

3. The funded projects of the Department of Design and their interactions with the basic design research

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The chapter first describes what is design research and which is the current landscape at the international level, providing an overview of the research activity carried on in the Department of Design to then look into the topics addressed by its funded research. The ambition is to depict the research landscape that emerges from the research projects accessed through competitive funds, gaining insights into how the funded research influences the basic research. In this framework, the chapter faces two relevant dimensions: (i) the interactions between the funded research and the department research profile and identity, and (ii) the relation between the funded research and the basic design research topics, exploring the continuity, discontinuity and interactions among the two strands. The analysis shows discrepancies between areas that the Department covers with its basic research and topics on which it obtains funding and vice versa. The funded research highlights, on the one hand, the occurrence of new areas which go beyond the thematic clusters of the basic research. On the other hand, it also reveals the disappearance of traditionally established domains of investigation, opening the discussion on how the research reached advanced levels of conceptualisation and specialisation. Ultimately, the chapter discusses how the attraction of funds impacts the Department's research, refocusing some strands and strengthening its capacity to influence ongoing transformations, leveraging the potential of design.

3.1 The basic design research landscape and the position of the Department of Design

Design and, consequently, design research are featured by disciplinary promiscuity as an inevitable result of its inherently interdisciplinary na-

ture (Friedman, 2003). It also shows the unceasing tendency to explore and weave new connections, expanding and blurring its boundaries. As a topic, design has been the subject of analysis from multiple disciplinary perspectives, producing as many insights into the subject. It is a multifaceted and complex phenomenon featuring a variety of dimensions which ranges from artefactual, processual, social, economic, technological, and environmental, which are addressed by reaching out to a multi- and inter-disciplinary array of methods and theories, often adopted and adapted from neighbouring fields (Cash et al., 2022). This is whereby design research has the duty to capture and reflect the discipline's interconnected nature, making its orientations and directions explicit.

The design research landscape involves a variety of academic communities researching the topic from various viewpoints. Its inherent diversity fundamentally defines the distinctiveness of the discipline whose work impacts far beyond its boundaries, nurturing the potential of design research, and constituting a pressing challenge in terms of identity and processes (McMahon, 2012). Such diversity has made it challenging the achievement of a consistent and comprehensive view of the research in this field. In mapping this miscellany and heterogeneity, Cash and colleagues (Cash et al., 2022, p. 1) identify various threads of discussion surrounding diversity and scope (Clemente et al., 2020; Horváth, 2004; McMahon, 2012), construction of knowledge (Briggs, 2006; Cash, 2020; Love, 2002), and methodologies (Blessing & Chakrabarti, 2009; Krogh et al., 2015; Reich, 1995).

Through its areas of investigation, design research gives a valuable glimpse of how the domain unfolds through specific studies, from the emergence of new research questions, methodologies and applications, to the crystallisation of certain concepts and insights. As it is recognised within its community and despite the recent significant advances, design research remains vulnerable, presenting fragilities compared to other fields (Margolin, 2010). With a contribution indeed scattered across the literature (Horváth, 2004), with well-known flaws and limits in terms of methodological development, validation and standardisation (Cash, 2018), it often fails to receive wide recognition in terms of impacts and relevance. Its insights still struggle to turn into convincing evidence for other disciplines, where there are common standards, and to bring an effective change of practices and culture (Dorst, 2016). A condition that underlines the need to strengthen its impact and avoid stagnation (Clemente et al., 2020).

Over fifty years of developments in design research, an extensive number of topics have been touched and resonate through the discipline, showing a series of 'waves' (Cooper, 2019), from design methods to design thinking

(Dell’Era et al., 2020) within innovation and its application throughout society, industry, and education. More specifically, fundamental design research has moved from methods and processes to services and systems (Cooper, 2019), while extending to neighbouring disciplines such as management and business, health sciences and IT (Christensen & Ball, 2019), showing an evident tendency to be cross-disciplinary and trans-disciplinary beyond multidisciplinary. Being conducted for, into, and through design (Frayling, 1993), over the last decades, the discipline witnessed an increased expansion of interest that opened up an abundance of novel areas of investigation. Consequently, the design domain has expanded from user interaction (Park & McKilligan, 2018) and system design (Jones & Kijima, 2018), to management (Micheli et al., 2019), ethics (Sweeting, 2018) and sustainability (Ali et al., 2016; Rocha et al., 2019), while exploring matters related to cross-sector innovation, adoption and adaptation from and to other disciplines, development and codification of design knowledge, understanding and framing of design problems as well as qualitative aspects of design. However, this proliferation of topic areas and the resulting cross-fertilisation that the design discipline encountered are often imputed to have exposed the domain to fragmentation and a possible disciplinary loss of focus (Christensen & Ball, 2019; Cross, 2018).

Although the progressive widening of the investigation areas is demonstrated by the growing contexts in which the design discipline can bring its contribution, the literature still lacks a current mapping and review of the basic research in design and its main topics. With this in mind, this chapter does not pretend to capture and provide the state of the art of design research in general. On the contrary, it intends to draw a map with precise and clear-cut boundaries, investigating in detail the topics of funded research taking place in the Department of Design. The relevance of the analysis lies in the role of the Department of Design of the Politecnico di Milano in the international context. Recognised as one of the leaders of design research in the world – ranked 5th in the QS World University Rankings by Subject 2022 “Art and Design”¹ –, it has been the main actor in many of the most advanced and controversial issues that have characterised the design research debate during the last two decades.

In the following are the keywords elaborated in 2015 on the delivery of the new Department website to describe its research, and validated during the Department production conference. The keywords are the result of a bottom-up process through which each researcher of the Department contributed with their keywords. The list obtained was later systematised and validated, resulting in 113 keywords as a sort of self-portrait of the Department.

¹ topuniversities.com/university-rankings/university-subject-rankings/2022/art-design

The keywords used by the Department to depict its basic research activities provide a vivid picture in terms of (1) contents, (2) approaches, and (2) subject areas (tab. 3.1).

Contents. In terms of contents, the work of the Department is outlined through nine areas, framing a multi-layered and extensive contribution on design matters. “Arts & Humanities” portrays the contribution in terms of design history, visual arts, cultural heritage, with a focus on museum studies, and cultural and creative industries. It also includes studies related to aesthetics, semantics and semiotics. “Design & Management” gathers, on the one side, explorations on change management and design policy; on the other, product performance, service assessment, and competitive advantage. “Health & Safety” represents the investigations related to design for older people, subjective well-being, safety and prevention converge, extending to fundamental research on risk evaluation. The research in this area also includes investigations on wearable technologies and smart systems such as sensors, home automation, control systems. “Knowledge Management” contains studies on communication process and information design, with specific focuses on data visualisation, as well as on digital archives and platforms. “Production Models” pictures the Department’s inquiry on (new) craftsmanship, digital manufacturing, distributed and open microproduction, with focuses on local craft and made in Italy. The research related to production processes is then completed with studies in the two directions of materials and networks. “Representation Systems” points out the investigation on the role of drawing in the design process, as well as the Department’s contribution in terms of computer aided design, researching on augmented reality, virtual reality, and virtual models, as well as design methods and processes such as reverse modelling and parametric design. “Responsible Development” reports studies on environmental and life cycle design, zeroing in on comprehensive matters of sustainable energy and lifestyle. “Social Innovation” is portrayed as an extended area looking at the matter in terms of collaborative services, corporate social responsibility, welfare, also including games for social change. The Department’s contribution on the matter is further enriched by specific research on perspectives on disintermediation and gender issues. Ultimately, “Urban Landscape” mirrors the advanced studies on smart city and urban spaces, with explorations on the two directions of mobility and traffic management, and spatial design and temporary living.

Approaches. The Department’s contribution unfolds through three areas: design approach, process and methods, and design research. “Design approach”

Tab. 3.1 – Keywords gathered grassroots from the community of the Department of Design in 2015 to describe its research.

