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**DESIGN VALUES
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Design for Responsible Innovation

Social Impacts of Products and Services

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Keywords

Responsible Design, Social Innovation, RRI Principles, Gender Equality, Advanced Design.

Abstract

Responsible Research and Innovation (RRI) is considered at EU level as a cross-cutting priority to encourage societal actors to work together during the whole research and innovation process, aligning results and outcomes with the values, needs and expectations of society. In order to investigate the relation between Design Cultures and the multi-level perspective of RRI principles, the Advanced Design Unit of the University of Bologna has launched the 2020-2021 Winter School “Design for Responsible Innovation” working on multiple ecosystems (Italy, Mexico and Chile) with their own territorial capital. The Winter School represented a first experimentation of a methodological approach that was gradually co-designed among the research groups involved, in order to work on an inclusive and non-hegemonic knowledge system. The relationship between the RRI dimension and the design disciplines has led to the creation of an iterative framework, in which the methodological approach has allowed to identify actions and tools to investigate and test how the processes and practices of Design, integrated with the RRI approach, could help to activate dynamic processes within social actors at transnational scale, and can facilitate the design of product-systems able to contribute to the big challenges of the present. The description of two experiences about Gender Equality topic, led the discussion about current educational design model that moves from local to the international dimension. The mutual exchange among teachers, young designers, and institutions creates new learning opportunities beyond territorial borders, introducing the Responsible Thinking and Education as a key to train future designers, able to take a role in mixed groups of interest and power.

1. Innovation, Responsibility and Design

Scientific debates concerning the relation between responsibility, research, design and innovation have broadened during the last fifty years (Papanek, 1971; Jonas, 1984; Collingridge, 1980; Groves, 2006), due to the intertwining with science and to the progressive inclusion of research policies at different decision makers' levels (Kearnes & Wienroth, 2011).

Moreover, technological innovation has led to a large-scale dissemination of new enabling tools, digital or physical, which, on one hand, puts technologies at the service of the socio-economic sectors with a direct influence on the development of new languages, relationships, structures, meta-processes, but, on the other, generates concerns about ethical and humanistic issues (Portugali, Meyer, Stolk & Tan, 2012).

Responsible Research and Innovation (RRI), was introduced for the first time in 2006 in the context of the Dutch Research Council Program entitled Socially Responsible Innovations. Seven years later, in November 2014, policy was endorsed in the Rome Declaration on Responsible Research and Innovation¹ as a cross-cutting/overall priority in Europe-funded programs to encourages societal actors to work together during the whole research and innovation processes, in order to better align results and outcomes with the values, needs and expectations of society.

This increasing significance for science, technology, policies, research and practice, offers forward-looking approaches and

1 <https://digital-strategy.ec.europa.eu/en/library/rome-declaration-responsible-research-and-innovation-europe>.

methods for reflecting on societal impacts, with a focus on participatory research and innovation aspects (Owen, Macnaghten & Stilgoe, 2012; Uyarra, Ribeiro & Dale-Clough, 2019), but also on how scholars, companies and other actors actually perform RRI, producing new knowledge and new ideas to introduce progresses and advancements in our society.

Scholars are seeking more ethical and social balance to innovation (Grunwald, 2011; Stilgoe J., Owen & Macnaghten, 2013; Koops, 2015), while EU policy frameworks and directives use RRI to emphasize the importance of including research activities in innovation. Considering an expanded list of legitimate actors which influence research and innovation processes, Von Schomberg (2008) uses the term “collective responsibility”, taking into account the engagement not only of researchers, but also of entrepreneurs, businesspeople, policymakers, public institutions and research funding agencies.

The topic of responsibility has progressively become central, at an international level, also for design cultures, intrinsically concerned to innovation processes, to include this debate as a fundamental paradigm.

Bringing together design-led innovation approach and the principles of RRI is at the core of the research and education activities of the Advanced Research Unit (ADU) of the University of Bologna, which promotes the adoption of an integrated and collaborative approach among all the key actors and communities of products/services value chains.

