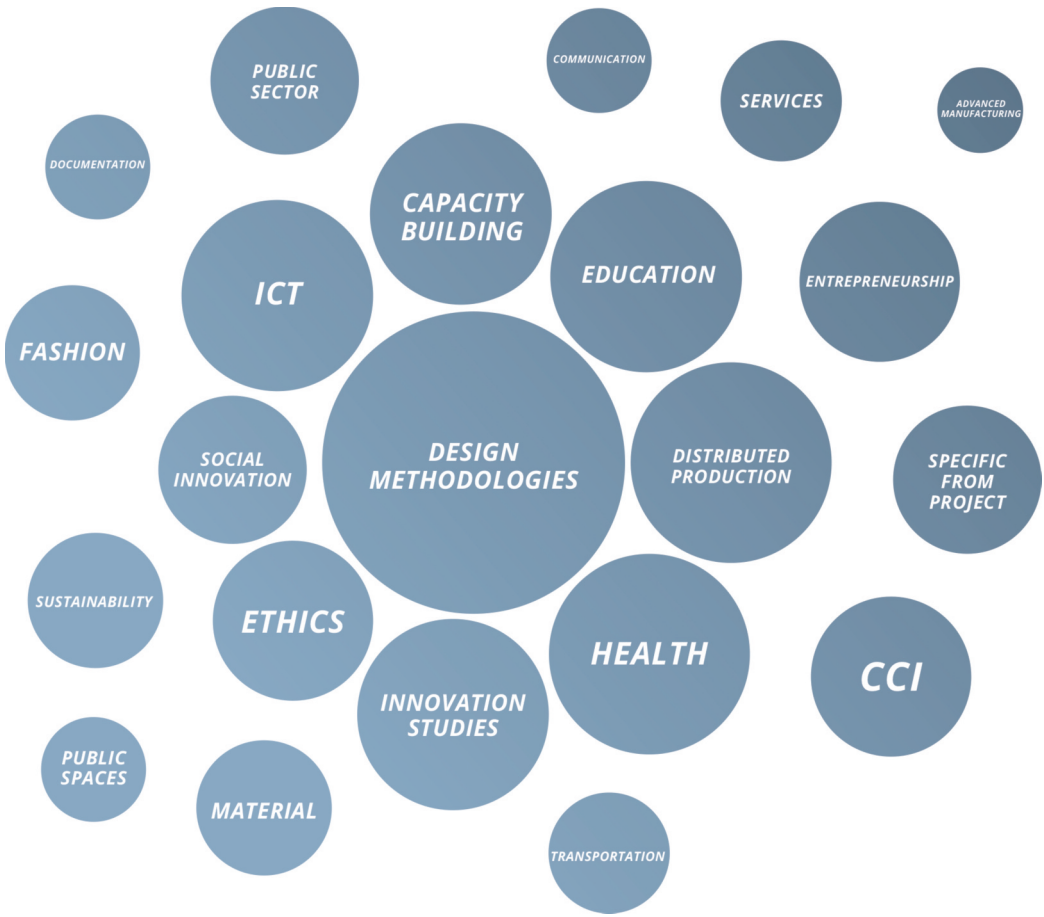
SEVEN YEARS OF DESIGN RESEARCH AT POLITECNICO DI MILANO

Analysis of the funded research projects

edited by Francesca Rizzo



D.I. FrancoAngeli
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Contents

6. The projects' impacts and trajectories: the relationship between research topics and impact pathways

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The chapter explores the impacts achieved by the research projects conducted at the Department of Design between 2014 and 2019. Adopting the framework used in the Horizon Europe programme (HEu), the analysis answers the following research questions: (i) What impacts have been generated by the funded projects according to the 3 main categories (scientific, societal, technological/economic) identified in HEu? (ii) Which are the research topics that have mainly contributed to achieving the impact categories? (iii) How have the funded projects contributed to reaching the 9 Key Impact Pathways (KIPs) proposed in HEu?

Findings reveal that all 32 research projects contribute to creating both scientific and societal impact. However, 21 research projects have also generated technological/economic impact. The Department of Design has performed best in achieving the following 4 KIPs: strengthening the uptake of research and innovation in society; fostering the diffusion of knowledge and Open Science; creating high-quality new knowledge; and strengthening human capital in research and innovation. Research topics related to "design methodologies" have contributed significantly to generating all 3 types of impact. Other clusters – "distributed production", "health", "innovation studies", "education" and "ICT"- have played important roles in achieving scientific and societal impact. The other most relevant clusters in reaching technological/economic impacts are "health" and "education".

The final discussion addresses how these impacts relate to the identity of the local scientific community in terms of research and innovation activities, reflecting on the strengths and weaknesses of the research performed at the Department of Design in terms of impact.

6.1 Evaluating the impact of research

6.1.1 Research impact and evaluation models

The interest in the evaluation of the impact of research actions has grown rapidly in the last decade with the goal of seeking the evidence of the values of investments made by governments and funders (Edler et al., 2012; Oancea, 2019). In the growing body of literature referred to the field, research impacts go beyond the academic realm; increasingly, non-academic impacts are recognised to be crucial to demonstrate how research might benefit a wide range of targets and the society. However, research impacts, especially those non-academic ones, are often indirect, non-linear and long-term, making their measurement highly complex.

Attempting at providing a brief non-exhaustive overview of the topic, providing a description of the notion of impact is relevant. The Oxford English Dictionary defines impact as a 'marked effect or influence'. In the realm of research, impact has been discussed and defined in a number of studies. Many of these have also produced guidelines to assist in description and measurement. ESF (European Science Foundation, 2009) has defined impact as the consequences of an action that affects people's lives in areas that matter to them. REF (UK's Research Excellence Framework, 2014) defines impact as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia'. This second definition is relevant in the context of this analysis as it points out the multi-faceted attributes of an impact and provides an initial list of the different perspectives to be examined. UKRI (UK Research Innovation) in its report on *Pathways to Impact* (2018) depicts impact as the influence of research or its effect on an individual, a community, the development of a policy, or the creation of a new product or service, thus adding to the previous definition an understanding of the different targets and beneficiaries of impact. Based on a review of diverse studies, Reed et al. (2021) define research impacts as the demonstrable and/or perceptible benefits to individuals, groups, organisations and society that are causally linked (necessarily or sufficiently) to research. This brief overview provides a foundation to describing impact in the context of this study: **an effect created by actions alongside a process (or pathway); this effect can be perceived from a variety of angles and received by diverse targets**.

To capture and evaluate the complexity of impacts, Bruno and Kadunc (2019) have recognised a set of methodological challenges specifically tied to research and innovation (R&I) activities:

- The time lag issue, linked to the wide range of interconnected activities that typically occur during research making the generation of impact possible only in the very long-term (sometimes even twenty or thirty years after);
- Uncertainty and risk, linked to the unpredictability of innovation work (Irvine & Martin, 1989) and the high-risk nature of the most innovative activities that often leads to a process of trial and error in which value is produced also by research activity that apparently fail;
- The attribution/contribution problem, linked to the inexhaustible nature of knowledge that develops and spreads over time often creating unexpected results (i.e., spillover effects).

These multi-faceted characteristics have intensified discussions on how to identify and account for research impact, giving rise to several proposals of frameworks, methodologies, processes of analysis, and methods for evidence (data) collection. Guthrie et al. (2013) have studied 14 such frameworks and observed that existing proposals focus on two main objectives: (1) accountability and better allocation of resources, for which quantitative approaches are best suited because allowing comparability; (2) learning, for which qualitative methods are more fitting, because more flexible even if they do not produce comparable results. Graham et al. (2018) found that the majority of R&I monitoring and evaluation frameworks aim at the first objective. At the same time, they present several shortcomings, for instance the widespread idea that scientific excellence can only be measured through bibliometric data (i.e., scientific publications and citations). This conception has evolved because of the events that have characterised the European socio-economic environment in the last fifteen years. For instance, the austerity in public spending that has dominated since after 2008 has highlighted the relevance of monitoring data on jobs and company turnover (Ravet et al., 2019), thus leading to the introduction of related metrics. Further, shifting socio-political conditions and priorities (i.e., the acceptance of the Sustainable Development Goals as a worldwide target to improve the condition of humanity) have led to the understanding that R&I should tackle the needs of society in general, beyond scientific excellence. However, the societal impact is highly complex to measure and in many frameworks is confused with the dissemination of R&I outputs (i.e., outreach on social media and policy documents) (Bruno & Kundac, 2019). Scholars (Alla et al., 2017; Reed, 2018) have thus argued that there is no single and best method or

process for evaluating impact of research; the challenge is to select the most appropriate methods in an overall evaluation design suited to a certain type of action and context.

When inspecting diverse proposed evaluation frameworks (Alvarez et al., 2010; Douthwaite et al., 2003; Research England, 2019), significance and reach appear as the two most commonly used criteria. These consider both the intensity of the effect on, and the number, extent and diversity of the beneficiaries. Furthermore, frameworks most often include the evaluation of the intermediate effects that occur over time at different time scales, beyond the impacts reached at the end of an action. Reed et al. (2021) emphasise evaluation as the process of collecting and interpreting data to assess the significance, reach and attribution of impacts deriving from research, whether positive or negative. Further, they identify five types of evaluation designs mainly distinguishing methods: i) experimental and statistical methods; ii) systems analysis methods; iii) textual, oral and arts-based methods; iv) indicator-based approaches; v) evidence synthesis approaches. These five methods can be categorised according to the extent to i) which they provide summative evidence versus formative feedback, and ii) the extent to which they provide evidence of research as a sufficient or necessary cause of impact. Crossing methods and extents, the authors propose a matrix to guide the design and use of the appropriate evaluation model according to the aims and contexts.

One element that is especially hard to evaluate in R&I activities is the chain of causality that might bring from an action to several different (and desired) effects. Approaches like programme-theory (Chen, 1990; Weiss, 1987; Donaldson, 2007) offer interesting insights in this respect. As Bruno & Kundac (2019, p. 66) observe "the central thesis of the programme-theory evaluation is that the impact of the programme is expected to occur based on a logical set of events and interactions between the participants to the programme, the results of the projects funded and the wider environment". This approach became a standard in the European Commission since 2017 (European Commission, 2017). Prior to this, the first global attempt to capture the socio-economic impact of research for all disciplines has been proposed by the Australian Research Quality Framework developed by Duryea et al. (2007). This framework provided a relevant basis for the development of the British system for assessing the quality of research in higher education institutions (Penfield et al., 2014). In the British case, the programme-theory approach was adopted introducing the notion of impact pathways. These typically include sketching a set of steps that, linked to one another along a process, can indicate how a certain output transforms into a wider aggregate impact. Pathways to impact have been adopted in the British system mainly

collecting evidence through a case study approach, and using a division between academic and non-academic impact, referring non-academic to societal and economic impacts.

These experiences have been central to elaborate the framework for impact evaluation proposed in the Ninth European Framework Programme – Horizon Europe (HEu). Presented in 2018, HEu moves beyond mere monitoring of programme implementation and aims at incentivising the generation of impact applying specific conditions to the research funding, and at diffusing a culture of evaluation of research that goes beyond academic excellence (European Commission, 2018). Instilling this culture of evaluation is crucial to demonstrate the European added value of R&I investments and reinforce accountability, transparency, and learning.

Building on the previous experiences, HEu adopts the notion of Key Impact Pathways and identifies three broad and non-exclusive impact categories which reflect the non-linear and long-term nature of R&I investments:

- **Scientific impact**: supporting the creation and diffusion of high-quality new knowledge, related to skills, technologies and solutions to global challenges.
- **Societal impact**: strengthening the impact of R&I in implementing EU policy priorities, and in supporting the uptake of innovative solutions in industry and society to address global challenges.
- **Technological and Economic impact**: fostering all forms of innovation, including break-through innovation, and strengthening market deployment of innovative solutions.

Each impact category is further detailed in Key Impact Pathways, 3 for each category identified (further details on this are provided in the following paragraph). Based on this, the HEu impact assessment framework expects research actions to generate:

- New and excellent scientific knowledge, attracting the world's best research resources and promoting world class scientific impact;
- Significant social impact, communicating, disseminating and exploiting the scientific results, by translating them into new products, services and processes to be offered to political concerns, citizens and the society in general;
- Positive growth on the economy, creating new job opportunities (including high skilled positions), attracting investments on R&I activities, and overall increasing the European GDP.

At present, this framework is considered the most advanced for the evaluation of research impact and is thus adopted as the main reference for the analysis reported in this chapter.

6.1.2 Key Impact Pathways and related Indicators

The literature review briefly reported in the previous paragraph has clarified that research impact evaluation is a process aimed at capturing both the final and intermediate effects (significance and reach) of research actions. Combined with this, the non-linear and long-term nature of the relationship between research activities and impacts (Bornmann, 2012; Reed et al., 2021) makes it challenging to depict the causal links that might attribute an impact to a single research project or output. For instance, effects deriving from research are often mediated by several factors (that might boost or limit the impact), including incentives, local/cultural specificities, laws and norms, ethical considerations, and so on. To account for these multi-faceted and dynamic relationships, the notion of pathways to impact has been first introduced in the British system for research quality assessment (UKRI, 2018) and further adopted in the HEu framework.**The pathways to impact can be described as the knowledge exchange or the engagement activities that facilitate impacts** (UKRI, 2018). They are typically used in indicator-based approaches to impact evaluation, hinged on identifying variables (indicators) that indicate the achievement of impacts. Indicators can be organised and evaluated in categories of logical structures (e.g., logic models and Theory of Change), consequently using any method to collect the evidence needed for each indicator. Indicator-based approaches aim at tracing causal chains from research to impact, based on an anticipated theory or desired change. HEu adopts a logic model (and prompts research actions to do the same) working forward from impact goals to identify the steps that would be necessary to move along the chain of planned research activities, research outputs, intermediate outcomes, short-term impacts, and ultimate benefits (fig. 6.1). This enables the design of the pathway to impact reflecting the impact delivery process. Further, it enables the design of an evaluation process that measures indicators to infer whether the research is making progress towards the desired impacts.

In HEu, pathways to impact are further detailed in Key Impact Pathways (KIPs) to provide measures to monitor the progress of research actions towards the programme's objectives. For each KIP, proxy indicators are identified to track progress and distinguish between the short (directly generated by research outputs), medium (produced during the research period) and longer terms (reached beyond the research duration) (fig. 6.1). Overall, 9 KIPs and 27 proxy indicators are proposed covering the 3 main impact categories (scientific impact, societal impact and technological/economic impact). Each pathway consists of a storyline (the main message that communicates the

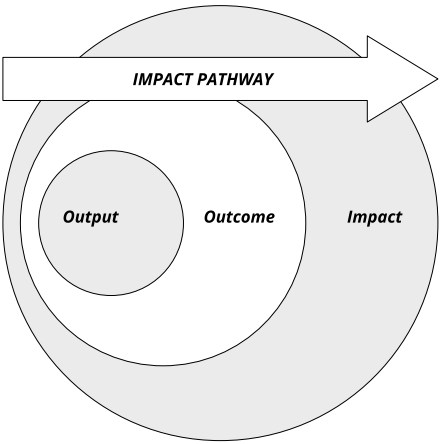


Fig. 6.1 – The impact pathway sheet.

progress towards impact), a time-sensitive indicator (distinguishing between short, medium, and long terms) and data needs (the information needed and the possible methodologies for data collection). The specifics of the KIPs and related indicators are illustrated in the following.

Scientific impact is expected to be achieved through creating high-quality new knowledge and enabling its diffusion, strengthening human capital, and promoting Open Science. The specific KIPs in this domain include:

1. **Creating high-quality new knowledge**. The traditional way to evaluate university research activities is mainly based on measuring academic quality and impact through the process of peer review (Grant 2006). This is further measured by citation-based metrics, such as H-index, I-index and citation counts. These academic metrics aim to measure the dissemination of the new knowledge created across the scientific community (Ravenscroft et al., 2017).
2. **Strengthening human capital in R&I**. The payback framework (Buxton & Hanney, 1996) included "the use of research in the research system" (e.g., acquisition of formal qualifications by members of the research team, career advancement, and use of project findings for methodology in subsequent research). REF (2014) mentioned the consideration of the interdisciplinary and diversity of researchers involved in the projects.
3. **Fostering diffusion of knowledge and Open Science**. A number of attempts are exploring ways to present the socio-economic impact of

publications and scientific knowledge by examining the online footprints, such as on social media (e.g., Altmetric uses a publication's online footprint – Twitter mentions, Facebook posts and shares etc.- to score its impact), and elaborating the Impact Story (a combined view of academics' citations and social media footprint). The idea is to provide a wider understanding of the academic impact beyond the simple citation count.

Tab. 6.1 – The detailed short, medium, and long-term indicators for the three KIPs linked to scientific impact.

Towards scientific impact	Short-term	Medium-term	Longer-term
KIP 1. Creating high-quality new knowledge	Publications - Number of peer-reviewed scientific publications resulting from the Programme	Citations - Field-Weighted Citation Index of peer-reviewed Publications resulting from the Programme	World-class science -Number and share of peer-reviewed publications resulting from the projects funded by the Programme that are core contribution to scientific fields
KIP 2. Strengthening human capital in R&I	Skills - Number of researchers involved in upskilling (training, mentoring/ coaching, mobility and access to R&I infrastructures) activities in projects funded by the Programme	Careers - Number and share of upskilled researchers involved in the Programme with increased individual impact in their R&I field	Working conditions – Number and share of upskilled researchers involved in the Programme with improved working conditions, including researchers' salaries
KIP 3. Fostering diffusion of knowledge and Open Science	Shared knowledge - Share of research outputs (open data/ publication/software etc.) resulting from the Programme shared through open knowledge infrastructures	Knowledge diffusion - Share of open access research outputs resulting from the Programme actively used/cited	New collaborations -Share of Programme beneficiaries which have developed new transdisciplinary/trans-sectoral collaborations with users of their open access research outputs resulting from the Programme

Source: Council Decision (EU) 2021/764 of 10 May 2021 establishing the Specific Programme implementing Horizon Europe – the Framework Programme for Research and Innovation, and repealing Decision 2013/743/EU

Societal impact is referred to the benefits that research brings to the wider society and is expected to be achieved by addressing EU policy priorities through R&I, delivering impact through R&I missions and strengthening the uptake of R&I within society. This includes the following KIPs:

4. **Addressing EU policy priorities through R&I**. In the Research Impact Framework developed by Kuruvilla et al. (2006), "policy" is one of the impact categories used to depict the relationship between research findings and policy issues. This builds on the notion that research findings might support policy proposals, guide policymaking, and suggest changes to policy practices. The policy category is also included in the payback framework (Buxton & Hanney, 1996).
5. **Delivering benefits and impact through R&I missions**. The payback framework (Buxton & Hanney, 1996) identifies one impact category related to the behaviour change observed or expected through the application of research findings at a geographical, organisational and population levels.
6. **Strengthening the uptake of innovation in society**. The SIAMPI measurement model has a central theme related to capturing 'productive interactions' between researchers and stakeholders by analysing the networks that evolve during research programmes (Spaapen & Drooge, 2011).

Economic impact is the category of impact assessment that has probably received most attention by scholars and practitioners. Economic models used to assess impacts of research vary from cost benefit analysis to return on investment and employ a variety of methods for defining the economic benefits of research (Milat et al., 2015). For example, the payback model (Buxton & Hanney, 1996) lists service/economic benefits as one of the impact categories, looking at factors like improved service delivery, cost savings, improved health, or increased equity. Buxton et al. (2008) have stated that economic measurements should consider a wide range of benefits, like indirect cost savings for production and innovations stimulated by research.

In HEu, economic impact also includes the benefits of adopting/deploying new technologies and is expected to be achieved by influencing the creation and growth of companies, especially SMEs, generating new job opportunities (both directly and indirectly), and increasing investments in R&I activities. This includes the following KIPs:

7. **Generating innovation-based growth**. One of the commonly recognised economic impact indicators is the economic growth in terms of market performance, enhancement of the skills base, and improve-

Tab. 6.2 – The detailed short, medium, and long-term indicators for the three KIPs linked to societal impact.