Typology	Topic	Department Keywords
Contents	Arts & Humanities	Aesthetics Cultural and Creative Industries Cultural Heritage Design for Cultural Heritage Design History Museum Studies Semantics and Semiotics Visual Arts
	Design & Management	Change Management Competitive Advantage Design Policy Product Performance Service Assessment
	Health & Safety	Design for Older People Design for Subjective Well-Being Risk Evaluation Safety and Prevention Smart Systems Wearable Technologies
	Knowledge Management	Communication Process Data Visualisation Digital Archives Digital Platforms Information Design
	Production Models	(New) Craftsmanship Digital Manufacturing Distributed and Open Microproduction Local Craft Made In Italy Materials Networks
	Representation Systems	Augmented Reality Computer Aided Design Drawing(S) Parametric Design Reverse Modelling Virtual Models & Virtual Reality
	Responsible Development	Environmental Design Life Cycle Design Sustainable Energy Sustainable Lifestyle

(continued)

Typology	Topic	Department Keywords
	Social Innovation	Collaborative Services Corporate Social Responsibility Deintermediation Games for Change Gender Issues Welfare
	Urban Landscape	Mobility Smart City Spatial Design Temporary Living Traffic Management Urban Spaces
	Design Approach	Co-Design Creativity Cross-Cultural Research Design Driven Innovation Design for All Design Thinking Emotional Design Experience Design Metadesign Strategic Design User Centred Design
Approaches	Design Process and Methods	Case Studies Decision Making Envisioning Ethnography Interdisciplinarity Mapping Product Development Prototyping Scenarios Storytelling Transmedia Practices
	Design Research	(Design) Education Design Theory Epistemological Research Phenomenological Research Reflective Practice

(continued)

depicts the research that explores design thinking and its application, design driven innovation, user centred design, metadesign and co-design, showing the presence of studies focusing on creativity, cross-sectoral and cross-cultural research. It also highlights how the Department leads research on design approaches, such as strategic design, experience design, design for all, and emotional design. “Design process and methods“ reports on the variety of meth-

Typology	Topic	Department Keywords
Subject Areas	Communication	Basic Design Brand Communication Communication Design Game Design Graphic Design Interaction Design Media Studies Movie Design Packaging Design Synesthesia
	Interior	Exhibition Design Hospitality Design Interior Design Lighting Design Private and Public Spaces Retail Design Urban Design Yacht Design
	Service	Product Service System Service Design Transportation Design
	Fashion	Fashion Design Jewellery Design Knit Design Textile Design Texture Design
	Product	Car Design Colour Design Ergonomics Furniture Design Lighting Product Design Product Design Usability

odologies investigated by the Department. The research on methods ranges from prototyping, ethnography, case studies, scenarios, mapping, storytelling, showing extended application, such as to processes of decision making, product development, transmedia practices, envisioning. Here it is noteworthy to notice that interdisciplinarity emerges as a specific area of research. Finally, “Design research” draws attention to reflective practice, (design) education, design theory, epistemological and phenomenological research as typologies of research on which the Department contributes to create knowledge.

Subject area. To conclude the exploration, the Department participates in building knowledge through its basic research on five subject areas, which

are the five umbrella domains through which the Bachelor of Science of the School of Design executes its educational offer: Communication, Interior, Service, Fashion, and Product. “Communication” pictures how the Department plays a role in advancing research related to basic design, communication and interaction design, graphic and movie design, packaging and game design. The research unfolds through various domains, such as brand communication, media studies, and synesthesia studies. “Interior” points out the contribution on interior and urban design, exhibition, lighting, and retail design, hospitality design, yacht design, and research on private and public spaces. The participation in the discourse on “Service” is depicted as related to product-service-system design, service design, and transportation design. In the area of “Fashion”, the Department advances knowledge on fashion and knit design, textile and texture design, and jewellery design. Ultimately, “Product” describes the contribution in terms of ergonomics and usability, product design, furniture design, colour design, lighting product design, and car design.

This chapter explores the **topics and areas addressed by the funded research** in the Department of Design, obtaining a snapshot of the issues addressed, their dimensions and results achieved, as well as their relation to the research of the Department. The relevance of the study lies in the fact that rather than individual studies, research programmes are ultimately accountable for progress, igniting advances in knowledge by generating new contents and opening up new problems (Koskinen et al., 2012). Given this premise, the chapter ambition is to build the landscape of the competitive research the researchers of the Department are carrying on and to gain some insights about how topics supported by funded research influence and orient basic design research by individualising continuity/discontinuity and deviations between the two.

3.2 Data collection and analysis

To answer the interrogations, the analysis unfolds from the elaboration and clustering of keywords describing the research projects², obtaining a comprehensive overview of the topics covered. For this purpose, the research projects are here specifically explored through the keywords used to describe them. The dataset consists of 159 keywords, validated through the

² Methodological note: as described in chapter 2 the funded research projects are analysed as qualitative case studies. As a consequence, when speaking of funded research projects, the reference is to the case studies developed on them.

project’s principal investigators and analysed to be thematically aggregated through a bottom-up approach. The clustering process started from analysing the keywords aiming at identifying common trends and macro-topics, which allowed the identification of preliminary thematic clusters. Through an iterative process of refinement and polishing, 22 clusters are mapped: 21 thematic clusters plus “Specific from project”, which contains keywords so specific to the project that they could not be included in other groups. Tab. 3.2 reports the clusters and the quantity of keywords belonging to each of them, while fig. 3.1 displays the 32 research projects, the reference to their funding program, and their descriptive keywords coloured according to their cluster of belonging.

Tab. 3.2 – Thematic clusters and number of keywords belonging to each of them.

Cluster	Keywords
Advanced manufacturing	2
Capacity building	9
CCI	7
Communication	3
Design methodologies	25
Distributed production	11
Documentation	3
Education	10
Entrepreneurship	7
Ethics	7
Fashion	5
Health	11
ICT	10
Innovation studies	10
Material	5
Public sector	6
Public spaces	3
Service	4
Social innovation	6
Sustainability	5
Transportation	4
Specific from project	6
Total: 22	Total: 159

Acronym [Program]	Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5	Keyword 6	Keyword 7
L'architettura in Lombardia dal 1945 ad oggi [REG / POR FSE]	Design for cultural heritage	Digital archive	Art and architecture catalogue	Design history	Digital platforms		
DIGIKNIT [REG / BANDO CREATIVITÀ]	Cultural Creative Industries	Knitwear design	Digital archive	Capability building			CLUSTER
DigiModo for CCI [EU / CREATIVE EUROPE - MEDIA]	Digital Entrepreneurship	Fashion industry	Creative industries	Educational module	Design-led research		● Advanced manufacturing
CREA [EU / H2020 - INDUSTRIAL LEADERSHIP]	Innovation and Entrepreneurship	Design thinking	ICT	Educational model	Creative industries		● CCI
CO-CREATE [EU / INTERREG MED]	Cross-fertilization	Design-driven innovation	Creative industries	SMEs and entrepreneurship	Knowledge transfer		● Capacity building
BRIEFING [EU / H2020 - FET]	Future and Emerging Technologies (FET)	Training	Business value creation	Innovation ecosystem			● Communication
DeFINE [EU / COSME]	Design and Entrepreneurship	Fashion-Tech	Creative industries	Design-led research			● Design methodologies
Edu4FT [EU / ERASMUS+ / KA2]	Fashion-Tech	Design Process	Creativity and Culture	Digital Technologies	Innovative Curricula		● Distributed production
FashionSEEDS [EU / ERASMUS+ / KA2]	Fashion Design Education	Transformation	Fashion Design for Sustainability	Design thinking	Innovative Curricula		● Documentation
LeSin [EU / ERASMUS+ / KA2]	Design for sustainability (DFS)	Open access learning resources	Curriculum development	Sustainable Product-Service Systems	Distributed Economies (DE)		● Education
MaDe [EU / CREATIVE EUROPE - CULTURA]	Materials knowledge	Material interpretation	Material narratives	Circular economy	Speculative design		● Entrepreneurship
LDI [NAZ / Accordo di collaborazione]	Industrial lighting	Sustainability	Well-being	Visual comfort	Working fatigue		● Ethics
NUNVOLE [REG / BANDO CREATIVITÀ]	Yacht design	Ergonomics	Advanced manufacturing technologies	Modern materials	Aesthetics		● Fashion
C-Roads Italy [EU / INEA - CEF]	Mobility	Connected and automated transport	Cooperative intelligent transport systems (C-ITS)	Vehicle to everything	Impact assessment		● Health
Nestore [EU / H2020 - SC]	Healthy ageing	Virtual coaching system	Co-design	Intelligent decision support system	Multi-domain monitoring system		● ICT
POD [NAZ / INAIL - ERANET - SAFERA]	Environmental monitoring	Personal protective equipment	Respiratory diseases	Wearable device	Working environment	Behavioural change	● Innovation studies
DesFromIdeasToMarket [REG / BANDO CREATIVITÀ]	Hands-on experimentation	Interactive furniture	Technological upgrading	Making	Local SMEs		● Material
PUDCAD [EU / ERASMUS+ / KA2]	Universal Design	New learning and teaching methods	Disabilities and special needs	Open and distance learning	Game-based learning		● Public sector
DDMP [EU / CREATIVE EUROPE]	Distributed design	Designers	Makers	Indie innovators	European Fab Lab network	Openness	● Public spaces
TAMBALI FI [REG / POLISOCIAL]	Start-up incubation	Technological-social	Additive manufacturing technologies	DfT materials	Training		● Services
campUS [REG / POLISOCIAL]	Social innovation	Community-centered design	Knowledge transfer management	Co-design	Participatory action research		● Social innovation
Human Cities [EU / CREATIVE EUROPE - CULTURA]	Participatory design	Co-design	Design for social innovation	Community-centered design	Public spaces		● Sustainability
Cascina 9 [REG / Fondazione Cariplo]	Action-research	Capacity building	Social innovation	Participatory design	Storytelling		● Transportation
Tango-Down Athena [REG / FONDAZIONE SAN PAOLO]	Participatory design	Storytelling	Context-based research	Situated research	Design futures		● Specific from projects
FIRE [EU / MIGRATION & HOME AFFAIRS]	Illicit firearms trafficking	Policy	Fighting crime	Prevention	Mapping	Data knowledge	
CIMULACT [EU / H2020 - SWAFS]	Public engagement	Participatory/ Participation	Responsible Research and Innovation	Public participation			
Eupolis [NAZ / Accordo di collaborazione]	Public administration	Digital transformation	Organisational change	Digital strategy	Educational programme		
Includi.MI [REG / FONDAZIONE CARIPLO]	Social innovation	Social entrepreneurship	Design for policy	Milan	Social impact investment		
SDIN [EU / H2020 - MSCA-ITN]	Service design	Service innovation	Training framework	Interdisciplinarity	Doctoral program		
SISCODE [EU / H2020 - SWAFS]	Responsible Research and Innovation	Co-creation	Policy-making	Innovation ecosystem	Design-driven innovation		
DIDI [EU / H2020 - INDUSTRIAL LEADERSHIP]	Open Source hardware and software	Ethics of digital transformation	Do-it-yourself technologies	Individual and social creativity			
WeMi [REG / Fondazione Cariplo]	Communication Design	Welfare	System of variable identity	Physical-Digital services	Hybrid territories		