With the aim of developing and testing a dynamic research and innovation process, being at the same time better aligned with society’s values and expectations, ADU investigates how

the application of RRI principles² could be based on the improvement of the human-centered design approach. The close relationship between RRI and design cultures and practices, already highlighted by Bayley, Sams, Spencer, Bentham & Bayliss (2016), is in fact deepened through the four typical dimensions proposed by Stilgoe and Guston (2017): Anticipation, Reflexivity, Inclusion and Responsiveness. These can be easily interpreted and customized through the design lens:

- The Anticipation dimension is based on the convergence between design methods and future-focused thinking, in an open experimental approach, strongly contaminated with the social, political and ecological challenges of tomorrow.
- The Reflexivity dimension revolves around the role of design, stimulating by new thematic reflections about tools, processes and methodologies (the convergence of design methods and future-focused thinking), which could deal with transformative values for society, foster the co-generation of futures and implement participation in the construction of collective futures.
- The construction of impact-led collective futures is based on the adoption of an Inclusive perspective in research and education activities of ADU which, through its community of researchers, students and territorial representatives, jointly develops tools, processes and methodologies.
- The Responsiveness dimension is introduced to investigate the transformative value in society and its relation to design-driven RI and to support flexible, non-definitive and

² <https://rri-tools.eu>.

increasingly generative design of new products and services (Caetano, Santos & Leitão, 2020).

Considering the advanced dimension of research, in its relationship with time, with processes and methodologies, ADU aims to work in the real contexts (in the relationship with citizens, in innovation processes, in post-industrial logics), going to establish a concrete dialogue with the tools of doing, knowing, educating (Celaschi, Formia, Iñiguez & León, 2019). An important occasion to test this research perspective is represented by the Winter School “Design for Responsible Innovation”. The Winter School started in 2020³, as a project financed by the University of Bologna within the Call “International Agreements-Promotion projects of innovation initiatives”. It has been developed thanks to the collaboration of three universities: University of Bologna⁴, Tecnológico de Monterrey⁵ and Pontificia Universidad Católica de Chile⁶, which created a collaborative process of learning and an inclusive design platform, contaminating values, knowledge and visions. The participants were a selection of young designers of the three Universities, involved from the beginning of the process, together with local and international stakeholders and research groups.⁷

3 Project timeline: october 2020 – in progress; first local workshop in January 2021, second international workshop in June 2021.

4 Università di Bologna, Dipartimento di Architettura, Advanced Design Unit. <https://site.unibo.it/advanceddesignunit/it>.

5 Tecnológico de Monterrey-TEC, Escuela de Arquitectura, Arte y Diseño. <https://tec.mx/es>.

6 Pontificia Universidad Católica de Chile – UC, Scuola di Design. www.magisterdiseno.uc.cl.

7 <https://adu.unibo.it/winterschool/>.

2. The Experience of the Winter School “Design for Responsible Innovation”

The Winter School represented a first experimentation of a methodological approach that has been gradually co-designed between ADU and the other partners, in order not to impose, but to build a path of shared knowledge on the topic of design-driven RI. The choice of such distant territories was functional to open the discussion on the relationship between design and RRI beyond the European context, working on an inclusive, not-hegemonic, knowledge system.

In fact, this experience allowed us to compare tools and practices to show the way in which design, innovation culture of sustainability and ethics are values for processes of local training and how responsible design can be inserted in territorial and cultural contexts very different from each other.

To experience concretely these processes, the research group had set out to work on three fields of action related to the concept of design-driven RRI: Thinking, Education and Production, with the intent to:

- begin to create new collective responsible knowledge at two levels: local and international;
- blend diverse backgrounds and characteristics of participants to create a common, non-hegemonic language about design concepts for responsible innovation;
- activate intraterritorial design opportunities to experience the intersection of RRI and design disciplines.

In order to adopt this multilevel system, the Winter School:

Design for Responsible Innovation was developed over one year and in two phases.

The first phase implemented actions at the international scale with experimental spin-offs at the local level (in Italy, Chile and Mexico), the second phase focused on building the international community.

