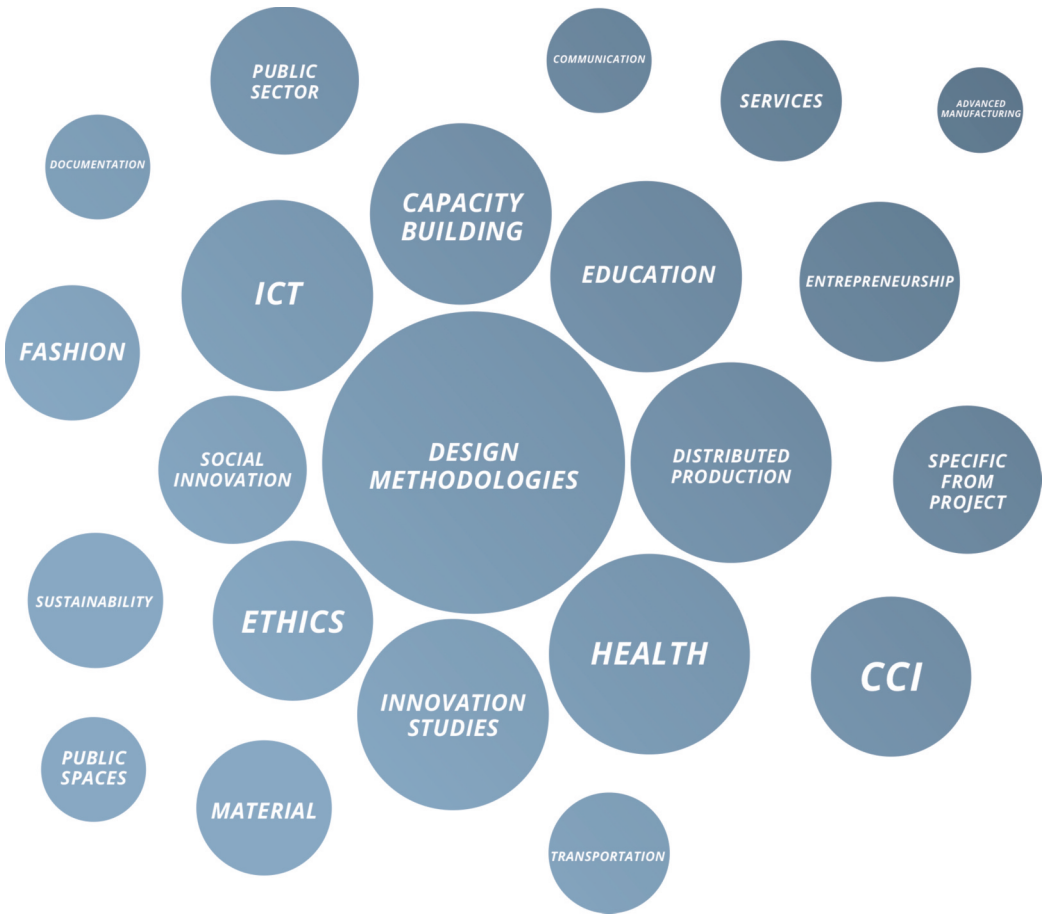
SEVEN YEARS OF DESIGN RESEARCH AT POLITECNICO DI MILANO

Analysis of the funded research projects

edited by Francesca Rizzo



D.I. FrancoAngeli
DESIGN INTERNATIONAL

The Design International series is born in 2017 as a cultural place for the sharing of ideas and experiences coming from the different fields of design research, becoming a place in which to discovering the wealth and variety of design, where different hypotheses and different answers have been presented, drawing up a fresh map of research in international design, with a specific focus on Italian design.
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7. Reflections on upcoming directions of design research

Alessandro Deserti
Department of Design, Politecnico di Milano

By analysing the Department of Design's research projects that have been funded and concluded, it has been possible to return a snapshot of the thematic areas that are most often manned, the type of output that the research produces, the results achieved under the funding program, and the long-term impacts that this can generate. This systematised information makes it possible to discover how the nature of design research projects has evolved to date, widening the mesh on the initial principals, to meet new challenges and respond to new needs for change suggested by the evolution of society, users, production processes, and policy inferences. How will this evolution continue? What will be the new challenges and new territories that our research will have to cover? And also, how will Design as a discipline be able to position itself and take directions of conscious development?