Fig. 3.1 – The research projects, their funding program, and their descriptive keywords, coloured according to the cluster of belonging.

3.3 The topics of the funded research

The topics have been first organised into a polarisation that distinguishes between specific sectors of investigations as *vertical topics* of inquiry and *horizontal topics*, transversal domains of inquiry as they refer to research that can inform different vertical sectors. The 22 thematic clusters have been positioned depending on such polarisation and then further displayed according to their relatedness, using proximity to indicate how close or distant they are from one another (figs. 3.2 and 3.3), and size to indicate their populousness. The side of the polarisation of the *horizontal topics* contains 10 clusters and 82 keywords, while the side of the *vertical topics* includes 12 clusters (11 thematic clusters plus “Specific from project”) and 77 keywords.

3.3.1 The horizontal topics

This set of topics taps into two of the design research typology that Frayling (1993, p. 5) individualises, as they focus both on the process of design and design approaches and tools (Research into Design); as well as on design as a research method for gaining knowledge, using it as a way of thinking and addressing matters beyond design itself (Research through Design). In general, horizontal clusters show a certain degree of continuity with the Department’s basic research as they include design methodologies, design education, public spaces, sustainability, and ethics, which represent historical themes of investigation within the large context of the discipline of design. However, in the framework of funded research, the continuity gives way to more discontinuous practices, since projects quite often reorient established research scopes beyond the need to serve the discipline per se toward a role of collaborating with and supporting other disciplines (as testified by the use of the outputs of research). Horizontal clusters also include emergent research areas such as innovation studies and entrepreneurship. Even though they testify a tradition, more in the practices than in academia, of design to collaborate with entrepreneurs and the world of industry, here they underline an innovative scientific collaboration that has emerged during the last decade: the one between design and management (S. Colombo et al., 2017).

Design methodologies. Nevertheless, the varied nature of the projects, design methodologies are a common thread, representing the most prominent area through which the Department contributes with its funded research. As such, the area reveals the Department’s ability to attract funds that require the

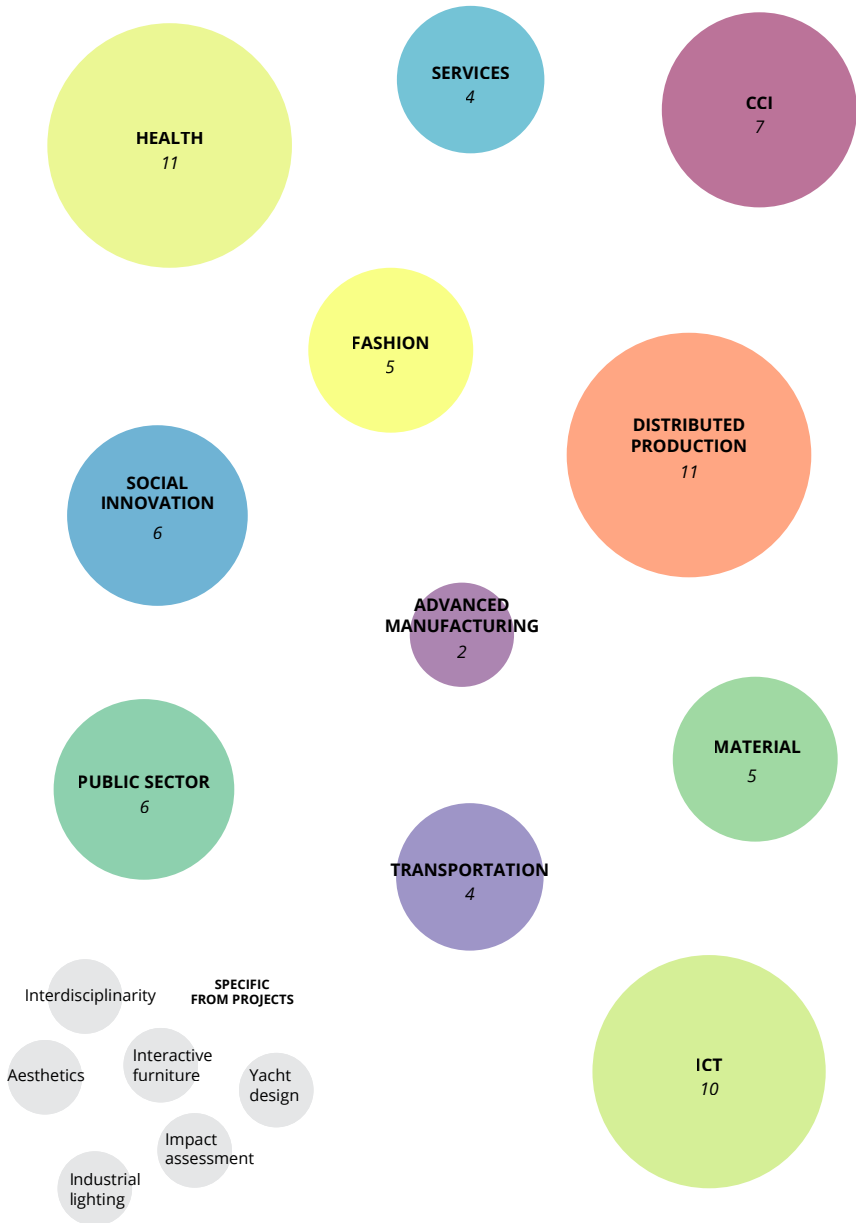
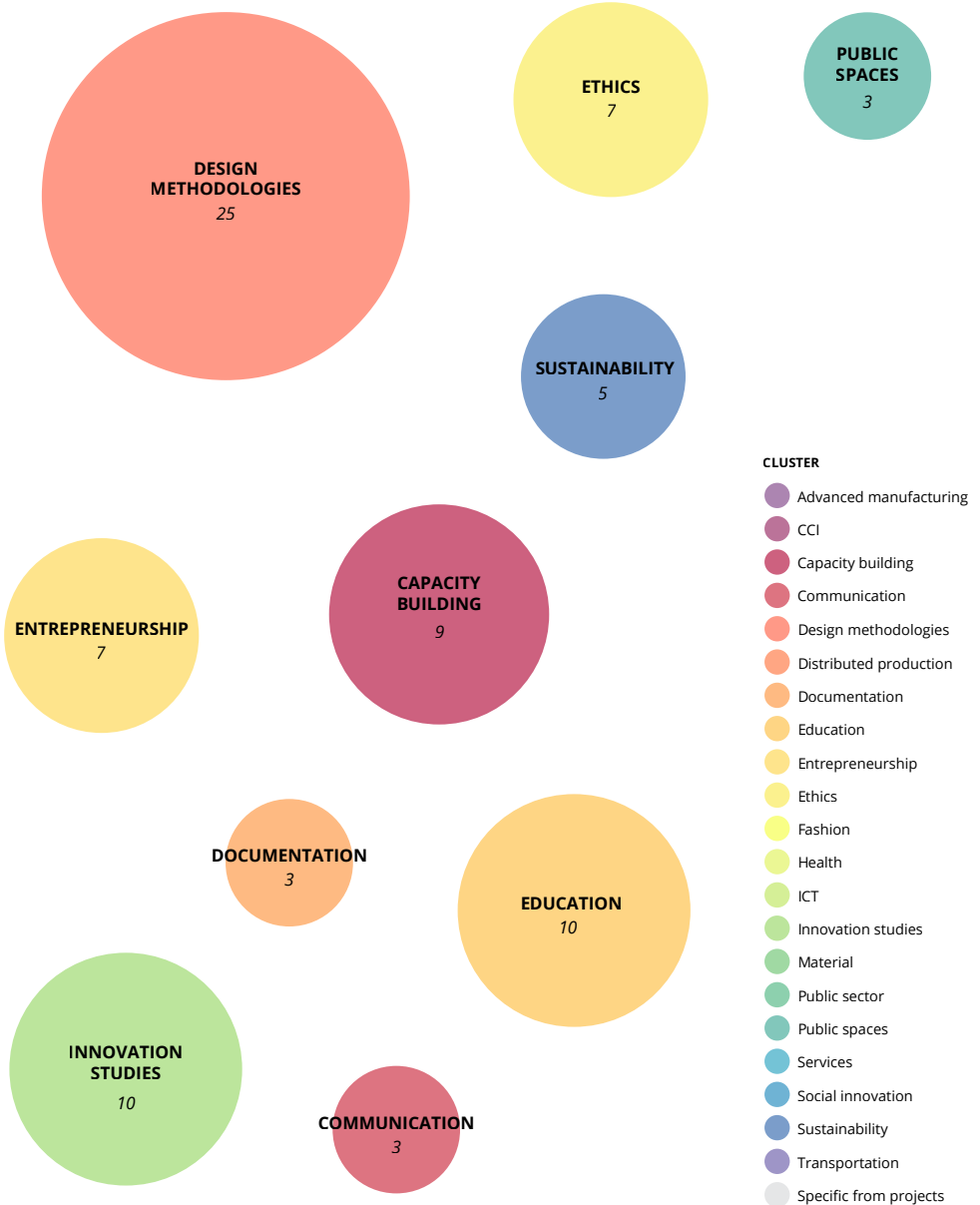