Towards societal impact	Short-term	Medium-term	Longer-term
KIP 4. Addressing Union policy priorities and global challenges through R&I	Result - Number and share of results aimed at addressing identified Union policy priorities and global challenges (including SDGs) (multidimensional: for each identified priority) Including: Number and share of climate-relevant results aimed at delivering on the Union's commitment under the Paris Agreement	Solutions - Number and share of innovations and research outcomes addressing identified Union policy priorities and global challenges (including SDGs) (multidimensional: for each identified priority) Including: Number and share of climate-relevant innovations and research outcomes delivering on Union's commitment under the Paris Agreement	Benefits - Aggregated estimated effects from use/ exploitation of results funded by the Programme on tackling identified Union policy priorities and global challenges (including SDGs), including contribution to the policy and law-making cycle (such as norms and standards) (multidimensional: for each identified priority) Including: Aggregated estimated effects from use/ exploitation of climate-relevant results funded by the Programme on delivering on the Union's commitment under the Paris Agreement including contribution to the policy and law-making cycle (such as norms and standards)
KIP 5. Delivering benefits and impact through R&I missions	R&I mission results - Results in specific R&I missions (multidimensional: for each identified mission)	R&I mission outcomes – Outcomes in specific R&I missions (multidimensional: for each identified mission)	R&I mission targets met – Targets achieved in specific R&I missions (multidimensional: for each identified mission)
KIP 6. Strengthening the uptake of R&I in society	Co-creation - Number and share of projects funded by the Programme where Union citizens and end-users contribute to the co-creation of R&I content	Engagement - Number and share of participating legal entities which have citizen and end-users engagement mechanisms in place after the end of projects funded by the Programme	Societal R&I uptake - Uptake and outreach of co-created scientific results and innovative solutions generated under the Programme

Source: Council Decision (EU) 2021/764 of 10 May 2021 establishing the Specific Programme implementing Horizon Europe – the Framework Programme for Research and Innovation, and repealing Decision 2013/743/EU

ment of productivity (e.g., revenues and turnovers increased by means of the results of research).

8. **Creating more and better jobs**. Another important factor of economic impact evaluation is the improvement in employment rates by means of job creation and creation of new entities, like start-ups and spin-offs.
9. **Leveraging investments in R&I**. The measurement of socio-economic impact was introduced in research impact assessment frameworks to assess and justify the significant investment in research (Grant 2006) in the medicine and healthcare sectors, which has revealed the importance to demonstrate research impact on further investments

Tab. 6.3 – The detailed short, medium, and long-term indicators for the three KIPs linked to economic impact.

Towards societal impact	Short-term	Medium-term	Longer-term
KIP 7. Generating innovation-based growth	Innovative results - Number of innovative products, processes or methods resulting from the Programme (by type of innovation) & Intellectual Property Rights (IPR) applications	Innovations - Number of innovations resulting from the projects funded by the Programme (by type of innovation) including from awarded IPRs	Economic growth – Creation, growth & market shares of companies having developed innovations in the Programme
KIP 8. Creating more and better jobs	Supported employment - Number of full time equivalent (FTE) jobs created, and jobs maintained in participating legal entities for the project funded by the Programme (by type of job)	Sustained employment – Increase of FTE jobs in participating legal entities following the project funded by the Programme (by type of job)	Total employment - Number of direct & indirect jobs created or maintained due to diffusion of results from the Programme (by type of job)
KIP 9. Leveraging investments in R&I	Co-investment - Amount of public & private investment mobilised with the initial investment from the Programme	Scaling-up - Amount of public & private investment mobilised to exploit or scale-up results from the Programme (including foreign direct investments)	Contribution to ' 3 % target' – Union progress towards 3 % GDP target due to the Programme

Source: Council Decision (EU) 2021/764 of 10 May 2021 establishing the Specific Programme implementing Horizon Europe – the Framework Programme for Research and Innovation, and repealing Decision 2013/743/EU

The indicator system adopted in HEu may appear simple and linear. However, indicators should be understood as the identification of the key dimensions where impact is desired and information needed, without overlooking interdependencies and connections. Bringing in also qualitative data and storytelling, the framework allows to produce a much richer picture of the impact produced in research, and how this generates value for the society and the economy, as well as scientific advancements.

The 3 impact categories, the 9 KIPs and the 27 indicators have provided both the theoretical framework and a practical guide to analyse the impact of the funded research projects developed at the Department of Design of Politecnico di Milano between 2014 and 2019.

6.2 Research design and methodology

6.2.1 Research objectives and questions

The analysis presented in this chapter aims at answering three main research questions.

a. What **impacts** have been generated by the funded projects of the Department according to the 3 main categories (scientific, societal, technological/economic) identified in HEu?

The aim of this question is to depict an overview of the impacts generated by the funded research projects in the last seven years, according to the framework adopted in the analysis. This first question adopts the categorisation of the three main impact categories (scientific, societal, and technological/economic) and crosses it with the main impacts identified by each project coordinator during the development of case studies (for details refer to chapter 3).

b. Which are the **research topics** that have mainly contributed to achieving the three impact categories identified in HEu *(scientific, societal, and technological/economic)*

This question is an in-depth investigation of the relationship between impacts and research topics. The aim is to understand which research topics (described in chapter 3) are working on producing which types of impact. More specific questions include: Which are the research topics that have created scientific impact, societal impact, and technological/economic impact? Which are the topics that have generated all the three types of impact? The results indicate the strengths and areas of improvement, but from the aggregated perspective of research topics rather than from the granular understanding offered by individual projects.

c. How have the funded projects contributed to reaching the 9 KIPs proposed in HEu? What KIPs are covered by which research topics? Instead, what KIPs might help us identify areas to strengthen competences and capabilities

The third research question aims to depict strengths and areas for improvement in the Department, according to the 9 different pathways to impact. The analysis reveals in which pathway the Department has achieved quantitatively more significant results, that is the pathways covered by a higher number of R&I projects. The investigation on the relationship between pathways and research topics allows to understand how different topics contribute to the 9 KIPs, depicting the overall profile of the Department in terms of research impact. At the same time, it suggests areas where less effort has been dedicated, as part of the activities developed by the Department in the same actions.

6.2.2 Research methodology and process

To answer the research questions stated above, data collection and analysis have been designed following the HEu impact assessment framework and the research topics described in chapter 2.

Firstly, the impacts identified by project principal investigators (PIs) for the sample analysed (32 research projects investigated through the project analysis described in chapter 2) have been referred more explicitly to the HEu impact categories and clustered accordingly. This activity has produced a general overview of the impact generated (reported in tab. 6.4 below) by crossing the impacts identified by PIs both with the three impact categories and the 9 KIPs. Through the projects, the link has also been made with the research topics (thematic clusters and keywords described in chapter 3) to understand their diverse degree of contribution to reaching specific impacts (pathways and impact categories). More specifically, the analysis has followed three main steps:

a. **matching** projects to a specific impact category and a specific impact pathway. Starting from the results of the semi-structured interviews conducted, the researchers involved have firstly listed the created impacts identified by the PI of each of the 32 projects. Afterwards, research projects' impact has been associated with impact categories and impact pathways of the HEu framework, creating the list reported in Annex I.
b. **crossing** projects, research topics and impact pathways to generate an overview on what and how many research topics could be connected

to which impact (pathway and impact category). The specific investigation on the 9 KIPs allowed us to focus on the research topics that have contributed to creating the pathways, uncovering further points of strength and areas where the Department might need to build more competence.

c. **visualising** the results. To better communicate the results of the analysis, the researchers used the open access visualisation platform RAW to create maps and make sense of the data collected. These maps and the analysis performed are presented in more detail in the remainder of the chapter.

Annex I presents the result of these two steps showing how the analysis of the samples led us to connect research topics (clusters and keywords) and impacts. This list was then split into 3 lists (each associated with one impact category) and other 9 lists (each associated with one KIP) to aid visualisation.

Table 6.4 summarises the overview of the relationship between projects, impact categories, and research topics (clusters and keywords). The details about the clusters and keywords that have contributed to each of the impact categories are illustrated in the following paragraph 6.3.

Tab. 6.4 – Relationship between impact categories, projects, and research topics (number of clusters and keywords).

Impact category	Number of projects that have reached the impact	Number of clusters linked to the projects	Number of keywords linked to the projects
Scientific impact	32	22	159
Societal impact	32	22	159
Technological/ economic impact	21	21	121

Table 6.5 shows an overview of the relationship between projects, KIPs, and research topics (thematic clusters and keywords).

Tab. 6.5 – Relationship between impact pathways, projects, and research topics (number of clusters and keywords).

Impact category	Number of projects that have reached the impact	Number of clusters linked to the projects	Number of keywords linked to the projects
#1 Creating high-quality new knowledge	27	22	135
#2 Strengthening human capital in R&I	25	22	124
#3 Fostering diffusion of knowledge and Open Science	28	21	139
#4 Addressing EU policy priorities through R&I	15	19	74
#5 Delivering benefits and impact through R&I missions	8	17	40
#6 Strengthening the uptake of innovation in society	31	22	154
#7 Generating innovation-based growth	17	19	85
#8 Creating more and better jobs	6	13	30
#9 Leveraging investments in R&I	4	9	23

6.3 The relationship between research topics, impact categories and KIPs

6.3.1 The impacts of the funded research projects

Our analysis shows that the 32 research projects analysed have resulted in a wide range of impacts, covering all three clusters adopted in HEu. In particular, we have identified: 136 types of scientific impact, 123 types of societal impact and 31 types of technological/economic impact (as shown in fig. 6.2 in an aggregate manner). These types derive from the case studies developed and have been directly indicated by each PI (all the details of created impact could be found in Annex I). The numbers reported do not correspond univocally to the projects analysed, but rather consider impacts individually accounting for the possibility of each project to generate more than one type of impact, as well as more impacts under the same category. As the figure

emphasises, the Department of Design has shown a significant influence in generating both scientific and societal impact, meaning that the funded research projects have contributed to creating new knowledge, diffusing the knowledge, delivering and transferring the research and innovation results in the society. However, at the same time, it shows significantly lower numbers in the area of technological/economic impact, meaning that the Department has focused less on translating the research and innovation results into economic growth, creation of new jobs and increase of investment in research.

When we focus this analysis on the 9 KIPs, the difference in focus and achievements is even clearer, as shown in the fig. 6.3. Here, the pathway with the highest number of entries is "strengthening the uptake of research and innovation in society", which is highly relevant to design research practices focused on co-creation and societal participation (i.e., users and stakeholders engagement, co-design, civic participation) to understand and solve different types of problems. The Department of Design shows good results also in "fostering diffusion of knowledge and open science". This shows consolidated practices linked to making knowledge and results produced in research projects available to the society (i.e., using open access publication strategies). The other two pathways under scientific impact, "creating high-quality new knowledge" and "strengthening human capital in R&I", also demonstrate significant results, speaking to one of the pillars of universities, that is, the creation of new knowledge and the education of a class of knowledge workers that is highly prepared for the future. On the contrary, the results obtained in other pathways show areas where more effort is needed. In particular, the analysis has shown limited results in "creating more and better jobs" and "leveraging investment in research and innovation" under the category of technological/economic impact. This might also be due to the fact that the Department focuses on these areas through other activities, that involve direct collaboration with industrial partners and do not use public funding. However, the consistent difference between the three areas shows one important area of reflection for future growth and enhancement of organisational capabilities.

6.3.2 The relationship between research topics, impact categories and KIPs

All 32 projects analysed have consistently created both scientific and societal impact. Consequently, when looking at these two impact categories, all the 22 clusters (21 thematic clusters plus one "specific from project") and the 159 keywords identified in the analysis reported in chapter 3 are repre-

sented (fig. 6.4). Among all the clusters of topics, "design methodologies" presents the highest number of results with 25 keywords reported to indicate the creation of scientific and societal impact. Following that, the clusters "distributed production" and "health" have also performed well, and both have 11 keywords present. The clusters "education" – 10 keywords, "ICT" – 10 keywords, "innovation studies" – 10 keywords have also made a significant contribution to achieving scientific and societal impact. The following ones are "CCI", "entrepreneurship", "ethics" with 7 keywords.

Among the 32 funded projects analysed, 21 have created technological/economic impact. In these 21 projects, 21 clusters are present with 121 keywords, meaning that some topics didn't manage to transfer the research actions into technological/economic impact. The cluster "communication" and the keywords belonging to it are not present in generating technological/economic impact (fig. 6.5). Even though all other clusters can be seen on the map, some keywords disappear when compared to scientific and societal impacts. Among all, the most important cluster still is "design methodologies", but it only covers 14 keywords (11 keywords disappeared). The number of keywords in the cluster "distributed production" has reduced to 9 (2 keywords are missing). Instead, in the cluster "health", all the 11 keywords are present and linked to achieving technological/economic impact. The same thing for cluster "education", in which 10 keywords are present. The number of keywords in the cluster "ICT" has reduced to 8, and the cluster "innovation studies" has only 7 keywords. Clusters like "entrepreneurship", and "capacity building" have remained the same. Instead, clusters like "material", "social innovation", "ethics", and "documentation" have shown a clear decrease, around half of the keywords belonging to them do no longer appear for the creation of technological/economic impact.

6.3.3 Relationship between research topics and KIPs

6.3.3.1 Scientific impact

KIP #1 Creating high-quality new knowledge (fig. 6.6)

27 funded projects have achieved the first KIP in the scientific impact. These projects represent 22 clusters and 135 keywords. The most prominent cluster is "design methodologies" with 22 keywords. The cluster that scored second is "innovation studies", in which all the 10 keywords are present. Other important clusters in this area (each with 8 keywords) are "ICT" "capacity building", and "education". Keywords in the clusters "ethics" (7 key-

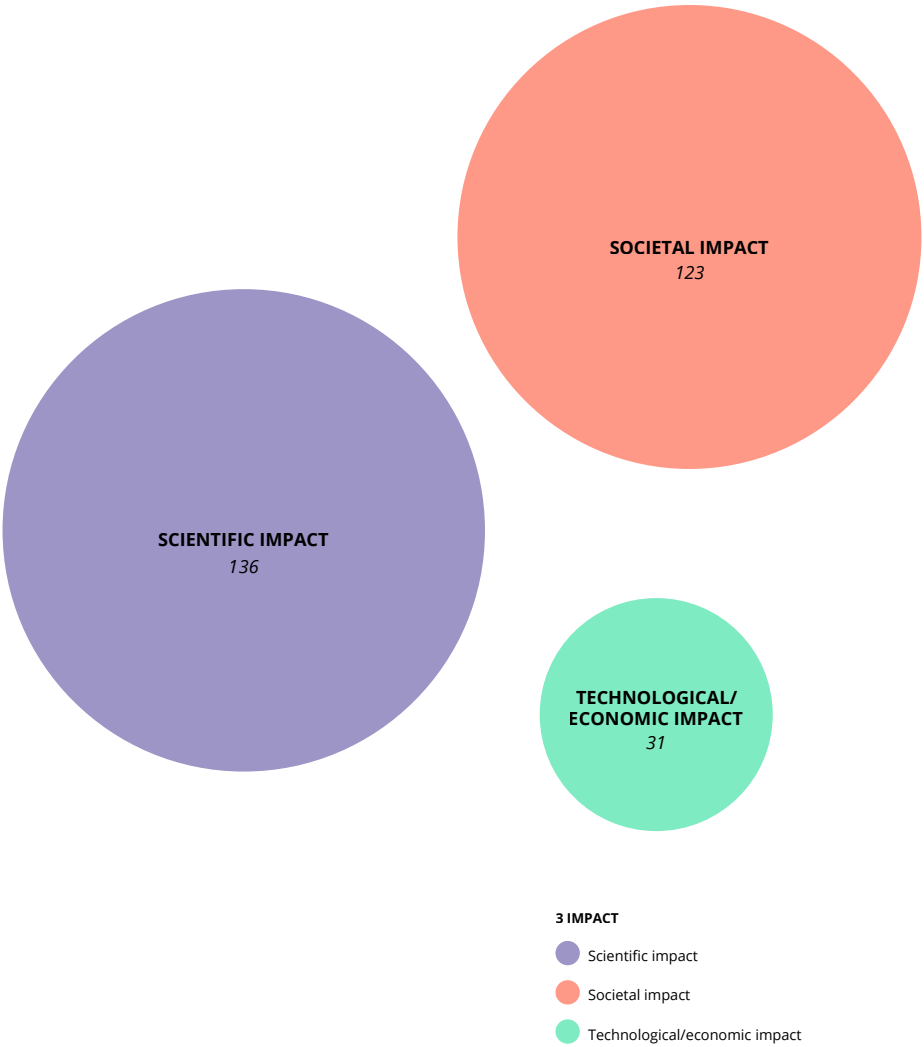


Fig. 6.2 – The relative relevance of the three impact categories according to the impacts generated by the funded research projects of the Department of Design in the past seven years.

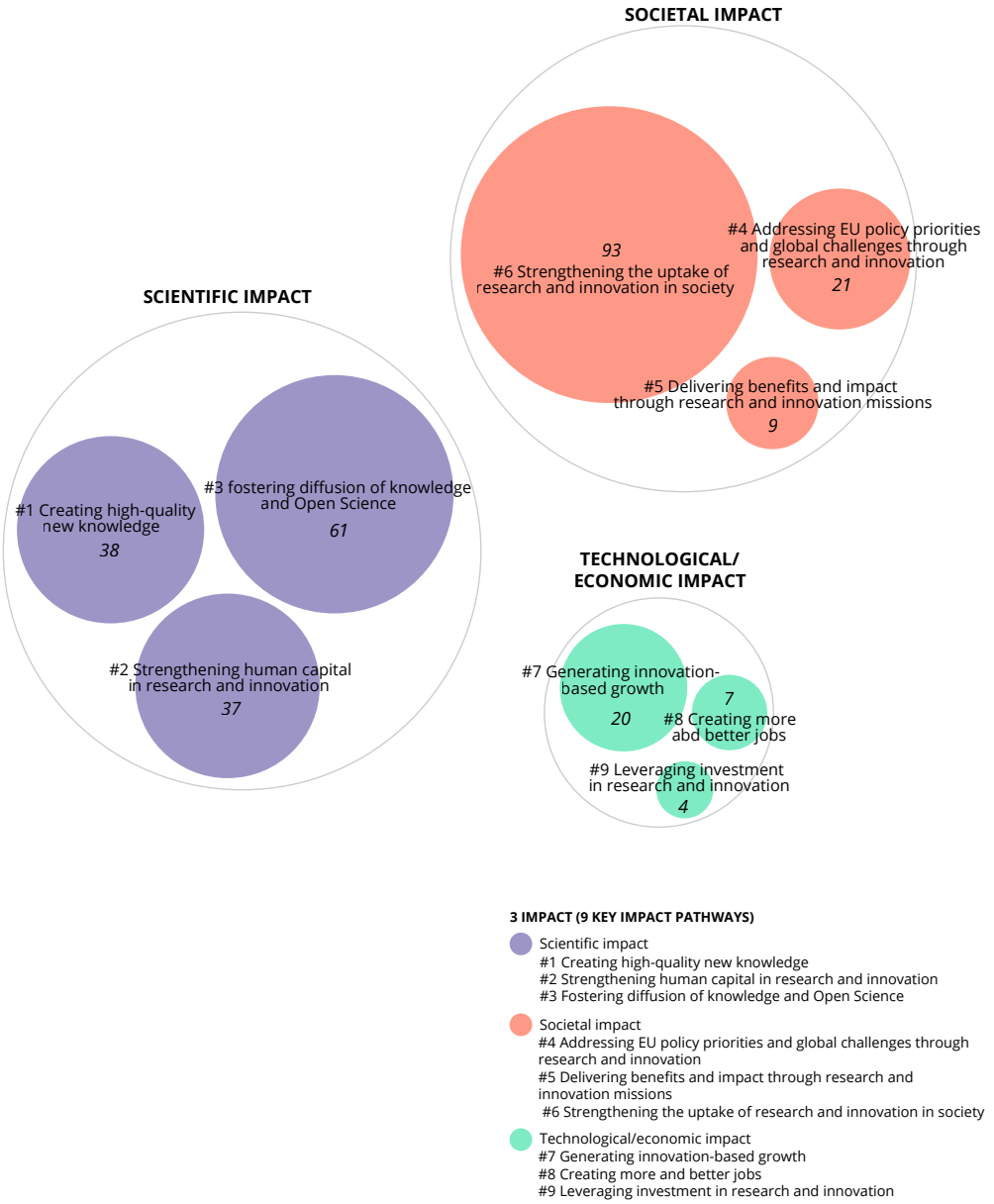


Fig. 6.3 – The distribution of the research projects analysed along the 9 KIPs in the past seven years.

words), "social innovation" (6 keywords), and "public sector" (6 keywords) are also fully present here. Instead, two other clusters that have played an important role in creating scientific impact – "distributed production" and "health" – have slightly reduced to 9 keywords and 8 keywords respectively.

KIP #2 Strengthening human capital in R&I (fig. 6.7)

25 funded projects have achieved the second pathway in the scientific impact. These cover 22 clusters and 124 keywords. The cluster "design methodologies" is still the most significant one but reduces the number of keywords to 17 (compared to 25 in total). Clusters "distributed production" and "health" have well performed with 11 keywords in achieving impact in this KIP. The cluster "education" is present with 9 keywords (only one keyword is missing), and the cluster "ICT" contributed with 8 keywords. The cluster "innovation studies" has only half of its keywords present – 5 keywords. Instead, the cluster "sustainability" is fully present with all its 5 keywords to contribute to strengthening the impact on human capital.