Building on the evidence gathered and presented in the previous parts of the book, this final chapter aims to discuss the possible futures. More than trying to anticipate in a forward-looking way what the future strategic trajectories of design research may be, the chapter will try to outline some emerging challenges to reflect on them critically. In this perspective, it will try to bridge past and present to possible futures, highlighting how they could affect design research and design practices, and the education of both researchers and practitioners.

7.1 Interdisciplinary collaboration as a means of transformation

One of the issues that emerge in the analysis of the whole body of the funded projects is that, in many cases, the contribution of the Department of Design focuses mainly on the use of design methods and tools to support

research in areas that are typical of other disciplines. With respect to this, it should be noted that, for example, the introduction of skills responding to the need to conduct experiments in real-life settings with the involvement of actors and stakeholders who express different points of view can bring with it a wider reorientation of research projects. In particular, entering into the merits of the objectives and contents of the projects, we see how the introduction of design methods and tools has caused the transition from the predominantly analytical approach that characterises, for example, many social sciences, to a more synthetic approach, focused on the use of experimentation to pilot innovative solutions and create new knowledge. Even if the evidence we draw from the analysis of the projects does not have a quantitative value, it seems that the quest for research that has a more direct connection with its impacts is sustaining the adoption of design as an approach. The use of design methodologies and tools is thus contributing to transformation of the kind of research conducted with researchers from other fields, who are pushed to move from the analysis and understanding of phenomena and problems to working on them, provoking transformations, verifying their impacts and possibly steering changes towards desirable outcomes. To think that this change occurred due to the introduction of design methods and tools would be very presumptuous and unrealistic. Rather, the change is determined in the first place by the demand of impact research aimed not only at analysing problems, but also at tackling them experimentally in order to prototype and assess innovative answers. In this new research landscape, the skills of the designers, who have always been oriented towards experimentally seeking these answers by involving a multiplicity of actors and competences, have proved useful for facing old and new challenges. While researchers from other disciplines often feel out of their comfort zone when experimentation in real-life settings and piloting are needed, designers operate in what for them is a natural environment: ill-defined and wicked problems (Simon, 1969, 1973; Cross, 2006; Lönngren & van Poeck, 2021; Peters, 2017; Head, 2022); need to use design experimentation not only to find solutions but also to explore the problem space (Kruger & Cross, 2006) and engage in a conversation subjects who have different and sometimes contradictory needs and points of view; ability to deal with unexpected questions; adoption of an approach largely based on trial and error and on redesign loops; use of prototypes as experimental verification tools (Camburn et al., 2017) and as boundary objects for transformation (Coughlan et al., 2007; Rhinow et al., 2012), etc. In most of the projects in which researchers from the Department of Design have been involved, problems and challenges are not only analysed, but also addressed by acting on them, albeit in an experimental way and on a small scale.

However, changes do not only occur within other disciplines. Design research is equally contaminated by the relationship in collaborative research with other methodologies and epistemologies. Thanks to this relationship, it introduces new points of view, methods and tools, and is pushed to deal with new questions. We will try to focus specifically on the latter issue, due to the consequences it is having on the widening of disciplinary boundaries, which for some it would be appropriate to keep tighter; on the knowledge needed to tackle the new areas, which is probably not always adequate; and on the tools that are put in place and tested, often borrowing them from other areas and adapting them. The latter have formed an increasingly large corpus that also emerges in its dimensions from the analysis of our research projects, which would require rationalisation and a sense-making operation. The new themes, methods and tools are posing important challenges for design research and their diffusion has already had effects on the training of researchers and designers, for whom even more important repercussions are seen in the future.

7.2 Change in the areas and objects of design

Beyond the changes affecting research tools and methods, collaborative research appears to have caused transformative effects that also affect design as a discipline and the fields in which it operates. Since the experiments to be conducted are often distant from the traditional domains of application of design knowledge, the object of design itself changes, becoming at times substantially different from those that have traditionally been the subject of interest of design researchers. This is a passage that probably initially took place in a not very conscious way, with reference to the experimentation objectives of the collaborative projects and the "objects" that they intended to manipulate in the experimentation. Hence the fact that while traditional design areas and objects are rarely the subject of research, new areas and objects emerge as subjects of research and experimentation, despite being little known or completely unknown to design researchers. Here the challenge for design researchers is sometimes immense due to the knowledge gaps they have to fill in order to deal with these new areas and objects of design research. Looking at the research carried out, there are many cases of this kind, in which areas and objects of design that are little known or unknown to designers emerge. In the following, I will try to cite some examples, without the aim of grasping and systematising all these new areas and objects of design, but rather with that of highlighting the transversal challenges and problems we face.