Fig. 3.2 – The 22 topic clusters displayed according to their polarisation and relatedness.



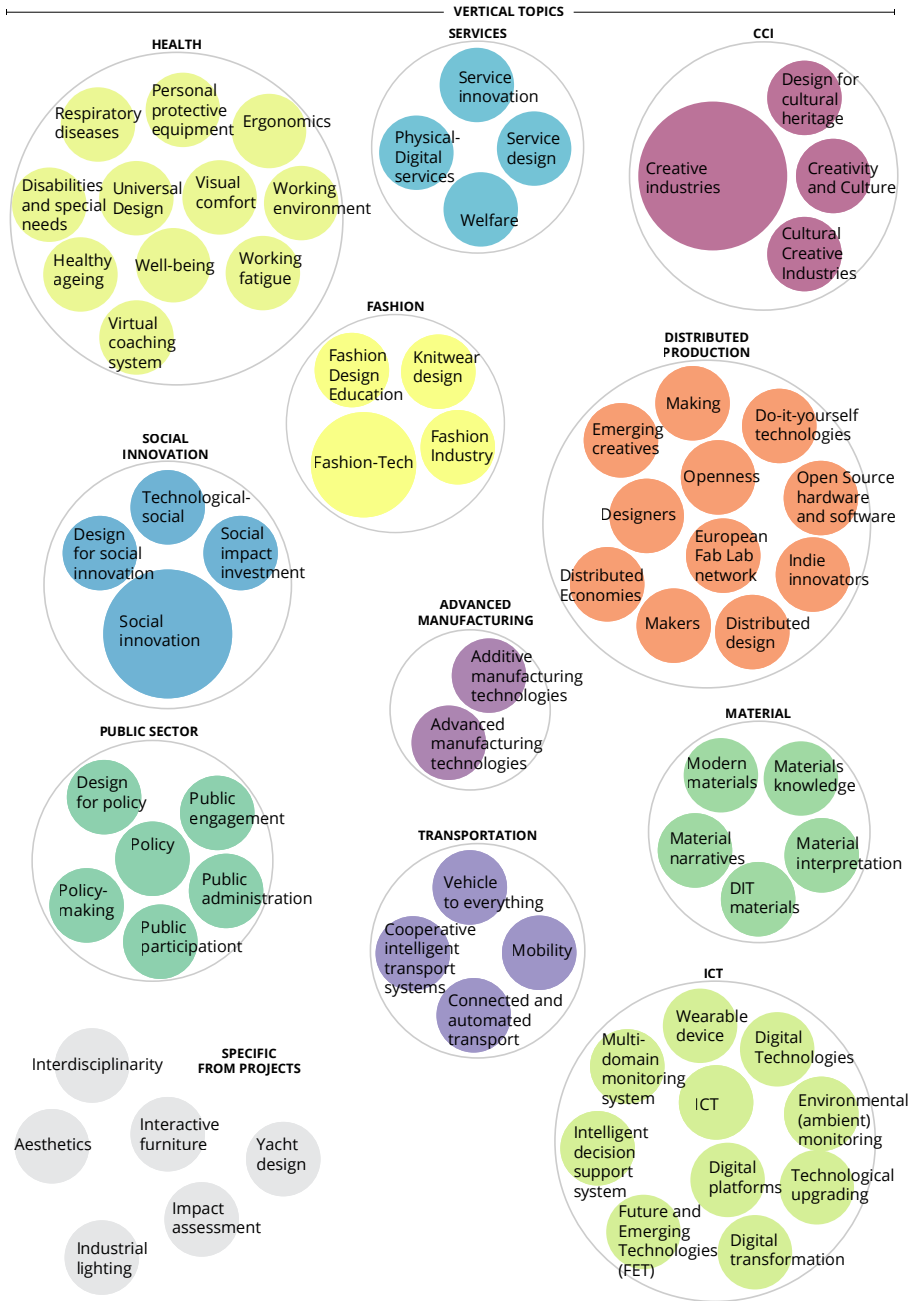
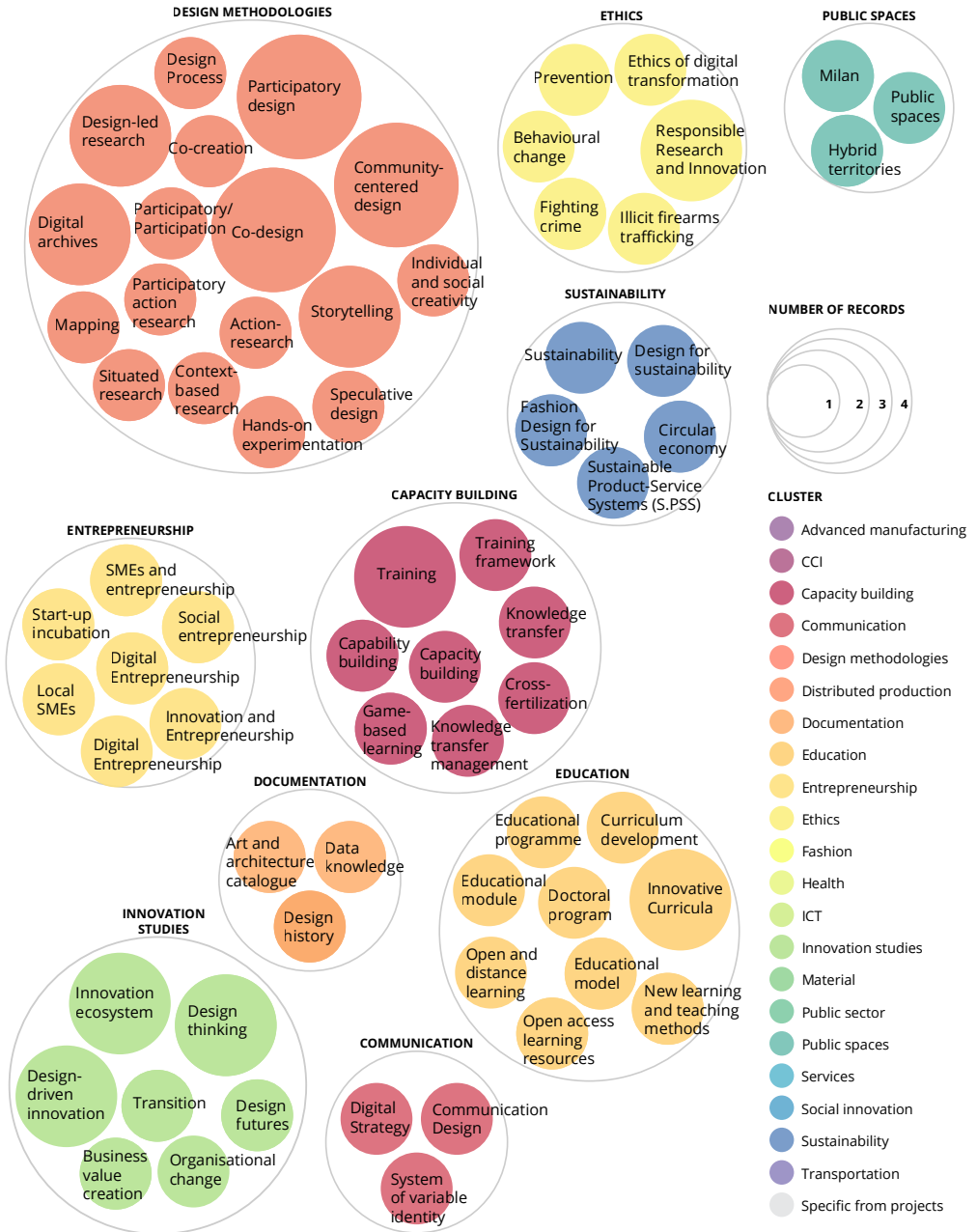


Fig. 3.3 – The keywords constituting the 22 topic clusters and those specific from projects.



application of design methodologies and processes. From participatory design and citizen engagement practices, co-design and co-creation (Deserti et al., 2019; Rizzo & Deserti, 2022), to action research and hands-on experimentation, speculative design, and situated research, the area shows the Department's tendency to highly take into account the context in which the research takes place in terms of features and communities. Moreover, it specifically points out the presence of an established and systematic value-centred approach committed to involving final users and stakeholders in processes to shape a better and more desirable future. The area is cross-cutting in terms of scale and subject matter: from the local to international scale, design methodologies are applied to address challenges ranging from the social to the technical domains.