KIP #3 Fostering diffusion of knowledge and Open Science (fig. 6.8)

28 funded projects have achieved the third pathway in the scientific impact. The research topics cover 21 clusters and 139 keywords. Once again, "design methodologies" is the most representative one with 22 keywords. This is followed by two clusters "distributed production" and "health" both with 11 keywords. Three other clusters include 9 keywords: "ICT", "education", and "innovation studies". In the clusters "CCI" "capacity building", and "ethics", 7 keywords are present, and the cluster "sustainability" is fully present again with 5 keywords. Instead, in the cluster "entrepreneurship", the keywords number reduces to 6.

6.3.3.2 Societal impact

KIP #4 Addressing EU policy priorities through R&I (fig. 6.9)

15 funded projects have created societal impact in its first pathway, covering 19 clusters and 74 keywords. Though the most influential cluster in this area is still "design methodologies", it only includes 9 keywords (compared to 25 in total), observing a decrease that might be due to the limits of research activities in the field of methodologies in addressing policy priorities. The second most important cluster in this pathway is "innovation studies", which contributes with 7 keywords. The cluster "public sector" has played an active role with 6 keywords. Clusters "CCI" and "Ethics" have both 5 keywords. The number of keywords in cluster "health" reduces here to 3, and the same happens in the cluster "ICT", which includes only 4 keywords in addressing EU

policy priority. Clusters "distributed production", "advanced manufacturing", and "material" are not represented when looking at achieving this pathway.

KIP #5 Delivering benefits and impact through R&I missions (fig. 6.10)

8 funded projects have created the second pathway in the societal impact, covering 17 clusters and 40 keywords. The analysis shows that very few projects managed to achieve this pathway, as clusters and keywords represented are quite limited. The cluster "design methodologies" has only 6 keywords, and the cluster "health" has 5. Three clusters "ICT", "innovation studies", and "transportation" are represented via 4 keywords. The five mentioned are the main research topics that have successfully generated impact through R&I actions.

KIP #6 Strengthening the uptake of innovation in society (fig. 6.11)

31 funded projects have created the third pathway in the societal impact, covering 22 clusters and 154 keywords. This pathway appears to be the most represented in the work conducted by the Department, as shown by the analysis: all the clusters are present and have the highest number and diversity of keywords. 24 keywords represent the cluster "design methodologies"; the clusters "distributed production" and "health" have 11 keywords; both the cluster "education" and the cluster "innovation studies" have 10 keywords. All are important clusters in this pathway. The "ICT" and "capacity building" clusters also perform well with 9 keywords. Clusters that have 7 keywords are "entrepreneurship" and "Ethics"; while with 6 keywords there are "CCI", "public sector", and "social innovation".

6.3.3.3 Technological/economic impact

KIP #7 Generating innovation-based growth (fig. 6.12)

17 funded projects have created the first pathway in the technological/economic impact, covering 19 clusters and 85 keywords. The analysis shows that this is one of the areas requiring strengthening in the Department, as the technological and economic impact dimensions of the funded research projects are significantly less represented if compared to the other two main areas of impact. Under this category, a good performance can be observed for this first pathway. "Health" is the most significant cluster with 11 keywords. This is followed by "distributed production" with 8 keywords, "ICT" and "capacity building" with 7 keywords and "design methodologies" that reduces to 6 keywords. Clusters "public space", "communication" and "documentation" do not have any keyword in this pathway.

KIP #8 Creating more and better jobs (fig. 6.13)

6 funded projects have created the second pathway in the technological/economic impact, covering 13 clusters and 30 keywords. A continuous decrease can be observed in both the number of clusters represented and keywords linked. With a very limited number of projects present, the relatively important clusters are "design methodologies", "education", "CCI", "sustainability" and "health".

KIP #9 Leveraging investments in R&I (fig. 6.14)

4 funded projects have created the third pathway in the technological/economic impact, covering 9 clusters and 23 keywords. The most influential cluster is "distributed production" which contributes with 7 keywords. Following, the cluster "transportation" has performed well in leveraging investment in R&I with 4 keywords present. Other clusters that are sufficiently represented here include: "ethics", "design methodologies", "health", "ICT", "public sector", and "documentation".

Finally, the relation between the 9 KIPs and the research topics is summarised in tab. 6.6, which provides an overview of how clusters link to KIPs. In the table, one can notice that the cluster "design methodologies" is playing an active role in most of the KIPs, especially those linked to scientific and societal impact. This means that the Department of Design has successfully transferred design approaches, methods, and tools (e.g., co-design, participatory design, and design-led research) into recognizable scientific and societal impacts through diverse research activities and in different areas. Following this, the cluster "health" has performed relatively well in generating all three categories of impact. The cluster "capacity building" is also an active contributor to all three types of impact apart from the #9 pathway under the technological/economic impact. Similarly, the cluster "distributed production" has contributed to all three impacts, only being absent in the #4 and #5 pathways under the societal category. Though the cluster "sustainability" is not including many keywords, it also plays a significant role in generating impact in all the 9 pathways. The same can be observed in clusters "fashion" and "transport". As opposite, several clusters are represented quite differently across the 9 pathways. The cluster "innovation studies" has actively contributed to 6 KIPs, however, it has a relatively limited contribution in the #8 and #9 under the technological/economic impact category. The same happened to the clusters "ICT", "ethics", "social innovation", "public sector", "service", and "public spaces". Clusters "materials" and "advanced manufacturing" have almost disappeared in #4 and #5 KIPs (societal impact category), as well as in #8 and #9 (technological/economic impact category).

6.4 Strengths and weaknesses emerged in the analysis

The analysis described in this chapter has allowed to identify the strengths and weaknesses in the achievement of impact for each of the research topics covered at the Department. The previous paragraphs have already offered summative comments on the most represented topics for each KIP identified in HEu. Notably, the presence of the cluster "design methodologies" is central across all pathways and impact categories, showing a clear specialisation of the Department in this area of research with more than one group working on this topic, and with a clear international reputation for the community. This result is in line with the analysis conducted initially on research topics, showing even more predominantly the significance of this cluster. However, the focus on this theoretical specialisation might also weaken the impacts that the research might have. Developing mainly methodologies and processes might lead to roles in multi-disciplinary collaborations that operate at the *meta* level of research, remaining further from the practical applications typically developed in collaborative projects (e.g., pilots and demonstrators).

Looking at the results of the analysis, it is also easy to notice how the core keywords of the design discipline do not emerge from our sample. It is thus difficult to say whether these keywords contribute to the impact produced by the research conducted at the Department. Areas like product design or interior design, and keywords like prototyping and storytelling do not appear prominently in the research sample. Building further on the discussion started in connection to the research topics where these areas emerged as distant from the topics currently covered by researchers at the Department, the analysis on impacts strengthens this finding highlighting how the core of the discipline for our researchers is shifting away from the basics of design. On the one hand, this might mean that the discipline can now count on a consolidated and recognised basis of knowledge that pushes it to explore new applications and topics. On the other, this is in opposition with the lack of recognition of design research in multi-disciplinary contexts and in the funded research, as shown for example by the absence of an ERC area dedicated to the design discipline (area 08a in the Italian categorisation of disciplinary scientific sectors).

New areas of application seem to become predominant instead. Areas like "health", "distributed production", "entrepreneurship", "public sector", "sustainability" seem to be core matters meeting the concerns of both funding institutions and researchers at the Department, where a relevant number of impact pathways can be found. Interestingly however, even when working in these domains, the researchers at the Department seem to be somewhat far from actions that lead to technological and economic impacts. This bares

Tab. 6.6 – The detailed short, medium, and long-term indicators for the three KIPs linked to societal impact.

Clusters	Scientific impact			Societal impact			Technological/ economic impact		
	KIP #1	KIP #2	KIP #3	KIP #4	KIP #5	KIP #6	KIP #7	KIP #8	KIP #9
Advanced manufacturing	2	2	1	0	0	2	2	0	0
Capacity building	8	5	7	3	2	9	7	3	0
CCI	5	5	7	5	1	6	5	3	0
Communication	3	1	2	3	2	3	0	0	0
Design methodologies	22	17	22	9	6	24	6	5	2
Distributed production	9	11	11	0	0	11	8	1	7
Documentation	1	2	3	3	0	1	0	0	1
Education	8	9	9	4	1	10	5	4	0
Entrepreneurship	6	5	6	4	0	7	6	2	0
Ethics	7	4	7	5	2	7	2	0	3
Fashion	4	5	5	3	2	5	3	2	0
Health	8	11	11	3	5	11	11	3	2
ICT	8	8	9	4	4	9	7	1	2
Innovation studies	10	5	9	7	4	10	6	1	0
Material	5	5	4	0	0	5	2	0	0
Public sector	6	5	5	6	1	6	1	0	1
Public spaces	3	2	3	2	1	3	0	0	0
Services	4	2	4	2	2	4	2	0	0
Social innovation	6	5	4	3	1	6	1	1	0
Sustainability	2	5	5	2	1	5	1	3	0
Transportation	4	4	0	4	4	4	4	0	4
Specific topics from project	4	6	5	2	1	6	6	1	1

important threats, as the funded research that only stays relevant in the theory risks remaining detached from the practice and lacks potential of real and effective take-up and diffusion.

Connected to this, it is important to comment on the high discrepancy of results between the three impact categories. The scientific impact is the cluster that receives most attention from researchers. This is in line with the type of mission and institution that a university represents, with the production and diffusion of high-quality new knowledge at the core of its mission. Under this heading, all three pathways to impact are well represented. This also shows a good reputation of the Department among other researchers operating in the same discipline, as the academic diffusion of knowledge derived from the design research is mainly published and diffused through sectoral channels (e.g., design research journals and international conferences).

The area of societal impact plays as important a role. However, here we find the prevalence of one pathway linked to strengthening the uptake of R&I in society. As opposite, other areas linked to delivering benefits and addressing global challenges through R&I receive considerably less attention. This might represent a weakness, as it might indicate less attention towards developing research in frontier and emerging topics or in working in the more complex domains linked to the current global challenges (i.e., the Sustainable Development Goals, the digital transition, the climate and energy crises). At the same time, it might also indicate a lack of recognition of the design research operating in these domains by funding institutions and researchers in adjacent fields, thus requiring further efforts coming from the design discipline to reinforce and disseminate its relevance.

Finally, the area of technological and economic impact emerged as the weakest. This result indicates one of the main areas of concern and raises many questions. In this third area, the generation of innovation-based growth is the most tackled by funded projects; while consistently under-represented are the two other areas linked to creating more jobs and leveraging investment in R&I. The weakness in generating technological/economic impact raises concerns linked to the untapped potential of the Department to participate more consistently in technological research. This is in opposition to its strong relationship to engineering disciplines and with industries (from 2018 to 2021 the Department has established 400 research agreements with 263 enterprises and institutions). Building on this, many areas of future improvement might emerge in response to the need to reinforce the collaboration of the Department with researchers in technological disciplines. This might help strengthen the impact of the research conducted at the Department, while also leading to exploring more consistently future and emerging research topics.

6.4.1 Open questions

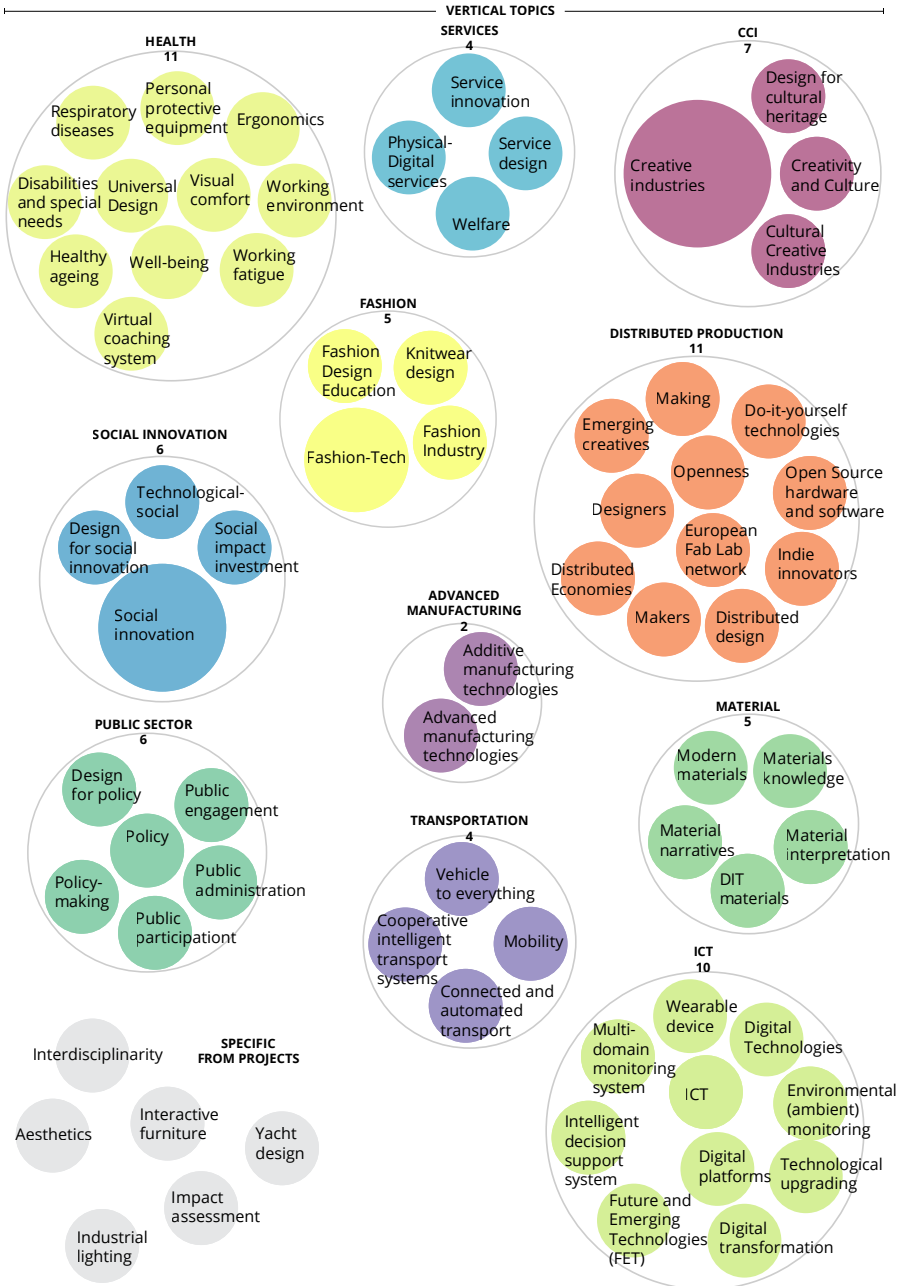
Building on the picture described, open questions emerge that might lead to future areas of work to strengthen the impact of the design research conducted at the Department. These are linked to three main areas of reflection:

- *theorical positioning and stronger relationship with technological disciplines*: to reinforce its role in funded research projects, the Department might need to clarify its peculiarities focusing on the added value of the approach that design brings to R&I. This might help find new collaborations and create new and stronger links with technological disciplines, where the participatory and iterative approach of design might represent an added value to tackle the complexity of current global challenges;
- *future and emerging research topics*: to strengthen the technological/economic impact, researchers at the Department might need to reinforce their attitude to exploring future and emerging research challenges. These might again be linked to reinforcing collaboration with technologists, but it might also cover disciplines dealing with transformation and transition management. The recent attitude of design to look into organisational and systemic change and its consolidated process to tackle ill-defined issues might be further reinforced to open/explore new frontiers of the discipline.
- *internal impact and link between research and education*: in the analysis conducted, the internal impact of the research also seems weak, that is the impact that the results of the funded research has inside the institution itself. There seems to be no pathway or practice to transfer the results of the research internally to the institution and build on existing or past work. This is evident also in the lack of a clear link between the research conducted and the teaching delivered, that often leads educational programmes to remain more static when compared to the evolution of the discipline. A stronger reflection is needed in this area to consolidate good practices aimed at transferring research results between researchers and towards educational programmes. In the long run, this might help strengthen a sense of community at the Department, but also to reinforce impact on society and economy as the new generations trained might represent an important multiplier of collaborations for the university.

6.4.2 Limits of the analysis

The analysis presented in this chapter has adopted an interpretative approach. As such, it suffers of all the typical limits associated with this type of qualitative work. One important limit is linked to the application of an impact assessment framework developed for research activities conducted from 2021 onwards (year in which HEu has started) to a sample of projects run from 2014 to 2020. This means that the framework incorporates considerations and initiatives (i.e., the European Missions) that were not present when the projects in the sample were conducted. This discrepancy might have biased some of the results presented.

Limited understanding of the projects in the sample by the researchers that have performed the analysis might also have biased the results. Moreover, the sample itself might have skewed results, as only funded projects have been considered, leaving outside other forms of research projects like for example those conducted in direct collaboration with industry. Funded research projects are typically steered (in terms of topics and actions) by the funding authority, that dictates top-down both research strategies and main objectives. Although this element might have steered topics and pathways in a certain direction, the analysis focused on the specific activities conducted by the Department in the projects. This has contributed to mitigating this limit, allowing researchers to make considerations on how the Department has been recognised in these international and multi-disciplinary collaborations and thus its identity in terms of research impact.



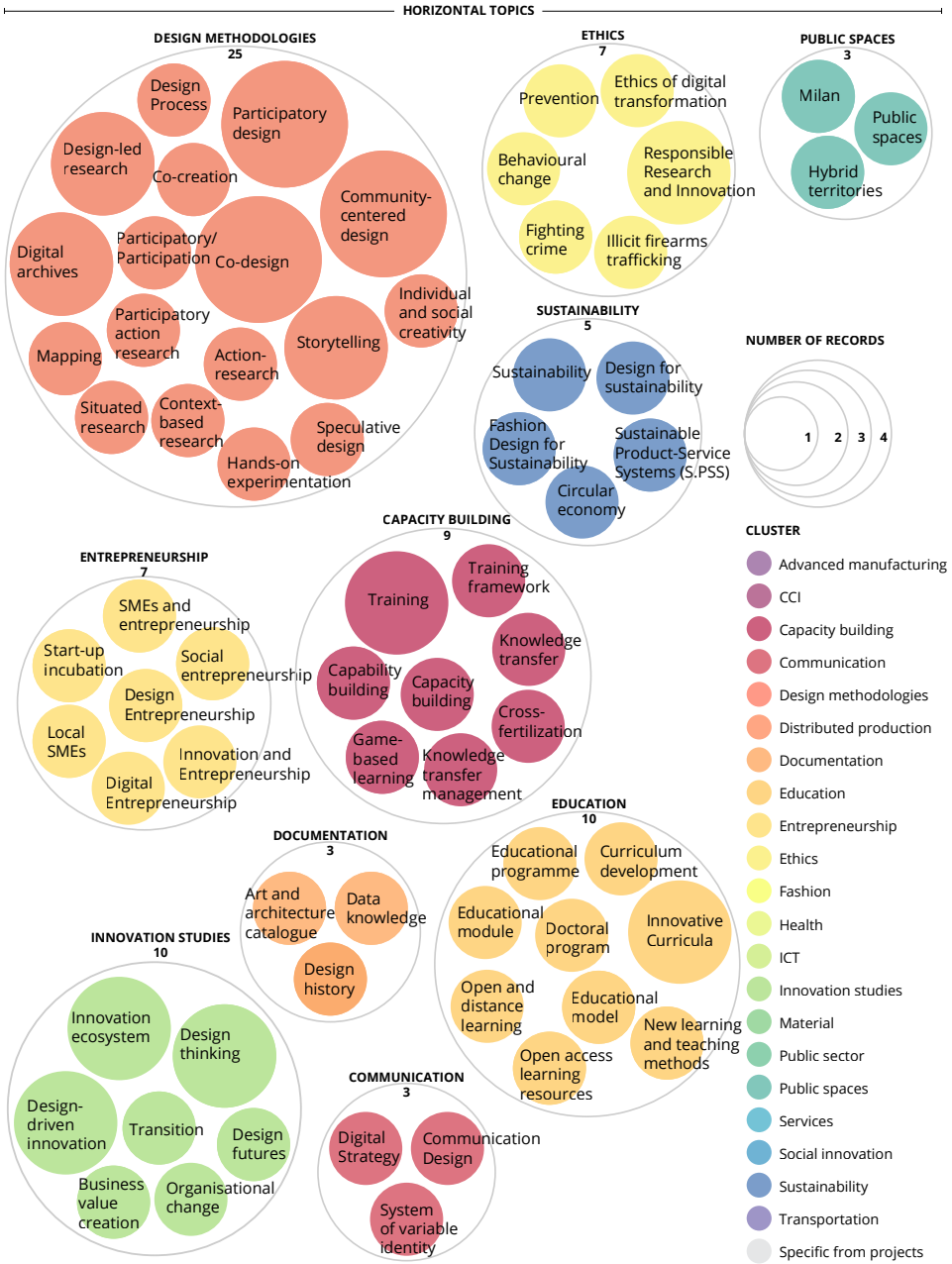
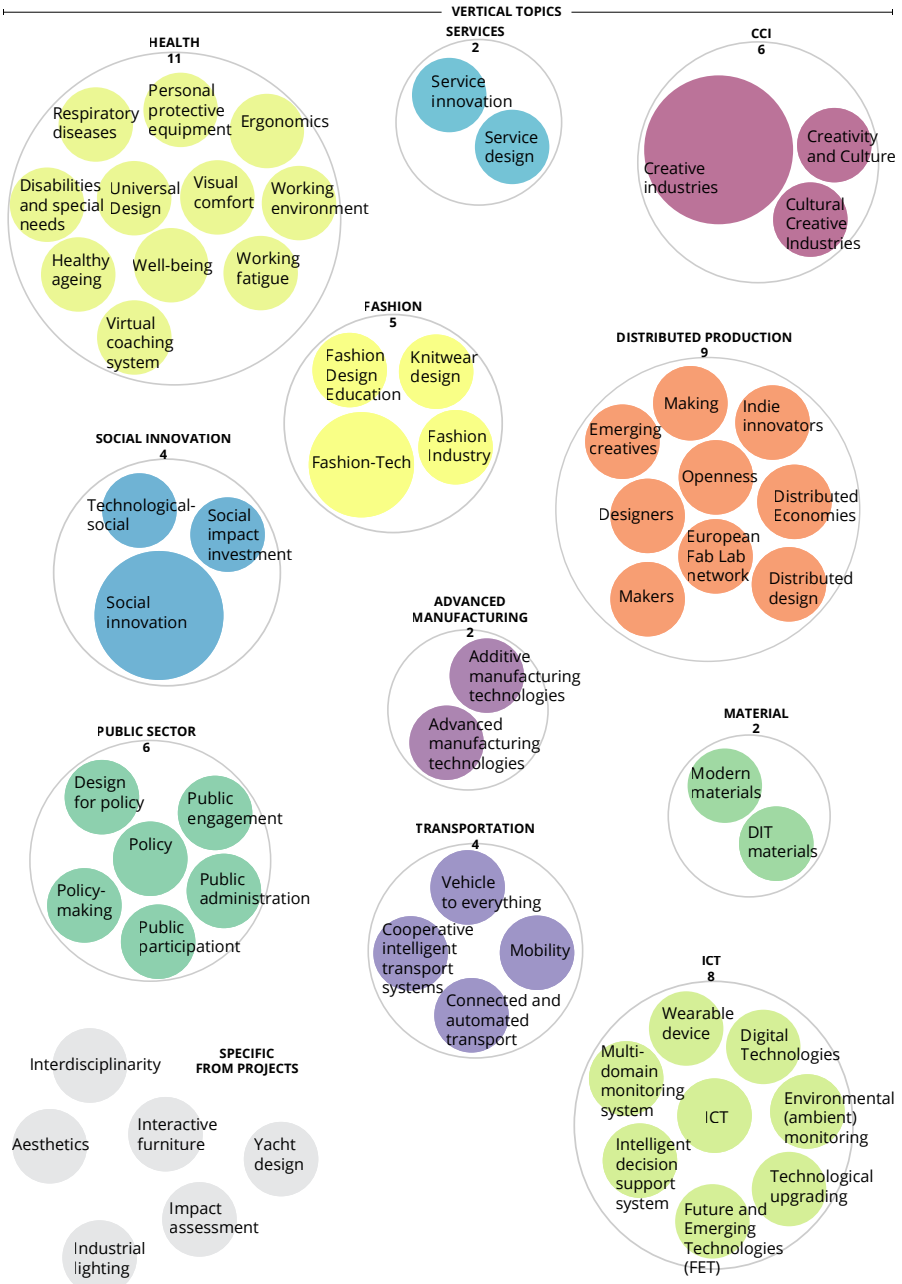