Policies. Designing new policies in an experimental way means delving into decades of debate on their formation and implementation, on the disconnection between intentions and results, on the methods adopted for monitoring and evaluating their impacts, and on many other issues studied by political scientists, lawyers, economists and sociologists (Deserti et al., 2020; Komatsu et al., 2021).

Non humans. Designers are increasingly confronted with the need to give shape to non-human agents, which are precisely one of the new objects of design. The term "nonhumans", introduced in the scientific debate mainly in the social sciences, and widespread in particular due to the success of the Actor Network Theory, is actually quite broad and ambiguous, and capable of including very different categories, from animals, plants, natural phenomena, inanimate objects, technical ones, material structures (Latour, 2005). It is a layered whole, which does not correspond to a precise definition, but which is rather the result of various contributions, which have accumulated and which have led to the inclusion of both natural and artificial objects, which according to ANT have a shared agency, which does not represent the distinctive element of humans compared to non-humans (Sayes, 2014). While recognizing that the design act has always involved the agency of non-humans, and that the artificial has always been the object of design, we must observe how today we are confronted with particular types of objects, characterised by a specific agency. In particular, this agency aims to replace the human one or to enhance it in a much more significant way than that which has characterised the traditional types of artefacts and machines, because it operates on the grip of decisions through calculation tools and learning mechanisms. Specifically, the development of artificial intelligence confronts us with the challenge of using increasingly refined calculation systems and algorithms, which must be developed, configured and tested, and which have become part of our daily life. Also in this case more traditional challenges arise, such as that of implementing a design process extended to the participation of subjects with very diversified skills and of the users of the products and services in support of which these agents are used, or that of designing the modes of interaction with AI; and new challenges, such as giving personality to non-human agents, addressing new technical problems but also new political and ethical issues (Komatsu et al., 2021). On the other hand, it is necessary to observe how non-human agents enter into a relationship with the design processes not only as subjects to whom form and behaviour must be attributed, but also as actors of the process itself. The shift in this case is from designing agents to interacting with them during the design

process, where the first challenge is to recognize them as such and understand their importance. The topic is not new in itself, and has been extensively covered both in the ANT and in the "material turn" of social theories (Law, 2009). What is new for designers, if anything, is the type of interaction that occurs with these new agents, and the ability they have to modify the design processes themselves. Let's imagine how an AI algorithm can, for example, provide data for design, but also give indications or become a subject that intervenes within a process or system that must be designed.

All this paradoxically intersects with human centricity, understood as a beacon that must guide the design process and as a fundamental point of view for an ethical development of technologies. In this regard, see the development of the debate that led the European Parliament and Council to the publication of the final proposal for the AI Act (artificialintelligenceact.eu/the-act). Already the discussion that led to the publication of the initial white paper added human centricity to trustworthiness, which had been identified as an objective to be ensured through the new legislation, linking the two objectives and leading to the guiding principles set out in the final version of the proposal: "Rules for AI available in the Union market or otherwise affecting people in the Union should therefore be human centric, so that people can trust that the technology is used in a way that is safe and compliant with the law, including the respect of fundamental rights" (European Commission, 2021, paragraph 1.1 "Reasons for and objectives of the proposal"). Certainly design is not the discipline most involved in the development of artificial intelligence, but its point of view is particularly interesting in the perspective of making it human centric. In fact, we are already committed in this direction with an important European training initiative linked to the introduction of AI in the public sector (ai4gov-master.eu), which is experimenting with project based learning models for the integration of technical and design skills, carefully taking ethical and regulatory aspects into consideration. Furthermore, entering into the merits of the research projects and piloting activities they have conducted, we find both the development of new services that use AI algorithms, and experimental activities that look at AI from original and unprecedented points of view. For example in SISCODE (siscodeproject.eu), a European research project coordinated by the Department, one of the co-creation labs has concentrated the experimentation on the realisation of an exhibition, conceived as a moment of reflection on the silent presence of AI is designed with algorithms in mind as spectators (Merzagora et al., 2022). The idea seems bizarre, but without realising it, we begin to be surrounded by information, which can take the most diverse forms, produced to be used only by AI algorithms.