The project, that started in the academic research context (Martinuzzi, Blok, Brem Stahl & Schönherr, 2018) had the ambition to be applied and tested in different fields, supporting quintuple-helix approach (Carayannis, Barth & Campbell, 2012), that allowed to map the territorial capital (Cristallo, 2018; Villari, 2018) – social, human, cultural, creative, historical – of different territories and transforms it into an active element of the design process (Fig. 1).

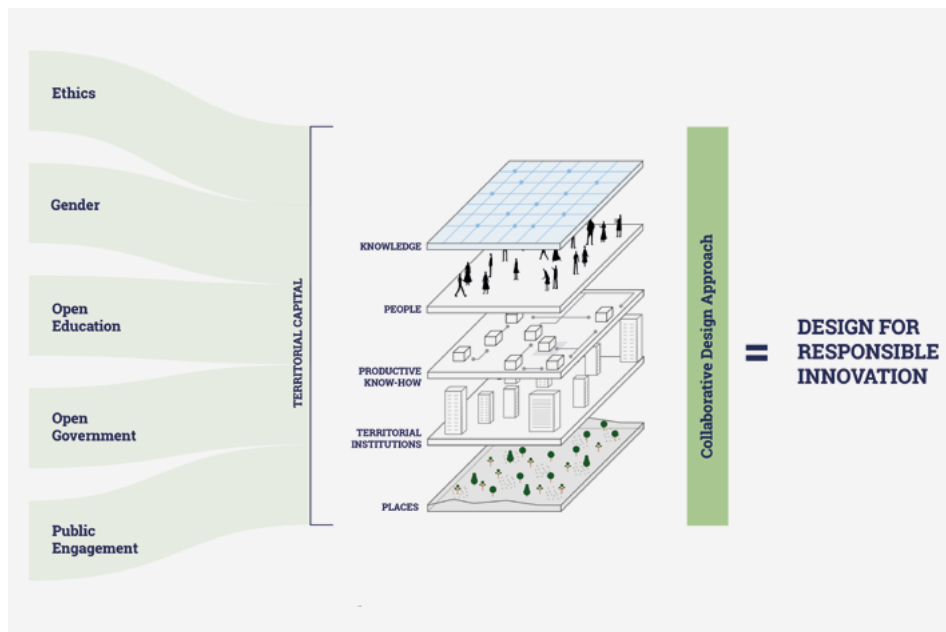


Figure 1. Design Framework: methodological approach. Credits: authors.

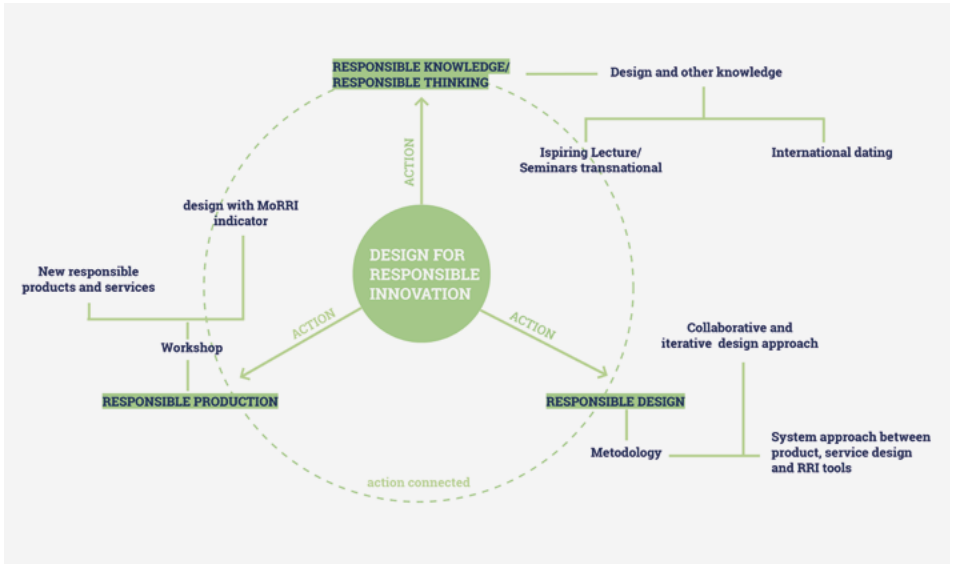


Figure 2. Design for Responsible Innovation: process. Credit: authors.