Fig. 6.4 – The distribution and relevance of the 22 clusters of research topics and the 159 related keywords indicating which research topic has contributed to reaching scientific and societal impacts.



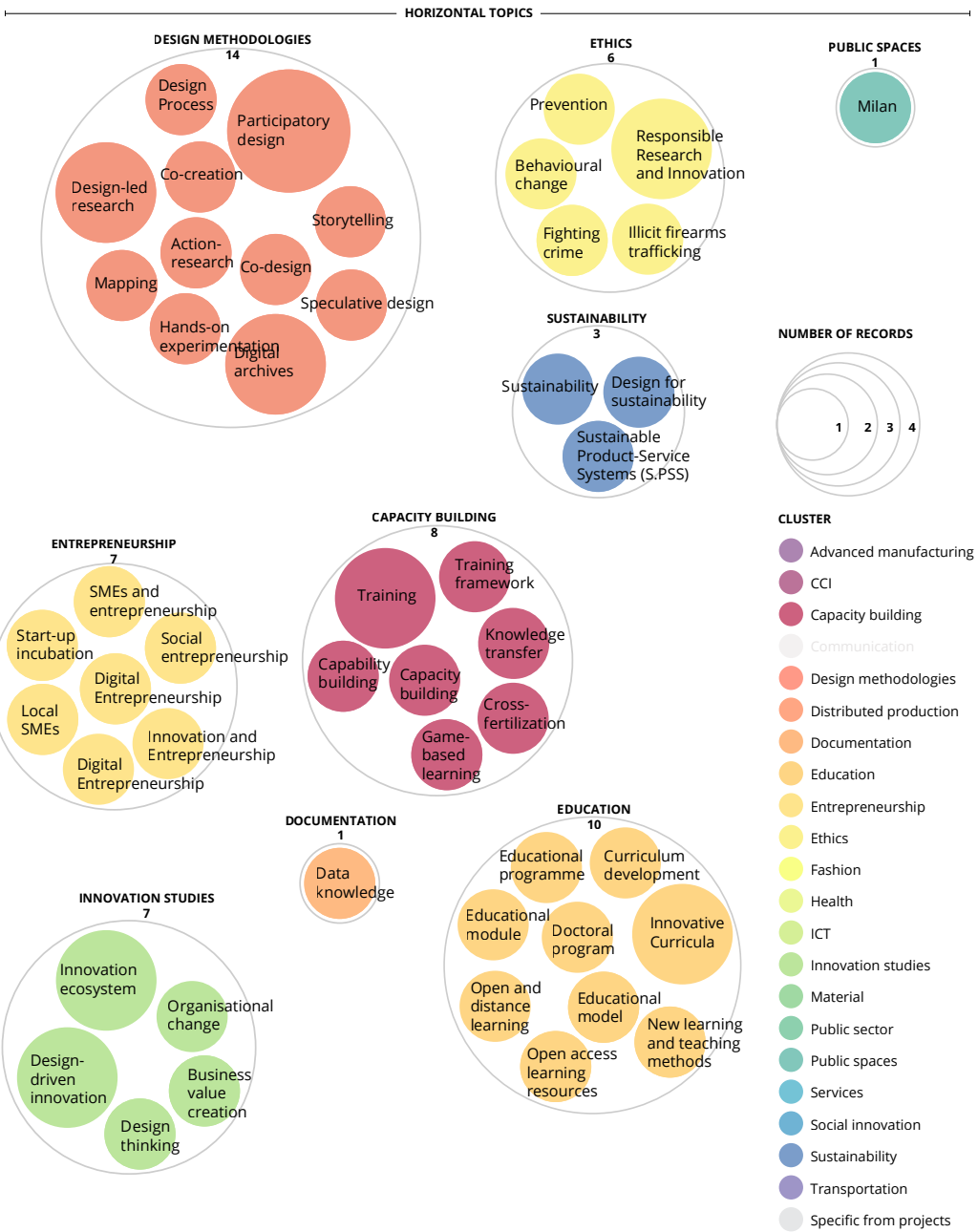
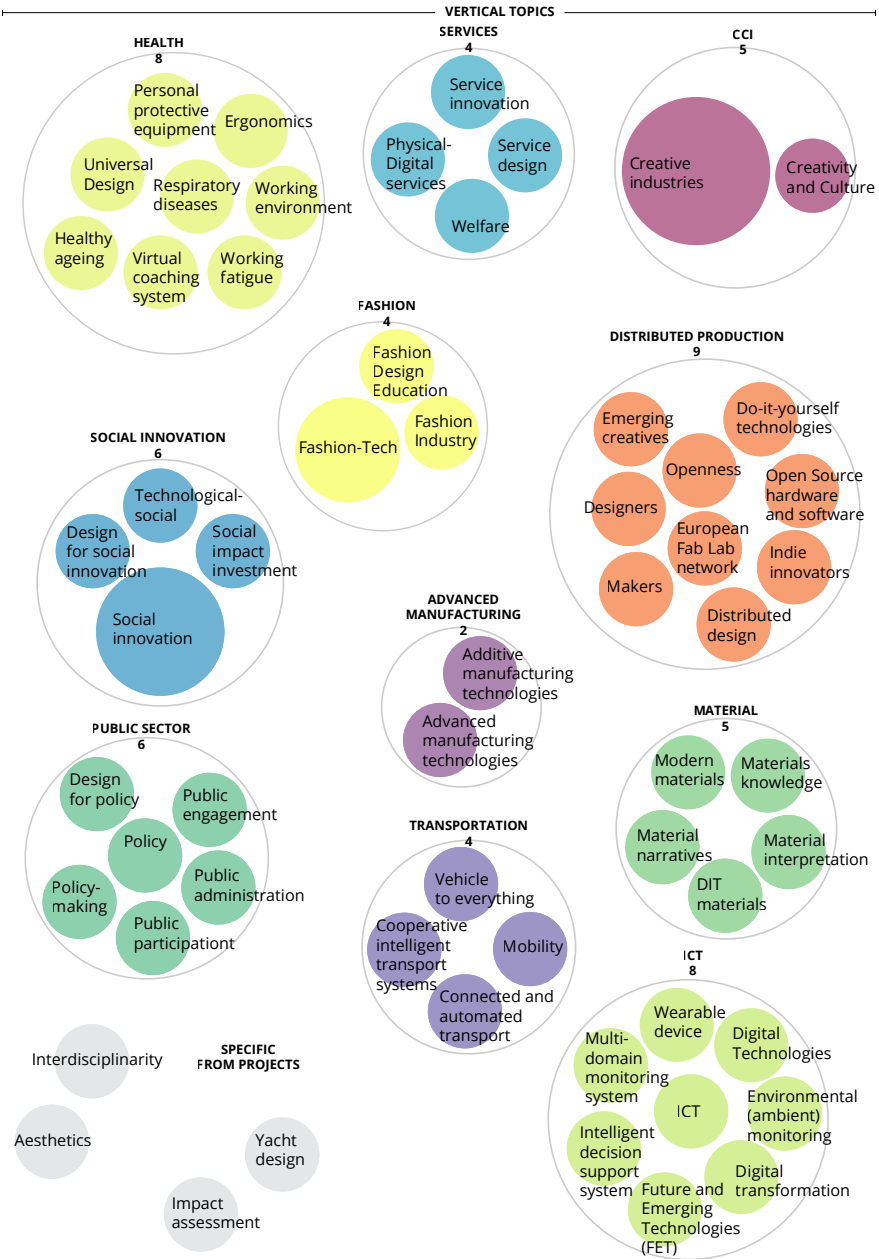


Fig. 6.5 – The distribution and relevance of the 21 clusters of research topics and the 121 keywords indicating which research topic has contributed to reaching technological/economic impact.



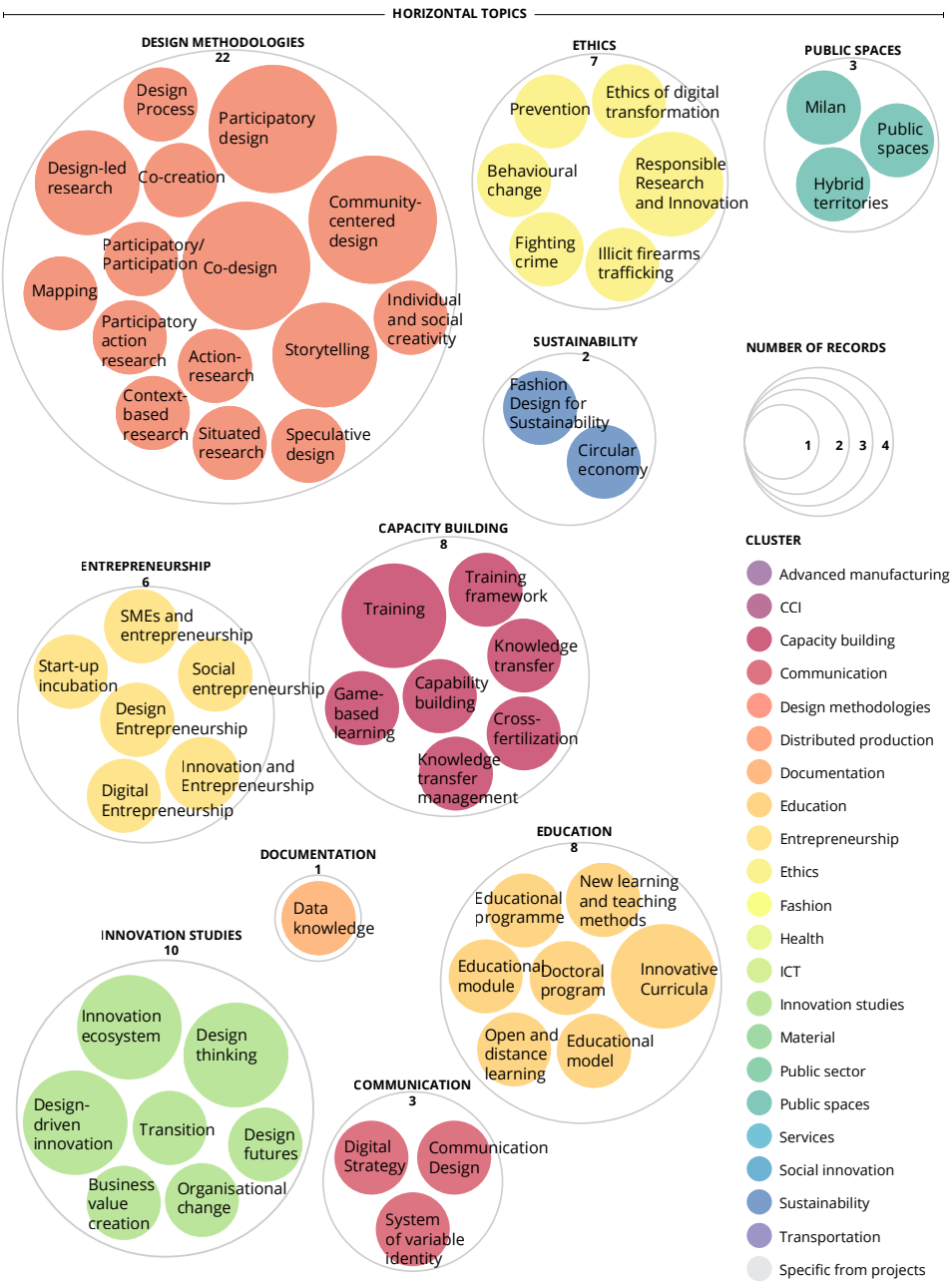
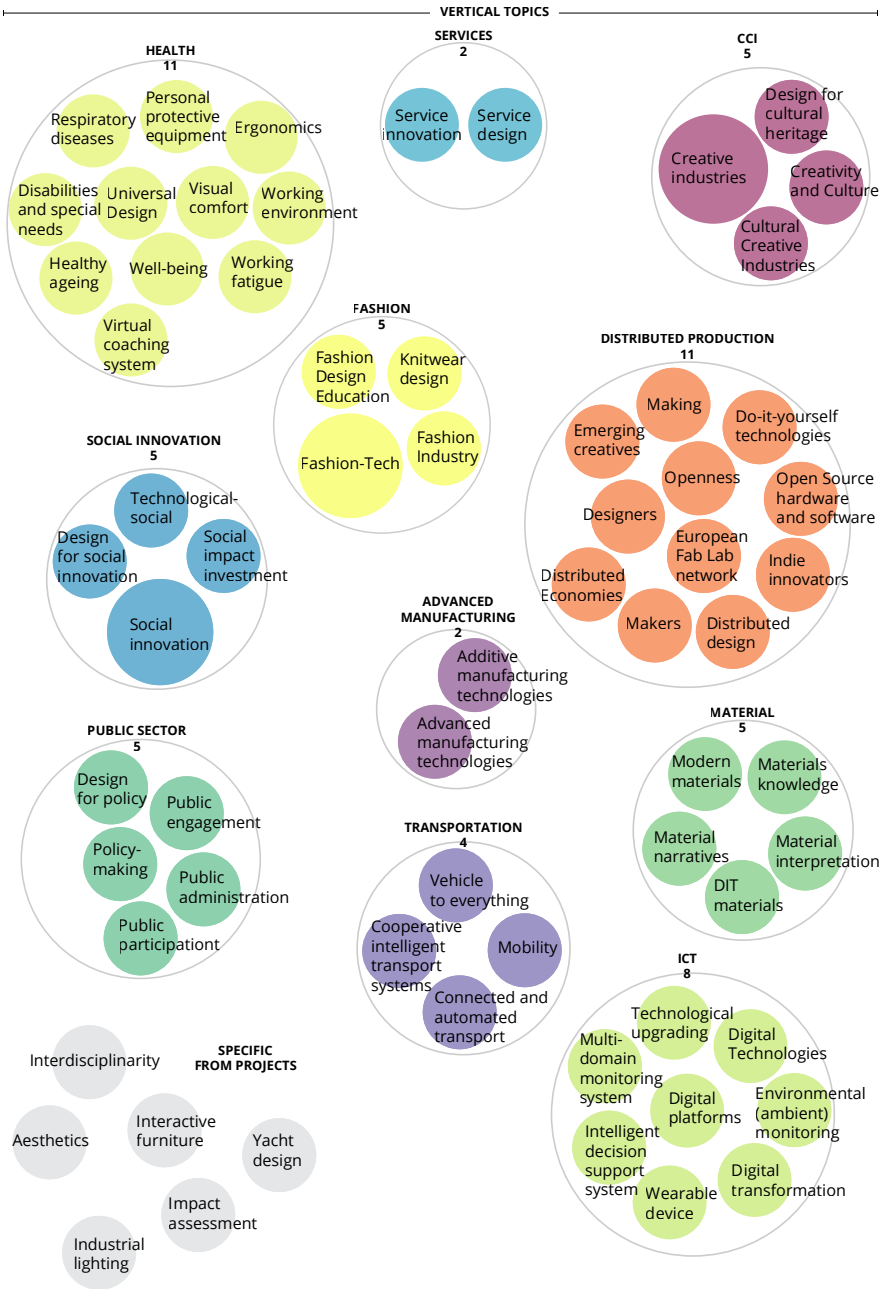


Fig. 6.6 – The distribution of the 22 clusters and the 135 keywords of the funded projects that have contributed to KIP#1 "creating high-quality new knowledge".