Education. The cluster highlights a research area that concerns the design of innovative training curricula and frameworks, showing an active commitment toward shaping a new generation of designers as agents of change on matters of relevance, extending from traditional and cross-cutting topics to urgent and pioneering ones (Deserti et al., 2018; Buratti et al., 2018; Maffei & Villari, 2004; Parisi et al., 2017). Among the others, sustainability and circularity, responsible innovation, technology applied to fashion, health, materials and new production processes (Carulli et al., 2017; D'Itria & Colombi, 2022; Zhou et al., 2021). The analysis also points out how education extends to policymaking, aiming to favour innovation shaped by synergic social, cultural, and economic strategies rather than being mainly technology-driven. In particular, it emerges how the Department is able to bridge with industry (Bertola & Vandi, 2020) and the public sector, timely addressing and even anticipating their needs. In this landscape, design research and design methodologies are employed and appropriated to train for designing valuable products, services, and systems, while ensuring social and economic sustainability and desirability (Bertola & Colombi, 2021; Bucchetti & Casnati, 2022; Canina et al., 2018; Ferraro & Pasold, 2020). The analysis also points out how the research on education is profoundly multidisciplinary, with a predominance of design-driven approaches that engage relevant stakeholders to build more effective and systematic activities and strategies. The projects report on different education modalities (synchronous, asynchronous, open and distance learning) (Bertola et al., 2020), mainly engaging learners in problem-based learning and learning by doing.

Capacity building. The cluster shows an interesting shifting of the focus of research on design education: from the designers' curricula to capacity building on design knowledge (processes, methodologies, and tools) to

deal with innovation management and implementation in private and public organisations. The clusters show the fundamental Department's contribution in connecting the innovativeness of the design approach firstly to education (historically bonded to the notion of learning by doing and learning by projects) with the most advanced scenarios. Secondly, to better bridge education and industry (Bertola & Vandi, 2020; Taverna et al., 2019; Vignati & Carella, 2018) or answer the unmet needs of capacity in industries and the public sector in order to develop innovation in real contexts instead of in laboratories. The cluster of capacity building precisely demonstrates the Department's ability to enter into specific contexts with a design-driven approach and provide contextual and situated training on design-related competencies through their implementation in the project. The cluster also contains keywords on knowledge transfer that refer to projects focused on how the Department of Design transfers its knowledge, namely by cross-fertilization and management (Fassi et al., 2019; Casciani, Colombi, Chae et al., 2021). Beyond simply transferring insights or technologies among sectors, attention is drawn on capitalising, systematising, and operationalising design thinking, cross-fertilisation and knowledge transfer management to pollinate other innovative and traditional domains. Ultimately, the analysis shows how through its projects, the Department's contribution also orients toward unusual themes for the discipline, as for instance, how to deal with education of employees in public or private organisations to support the development of new competencies.

Public spaces. The cluster is currently a relevant thematic area, previously mostly enquired by urban scholars and architects and currently reclaimed. The re-entry of the area in the design research specifically points out the need to address public spaces as services and/or service-related context of interaction on the one hand (Concilio & Rizzo, 2016), and policy design (Mortati & Maffei, 2018), policymaking and governance on the other. The topic is addressed at various scales and levels, corroborating that the Department manages to attract funds that intercept the need to profoundly innovate the public sector at different levels: services, culture of service design, as well as with a very close relationship to the physical context where it is located, as well as with other cities and networks of cities to experiment in the urban space. Confronting challenges that communities, society, and institutions face, the Department proves to be able to include and work with the socio-cultural city assets, involving multi-level stakeholders from the framework of the quadruple (Galvao et al., 2019; Peris-Ortiz et al., 2016) and up to the quintuple helix (Carayannis et al., 2012; Carayannis & Campbell, 2010) – academia, industry, public sector, civic society, and natural environments of

society. In so doing, the Department demonstrates to be able to successfully address environmental aspects for a more sustainable socio-ecological urban and twin transition (Muench et al., 2022). Relying on action-research and participatory design, it achieved a win-win situation that put the foundation of the design for public spaces at the intersection of ecology, knowledge and innovation, encouraging crucial synergies between economy, society, and democracy. Among the most relevant implications, considering and transferring cultural values oriented to innovation and change, and developing urban strategies able to sustain innovation at multiple levels.

Innovation studies. This cluster emerges from keywords related to the intersection between design and discipline, such as management, sociology and psychology, from one side, and engineering from the other, striving to investigate the role and relevance of emerging innovations in addressing societal problems. Innovation studies constitute a long-preserved content area which emerges as one of the Department's competitive features, demonstrating its ability to compete with other disciplines that historically preside over it – such as management. The main contributions resulting from the cluster regard design-driven innovation and design thinking, the study of favourable conditions to create value and support the development of innovation ecosystems, the experimentation of how design-related practices and methodologies can contribute to transformation and organisational change (Deserti & Rizzo, 2014), and ultimately how design methods can support envisioning practices. Although studies on innovation have been present in the field of design theories for a long time, this cluster shows the recent capacity of design to attract funding connected to applied research.

Entrepreneurship. The cluster of entrepreneurship mirrors how design can bring and add value to entrepreneurial activity of various natures in its different phases (S. Colombo et al., 2017; Dell'Era et al., 2020). Central is the strategic role of design practice in supporting entrepreneurship and fostering business, recognising the contribution of design-driven entrepreneurship. Acknowledging the challenges and opportunities of embedding design within different entrepreneurial contexts (Telalbasic, 2021), the cluster maps the multiple ways design research enables, activates and sustains innovative, cross-cutting, and also provocative and new ideas (Vignati & Carella, 2018). Design is applied in projects that aim to create new value and business models as a core for establishing new enterprises, favouring innovation through cross-pollination among disciplines and sectors. The cluster includes research projects often based on practising the design process with

an application that extends from local SMEs and start-up incubation to activate multi-level entrepreneurial ecosystems, to digital entrepreneurship for the creative and creative industries, up to social and sustainable entrepreneurship, hence supporting social, cultural, and environmental enterprises.

Ethics. Another cluster which more consistently surfaced in the last decade is ethics. There is evidence of appropriation and streamlining that is denoted by a move beyond the usual and traditional exploration of the topic in terms of ethics of the process or the design act in the strict sense, in favour of a deeper and more transversally focused approach. The cluster shows how the research in the Department investigates the topic in terms of Responsible Research and Innovation (RRI), involving society in science and innovation to involve multiple actors, including civil society, in science and innovation to better align scientific practices and results to real needs (Rizzo & Deserti, 2022; Wetter-Edman et al., 2014; Meroni, 2007). It focuses on the transformative potential of design (Sangiorgi, 2011) in terms of behavioural change (Ferraro et al., 2018; Perego et al., 2020), vetting into how persuasive technologies and information design can persuade toward more ethical behaviours on the one hand (Ferraro et al., 2017; Bruno et al., 2021), and provide access to more understandable and usable information on the other (Mauri et al., 2017). The ethics of digital transformation is also specifically considered, and revolves around principles and practices to responsibly develop and implement digital technologies while driving innovation able to better respond to needs and emergencies (Mariani et al., 2023). Ultimately, the topic extends to prevention, looking at how data and their visualisations can be exploited to generate knowledge to prevent or restrain crime. Therefore, going beyond prior attitudes that mainly looked at ethics in terms of research processes and results, the research investigates novel trajectories, shedding light on how design can contribute and impact the society and the environment.