3. Experiencing Responsible Design: Tools and Methods

The intra-university and transnational dialogue supported the development of a learning and design model based on the blending/exchange of skills, knowledge, and relationships at multiple levels and on field experimentation.

The approach is based on the relation between the four RRI dimensions previously described – Anticipation, Reflexivity, Inclusion, and Responsiveness (Stilgoe et al., 2013) – with the different innovation processes – material, organizational, discursive, and spatial dimensions – expressed by Jakobsen, Fløysand and Overton (2019, p. 233) by interconnecting them with design driven approach.

This led to the creation of an iterative framework (Fig. 2) in which the previously described methodological approach allowed the identification of actions and tools to investigate

and test three fields of action: Responsible Knowledge (thinking), Responsible Design (education), Responsible Production (manufacturing):

Responsible Knowledge/Responsible Thinking

Actions: Collective learning activities to promote the building of a collective intelligence process by sharing skills and knowledge.

Tools: seminars, open meetings between the academic and the designer's community, inspirational conferences, opportunities for exchange with local stakeholders.

Goals: This process allowed, on the one hand, to bring the research community closer to more inclusive and responsible design systems, comparing approaches, ideas and learning paths. On the other, to enable a form of collaborative learning based on peer-to-peer knowledge exchange to provide opportunities for designers to develop their own vision.

Responsible Design

Actions: multilevel reflection on how design can contribute to making responsible innovation part of the development policies of the territories and how RRI can encourage the creation of more ethical and inclusive design methodologies.

Tools: collaborative interaction tools; design driven tools useful to facilitate the integration of MoRRI⁸ and SDGs⁹ indicators in the different phases of the design process; guidelines to conduct responsible and inclusive design processes.

⁸ <https://rri-tools.eu/>.

⁹ <https://sdgs.un.org/goals>.

Goals: a process of change in the behavior of society, made through the development of responsible and accessible product-systems, democratic and inclusive, aimed at allowing cooperative forms of design and learning; a debate on design for responsible innovation fed in a collaborative way between several territories.

Responsible Production

Actions: a collaborative and iterative prototyping experience, supported by the skills acquired during the seminars.

Tools: workshops.

Goals: To generate the evolution of participants' thinking towards the design of new inclusive and responsible products and services. At the same time, the adoption of a quintuple helix approach (Carayannis, Barth & Campbell, 2012) that will allow to map the territorial capital (Farrel & Thrion, 1997; Franzato, 2009; Villari, 2018) and their social relations linked to spatial-temporal contexts (Fløysand & Jakobsen, 2011), transforming it into a key variable for the design process.

The three phases over described have two distinctive features:

- Adaptability, to contribute to cognitive, skills and procedures change (MoRRI 2018) in different territories;
- Interactivity, to introduce continuous improvements to the knowledge and production process.

4. RRI and Design in the Mediterranean: Case Studies from Winter School

In this paragraph a selection of experiences within the Winter School project will be described, that tested the methodological approach described above in relation to a specific principle of RRI – Gender equality – applied in a Mediterranean context and on a more global scale.

The choice of the topic is particularly relevant if we consider that, according to the Sustainable Development Report of 2020 (Sachs et al., 2020), the achievement of the related SDG “Goal 5 - Gender Equality” has not undergone any significant improvement by 2020 (Italy) or it represent a challenge that still needs significant improvements (Chile, Mexico).

This choice has made it possible to investigate how the Design for Responsible Innovation approach could act as a knowledge innovator and a community activator both in a local and international dimension, starting from gender issues.

The experimentation involved young designers, research groups and representatives of the communities of the territories involved.