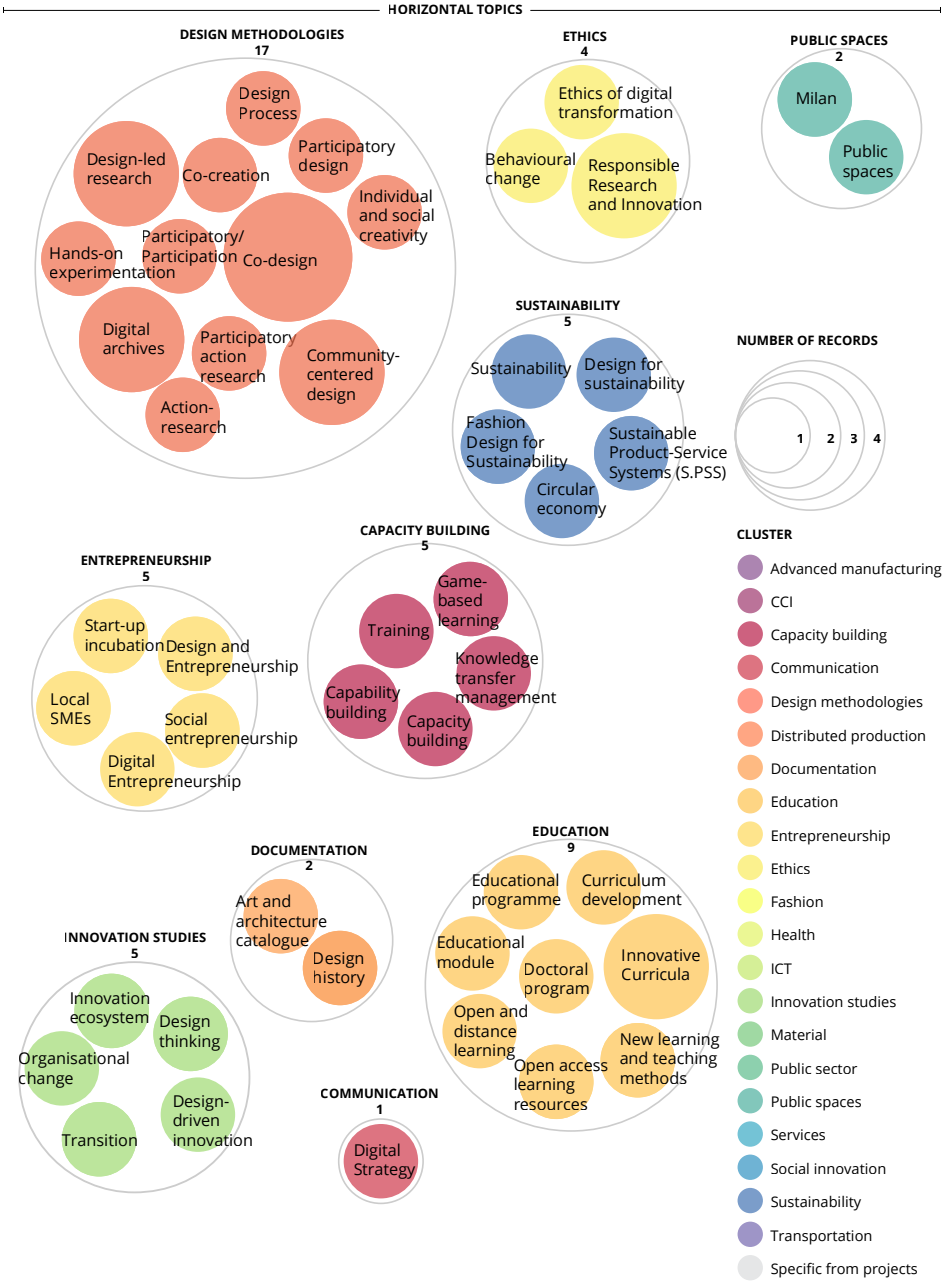
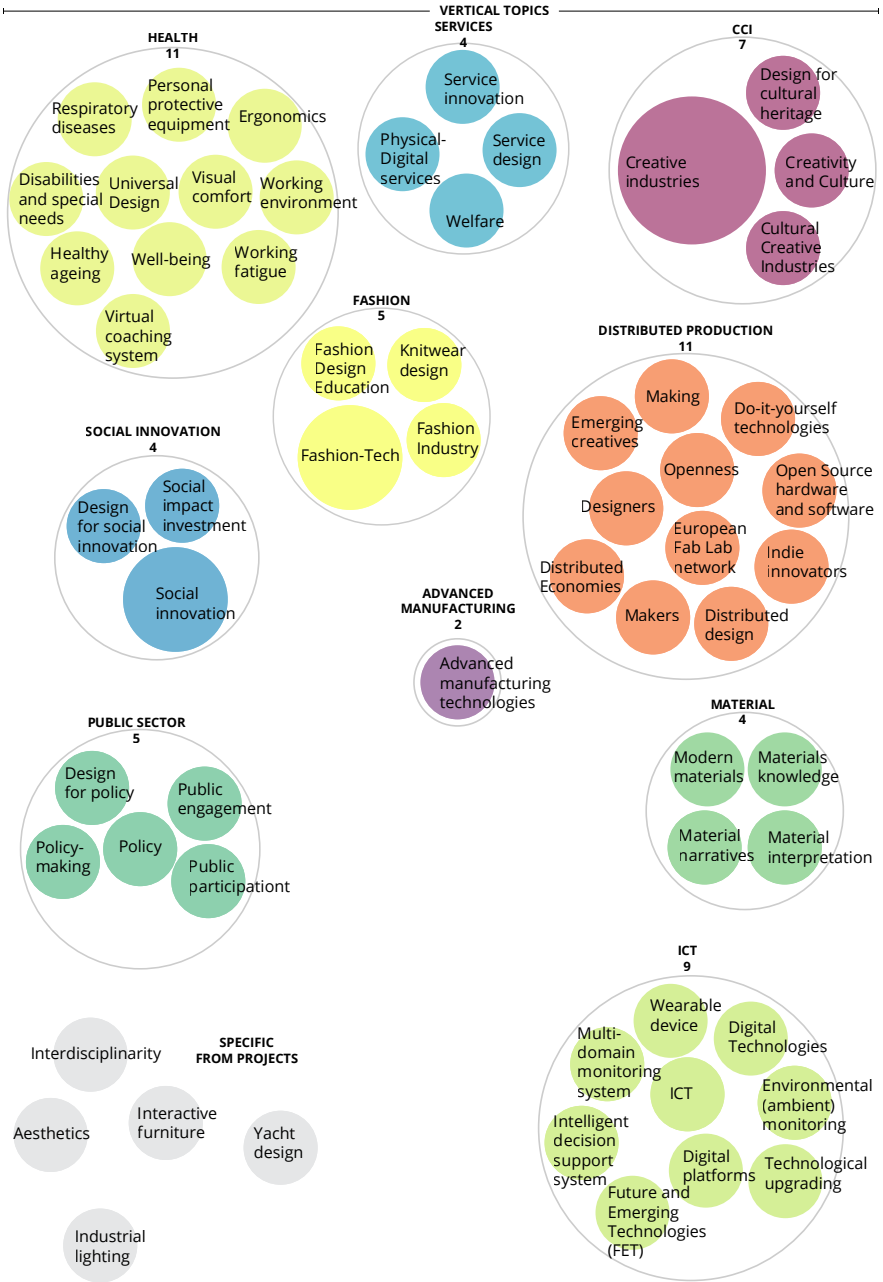


Fig. 6.7 – The distribution of the 22 clusters and the 124 keywords of the funded projects that have contributed to KIP#2 "Strengthening human capital in R&I".



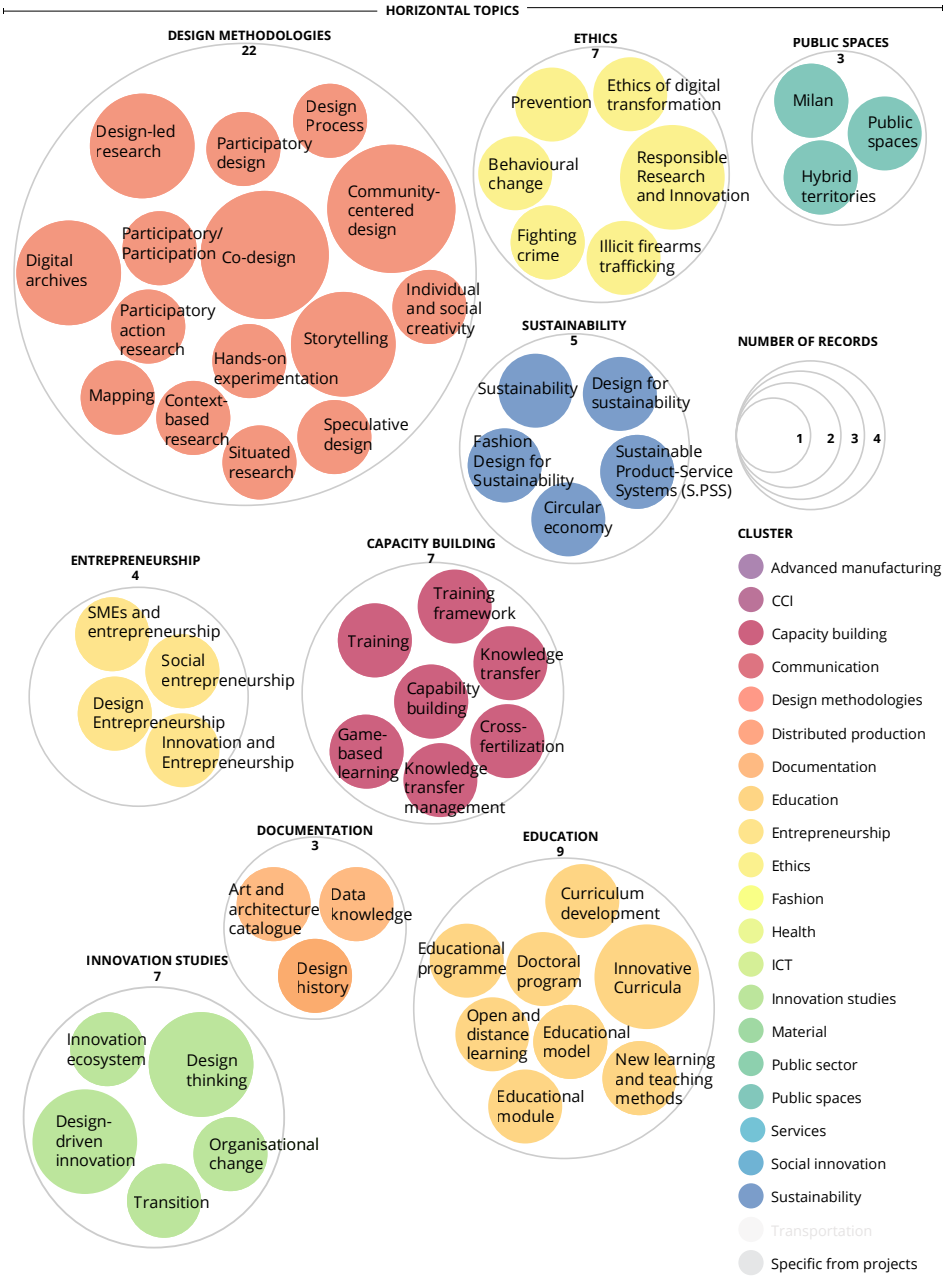
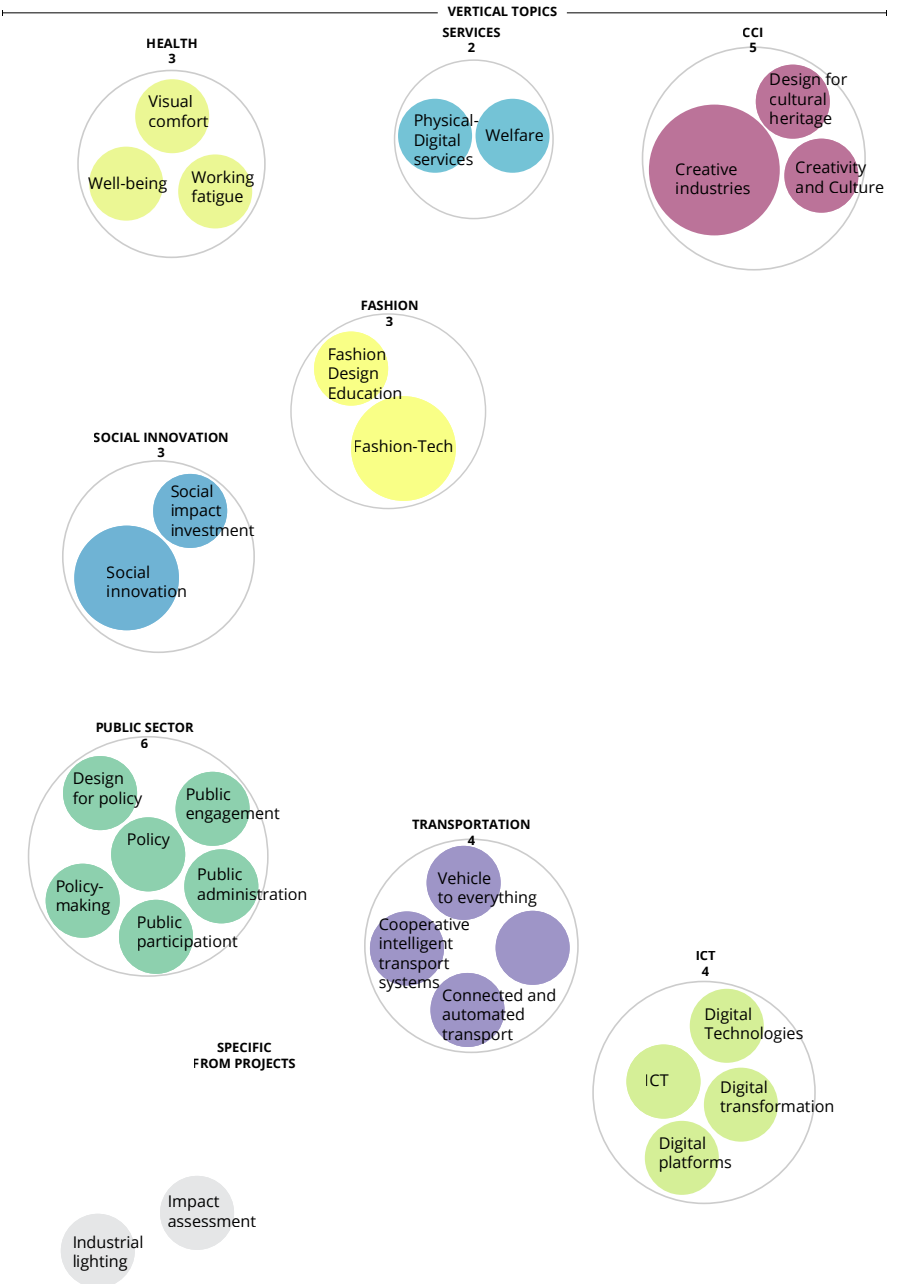


Fig. 6.8 – The distribution of the 21 clusters and the 139 keywords of the funded projects that have contributed to KIP#3 "Fostering diffusion of knowledge and Open Science".



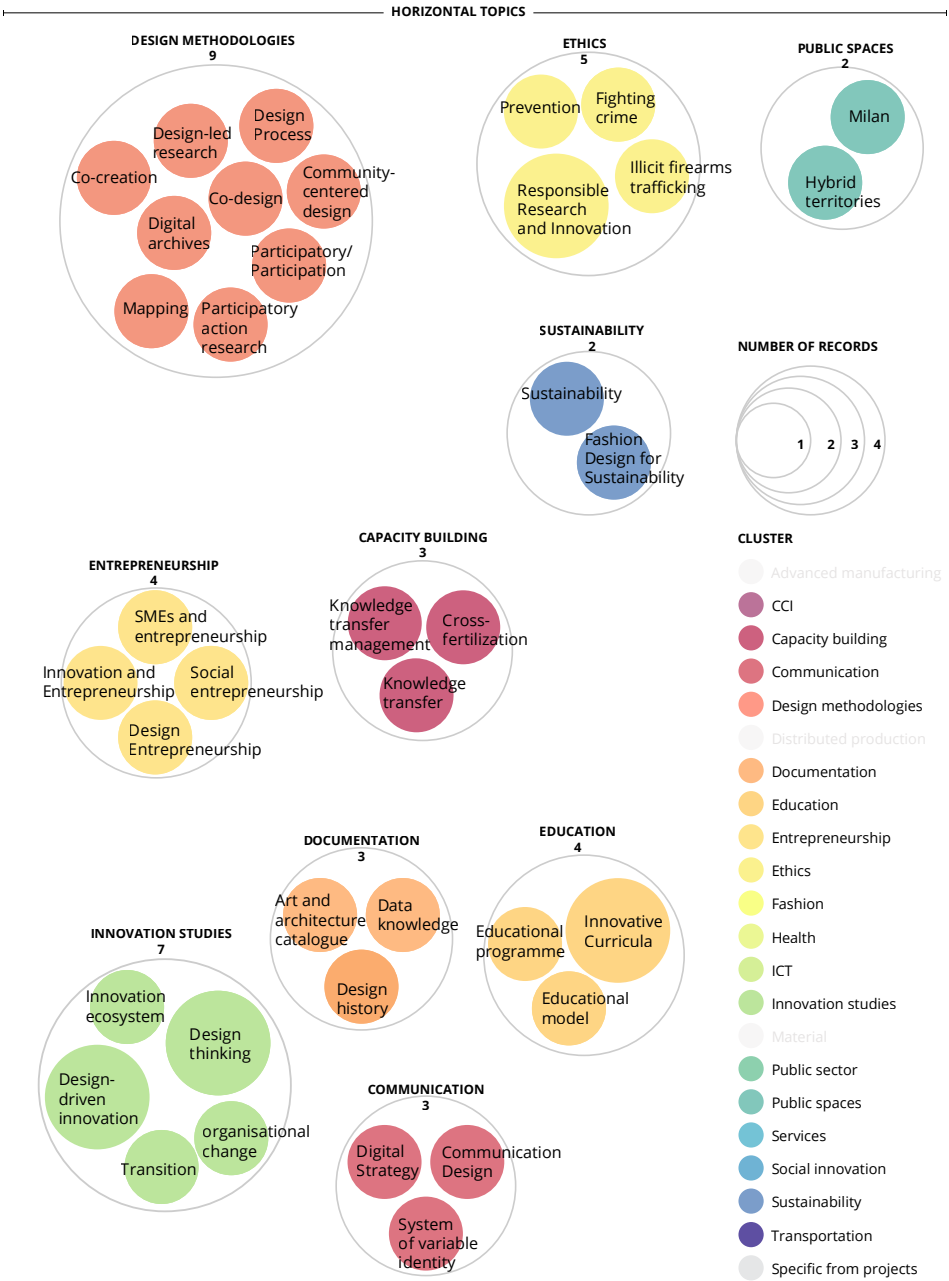
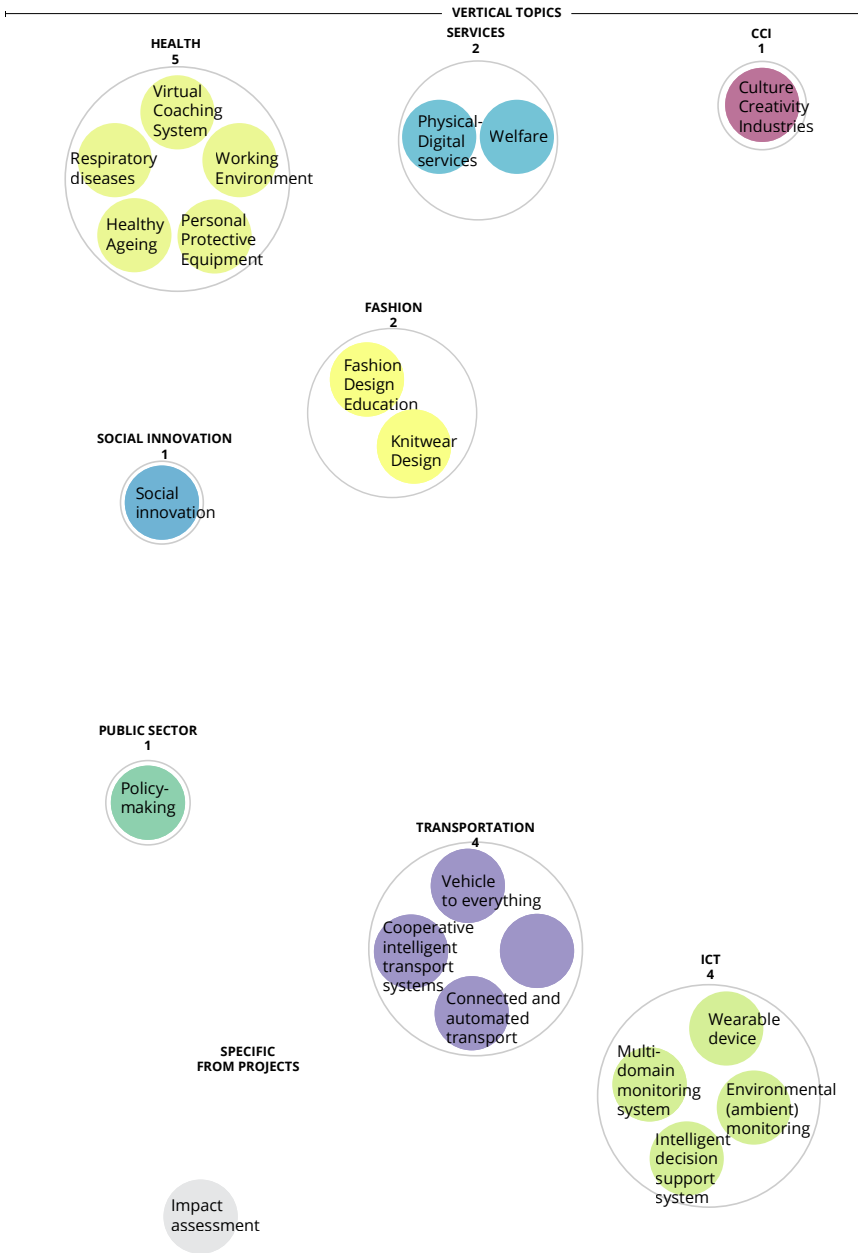


Fig. 6.9 – The distribution of the 19 clusters and the 74 keywords of the funded projects that have contributed to KIP#4 "Addressing EU policy priorities through R&I".