Sustainability. Instead, although sustainability is a world-wide burning and pressing topic particularly addressed by the Department, it is not as represented as expected, considering the Department interest on the topic. The cluster shows that specific attention is drawn on the issue of evaluating the impact and possible application scenarios of technologies and innovation in order to improve the everyday life impacting on people, their products, and environments. Through applied research, sustainability is explored in terms of how improved product-service-systems can positively impact productivity and comfort, reducing the risk of accidents and increasing efficiency and wellbeing. The collaborations activated through research projects often

entails relevant national actors able to generate impact on national policies and regulations. In terms of circular economy, the topic is also covered in terms of materials and responsible design (Pollini & Rognoli, 2021; Romani et al., 2021), investigating how designers can play as agents of change, able to design, redesign, reform, reuse, and redefine materials giving them new purposes, and therefore advising, educating and communicating their possibilities towards positive social, economic, political, and environmental change across all sector. Ultimately, the topic of design for sustainability is also addressed in terms of education, playing an active and frontline role in training and promoting a new generation of designers and design educators able to effectively support and drive the transition towards a (more) sustainable society for all (Brown & Vacca, 2022; Santulli & Rognoli, 2020).

Communication. The cluster depicts mainly projects that are targeting the public sector and its administrations. Projects in this area focus on the development of communication digital strategies to support the digitalisation and digital transformation of Public Administrations. Design practices as the assessment of citizens' sentiment are introduced to orient the design and implementation of marketing and communication strategies for digital media (Piredda & Ciancia, 2022). The research activities are oriented to investigate design-driven approaches and project-based learning, engaging the public administration personnel and private sector field experts to build more effective and systematic activities and strategies. They specifically highlight how such a cross-fertilisation among triple-helix actors has been a fundamental trigger for organisational and institutional change in terms of digital transformation. A second application is that of communication design for eradicating access barriers to public services and their spaces, favouring inclusivity by design (Bucchetti, 2017b, 2017a). Active listening and involvement of multi-level stakeholders lead to systems of variable identities that reconsider the role of services and their spaces for creating value through inclusive service-management logics.

Documentation. Ultimately, the cluster documentation refers to funds that support the reconstruction, systemisation, study and analysis of documents. The funded projects in this area provide a picture where traditional dimensions of art and architecture catalogues and design history coexist with contemporary and creative modalities of data knowledge and management. Documentation also regards heterogeneous, visual and location-based data produced by humans and machines, such as collections of user-generated contents, web imaginary, and geo-based data (Bach et al., 2018; G. Colombo et al., 2017).

3.3.2 The vertical topics

This set of clusters overlaps with the third design research typology identified in literature by Frayling in 1993 (Frayling, 1993, p. 5) as Research for Design. The clusters cover the funded research the Department conducts on knowledge-finding and evidence-based analysis to support the design as innovation of products, processes, services, and systems. Looking at these vertical topics, it is noteworthy to highlight the relevant presence of new and emerging topics of research, and the absence of those keywords that define the historical Department subject areas (see tab. 3.1), such as product, interior, communication and fashion design. Specifically, the clusters' description, in the following, shows a new formulation and dimension of the area of product. It disappears as a term or cluster per se, being inflected in other clusters such as advanced manufacturing, and distributed production. Similar reasoning occurs for the area communication that is mainly investigated through research funds under the clusters ICT and service. For the subject fashion, even though a cluster is still present, the funded projects testify new interests toward circular economy and new and more sustainable ways of producing and consuming. Finally, the subject interior is partially covered through funded research in the cluster Creative and Cultural Industries even though the transversal nature of the CCIs areas cannot allow for a strong identification with the notion of interior design.

Alongside the discontinuity and reorientation of the classical subject areas the set of vertical clusters also include new research topics on which, in the last decade, the Department of Design has played a strong leadership both for the capacity to orient the design research agenda as well as basic and to attract especially EU funds, these are: services, public sector, social innovation, ICT, transportation, health, Creative and cultural industries.

Services. Strictly speaking, the cluster is explicitly represented in the analysed case studies through four keywords. The direction is that of supporting systematisation and operationalisation at the intersection between service design and service innovation with multidisciplinary approaches that leverage creativity to foster innovation across the various areas of the public and private sectors, from physical to digital and hybrid services. The analysis of the cluster specifically highlights that the design of (complex) service systems is inherently and traditionally addressed by the Department valuing co-creation. The constant engagement of highly dynamic, complex, and heterogeneous constellations of stakeholders opened crucial reflections on how to address and manage the participation of multi-level actors featur-

ing various goals and motives, power dynamics and capabilities. Acknowledging this condition that further challenges innovation processes and their outcomes, the contribution of the Department of Design to funded projects is twofold. On the one hand, it addresses and supports the design of complex services favouring a user-centric and ecosystemic perspective for an intuitive and immediate access to services for all (Deserti et al., 2022; Meroni & Selloni, 2022; Rizzo et al., 2018). On the other side, specific attention is drawn on education and training programmes that at various levels shape designers and researchers as agents of change in the area of service design for innovation (Patricio et al., 2020; Sangiorgi et al., 2019). Even if the representation through projects that directly mention service/s as keywords is limited, it is necessary to emphasise how the area of service design and innovation spreads across several clusters, from health to social innovation.

Public sector. The cluster includes projects that pose growing attention to challenges regarding the development of new approaches to service design, delivery and provision, to the definition of its governance, and the capacity to effectively engage citizens in its processes. In these terms, the analysis of the funded research shows the extension of the notion of design to that of policy as a new design object is an object of design investigation and experimentation, which is often faced with the inclusion of end-users and stakeholders to create value and effectively respond to real needs (Meroni & Selloni, 2022). Public and citizen engagement thus emerge not only as a third mission to create new relationships with the territory and value to the society through public engagement activities, but rather as a specific area of research where co-design approaches are applied (Campo Castillo & Rizzo, 2020; Selloni, 2020). Consequently, it specifically demonstrates the ability of design to bring its specific value through the implementation of its methodologies and methods, in a manner which is often complementary to contributions from related disciplinary fields, such as policy design. The analysis also shows research activities to support the local administrations to improve the welfare conditions of its communities, supporting the development and growth of territorial support networks through the strengthening and involvement of social entrepreneurship in policy making processes. The application extends from design thinking and strategic planning upto service design, assessment and monitoring activities (Bianchi et al., 2022), often exposing the public administration to design practices and mindset, with significant implications such as the ignition of organisational and institutional change (Deserti & Rizzo, 2014).

Social innovation. The cluster social innovation pops up as rich and populated with practices by nature interdisciplinary. Specifically conducted applying participatory approaches, the funded projects highlight how the Department of Design is active and committed to support the development and Social Innovation solution from one side, and the other side to study this new area of application as a specific area of service design devoted developing collaborative solutions that should be sustainable in their contexts and that should answer to specific societal challenges stemming from bottom-up and unmet needs (Deserti & Rizzo, 2020; Meroni, 2019; Maffei & Bianchini, 2018). A distinguished feature that emerges is the deep bond with the neighbourhoods and territorial areas involved and the various actors engaged (Fassi et al., 2019, 2016; Fassi & Sedini, 2018; Deserti & Rizzo, 2020). Beyond the impact on the spaces, with actions that foster their resilience and development, facilitating the interaction, integration and social cohesion, the Department of Design brings specific methodological and procedural contributions (Deserti et al., 2022). This contribution is brought in two different manners, both explicitly meant to empower territorial actors by encouraging the acquisition of skills and competencies, consolidating the social capital of the multiple and multi-level actors involved, strengthening the connection and opportunities for collaboration (Meroni et al., 2018; Maffei et al., 2018; Menichinelli et al., 2020). Secondly, the contribution regards the design and implementation of training formats about design for social innovation (Piredda & Ciancia, 2022), for policy and for social impact investment, often supported by digital learning hubs, lessons learnt and handbooks, MOOCs, Interactive Guidebook for citizens, practitioners, and policy makers showcasing design-based learning frameworks and capacity-building courses. The training formats are built to favour knowledge sharing and transfer among multi-actors and multiple levels of governance, drawing specific attention on how diversities among stakeholders can positively impact the creation of value/innovation.

Creative and cultural industries (CCIs). Among the verticalities, another relevant cluster is that of creative and cultural industries (CCIs). Recalling that the timeframe of the case study analysis regards funded research projects is the period 2014 mid-2021, the area of CCIs mainly stands as distinguished from that of cultural heritage, with which it was originally and traditionally bound, following an Italian historical convention to include artisanship in the field of CCIs. The contribution of the Department that emerges from the projects concerns the support to sectors which suffer a lack of innovation by bringing strategic innovation to strengthen their competitiveness

in domestic and international markets (Zurlo, 2019). Specific attention is drawn to the definition of replicable and scalable learning models that jointly introduce creativity and ICT developments as drivers to ignite specific structural changes and arrangements in stagnant entrepreneurial tissues, favouring social and service innovation, and technology driven innovation, and leading to the development of innovative products for new and old markets (Cautela et al., 2022). The contribution presents an educational perspective that is supported by the development of a curriculum that links cross-cutting challenges (Bertola et al., 2020; Taverna et al., 2019).