The first phase focused on the Bolognina area, a district of the city of Bologna concentrating on Gender Equality and Young Generation. This experience has enabled the participants to test the design for responsible innovation approach, in a context characterized by a strong multiculturalism and a strong level of local activism, involving in the activities also the communities and associations present in the area.

The second phase, took place on an international scale, the young designers created international working groups and

shared experiences, cultural visions and tested the Design for Responsible Innovation approach applied to gender equality – from the perspective of Gendered Design Innovation – in different contexts, initiating a reflection on the theme and the role of design on a more conceptual scale.

The two experiences have tested the three methodological steps described above and, thanks to their temporal conformation (first and second phases), have allowed to improve each time, the tools, actions and approaches with the aim of integrating the best RRI dimensions with the disciplines of design. Regarding Responsible Knowledge/Responsible Thinking, seven seminars have been organized, involving 38 international speakers that on the one hand allowed participants to broaden their point of view with respect to the theme of gender equality and the role of RRI dimensions in the current challenges and, on the other, allowed participants to integrate the reflections that emerged within the projects in progress through continuous in-depth analysis.

Regarding Responsible Design, design toolkits were created and/or adapted to RRI-oriented policies. In particular, during the second phase, the dimension of international collaborative planning, has brought out the need to identify a common language to the design toolkits going to reread them through the RRI principles and SDGs.

Finally, regarding Responsible Production, the workshop activities were oriented towards prototyping. In the local context, with a quintuple-helix approach based on listening to the communities involved and studying the territories identified,

it was possible to develop nine responsible product-services systems. In the international context, the exchange of cultural visions, skills and design approaches within the same working groups, has put in place the development of four prototypes for a reflection on a global scale on gender equality. This double level allowed to apply the approach of design for Responsible Innovation at multiple scales, bringing out obstacles, new challenges and strengths of the applied system.

In fact, the two experiences described, thanks to the local and international scale, have allowed the research group to:

- To experiment and test in a vertical way, on circumscribed and well-defined themes, the integration between design disciplines and RRI. This brought out the importance of adapting actions within the designed models to the individual design issues to be addressed.
- To integrate the intersectional perspective (Knudsen, 2006) and the RRI topics into the design methods, enabling the design of solutions that are more representative of the end-users and stakeholders involved in the process and to avoid stereotypes (European Commission, 2020), due to the fact that the integrated specificities of individuals are taken into account from the early stages of the process to the implementation of final solutions (Fig. 3).
- To design and test innovative models of collaboration between citizens, institutions and other actors that would allow the inclusion of a plurality of individuals, with a particular focus on those who remain excluded from traditional governance and collaboration models (Fig. 4).



Figure 3. Project Ca'Mon, a card game based on a process of co-design for school students with the aim of raising awareness among young people about gender issues and multiculturalism. Credits: Caterina Amato, Denise Bruno, Simone Ugolotti.



Figure 4. Platform for the data-driven narration of Bologninaèquartiere. Credits: Sofia Bercigli, Lorenzo Brunello, Marco Dall'Olio.



Figure 5. Game-volution box. Credits: Ignacia Lara, Denise Bruno, Alejandra Tovar, Kevin Pineda, Rossella Monopoli.

- To foster the construction of literacy (D'Ignazio, 2017), understood both as a set of skills useful for the critical analysis of gender issues, and as a process of empowerment that derives from the acquisition of such skills, of the actors involved in the Winter School process.
- To foster, through the engagement and empowerment of different actors, an infrastructure of dialogue between institutions, associations, communities and actor from the private sectors, which enables the design and implementation of further services and solutions in response to present and future needs (Fig. 5).

5. A Changing World: the Role of the Design Cultures

The Winter School has been the occasion to test, in collaboration with young designers and with an international community of experts how design acts:

- a) as an innovator of knowledge, highlighting the value that a responsible approach can bring to society;
- b) as an activator on responsibility in the territory, taking into account the topics of gender, ethics and public engagement, being sensitive to current and future societal issues
- c) as a mediator of languages, by taking into account the need of cross-fertilization between different skills and the importance of interculturality.