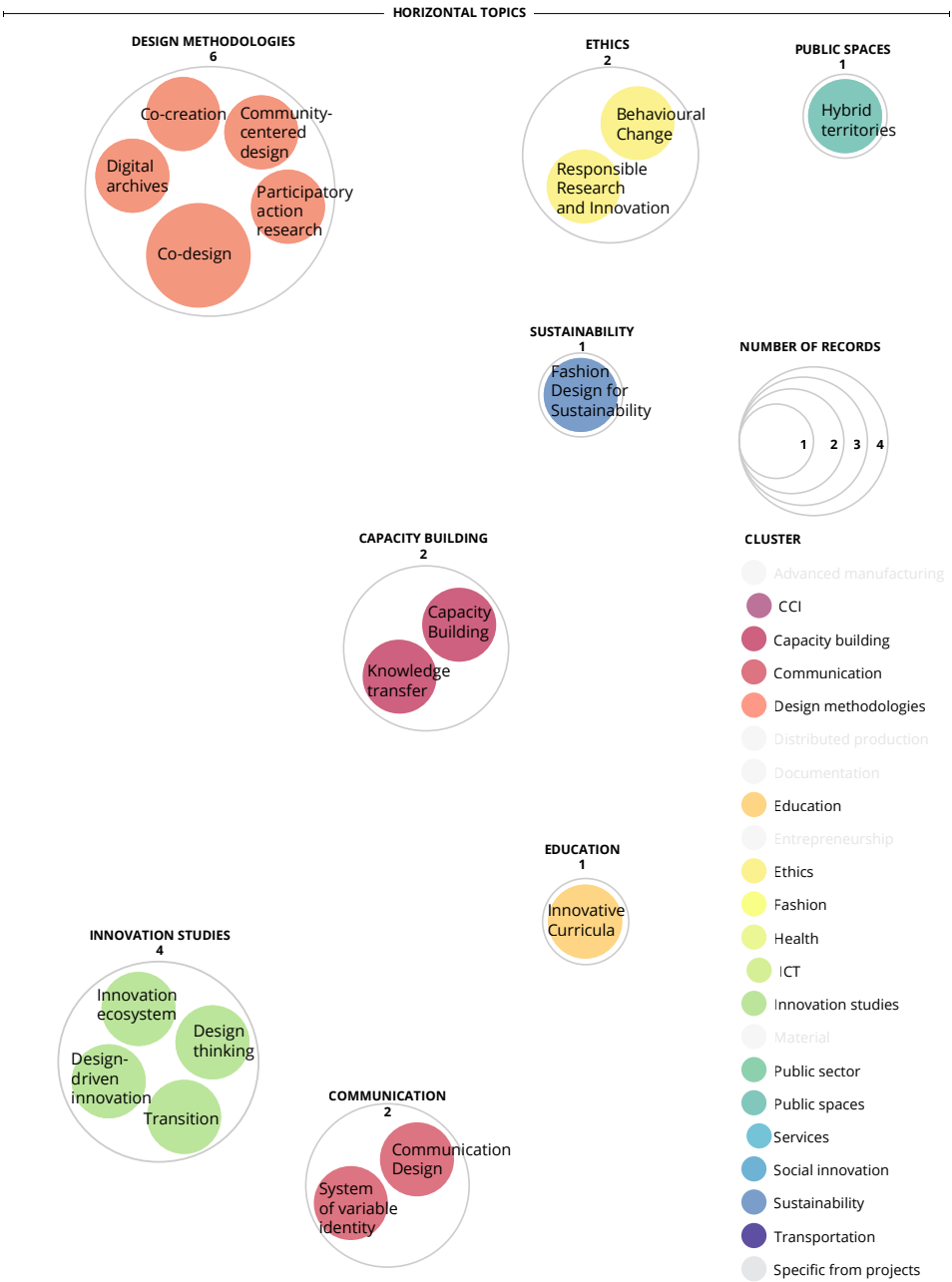
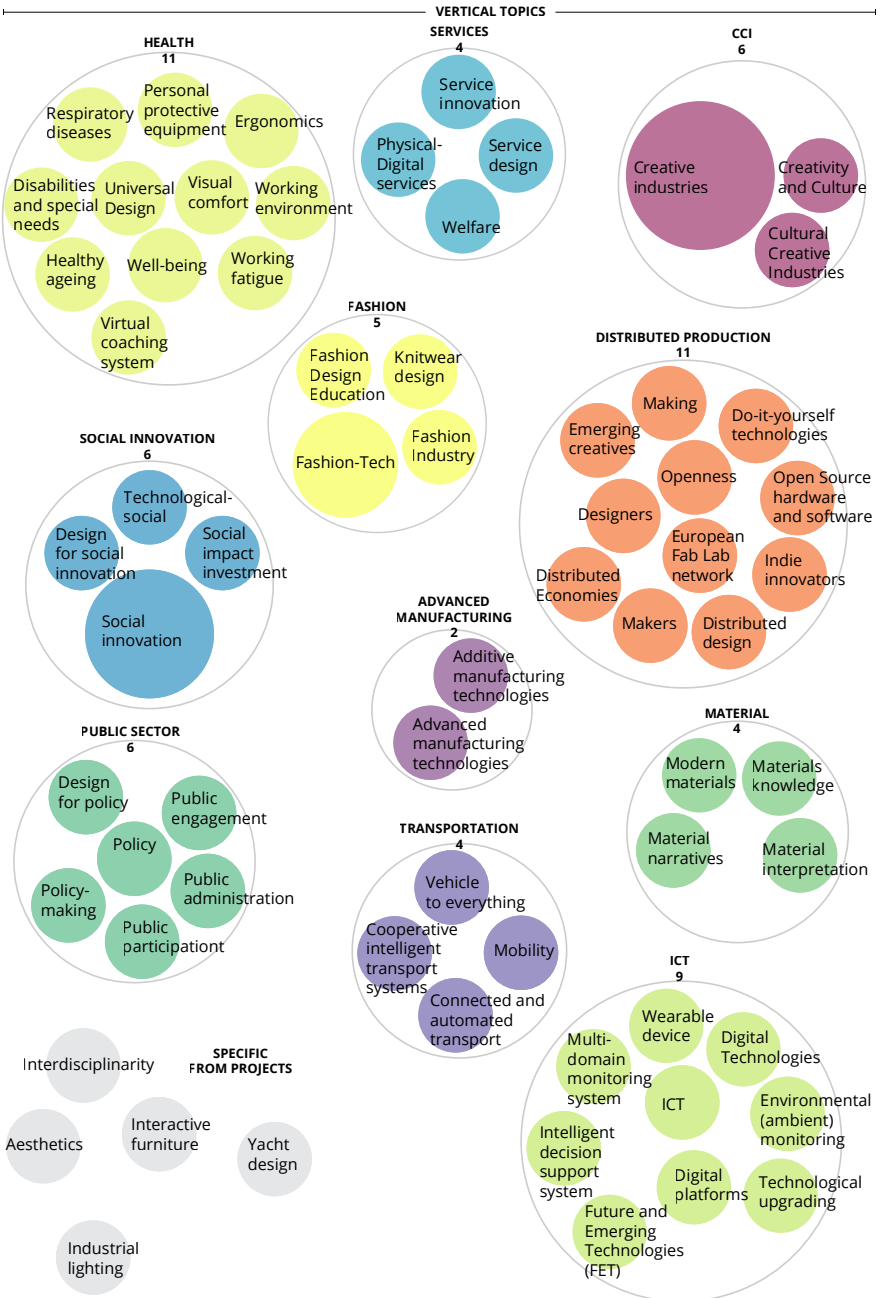


Fig. 6.10 – The distribution of the 17 clusters and the 40 keywords of the funded projects that have contributed to KIP#5 "Delivering benefits and impact through R&I missions".



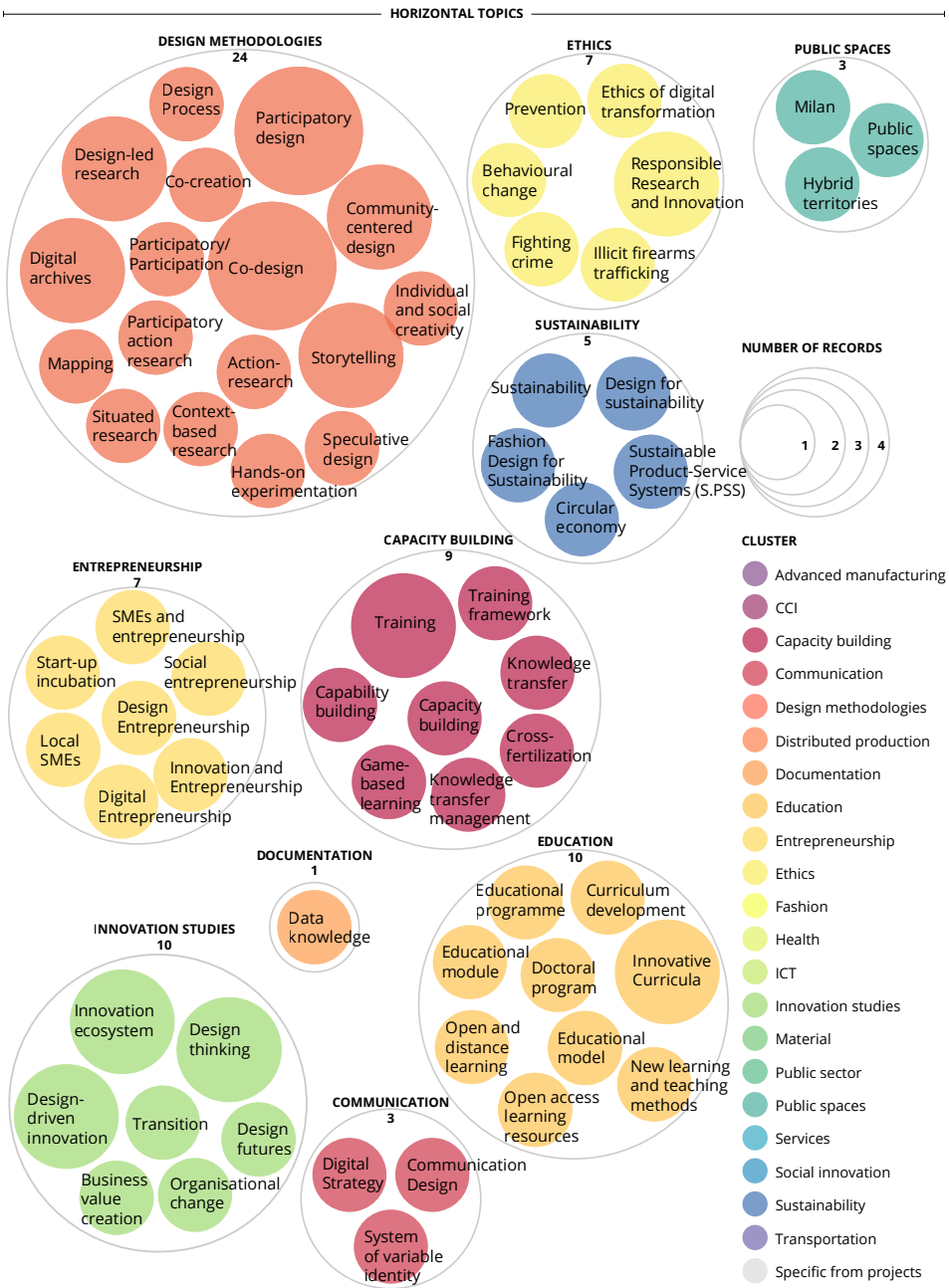
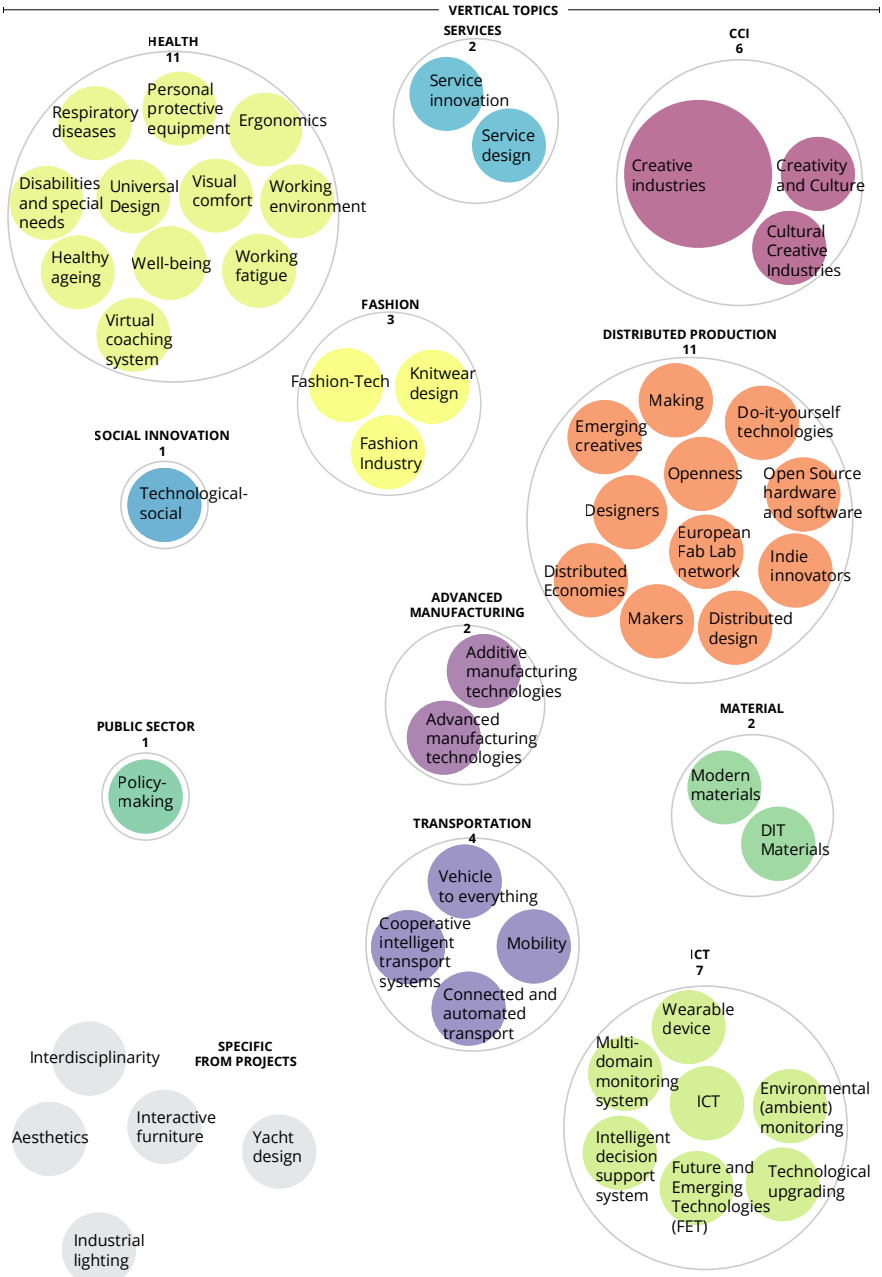


Fig. 6.11 – The distribution of the 22 clusters and the 154 keywords of the funded projects that have contributed to KIP #6 "Strengthening the uptake of innovation in society".



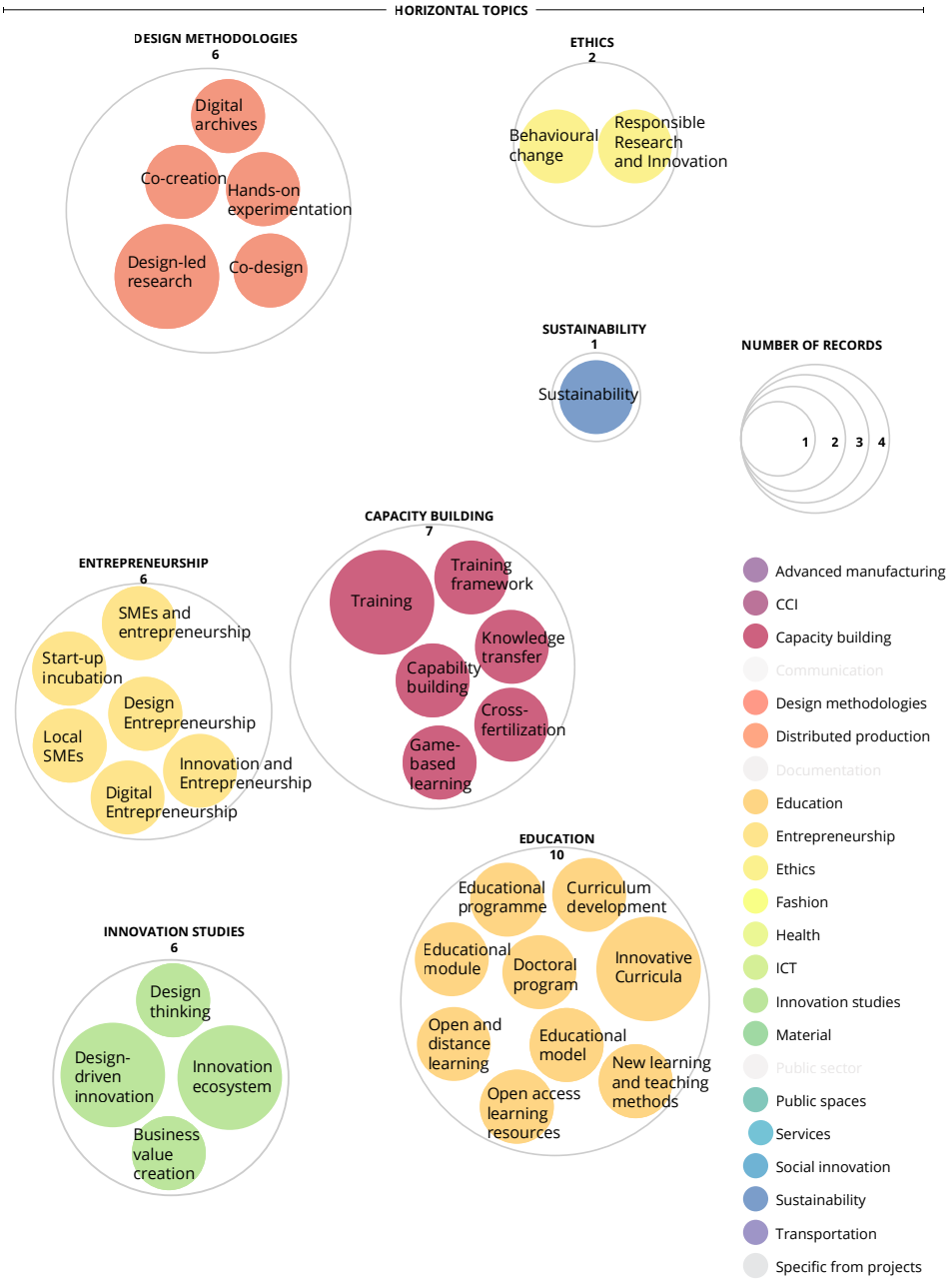
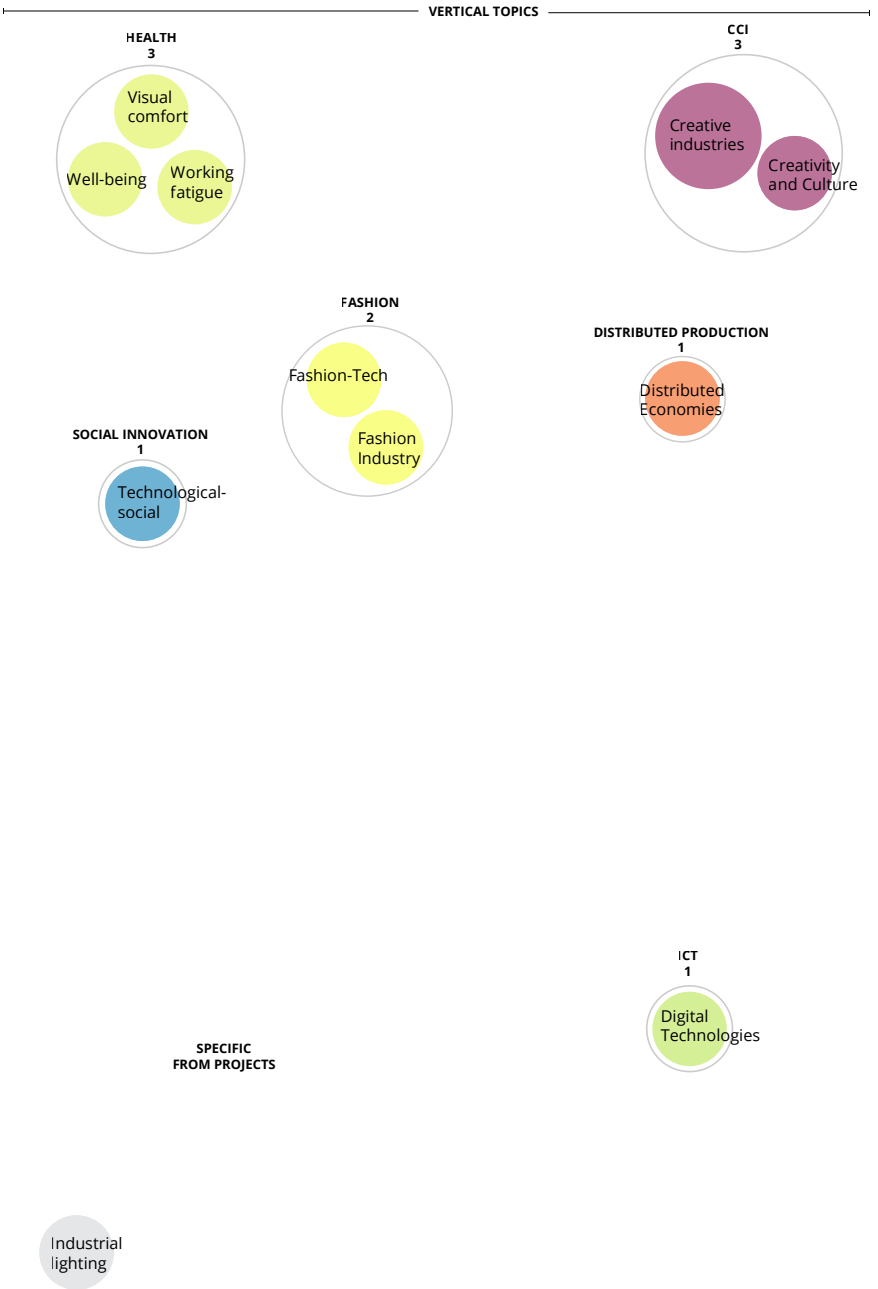


Fig. 6.12 – The distribution of the 19 clusters and the 85 keywords of the funded projects that have contributed to KIP #7 "Generating innovation-based growth".