Behaviours. The ANT also clarified unequivocally how the design of some tangible and intangible artefacts has political effects that regulate people's behaviour. The example of seat belts and warnings that make their use mandatory when starting the car, proposed by Latour (Latour, 1992), is in this sense simple and very clear, and raises interesting questions about where morality should be placed.

In general, every artefact has an impact on the behaviour of those who use it, and its design is therefore at the same time the design of a product, service or any other category of goods, and the design of the interaction with its users, which affects their behaviour.

More recently, however, behaviour itself, regardless of artefacts, has been explicitly identified as the primary design focus. In some ways, the condition is not unlike that placed on the designers of systems who aim to ensure that anyone who drives a car is forced to put on a seat belt, but the way the problem is posed to the designers, and how they approach it, change. Behavioural change as an objective is supported methodologically, and equipped with both a theoretical framework and operational tools. The theories of change, often built on the same logic models that have determined the European framework of impact research, have spread starting from the areas in which the moral drive appears most strongly, such as (design for) social innovation (Brown, 2020). The theories of change have often concerned the social sphere, with respect to which they are proposed as tools to guide the transformation, and more recently have tried to combine it with the environmental sphere (Shove, 2010). With respect to this, the moral drive that we have mentioned is inevitably connected to the idea of what is socially or environmentally right and appropriate, and seeks to orient individual behaviour in this direction. The questions that arise concern not only the knowledge and tools available to designers, but also the ethics of design, and how it can be managed when the goal is to intentionally change the behaviour of individuals and social groups. The decision as to what is socially or environmentally right can at any time conflict with the possibility that other points of view exist and with the freedom to express them. In this context, more solid theories of change and more refined tools risk being particularly critical if they are not accompanied by careful consideration of the ethical dimension of design research, which emerges strongly in relation to the involvement of people and the experimentation bound to their behaviours. Although this is not a new topic, also in this case the design researchers and designers seem less equipped than those who work in other fields, perhaps more explicitly touched by ethical aspects. Even considering the increasingly close relationships between design and some disciplines that carry out experiments that

by their nature pose ethical questions, the development of further knowledge and awareness on the ethics of design certainly emerges as a significant challenge that research must face.

Organisations. Some of the projects analysed, if read through the filter of the declared impact objectives, aim at changing organisations. The impact generation model proposed by the European research framework itself, forged on the basis of the logic model and brought back from the scale of the entire program to that of the single project, has probably led to the definition of broader and more ambitious overall objectives than those which size and limitations of individual projects made it possible to obtain. However, it is very interesting to observe how in some projects organisations are in several cases explicitly identified as objects that must be transformed, and how in many others they are implicit objects of transformation if we look at the expected impacts. To give just a few examples, the research work carried out to support the operationalisation of Responsible Research and Innovation (RRI) (Deserti et al., 2022) proposed to scale down the research already conducted on RRI, from the focus on national practices to that on the variety of local experiences in an international context, with the aim of moving from broad recommendations to experimentation with RRI practices within different local ecosystems, investigating the transformative impacts they can have on organisations and ecosystems. These objectives, in addition to being supported by the impact generation model proposed by the research framework, were fueled by research already carried out on the relationship between design and organisational change (Boland & Collopy, 2004; Buchanan, 2008; Junginger & Sangiorgi, 2009), and tried to address it experimentally, to support the transition from an implicit role of the design to the definition of methods and tools capable of supporting its explicit role of transformation agent of the organisation.

This experimentation has mainly focused on the project itself as a tool for organisational change and has addressed different areas and objects of design not only with the aim of developing new products, services or systems, or of improving existing ones, but also with that of transforming the processes of the organisations that took part in the experimentation, with the idea that the change of products and processes drives the change of the organisations themselves. Here it is appropriate to quote in a paradigmatic way the theme of the introduction of design in the public sector, which had already been the subject of analysis in the perspective of design as an agent of organisational change (Deserti & Rizzo, 2014). In this sector, design mainly works on well-established design objects (mainly services, but also on even more

consolidated objects such as communication artefacts) but begins to look at them in the perspective that they can be tools for the operationalization of policies – which become precisely the real goals and new objects of design – or for organisational change. If the change is not intended to be episodic but intentionally guided, knowledge of the organisation in a broad sense, and of a specific type of organisation which is the public one, becomes of fundamental importance. And once again extraordinarily wide knowledge gaps emerge, posing major challenges for designers and design researchers. If the change is not intended to be episodic but intentionally guided, knowledge of the organisation in a broad sense, and of a specific type of organisation which is the public one, becomes of fundamental importance. And once again extraordinarily wide knowledge gaps emerge, posing major challenges for designers and design researchers. A certain degree of unawareness and naivete may allow design researchers to express a fresh and unconditioned point of view, but at the same time set important limits when defining ambitious goals for cultural change in a sector in which even more structured disciplines have shown all their limitations.