Considering the experience described, design discipline and practice could trigger and operationalize RRI dimensions within organizations (Deserti, Real & Schmittinger, 2021), by reading impacts through the lens of design cultures, and testing models of inquiry that foster the development of educational systems for young designers to think ethically, openly, and sustainably about new futures (Salamanca & Brigs, 2021). Moreover, the transnational experience of the Winter School highlighted additional internationalization potential and roles of Design within the RRI approach.

The obstacles traversed during the two phases – distance, language, cultural difference – turned into potentials that:

- pushed the participants to work collaboratively;
- emphasized the importance of the interrelationship between the different dimensions of the proposed challenge;
- highlighted the need to leave free, at the local scale, the choice of RRI principles to be integrated into projects and the need to investigate a single RRI principle at the international scale to see how a model applied locally could also work in a transnational system on a complex challenge.

Overcoming these obstacles has revealed how Design processes and practices can activate a dynamic and interactive process within social actors, beyond borders, able to consider the complexity of social dynamics as global and local elements, for the design of product-systems adherent to the peculiarities of the territorial contexts but able to contribute to the big challenges (COVID19, climatic crisis, reduction of inequalities, etc.); but also the possibility to share values and societal expectations, regarding ethics, gender, openness among young communities of students. Moreover, the prototypes designed during the School, in relation to the Gender Equality topic, have been useful for investigating the complexity of intersectional dynamics as a vector for promoting gender heterogeneity in different cultures, and for creating an expanding vocabulary of gender identity, a principled commitment to gender equality, gender diversity and the rights of sexual minorities.

The integration of RRI approach in the process of conception, creation, development and distribution of a product and a service, generates a re-discussion of the current educational model of design at local and international level, but also a better identification of effective tools that facilitate the application of RRI principles to design projects, going beyond the dimension of pure research of existing toolkits and documentation and expanding them to the various fields of interest of design cultures. This expected integration is still an open field: the Winter School project has in fact to be considered as a first transnational experimentation aimed at answering the following question: what is the role of Design and Design Cultures within the current and future big challenges?

To bridge the gap between disciplines, vocabularies and the interpretation of the design methods is the key action to support future designers also in the self-evaluation of individual and collective social impact in their design practices through a clear and accessible measurement system. A new Global approach is needed, starting from the experimentation of new forms of education, based on a mutual exchange among teachers, students, and institutions that constitutes new learning opportunity beyond territorial borders. Introducing in the design courses curricula the concepts of Responsible Thinking and Responsible Education is the key to train responsible future designers, able to take a role in mixed groups of interest and power in a quintuple helix perspective.

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She holds a degree in Product and Systems Design Engineering from the University of the Aegean, majoring in Service Design. Since 2020, she has been a PhD candidate in the Department, studying issues related to the emergence of sustainable futures through design.

Using participatory action research she aims to explore the ways in which tacit knowledge can emerge, be understood and leveraged to better design relational services for sustainable futures. This exploration will pivot on the ways of knowing that emerge from the process of design, craft and co-creation as well as on the indigenous practices at the local level. Her research aims to enable the emergence of a new design epistemology, based on concepts like post-humanism as well as on feminist and indigenous theoretical frameworks. This will be accomplished with small groups of people, within which co-creation will occur, following processes of participatory design.

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PHD Fellow Professor at EINA, Centre Universitari de Disseny i Art de Barcelona, at the UAB, since 2011. She is doctorate in Humanities (2023), at UPF, and Graduate in Interior Design (2004) at EINA. She combines teaching in Space Design Bachelor at EINA with and researching. She coordinates the Master in Space Design and also she has her own studio of space design Sara Coscarelli Creación de Espacios (2008). Her researches are related with Interior Domestic in the Mediterranean context. She is developing consequences of the Mediterranean Critical Regionalism concept. She has published in many international conference. Moreover, she is an Interior Designer with own studio.

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PhD student in Design Science at Università Iuav di Venezia, designer and photographer. He investigates how the culture of the project can become a tool for reading and social innovation. After graduating in Industrial Design at the Polytechnic University of Bari with a thesis that combines territory, handicraft, design and industry, patented by the Polytechnic, he moves to Venice where he continues his studies at the Iuav University, graduating in product and visual design with a thesis on photography for design. In September 2020 he becomes a research fellow at the Iuav of Venice.