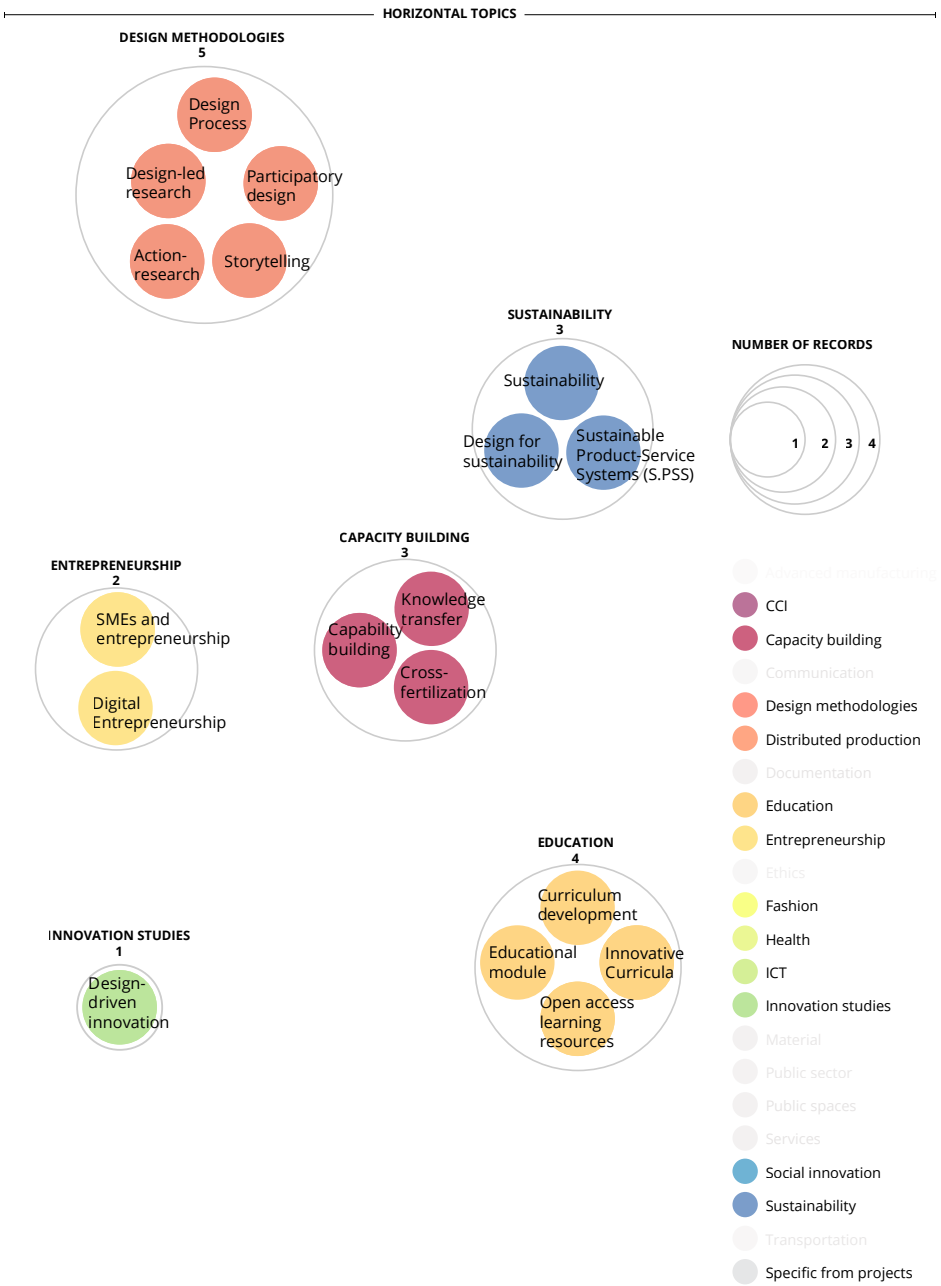
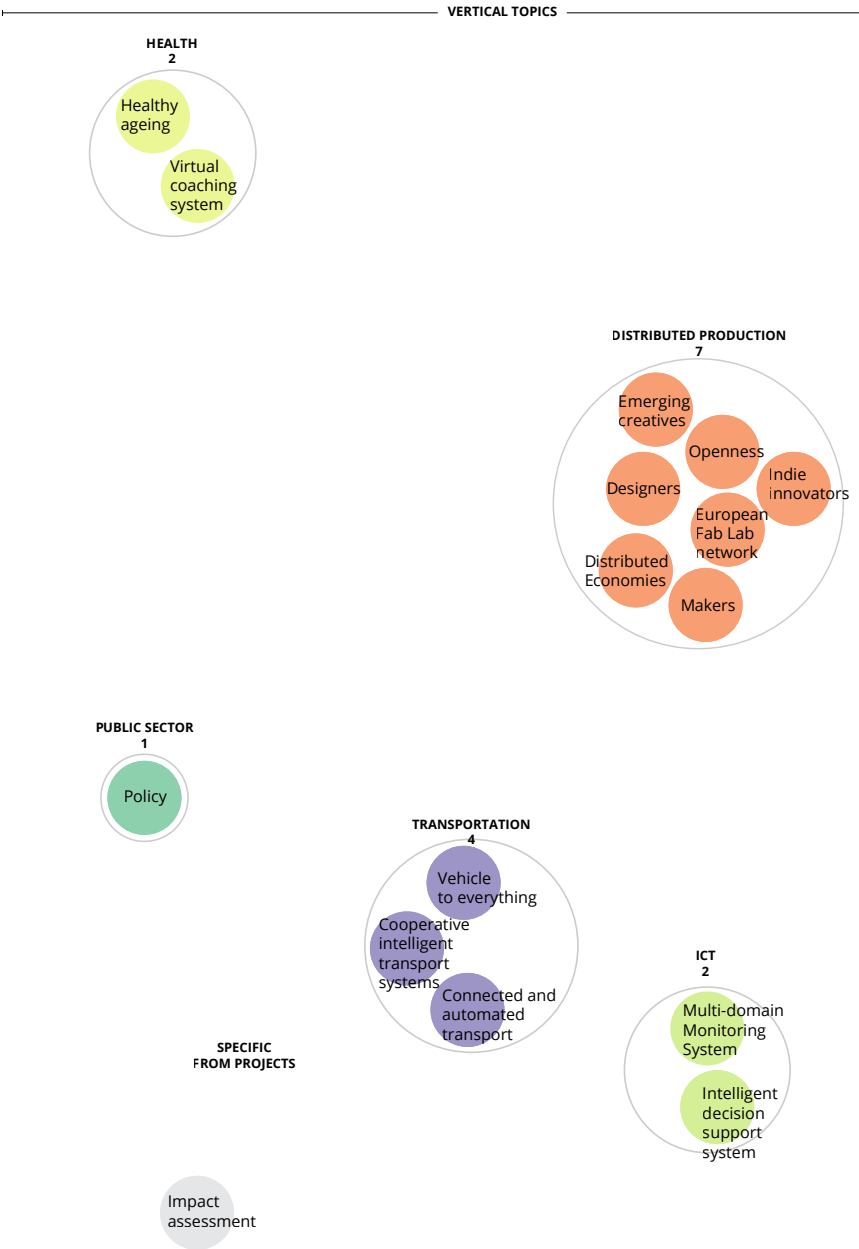


Fig. 6.13 – The distribution of the 13 clusters and the 30 keywords of the funded projects that have contributed to KIP #8 "Creating more and better jobs".



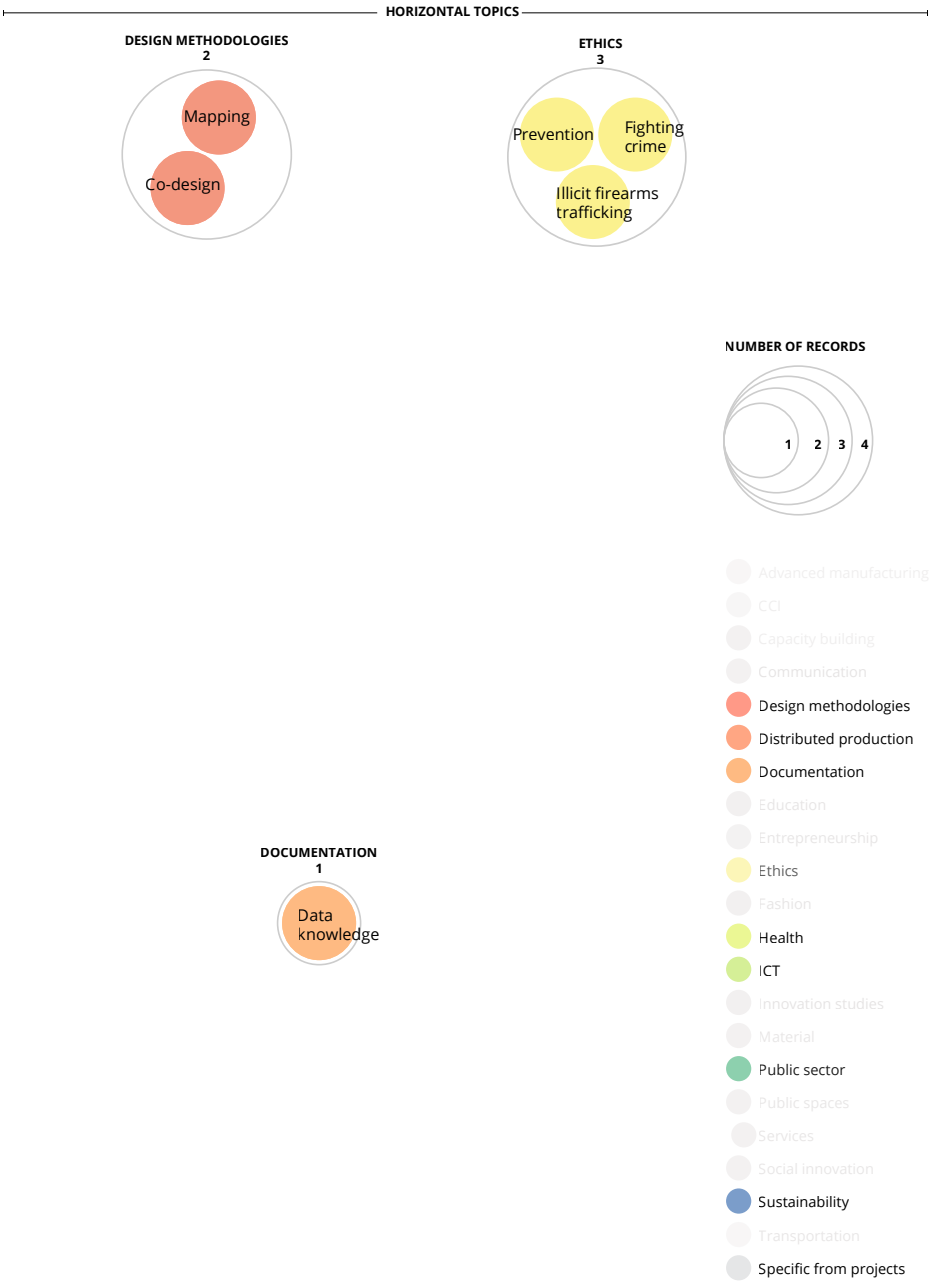


Fig. 6.14 – The distribution of the 9 clusters and the 23 keywords of the funded projects that have contributed to KIP #9 "Leveraging investments in R&I".

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Annex I.
Relationship between research projects, keywords, clusters, key impact pathways and impact categories

**PR = project name; ImPa= impact pathways; ImCa= impact categories*

PR	CLUSTERS	IMPACT	ImP	ImCat
C-Roads 5 keywords	Transportation, Specific from project	• Reinforcing/advancing knowledge on C-ITS and their possibilities • Contributing to develop a scientific community focused on the evaluation of the impact of C-ITS on mobility	#1	scientific impact
		• High recognizability and prominent role at National and International scale in measuring impacts of ITS/C-ITS technology on mobility • Advance of career: 1 position as RTDA	#2	
		• Informing the development of future vehicle control strategies and intelligent transport policies in EU	#4	societal impact
		• Increasing road safety • Contributing in decreasing congestion (sustainability)	#5	
		• Reinforcing/advancing knowledge on cooperative intelligent transport systems and their possibilities • Bringing new knowledge on C-ITS impact on drivers and social acceptance	#6	
		• Informing and nurturing the development and transferability of on-board technologies in the mobility sector	#7	technological /economic impact
		• Nurturing the development of harmonized strategies and C-ITS specifications for Europe	#9	
Cascina 9 5 keywords	Capacity building, Design methodologies, Social innovation	• Reinforcing the diffusion of co-design practices for social engagement and/for inclusion of migrants • Reinforcing knowledge and awareness on how to apply co-creation and social innovation processes • Further exploring of a research approach developing tools and methods replicable and scalable to other contexts	#1	scientific impact
		• Favouring capacity building and knowledge transfer to the local ecosystem about the application of co-creation for social innovation and social inclusion • Improving the quality of life of the Dergano neighborhood and reinforcing the sense of belonging of the community. • Reinforcing social engagement, inclusion, and	#6	societal impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		integration of migrants and refugee, and other vulnerable groups • Empowering the local community transferring skills on digital strategies to cultural operators partners through capacity building and knowledge transfer • Increasing awareness and sensibilization towards the migrants/refugee experiences in the neighborhood • Reinforcing attitudes of social engagement and/for inclusion of migrants between HEI, local communities, cultural associations and organizations • Strengthening collaboration with cross-sector actors		
		• Supporting and boosting the local economic ecosystem, and activate virtuous behaviors	#8	technological /economic impact
Eupolis 5 keywords	Communication, Education, ICT, Innovation studies, Public sector	• Reinforcing cross-sector knowledge for supporting digital transformation in the PA sector	#1	scientific impact
		• Reinforcing understanding of social innovation processes and digital transformation in the PA • Favouring the operationalization of digital strategies for PA • Favouring the development of a solid relationship with the actors and stakeholders, and further collaborations between the higher education domain and the public sector	#2	
		• Reinforcing Regione Lombardia's knowledge on how to operationalize and apply corporate social responsibility in the PA • Informing policies for supporting a more efficient digital transformation in the Regione Lombardia	#4	societal impact
		• Strengthening knowledge transfer on the topic of communication, digital strategy, digital transformation • Favouring capacity building and impacting on power dynamics among the PA depts • Favouring organisational change and better communication within Regione Lombardia • Contributing to overcoming a siloed mentality with knowledge transfer among the triple helix actors • Increasing PA knowledge on how to strategically plan the communication of/within the organization	#6	
PUDCAD 5 keywords	Capacity building, Education, Health	• Contributing to the discourse on the advancement of CAD-based design modelling and its implementation, and the use of game-based learning for including universal design principles in design education	#1	scientific impact
		• Favouring capability building in HEIs students • Strengthening collaboration with cross-sector	#2	

PR	CLUSTERS	IMPACT	ImP	ImCat
		actors (researchers/academia, HEIs, associations/NGOs)		
		• Reinforcing collaboration, knowledge and experience exchange to include reasonings on special needs in design education across borders • Sharing open access knowledge on the topic of universal design principles	#3	
		• Strengthening the quality of design education implementing principles of Universal Design • Strengthening the awareness that reflection on accessibility and its impact on social exclusion need to be included in design education curricula • Enriching design curricula spreading new engaging approaches in CAD-based design development process • Exchanging cross-sector scholarship and know-how on how to embed UD principles in design education and HEIs • Favouring networking and reinforcing synergic cooperation between HEIs and NGOs dealing with disability	#6	societal impact
		• Supporting Universal Design Principles in HEIs through video game (software) and its supporting infrastructure	#7	technological /economic impact
LDI 5 keywords	Health, Sustainability, Specific from project	• Strengthening the cooperation with ENEA	#2	scientific impact
		• Providing open access to knowledge on the relevance of sustainable and better lighting	#3	
		• Supporting competitiveness and sustainable development of national lighting policy for improving working conditions	#4	societal impact
		• Improving the working environment impacting on work efficiency – new design of lighting system • Improving the quality of life of the workers • Favouring capacity building and knowledge transfer from academy to industry	#6	
		• Contributing to the development of optimized and more sustainable lighting ensuring workers' visual comfort	#7	technological /economic impact
		• New working position	#8	
FIRE 6 keywords	Design methodologies, Documentation, Ethics, Public sector	• Knowledge and the skills acquired have been applied in other contexts	#1	scientific impact
		• Strengthening the position of the research lab in data-intensive research projects.	#3	
		• Informing the policy framework to deal with and fight ITF • Reinforcing knowledge on firearms transfers as a foreign policy instrument to set security	#4	societal impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		requirements and objectives • Providing indications for future initiatives, policies, strategies, and decision-making on ITF		
		• Building knowledge of ITF logics, actors, and channels • Impacting on EU security by informing the setting of tangible objectives towards reduction in firearms flows. • Bridging scholarship from different disciplines to provide new knowledge out of data spread online	#6	
		• Favoring knowledge transfer across sectors	#9	technological /economic impact
SISCODE 5 keywords	Design methodologies, Ethics, Innovation studies, Public sector	• Increasing knowledge of co-creation processes in diverse European contexts • Increasing cross-fertilization between Design and RRI field by introducing new drivers for responsible innovation in STI • Advancing reasoning on the need to include other forms of innovation in the science-based and tech-oriented RRI field	#1	scientific impact
		• Reinforcing collaboration between a multi-actors ecosystem at local-to-national level to boost knowledge uptake in policy-making • Strengthening knowledge on assessing the impact of co-creation in organizational/institutional change	#2	
		• Reinforcing knowledge on the role of stakeholder engagement in co-creation and co-production processes • Further developing a research group approach, feeding the debate on co-creation practices in STI policy making	#3	
		• Connecting different levels of policymaking for reinforcing knowledge and spreading approaches to multi-level governance • Contributing to overcoming a siloed approach for better integrating co-creation in policymaking	#4	societal impact
		• Contributing to overcoming researchers, innovators, and policy makers prejudices and preventions on co-creation in STI	#5	
		• Providing guidance to cope with organizational barriers and resistance to change preventing concrete implementation of RRI solutions and policies • Contributing to mitigating the gap between ideation and implementation in the co-creation of RRI policies and solutions • Favouring the introduction of a pragmatic culture a largely theoretical sector (RRI) • Providing guidance towards better ways to engage	#6	

