and rights in a broader, systematic perspective.

Authors

Marco Ajovalasit. Associate Professor in Human-Centered Design in the Design Department at the Politecnico di Milano, Italy, where he teaches modules in User Experience Design, and Digital Interaction Design. His research expertise is in the field of design for meaning and human-centred design methods leading to products, systems and services which are physically, perceptually, cognitively and emotionally intuitive to their users. Research focuses on the "design for meaning" approach defining human-centered design methods for designing products, systems and services based on new meanings for the consumers, including the use of data, designing ethnography, real fiction and co-creation. A particular emphasis of the research is on the development of a toolkit for designers for organizing the consideration of the intended meaning of the designed artefacts. Focus is placed on the thinking process, dialogue and use of semantics consumers typically associate to the understanding of the designed artefact. He has been the Principal Investigator (PI) (2013-2016) of a £3.2M FP7 EU Grant funded project "Light.Touch.Matters: Design-driven development of touch sensitive luminous flexible plastics for applications in care & well-being", which put together a multi-disciplinary team of designers and material scientists and industry leaders involving four Universities and thirteen SMEs designers from 9 different countries. Within the EU project he has developed design guidelines for meaningful interactions for the consideration of the effects of product properties on the perceptual experiences which occur at a product interface.

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Alice Paracolli. Ph.D. student in Design at Politecnico di Milano. She is specialised in User Experience, and her research focuses on Sustainable UX applied to AI-infused Objects. Ubiquitous computing elicits an endless range of internet-enabled devices, offering the potential to the user to be more diligent in energy use, except that it creates an ever-growing web of data-consuming objects that stay on forever. The Ph.D. aims to set design guidelines for sustainable, connected objects, proposing a framework to build continuously incremental sustainable innovation in technology.

Martina Sciannamè. Ph.D. student in Design at Politecnico di Milano. She investigates how AI and ML can be meaningfully included in Design education with a multidisciplinary approach. Her aim is to produce theoretical knowledge and practical tools to enable designers to exploit the opportunities offered by this technology and to communicate with ML experts, being aware of its actual capabilities and limitations. Her hope is that the intersection of Design and ML, within the frame of Ethics, will finally steer the development of ML systems towards real-world problems and responsible innovation for the flourishing of humans.

Davide Spallazzo. Ph.D. in Design and Associate Professor at the Department of Design of Politecnico di Milano. Active in Interaction Design and Human-Computer Interaction, his main research interest is the human-centred approach to digital innovation and meaning-making, applied to diverse fields of inquiry. Over the years, he coordinated and took part in several national and international research projects concerning digital technologies in the Cultural Heritage field, serious gaming, and AI. He is now coordinating the

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Artificial intelligence is more-or-less covertly entering our lives and houses, embedded into products and services that are acquiring novel roles and agency on users.

Products such as virtual assistants represent the first wave of materialization of artificial intelligence in the domestic realm and beyond. They are new interlocutors in an emerging redefined relationship between humans and computers. They are agents, with miscommunicated or unclear properties, performing actions to reach human-set goals.

They embed capabilities that industrial products never had. They can learn users' preferences and accordingly adapt their responses, but they are also powerful means to shape people's behavior and build new practices and habits. Nevertheless, the way these products are used is not fully exploiting their potential, and frequently they entail poor user experiences, relegating their role to gadgets or toys.

Furthermore, AI-infused products need vast amounts of personal data to work accurately, and the gathering and processing of this data are often obscure to end-users. As well, how, whether, and when it is preferable to implement AI in products and services is still an open debate. This condition raises critical ethical issues about their usage and may dramatically impact users' trust and, ultimately, the quality of user experience.

The design discipline and the Human-Computer Interaction (HCI) field are just beginning to explore the wicked relationship between Design and AI, looking for a definition of its borders, still blurred and ever-changing. The book approaches this issue from a human-centered standpoint, proposing designerly reflections on AI-infused products. It addresses one main guiding question: what are the design implications of embedding intelligence into everyday objects?

FrancoAngeli
La passione per le conoscenze