Fashion. Partly overlapped with the former, the cluster of fashion is a specific sector in which the Department of Design conducts research. The analysis highlights a diversified approach to innovation in the fashion domain that extends from the contents to processes. Besides research to preserve and conserve heritages of technical knowledge and style through their digitisation, paramount are the areas of fashion-tech and sustainability (Bertola & Teunissen, 2018), underlying the Department's capacity to be a key player in bridging the fashion field with that of innovative technologies (Bertola, 2021). Fashion emerges as a mature sector embedding enabling and disruptive technologies such as digital fabrication, advanced manufacturing, wearables, sensors and embedded systems (Casciani, Colombi, Chae et al., 2021; Ferraro & Pasold, 2020); this is renewing fashion business models, service systems and consumption habits meaningfully intersecting creativity, technology, and entrepreneurial skills. Innovative and interdisciplinary educational modules (Casciani, Colombi & Vacca, 2021; Colombi & Tenuta, 2020) are designed to train digital entrepreneurship for the creative industries (Bertola & Vandi, 2020), with a specific application to the fashion field, in a context of social, civic and environmental responsibility (Brown & Vacca, 2022; Pal et al., 2022). Cross-cutting and cross-disciplinary training pathways aim at breaking the barrier between technologies and creative communities.

Advanced manufacturing. The cluster reports on advanced research on cutting edge manufacturing technologies, exploring materials for promoting entrepreneurial opportunities, product and process innovation. This trajectory complements growing research on new materials created through self-production practices, both creating new materials and building on existing ones (Romani et al., 2021). The analysis of the projects outlines a rooted interest in the topic, which is addressed through fundamental research as well as experimentations for technological, social, and economic innovation. Following circularity and sustainability principles, the basic research on new, bio, and

Do It Yourself materials (Romani et al., 2021) is accompanied by training and real-life implementations at various scales for transferring knowledge. The contribution of the Department of Design is wide and varied, with cross-sector field applications that go from advanced industrial and high-tech sectors to underdeveloped or developing countries. Additive manufacturing technologies and Do It Yourself materials are exploited to generate virtuous ecosystems that prompt synergies among multi-level local actors. Value is created by empowering people, strengthening the local supply chains, and promoting entrepreneurial opportunities that fuel social and economic growth (Canina & Bruno, 2019b). Specific explorations regard the enabling conditions and dynamics that develop in creative and innovative ecosystems that explore additive manufacturing and new materials actively engage quintuple helix actors (Carayannis et al., 2012). Design methodologies and material research are employed and appropriated to develop approaches and techniques for designing valuable products while ensuring social and economic sustainability.

Materials. The cluster portrays materials design and making as a striking cross-sector driving force behind innovation, capitalising on creativity to provide better circular economy solutions through the ideation of new materials (Karana, Barati et al., 2015; Karana, Pedgley et al., 2015; Ferraro, 2020). The case studies analysis highlights how the Department research on material contributes to advance knowledge on the topic of materials featuring innovative properties and qualities in terms of interactivity, connectivity and intelligence, Interactive, namely Connected, Smart Materials (Rognoli & Ferraro, 2022) providing methods, tools, and guidelines. The basic research on materials is deeply intertwined in the higher education context (Parisi et al., 2017). A specific contribution from the Department regards indeed the training of future material designers as future agents of change (Clèries et al., 2021), as well as with experimentations in the field to positively impact social, economic, political, and environmental change. On the one hand, the Department partakes in creating knowledge on the role of new materials and material designers as an emerging but crucial figure in an industry keen on incorporating a circular economy approach. On the other hand, material experimentation is applied to improve living conditions. Beyond the fine-tuning of design methodologies and developing techniques for innovating design products, material and do-it-yourself material design (Rognoli et al., 2015) is applied to generate a virtuous system that prompts entrepreneurial opportunities, fostering a process of social growth and economic independence. The transfer of consolidated training models is deeply intertwined with technological and social innovation, ensuring innovation and sustainability at different levels.

Distributed production. A related cluster is that of distributed production, which unfolds at the intersection of the two global trends of the maker movement and digitisation of design. In the last decade, the research of the Department of Design has particularly presided over the topic (Menichinelli et al., 2020), contributing to various extents to the development of the network, and supportive platforms, as spaces where microfactories, in the shape of makerspaces, Fab Labs and Living Labs, are mapped, community building and social inclusion are favoured, knowledge sharing takes place, project development is supported (Carulli et al., 2017; Menichinelli et al., 2017; Zanetti et al., 2015). The Department played a central role in enabling cross-sector fertilisation among design, production activities of designers and manufacturing SMEs. Particularly relevant is the support provided to creative common development (Bruno & Canina, 2019), such as open source hardware and software which are based on the concepts of sharing, reuse, and improvement (Bianchini et al., 2019). Pursuing a synergistic approach between craftsmanship and digitalization, prototype experimentation is put at the centre, together with relevant actors and stakeholders from the context (Maffei et al., 2018). Acknowledging that distributed manufacturing is prevalent on small scales, specific investigations enquired possibilities and conditions for multi-level scaling. The Department is proven to bring specific knowledge to embed in the practice the dimensions of sustainability and circularity, social desirability and responsibility, social equity and cohesion (Canina & Bruno, 2019a).

ICT. The cluster of ICT is a wide group that gathers the various contributions of the Department in relation to information and communications technologies, with studies that spread from future and emerging technologies and transfer of early stage development technologies among domains, to their extensive cross-sector applications. Instances are digital transformation (Ronchi & Ciancia, 2019), individual and environmental monitoring (Andreoni et al., 2022; Ferraro & Pasold, 2020; Studer et al., 2015; Ferraro, 2015), and intelligent decision support systems (Angelini et al., 2022), sustainable energy and transportation technologies, communication technology techniques for strategic planning, design and monitoring. The Department's contribution extends across the triple helix actors (Ranga & Etzkowitz, 2013). It favours cross-sector fertilisation, bridging ICT development, innovation and creativity in the entrepreneurial, public, and educational contexts, prompting exploration and exploitation in novel as well as traditional fields.

Transportation. A related cluster is transportation. It unfolds exploring the topical matter of ICT applied to mobility and connected and automated

transport in particular, concerning effective data exchange through wireless communication technologies between components and actors of the transport system to improve road safety and efficiency of transport. The cluster depicts ongoing research on testing and implementing cooperative intelligent transport systems (C-ITS) in a harmonised and interoperable way on specific applications such as highway chauffeur and truck platooning. Exploiting the vehicle-to-everything technologies, the Department of Design is involved in testing the technology and its implementation across Europe, zeroing in the evaluation of the impacts of such technology and alerts generated from the increased information available on mobility in real traffic conditions (Agriesti et al., 2019, 2020), bringing specific assessment expertise (Agriesti et al., 2018; Studer et al., 2018). Truck platooning is one of the major topics in transport science and freight transport. Parallel to the abrupt acceleration, the need to account for possible risks on the European network. In this landscape, fundamental field-tests are complemented with traffic simulation that reproduce truck platooning and allow reasoning on critical and best driving strategies (Agriesti et al., 2021). Beyond comfort of driving, the relevance of the cooperative and interoperable aspect concerns its expected impact on traffic road safety, efficiency and fluidity, leading to a more efficient use of the infrastructure, energy efficiency decreasing and related emission reduction. Such a broad impact related to safety and environmental issues gathers the interest of public and private stakeholders, which are directly engaged to better support responsible and desirable innovation. Moreover, the economic impact implies considerations in terms of supply-chain logistics and management (Marotta et al., 2018).

Health. The cluster health covers different aspects of design in the context of wellbeing, from the scale of the individual to that of the work environment and everyday spaces. The analysis of the case studies highlights three main directions: better ageing, improved work environment, and universal design for disabilities and special needs. In a context where the ageing population is growing fast, health and wellbeing are strategically addressed to reduce the economic burden on welfare systems. The Department's contribution focuses on persuasive technology for behavioural change (Ferraro et al., 2017, 2019), and on the promotion of preventive policies for both healthy ageing and personal protective equipment. Extending from the physical to the virtual domains, the research explores the potentialities of tangible and intangible objects, wearable and environmental distributed sensors and system platforms providing situated and contextualised data, as well as software and apps enabling monitoring (Perego et al., 2020) and personalised coaching (Angelini et al., 2022). Secondly, the Department actively explores wellbeing in the working environ-

ment to contribute lessening work-related exposures which are estimated to account for occupational diseases (Sigsgaard et al., 2010) and accidents. The last strand of investigation taps into how universal design should be applied to provide inclusive and accessible environments for everyone, preventing isolation of vulnerable groups such as persons with distinct forms of impairment or limited motor functions from society (Costa et al., 2019). A topic addressed as part of the design education, engaging students in problem-based learning to trigger better awareness of accessibility (Buratti et al., 2018).