Systems. The aforementioned theories of change are placed within a stream of thought that pays particular attention to systems and that looks at their complexity as one of the challenges that design research and design have to face. The relationship between design and cybernetics has developed on the premise that design can also be applied to change objectives that involve complex systems, characterised by non-linear relationships between causes and effects, and in which a local perturbation can have significant effects that are hardly predictable and controllable (Glanville, 2009; Krippendorff, 2007). Rittel and Webber discussed many years ago the idea of wicked problems, that affect planning and designing and that are more than just complex, questioning the idea that some problems can be addressed within an efficiency logic based on the development of solutions (Rittel & Webber, 1973). With respect to this, the two authors observe how problems that have a systemic nature imply difficulties in defining the problem itself. In their words, these problems present the intractable difficulty "*of knowing what distinguishes an observed condition from a desired condition*" (Ibidem, p. 159) and in locating where in the complex causal networks the trouble really lies. Moreover, the problem of identifying the actions that might effectively narrow the gap between what-is and what-ought-to-be appear equally intractable. Despite these not very comforting premises for design research, the challenge of design for systemic change has largely unfolded for some years, in connection with the aim of pushing designers to become aware of their

social and political role, and then was almost forgotten until recent years, in which mainly the emergence of the climatic and environmental issue, have brought the idea of design for systems back into the scientific debate. In particular, Norman and Stappers, with the idea of DesignX, have again placed their attention on complex systems, taking up and updating various considerations of historical literature (Norman & Stappers, 2015). Several projects collected and analysed here aspire to transformations at the system level and have operated experimentally on complex systems: transport, health, education, the city and others. In many cases, research projects have tried to link the dimension of experimentation, typically conducted on a small scale, with the enormous challenges posed by the change of these systems. For this reason, as well as due to the request to connect the actions developed experimentally in the projects with outcomes and impacts in real-life settings, part of the research focused on the scaling mechanisms of the innovations tested. This is a topic of particular interest, with respect to which, however, a challenge that arises is precisely that of causal links, which the theories of change often imply implicitly or explicitly, and whose identification difficulty is paradoxically one of the characteristics of complex systems. Here remain some basic questions to which the research has not given an answer, and are perhaps destined to remain without a single answer. In particular, we must ask whether systemic change can really be based on small-scale experiments which are then transformed into stable and scaled solutions in different ways. After years of experimental research and reflections, well documented here, we can honestly say that these experiments can make a contribution but that change also occurs in other ways and on another scale, which is currently being tested in new projects, that will hopefully offer new interesting contributions to the development of design knowledge for systemic change.

7.3 Reflections and trajectories for future work

The new themes and transformative challenges that characterise impact research seem to lead at the same time to the development of new knowledge, which is mainly the result of interdisciplinary collaboration, and the need for new knowledge and skills for all those who take part in it. In particular, while for researchers of other disciplines the need to operate experimentally on transformations in real life settings emerges, for design researchers the demand for knowledge of new objects that must be experimentally manipulated emerges. In particular, to use an analogy with the design of tangible products, the need emerges to know the "materials" and "components" of which

these objects are made, their transformation processes, and the ways in which change can be intentionally addressed. In several of the research presented here, the materials used to design a service or policy appear to be primarily data, while the components appear to be their aggregates. As we have seen, in some researches, individual and collective behaviours are objects that are experimentally modified as tools that contribute to the transformation of a system. Almost all research poses the challenge of understanding what are the new materials, components and transformation processes with which designers work, and what are the skills needed to manage them. Who should be and what skills the designer and the design researcher should have in these new contexts are the relatively simple questions we can ask. However, the answer is problematic and rather complex, so much so that we look at the design practice (Manzini, 2015) as much as we look at design research. On the one hand, the claim of knowledge of the methods and tools of the discipline emerges as a fundamental competence to act as designers and design researchers; on the other hand, the claim of knowledge of the design area and the object to be manipulated emerges, without which it is impossible to operate consciously on its transformation. And consequently: to face the change we need a designer or a design researcher to whom we must attribute knowledge about new design objects, or is it better to involve the specialists of these objects to whom we must give design skills? Impact research, as it is configured, is experimenting with the involvement of multiple figures who have distinct vertical skills but who are capable (or at least try) to collaborate. It is certainly not only an inevitable path, but also a harbinger of great enrichment and which is giving important transformative results. However, some questions still remain without satisfactory answers. In particular, those relating to the boundaries of design as a discipline and the knowledge of design researchers and designers. They are probably destined to remain basic issues on which it will be necessary to constantly formulate questions in the face of external changes, which require to reconcile both the ability to involve a multiplicity of knowledge, as well as that of updating and redirecting knowledge and the repertoire of methods and tools that design researchers and designers have at their disposal.