In his research he intends to analyze representational and transformative technologies as tools to communicate and market a product or a service. In addition, he studies to understand how photography could become a means of analysis and study for design, becoming historical memory of ancient craft values and material knowledge.

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Architect and Full Professor of Design at Politecnico di Torino, she is a researcher in the field of the culture of materials for innovative design, technologies and production processes, investigating the sensory and sustainable dimension in a human-centred approach to design, which pays attention to people real needs: functional, relational and perceptive.

The work is carried out in close connection to the regional manufacturing sectors as part of a complex system of relationships which aims to disseminate innovation, develop new technological paradigms and new, more sustainable production scenarios. Scientific Director of MATto, innovative materials archive open to Piedmont SMEs, since 2018 she is Vice Rector for Quality, Welfare and Equal Opportunities at the Politecnico di Torino.

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She wrote articles both in international conferences and journals, such as "Strategic Design Research Journal", "Design and Culture", "Journal of Design History", "MD Journal", "DIID. Disegno Industriale Industrial Design", "The Design Journal".

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One of his main lines of research concerns the valorization of that design dialoguing with craftsmanship, strongly anchored to territories of the country, and capable of supporting the Made in Italy development, that is what he names "Handmade in Italy." About this, he is the national coordinator of the ADI Thematic Commission "Handmade in Italy," which he founded in 2017. Since 2020 he is Scientific Committee member of SYMBOLA Foundation for Italian Qualities.

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She is involved in the development of International projects and in educational cross-city programs about design for responsible innovation.

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From 2007 to 2017 lecturer fellow and then post-doc researcher at DIDA Department of University of Florence, where he led several joint research labs in between Academia and advanced craftsmanship SMES. Professor in Fashion Design and Product Design at undergraduate program in Design of University of Florence. PhD in Industrial design, Environment and History, his professional profile is focusing on relationships between design strategies and advanced manufacturing processes. Academic coordinator at Fashion Design department of IED-Istituto Europeo di Design in Florence from 2014 to 2018. From March 2018 to December 2019, Associate Researcher at Nanjing University/School of Art.

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She teaches Bio-innovation Design and Design for Scientific Visualization in the Master’s Degree Course Design for Innovation and Industrial Design Laboratory 3 in the Three-year Degree Course of Design and Communication. In the field of experimental design research, she investigates the opportunities to build hybrid paths that involve advanced scientific contributions in the design project to bring contemporary science closer to people’s lives.

Since 2006 she founded and coordinates the Hybrid Design Lab (www.hybriddesignlab.org), the design laboratory dedicated to mutual relations between design and science with particular attention to the experimentation of biomimicry in design and the integration of designers in the development processes of new materials to which the specific Designer in lab project is dedicated.

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He is occupied with street art and mainly with large-scale murals. He's worked individually and with his team, Really? Team, in various parts of Greece.

He also works as a designer, illustrator, street artist and musician. His interests include photography, production and direction of audiovisual works, writing and acting. His research interests revolve around Design, Art and Creation, focusing on the design processes that precede, are subject to and follow the creation of works of Street Art, and how they are qualitatively and quantitatively related to Design, in terms of productivity, quality, performance and user experience.

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Currently he is professor of industrial design at the Faculty of Applied Arts, Helwan University. The academic history extends gradually, starting from a teaching assistant to a professor. During those periods, he taught at many public and private universities, which have departments of industrial design and product design. He published more than twenty research papers in refereed scientific journals and local and international conferences, supervised many master's and Ph.D. theses, and participated in the discussion and judgment committees for scientific theses. He received the award for the best master's thesis at Helwan University, as well as the medal of the Faculty of Applied Arts. Patent design for a white cane model for the blind. Held several workshops for designing and prototyping in addition to many participations in the field of industry, especially the manufacture of handmade models, as well as community service and volunteer work for people with special needs.

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