3.4 Continuity, discontinuity and interactions between the funded and the basic research of the Department of Design

To introduce the discourse springing from the comparison between funded research topics and basic research topics, further explored in the following discussion (fig. 3.4), the analysis portrays the presence of new entries together with topics that can be considered as outsiders. Namely, topics traditionally and formally far or not covered by the research lines of the Department of Design, which are becoming more and more present and pivotal. The following discussion builds on the interactions between the Department’s research profile and the topics of its funded research over the last decade to

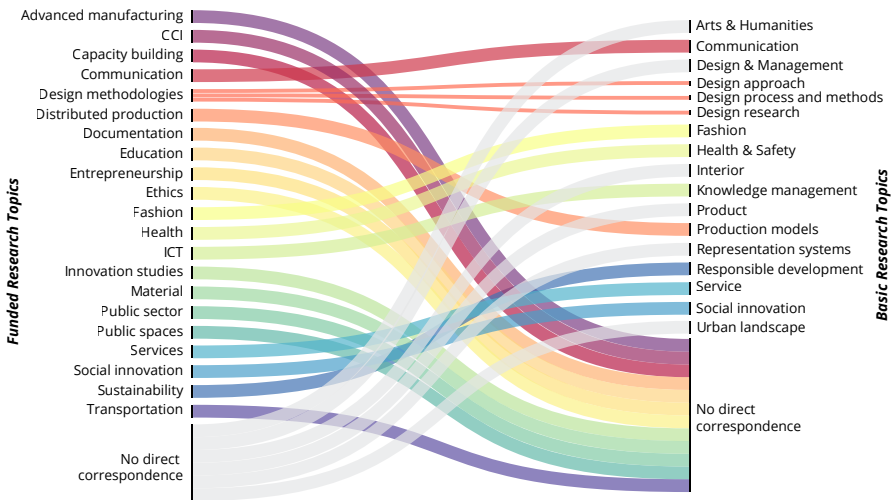


Fig. 3.4. – Relatedness between Department of Design’s funded research topics and basic research topics.

gain some insights on their relationship, fuelling a fundamental reflection on the Department's research identity.

The continuity on the topic of methodologies and tools is not surprising, considering how the topic has historically always been present in the Department's research. The Department is indeed nationally and internationally recognised for its relevant contribution to scientific knowledge on methods, processes, tools and their domains of application, extending the domain of design to bring cross-sector innovation. Both in terms of funded and basic research, the analysis highlights a constant effort in the amplification of the disciplinary boundaries, demonstrated by the application of design-driven approaches and research methodologies to new or formerly considered far-away domains. As a consequence, design methodologies can be considered as a Department's competitive and distinguishing feature. Analogue consistency between the clusters of funded and basic research regards the topics of **Health & Safety, Production models, Sustainability/Responsible development, ICT/Knowledge management** and **Social Innovation**, although they articulate themselves very differently when exploring the keywords that constitute the clusters.

On the other hand, the basic research cluster of **Design & Management** gathers studies on change management, design policy, and assessment, which are consistently present in a distributed and transversal way across the funded research. Analogous situation concerns the basic research cluster **Urban landscape** that groups studies on mobility, smart city, urban spaces and temporary living, which are jointly objects of funded research depicted under the clusters of **Public space** and **Transportation**.

Both the vertical and the horizontal clusters show an ongoing amplification of disciplinary boundaries, with an inherent proneness to apply design knowledge-driven approaches and research to new or formerly "non traditional" considered far-away domains like for example, topics previously often enquired by urban scholars and architects and currently reclaimed, are that of public spaces as objects of investigation and design on the one hand, and policy design, policy-making and governance on the other. The reasoning extends to the public sector, which poses growing challenges regarding the development of new approaches to service design, delivery and provision, to the definition of its governance, and the capacity to effectively engage citizens in its processes.

Delving further into the comparison, it is noteworthy to discuss that the funded research clusters present specific investigation topics that cannot be directly correlated in the thematic clusters of the basic research. Recalling and expanding the reasoning introduced while presenting the vertical topics addressed by the funded research of the Department of Design, it is rele-

vant to emphasise that parallel to the occurrence of new areas, there is the disappearance of traditionally established domains of investigation. While congruence concerns the subject areas of **Communication**, **Fashion** and **Service**, the analysis highlights that domains such as **Product** and **Interior**, from which our educational curricula are also named, are no more thematic areas per se. That said, some clusters of the funded research detail the investigation on related basic research clusters. It is the case of **Advanced Manufacturing** that can be considered related to the basic research cluster of **Product**, providing a higher specificity on the typology of contribution brought by the Department. Among the reasons, the fact that the research in established domains such as product and service design, communication and interaction design achieved advanced levels of conceptualisation, complexity, and specialisation indeed, and they are pervasively present in the overall thematic areas. This condition can be interpreted as a progressive specialisation of the Department of Design on such topics. The research has evolved and articulated towards more specific areas, highlighting an attainment of such maturity and mastering that the topic becomes distributed and articulated in several subdomains of the discipline.

That said, what is particularly interesting to observe is the discrepancy between the areas in which the Department identifies itself through its basic research and the topics on which it receives funding and conducts projects, and vice versa. Although the Department is renowned for its long-lasting basic research and remarkable contribution on the topics of cultural heritage, which are part of the basic research cluster of **Arts & Humanities**, the topics are not explored through funded research. Analogously, the Department conducts relevant basic research on **Representation systems**, which is mostly absent from the funded research. Among the reasons, difficulties with basic research funding through PRIN funds – that are not among the sources of funds through which the Department is able to sustain its research. PRIN funds as well as EU funds use the ERC fields which groups disciplines to facilitate scientific research in the European system. However, design is not part of any grouping, implying that researchers need to submit their project proposals to other ERC sectors for being evaluated by experts not pertaining to the design discipline.

Surprisingly, nevertheless the Department actively researches multidisciplinary, learning-by-doing and problem-based learning methodologies to teach design principles, being world-wide recognised as a relevant player on the matter, the area of **Education** emerges from the analysis of the funded research but is not identified as a basic research topic, if not as the specific keyword of Basic Design, used in the cluster Communication.

The fact serves as an opportunity to open further the reflection on the relation between funded research, basic research, and education. The landscape resulting from the funded research shows diversity of approaches, foci, and philosophy, with contributions ranging from theory-driven to contextualised knowledge. However, it emerges as a matter of fact that, although design research successfully contributes to widening its investigation to new domains, it still struggles to enter and **impact the design curricula**.

Similarly, through its funded research, the Department shows a marked ability to conduct research out of its higher education context. It is quite relevant to notice how even when funded projects deal with traditional design topics as, for example, design education, the contribution of the design is reorientated toward an unusual theme for the discipline like how to deal with education of employees in public or private organisations to support the development of new competences. Rather than sustaining traditional design education research, the funded research has focused and supported the training in the area of innovation management, moving the target from student profiles to adults. Through life-long learning actions, the Department shows to play a key role in bringing design methodologies and approaches to the private and public spheres. This dimension, very pronounced in the context of funded research, is not present in basic research. This specific reorientation testifies the application of design knowledge to deal with processes of organisational transformation/change.

Then, the Department is recognised to be a cultural and creative engine for the local area, as testified by its rooted synergies with the civil society, the economic system, public and private institutions, and its role in supporting the application and transferring of knowledge and research results outside the academic community to sustain social and cultural growth. However, the Department engagement in the Third Mission often overlaps with the research with civil society and the third sectors, which are engaged to foster progress and boost innovation. This trait is vividly highlighted by the funded research that provides evidence of how participatory approaches are established and pervasive in the Department's research.

A further evident trend regards the strong convergence in funded research of design with engineering disciplines, demonstrating the capacity to bridge gaps, hybridise competences, and increase competitiveness. The trend also regards more traditional areas which are influenced by technological transformations, as it occurred for the fashion-tech and health-tech fields. This convergence is progressively redefining the perimeter of the design research,

enlarging its application contexts. Parallel to this strong and evident convergence, the absence of theorising from the Department's basic research and in the funded research. It is recognized that the Department brings new knowledge in terms of methods, processes, and outcomes, but not in the form of theories, opening a reflection in terms of future possible improvement.

3.5 Conclusions

Over the last decade the Department demonstrated an increasing capacity to attract European funding sources, outlining its multi-polar academic science and innovation potential and its role as a relevant player in design research at the national and international level. As discussed, the attraction of funds impacted the Department's research, reorienting some of its directions and making it progressively more capable to influence the ongoing changes, enhancing the potential of design.

Although it contributed to the advancement of scientific knowledge in terms of processes, methods, and tools, it still features theorising difficulties. This although projects and its educational context potentially provide a fertile space for fuelling iterativity and interactivity between theory-generating and theory-guided experimenting.

Ultimately, the comparison between the funded and basic research reported few overlapping of topics, showing difficulties in the spill-over of funded research into basic research. Innovative arguments addressed through research projects which often contribute to widening the topics of the Department's design research, still remain under- or unexplored directions in terms of basic research.

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