In the process of "scientificisation" of the discipline, design literature often referred to Simon's seminal studies, which extended the disciplinary boundaries far beyond those of the categories of goods and problems to which designers have historically dedicated themselves (Simon, 1969, 1988). His famous and most cited sentence "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones" (Simon, 1969, p. 111) paved the way for the idea that design is first of all a

core human activity and a process that characterises the sciences concerned with "what ought to be" in contrast to the sciences which are concerned with "what is" (Kimbell, 2009). As important as it was, Herbert Simon's definition can nevertheless entail possible misunderstandings, because if on the one hand it defines the design dimension and the ability to intentionally act on reality as a characteristic of many human activities that require specific skills; on the other hand, it risks identifying all those who carry them out as designers. It should be noted in this regard that a surgeon who operates a patient or a politician who promulgates a new law, for example, fit perfectly with Simon's definition without either of them being properly a designer. Taking a cue from the second case, it is however interesting to observe how the recent opening of a line of research on policies as objects that can be designed, prototyped and experimentally verified, has created a new space for research, experimentation and theoretical reflection for design researchers, which raises questions relating to the necessary knowledge and the boundaries of the discipline. Therefore, if on the one hand the new areas and objects of design research are allowing to generate new knowledge, often also usefully brought back within the already consolidated fields, on the other hand they bring with them many challenges that we have tried to describe in a non-systematic way. A broader reflection on them is certainly necessary, not only and not so much to systematise, but to address the epistemological aspects of the discipline, creating a virtuous circle that relates impact research with theoretical elaboration, overcoming the sequential model "basic research / applied research / technology transfer" typical of other disciplines. In this, a young discipline like design, which does not have to carry the weight of a large historical corpus, can certainly propose itself as a precursor.

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Authors

Francesca Rizzo (editor), Ph.D. in Electronics and Telecommunications Engineering, is Professor at Politecnico di Milano, Department of Design where she serves as delegate of Director for the research activity. She is expert in Participatory Design (PD) applied to the fields of service design, social innovation, and public sector innovation. She has been actively working as researcher for various EU projects in the FP7 programme and in H2020 (Peripheria, My Neighborhood, Smart Campus, Life 2.0, SIC, SISCODE, easyRights, NetZeroCities). She will serve as coordinator of ORBIS under HEurope (2023-2026). She is author of many publications in journals and conference.

Patrizia Bolzan, Ph.D. in Design, is Researcher at the Department of Design of Politecnico di Milano. She investigates the ratio between digital fabrication, with particular attention on additive manufacturing technologies, and Design in practices and processes. She deals with circularity in product system design and technological integration in prototypes. She has participated in several research projects, and she is the coordinator of De-Forma (Design Explorations on Biofabricated Organic Materials) project, funded by the Department of Design, with the basic research grant. Since 2015 she has been on the permanent staff of Polifactory, interdepartmental makerspace and FabLab).

Alessandro Deserti is Professor in Design at the Politecnico di Milano, where he is currently leading the Department of Design. His main research lines deal with design-enabled innovation processes, methods and tools and ways in which they combine with systemic and organization change. He investigated the application of design methods and tools in diverse contexts, such as human smart cites, social innovation, responsible research, and in-

novation (RRI), public sector innovation (PSI), business model innovation. He has been actively working as researcher for various EU projects in the FP7 and in H2020. He is currently involved in DESIRE a HEurope project demonstrator for the New European Bauhaus initiative. He is author of many publications in journals and conference.

Annalinda De Rosa is Post-doc Research Fellow at the Department of Design of Politecnico di Milano; adjunct professor at the School of Design, and the MSc Innovation and Technology Management of Università Cattolica del Sacro Cuore. Her research concerns the relationship between spatial and service design, specifically focusing on design-driven models for incubating innovative processes for the CCS to improve social cohesion through participatory design in urban and rural areas. Member of the Polimi DESIS Lab within the international DESIS Network (Design for Social Innovation and Sustainability). She is the project manager of Human Cities/Smoties – Creative works with small and remote places research project (Creative Europe program).

Venere Ferraro, Ph.D. in Design, is an Associate Professor at the Department of Design of the Politecnico di Milano. She participated in several International and National research; she has been the coordinator of the research project "POD" (SAFERA 2014 joint call) and the European research project "DATEMATS" (KA2-2018). What characterizes her research is human-centred design. The research interests lie in the domain of interaction design, more in detail: the role of wearable technologies, emerging materials, and big data in designing experiential systems for digital care, with particular attention to tools and methods for changing user behaviour.

Ilaria Mariani, Ph.D. in Design, is Researcher at Politecnico di Milano, Department of Design, where she is part of the team supporting the research activity. Her research interests are at the intersection of interaction, communication, and service design. Her research addresses games and complex interactive systems for communication and speculation, social change and innovation, focusing on comprehending their impact on users. In recent years she moved her focus to digital transformation and design-led innovation in the public sector. She actively participates in various research projects on these topics, such as the H2020 SISCODE and easyRights, the CEF AI4GOV, the ESPON Digiser, and the HEU ORBIS.

Marzia Mortati, Ph.D., is Associate Professor in Service Design at the Department of Design of Politecnico di Milano. She is Vice-Director of the

International Master in AI for Public Services and one of the executive directors of the European Academy of Design. Her research focuses on the design process, service design, public sector innovation, and new technologies. She has worked on numerous international research projects and has authored several articles in international scientific journals (i.e., Design Issues, Technovation, Design Management Review, The Design Journal, Policy Science, International Journal of Entrepreneurial Research and Behaviour) and conferences since 2008.

Xue Pei is a Post-doc Research Fellow at the Department of Design of Politecnico di Milano, where she obtained her Ph.D. in design management. Her research and design practices focus on applying design (thinking) approach, methods, and tools to foster innovation in organisations in both private and non-profit sectors. She has developed expertise in design research, strategic scenario building, and service system design. She has participated in a number of European and national research projects (Horizon 2020, Interreg, Fondazione Cariplo), and co-led several strategic and service design research projects with private funding. She also conducts didactic activities in public universities and private institutions.

Davide Spallazzo has a Ph.D. in Design and is an Associate professor at the Department of Design of Politecnico di Milano. His research sets in the interaction design field, particularly in UX, aesthetics, and meaning-making. He has been coordinating research projects in the field of cultural heritage and serious gaming. In recent years he moved his attention to the intersection of AI and Design, coordinating the Meet-AI research project aimed at eliciting the design qualities of AI-infused products and defining a new UX assessment method. He is currently serving as deputy coordinator of the Ph.D. program in Design and as secretary of the MSc in Digital & Interaction Design at Politecnico di Milano.

Which are the main research funds currently accessed by the Department of Design? What are the topics explored through them and which are the interconnections with the Department core research activities? Also, what are the research products delivered, the reached outcomes, and the expected impacts BY these research projects?

The book synthesises the results of a qualitative analysis conducted over 32 research (out of 96) projects coordinated or participated in by the researchers of the Department in the timeframe 2014-mid 2021.

The results of the analysis confirm the high-level attractiveness of the Department research profile on core topics such as design methodology, service design, and health.

However, more interestingly, the analysis shows a significant variety of new topics and themes that emerge as new research questions for the Department, such as the role of design in public sector innovation, ethics, or policy design.

The publication provides a snapshot of the topics addressed through the competitive research projects, the dimension of such strands of investigations, the typology and features of results achieved, as well as their relationship to the Department's basic research lines.

The relationship and interplay among the outputs, outcomes, and impacts of the funded research is then elaborated in impact pathways, opening up reflections about the upcoming and future of Design research. The findings of the analysis aim to capture the present to understand future directions in terms of scientific, societal, technological and economic aspects.

The volume addresses an academic audience from long terms researchers the field of design and other closely related scientific-disciplinary fields at the national and international levels, to young researchers approaching the world of design research.

FrancoAngeli
La passione per le conoscenze