PR	CLUSTERS	IMPACT	ImP	ImCat
		stakeholders & civic society in STI • Reinforcing knowledge on how co-creation for RRI can impact organizations • Providing guidance to concretely support the implementation of co-creation in RRI solutions and policies • Strengthening cross-sector capacity building an knowledge transfer on the application of design methods for co-creation • Improving the capacity to design appropriate citizen science and other co-creation processes in RRI field • Contributing to mitigate the gap between theory and practice in STI domain • Increasing the understanding of dynamics and circumstances that favor or hinder co-creation for RRI • Contributing to diffuse the culture of co-creation in R&I communities and in the industry • Contributing to better integrating the voice of society in science and innovation. • Favouring the uptake of co-creation to effectively engage society in science, technology and innovation.		
		• Supporting therapists and families of impaired children for home rehabilitation.	#7	technological /economic impact
campUS 5 keywords	Capacity building, Design methodologies, Social innovation	• Deepening and expanding knowledge on practice-based experimentations in design for social innovation research	#1	Scientific impact
		• Enriching design curricula, with an emphasis on students' active participation and engagement • Strengthening collaboration with cross-sector actors	#2	
		• Scaling-up of the co-creation processes towards a systemic approach in the urban context • Reinforcing synergies between university and civil society through knowledge transfer on transformation of the public spaces • Reinforcing the advancement of knowledge and diffusion of strategies for quality transformation • Reinforcing collaboration with a multi-actors ecosystem at local level for further collaborations • Further developing a research group approach for participatory action research methodologies in design for social innovation	#3	
		• Strengthening the exploitation of the co-creation processes of public spaces to provide evidence-based policy options	#4	societal impact
		• Boosting the proactive engagement of the civil society in the transformation of the public spaces	#5	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Boosting the proactive engagement and participation of the civil society in co-creation processes • Empowering NEETs with know-how to transfer specialised knowledge with the purpose of strengthening their employment potential • Exploring the replicability of the approach and of the modus operandi of the methodology applied and of the multi-actors network of local stakeholders towards a long-term uptake in society	#6	
Human Cities 5 keywords	Design methodologies, Public spaces, Social innovation	• Deepening and expanding knowledge on practice-based experimentations in design for social innovation research	#1	scientific impact
		• Strengthening collaboration with cross-sector actors internationally and with international entities • Enriching design curricula, with an emphasis on students' active participation and engagement	#2	
		• Scaling-up of the co-creation processes towards a systemic approach in the urban context • Reinforcing collaboration between a multi-actors ecosystem at local level with higher education/design centers • Increasing the understanding of dynamics and circumstances that favor co-creation processes in participatory design for urban public spaces • Further developing a research group approach for participatory action research methodologies in design for social innovation	#3	
		• Exploring the replicability of the approach and of the modus operandi of the methodology applied and of the multi-actors network of local stakeholders towards a long-term uptake in society • Boosting the proactive engagement and participation of the civil society in co-creation processes • Improving the civic engagement of vulnerable groups for encouraging and facilitating active participation and for improving integration • Strengthening the impact and the quality of design education in order to reinforce training strategies of design educators	#6	societal impact
Tango-Down	Design methodologies, Innovation studies,	• Contributing to the discourse on the cross-fertilization and integration between the design discipline and Future Studies, Anticipation and Future Narration perspectives	#1	scientific impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Deepening and expanding knowledge on practice-based experimentations in design for social innovation research		
		• Promoting a cross-fertilization between the design discipline and creative writing/theatre towards promoting the contribution of cultural heritage to social cohesion and inclusion • Contributing to the discourse on the cross-fertilization and integration between the design discipline and Future Studies, Anticipation and Future Narration perspectives	#3	
		• Identifying and overcoming social barriers and divisions among citizens for re-invigorating and enhancing the public dialogue linked to local cultural heritage and identity • Contributing to the capacity building to university students enhancing the impact of design education in social innovation environment	#6	societal impact
CIMULACT 4 keywords	Design methodologies, Ethics, Public sector	• Deepening and expanding knowledge on the theme "Design for Policy" and participatory design methodologies in co-design processes	#1	scientific impact
		• Further developing a research team approach and skills improvement in designing the interaction in co-design sessions for the engagement of citizens and multiple stakeholders • Reinforcing group knowledge and expanding the research team	#2	
		• Increasing the diffusion of research scenarios in education	#3	
		• Deepening of "co-creation" and "validation" issues in the field of "Design for Policy" • Informing the development of future policies on the next EU Research and Innovation agendas	#4	societal impact
		• Developing strategies to address the demands and needs of citizens expressed in other, non-electoral forms of political participation • Boosting the capability building and the engagement of civil society in processes of direct democracy by establishing genuine dialogue between citizens, stakeholders, scientists, and policymakers • Facilitating the dialogue and shared understanding between policymakers, citizens, and stakeholders for the uptake of R&I in society • Foster participants' personal development and awareness for the others and for the ongoing scientific debate	#6	
SDIN 5 terms	Capacity building, Education, Services,	• Reinforcing and advancing knowledge on interdisciplinary contributions to service design and innovation	#1	scientific impact

PR	CLUSTERS	IMPACT	ImP	ImCat
	Specific from project	• Improving the research skills of early career researchers towards increased individual impact of application of service design approaches • Developing interdisciplinary competencies in the key service design for innovation area and in key service sectors • Developing and reinforcing group knowledge and skills improvement in key service sectors • Reinforcing group knowledge and networking towards the further development of research areas and topics	#2	
		• Integrating the competences and infrastructures of key European universities and non-academic organisations for a European-wide doctoral program in service design for innovation • Reinforcing group networking in the service design scientific community	#3	
		• Increasing awareness and producing spillover effects to the other sectors of the economy and society linked to the service design for innovation area, contributing to EU smart specialization strategy • Strengthening the quality of PhD in design curricula in service design for innovation	#6	societal impact
		• Favouring the employability as a spillover effect of supporting ESRs to start building their own network of contacts outside academia	#7	technological /economic impact
L' architettura in Lombardia 5 keywords	CCI, Design methodologies, Documentation, ICT	• Reinforcing group knowledge and networking in the development of criteria for data collection and archives development	#2	scientific impact
		• Increasing the diffusion of open access knowledge about Lombard architecture of the late twentieth century • Promoting the diffusion of a renewed concept of "cultural heritage" to preservation or transformation of buildings • Reinforcing group networking in the service design scientific community	#3	
		• Increasing the diffusion of strategic cultural itineraries of modern/contemporary Italian architecture	#4	societal impact
DigiMooD 5 keywords	CCI, Design methodologies, Education, Entrepreneurship, Fashion	• Promotion of the culture of cross-fertilization between entrepreneurship, creative industries & ICT, considered as new drivers for innovation and growth	#1	scientific impact
		• Favouring capability building in HEIs students through new curricula that promote cross-sector knowledge among cultural and creative sectors, business, and technology disciplines in the Fashion industry • Strengthening the awareness, diffusion and uptake	#2	

PR	CLUSTERS	IMPACT	ImP	ImCat
		of the ideal profile for future fashion professionals • Reinforcing group knowledge and expanding the research team and subsequently attracting a PhD student		
		• Reinforcing cross-sector knowledge for supporting digital transformation in the Fashion Industry and education • Reinforcing collaboration and synergies between university and entrepreneurs through exchange on digital skill-set for CCIs	#3	
		• Strengthening the impact and quality of design education to get a mutual reinforcement between educators and working system • Strengthening the impact and the quality of design education in collaboration with entrepreneurs in fashion companies • Increasing the awareness of the culture of cross-fertilization in applying entrepreneurial culture within design as a driver for innovation and growth in the fashion system	#6	societal impact
		• Favouring the employability of design students in fashion design by improving their digital skill-set within the fashion system awareness in order to favour the industry growth	#7	technological /economic impact
		• Favouring the employability of design students in fashion design	#8	
DeFINE 4 keywords	CCI, Design methodologies, Entrepreneurship, Fashion	• Reinforcing and advancing knowledge on the design contributions to Fashion-Tech research and innovation	#1	scientific impact
		• Favouring capability building of innovators in Fashion-Tech to improve their access to finance and submit for mentoring • Reinforcing group knowledge and expanding the research team and subsequently attracting a PhD student	#2	
		• Increasing awareness and innovation capacity of SMEs in Fashion-Tech industry and business support organisations	#3	
		• Nurturing policy development and entrepreneurial support dedicated to the Fashion-Tech sector	#4	societal impact
		• Favouring networking and reinforcing synergic cooperation of incubators, accelerators, and other business in Fashion-Tech industry with financiers to spread awareness about the value of investing in Fashion-Tech businesses • Increasing the awareness of the ecosystem of the Fashion-Tech sector as new driver in developing entrepreneurial business ideas for creating innovation and growth in the society	#6	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Producing and sharing knowledge on the nature and opportunities of the fashion-tech sector		
		• Demonstrating the strategic value of the adoption of new technologies in the Fashion-Tech businesses for SMEs growth and competitiveness • Informing and nurturing the development and transferability of new technologies in the Fashion-Tech businesses • Shaping innovative visions into business opportunities and promoting the participation and preparation of innovators	#7	technological /economic impact
WeMi 5 keywords	Communication, Public spaces, Services	• Deepening and expanding knowledge of welfare sector and ecosystem through experimentation activities	#1	scientific impact
		• Strengthening adherence to system values to foster multi-actor collaboration at the local level and improve the welfare ecosystem	#3	
		• Aligning better policy priorities to the real needs of the local ecosystem. • Nurturing policy development dedicated to the welfare sector to improve the overall quality of services and the capacity to increase the rates of coverage of needs.	#4	societal impact
		• Boosting the proactive engagement of the civil society in the transformation of the public welfare system to reinforce inclusion and integration • Ensuring the implementation and development of a widespread welfare system capable of reaching more and more segments of the population • Promoting better quality of the offer and facilitating access to services by contributing to the welfare of citizens and workers.	#5	
		• Strengthening the listening and gathering of widespread needs in order to promote the emergence of unexpressed social demand and needs not (re)known by the system today • Improving the quality of life of citizens, supporting and boosting the local welfare ecosystem • Reinforcing inclusion of increasingly large sections of the population • Promoting the inclusion of the middle and upper income classes in welfare services, improving the quality of services and places, establishing economic support tools for lower income groups	#6	
CREA 5 keywords	CCI, Education, Entrepreneurship, ICT, Innovation studies	• Creating new knowledge of cross-fertilization among creative industries, ICT and entrepreneurship disciplines	#1	scientific impact
		• Promoting the culture and knowledge of cross-fertilization among creative industries, ICT and entrepreneurship disciplines	#3	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Fundamental basis creation of CI.lab inside department • Reputation and recognition on the research topic: design-driven approach for business and innovation		
		• Strengthening the policy priority on enabling an innovative entrepreneurial ecosystem through the creation of a bottom-up approach	#4	societal impact
		• Capability building, empowering university and high school students to apply Creativity & Design-driven methods on ICT entrepreneurship to produce business ideas through Summer Academies. • Fostering the diffusion of the culture of cross-fertilization through implementing training activities	#6	
		• Increasing of the number of offered opportunities for entrepreneurs, new initiatives, more opportunities of collaboration between different actors	#7	technological /economic impact
CO-CREATE 5 keywords	Capacity building, CCI, Entrepreneurship, Innovation studies	• Creating new knowledge of cross-fertilization among creative industries and traditional industries	#1	scientific impact
		• Promoting and diffusing the culture and values of: 1) creative industries & design-driven innovation in the traditional sectors/clusters 2) cross-fertilization innovation method and tools in both creative industries (design-driven) and the traditional sectors/clusters • Scaling up the research line dedicated to cross-fertilisation between Creative Industries (especially the design-driven innovation approach) and individuals, SMEs and big organizations	#3	
		• Promoting the cross-sector innovation & cooperation policies to foster an environment and a new approach of innovation in local ecosystems	#4	societal impact
		• Promoting and diffusing the culture and values of: 1) creative industries & design-driven innovation in the traditional sectors/clusters 2) cross-fertilization innovation method and tools in both creative industries (design-driven) and the traditional sectors/clusters • Capacity building, empowering SMEs and managers in the traditional sectors to benefit from cross-fertilization & cross-sector collaboration with creative sector	#6	
		• Increasing the competitiveness and performance of SMEs in the traditional sectors • Facilitating and enhancing networking and collaboration opportunities among different sectors	#7	technological /economic impact
		• Increasing the new job offering in different local ecosystems	#8	

PR	CLUSTERS	IMPACT	ImP	ImCat
BRIEFING 4 keywords	Capacity building, ICT, Innovation studies	• Creating knowledge on FET ILP projects, future CSA projects to identify the needs of FET projects and design supporting activities	#1	scientific impact
		• Diffusing the knowledge of and awareness on commercialization and business opportunities in the FET community • Strengthening the research on developing design-driven approach & methods in training activities for new business opportunities • Gaining reputation and more opportunities on applying design-driven approach in different research communities and topics	#3	
		• Capacity building, transferring the mindset, methods and tools of identifying the innovation potential of FET research • Building up and promoting the diffusion of long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward	#6	societal impact
		• Building up the long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward	#7	technological /economic impact
LeNSin 5 keywords	Distributed production, Education, Sustainability	• Increasing the numbers and quality of courses on Design for Sustainability (DfS) in HEI internationally • Paying a leading role and having a very strong network and reputation in the research communities related to the topic • Design for Sustainability (DfS)	#2	scientific impact
		• Diffusing knowledge on Design for Sustainability (DfS) that benefits HEIs in design internationally • Growing a wider network and a strong reputation in the research communities related to the topic • Design for Sustainability (DfS)	#3	
		• Capacity building, empowering the teachers and students/future designers with both consolidated and cutting-edge knowledge on Design for Sustainability (DfS) • Building up the awareness and priority of sustainable development	#6	societal impact
		• Increasing opportunities for the employment of design graduates with skills on DfS and new joint projects for the society	#8	technological /economic impact
DiDIY 4 keywords	Design methodologies, Distributed production, Ethics	• Redefining the ways in which digital DIY tools can support and contribute to creativity process for innovation and project development	#1	scientific impact
		• Creating of a specific research topic: co-design in digital • Reputation on applying and diffusing the user-centred approach for DiDIY application in certain areas	#2	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Promoting the diffusion, the adoption of a strategic approach and the human-centered mindset to the application of DIDIY technologies in 4 domains/areas	#3	
		• Strengthening the awareness of the importance of considering the human/users' aspect in the Digital DIY scenario • Formulating of the multidisciplinary perspective to approach the multifaceted issues related to Digital DIY scenario • Promoting the collaboration among diverse actors in the DiDIY community/ecosystem in the future • Promoting the diffusion the adoption of a strategic approach and the human-centered mindset to the application of DIDIY technologies in 4 domains/areas	#6	societal impact
DIGIKNIT 4 keyword keywo	Capacity building, CCI, Design methodologies, Fashion	• Reinforcing group knowledge and expanding the research team and subsequently attracting a Ph.D student • Creating a new and dedicated research line/direction	#2	scientific impact
		• Increasing educational quality for and the competitiveness of future designers in fashion-knitwear sector through training and direct collaborating with company	#3	
		• Diffusing and promoting the knowledge and practices of digitization of company archives	#5	societal impact
		• Increasing the awareness of the importance and values of digitization of company archives • Empowering future designers in fashion-knitwear sector with digital skills, tools and resources	#6	
		• Increasing the quality of offerings and the company's competitiveness	#7	technological /economic impact
TAMBALI FII 5 keywords	Advanced manufacturing, Capacity building, Entrepreneurship, Material, Social innovation	• Creating knowledge on new material composition for proposing to use in the fishing sector in Senegalese context • Creating knowledge on composition of materials and manufacturing in local industrial chain/sector	#1	scientific impact
		• Established relationship with local stakeholders and communities	#2	
		• Capacity building, empowering local students and actors in the fishing sector with obtained knowledge on innovative manufacturing technologies and composite materials • Fostering the diffusion of experiences and know-how of methods and techniques on innovative manufacturing technologies and composite materials • Reinforcing collaboration and synergies between	#6	societal impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		research institutions, companies, and associations in italy and Senegal		
		• Strengthening and facilitating to create the local community and ecosystem for activating a new sustainable fishing chain and high engagement of local actors	#7	technological /economic impact
NUVOLE 5 keywords	Advanced manufacturing, Health, Material, Specific from project	• Creating knowledge on industrial design methods and strengthening the relationship between industrial design, material and manufacturing technologies	#1	scientific impact
		• Gaining specialized knowledge and reputation on industrial design and in the furniture & accessory industries	#2	
		• Promoting the diffusion of the specialized knowledge on industrial design in the furniture & accessory industries	#3	
		• Fostering the diffusion of experiences and know-how of methods and techniques on innovative manufacturing technologies and composite materials	#6	societal impact
		• Promoting the innovation opportunities in industrial design processes through studying new typologies of materials and manufacturing technologies • Strengthening the values of industrial design and offerings on the market	#7	technological /economic impact
Edu4FT 5 keywords	CCI, Design methodologies, Education, Fashion, ICT	• Creating knowledge on the culture of cross-fertilization on fashion-tech topic in academic and company fields • Creating new knowledge and expanding the definition of "Fashion-Tech"	#1	scientific impact
		• Reinforcing group knowledge and expanding the research team and subsequently attracting a Ph.D student	#2	
		• Reinforcing collaboration and synergies between university and entrepreneurs through knowledge transfer and cross-sector exchange • Raising transdisciplinary knowledge and improving the reputation of the research group at national and European level	#3	
		• Informing the development of future policies towards an entrepreneurial action-plan for the modernization of Higher Education	#4	societal impact
		• Strengthening the impact and the quality of design education in order to get a mutual reinforcement and to widen the visibility and academic influence	#6	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Favouring the employability of design students in fashion design by improving their skill-set with fashion-tech awareness. • Increasing of the number of offered opportunities for early career researchers in the fashion-tech area	#8	technological /economic impact
FashionSEEDS 5 keywords	Education, Fashion, Innovation studies, Sustainability	• Developing a research and learning new pathway in the Fashion field, based on the dimensions of cultural, social, economic and environmental sustainability • Creating knowledge on Fashion Sustainability, and then integrating the new research theme by the group involved	#1	scientific impact
		• Strengthening the impact and the quality of design education by developing the field of fashion for sustainability, enhancing and expanding academic visibility and influence • Reinforcing group knowledge and expanding the research team and subsequently attracting a Ph.D student	#2	
		• Reinforcing collaboration and synergies between university and entrepreneurs through knowledge transfer and cross-sector exchange. • Raising transdisciplinary knowledge and improving the reputation of the research group at the national and European level	#3	
		• Informing the development of future policies towards an entrepreneurial action-plan and regional innovation score for the modernization of Higher Education	#4	societal impact
		• Fostering new sustainable behaviors in consumers, who gain access to products derived from the new holistic view of sustainability	#5	
		• Strengthening the perception of the importance the sustainability in the Fashion field, as a holistic element	#6	
MaDe 5 keywords	Design methodologies, Material, Sustainability	• Reinforcing knowledge on the culture of cross-fertilization on materials designers topic in academic and educational fields • Creating knowledge on “Materials Designers” topic and bring another research proposal	#1	scientific impact
		• Reinforcing group knowledge and expanding the research team and subsequently attracting a Ph.D student	#2	
		• Reinforcing collaboration and synergies between university and entrepreneurs through knowledge transfer and cross-sector exchange on sustainable materials • Sharing open access knowledge on the topic of materials designers	#3	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Enriching design curricula by spreading new experimental approaches for the implementation of knowledge and skills in the material designer field • Fostering new sustainable and circular approaches in materials designer, who create the substance from which the products of the future will be made • Deploying design-related material culture to overcome Specialist Materials Designers skills gaps • Strengthening the importance of exploring new materials and related possibilities even by non-experts of chemical and physical materials properties	#6	societal impact
POD 6 keywords	Ethics, Health, ICT	• Creating knowledge on “Design through prototyping” topic, which led to create the FARB project "The Role of the Prototype"	#1	scientific impact
		• Reinforcing group knowledge and expanding the research team and subsequently attracting a Ph.D student	#2	
		• Strengthening the design for behavioural change theme in the technical domain of the “persuasive technologies” • Fostering the importance of research through prototyping to a broad audience • Raising transdisciplinary knowledge and improving the reputation of the research group at the national and European level	#3	
		• Fostering better quality and safety at work, and also increasing the overall workers' health condition	#5	societal impact
		• Strengthening the importance of the research-based innovative solutions created, to a broad audience • Increasing and/or building new awareness in workers towards personal protection and care to promote job security and reduce the impact in the healthcare industry	#6	
		• Sustaining technology transfer between diversified sectors	#7	technological /economic impact
DesFromIdeasToMarket 5 keywords	Design methodologies, Distributed production, Entrepreneurship, ICT, Specific from project	• Enhancing the impact and the quality of design education with new forms of innovative teaching methods	#2	scientific impact
		• Raising learning-by-doing knowledge and improving the technical reputation of the research group	#3	
		• Increase awareness and innovation capacity of SMEs in a technological and socio-cultural innovation	#6	societal impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		space • Empowering design-related making culture for an advancement of digital fabrication knowledge • Strengthening the perception of the importance of digital fabrication for production to a broad audience		
		• Demonstrating the strategic value of digital fabrication for SMEs growth in terms of innovation capabilities	#7	technological /economic impact
DDMP 7 keywords	Distributed production	• Creating knowledge and clarifying the definition of distributed design	#1	scientific impact
		• Expanding the research team and the Fab Lab's internal community	#2	
		• Strengthening the contribution of design and digital fabrication in patient innovation to meet the needs of both patients and caregivers • Reinforcing collaboration between makers/designers and patients/caregivers	#3	
		• Strengthening and spreading the co-creation culture in research and innovation for healthcare solution • Boosting the uptake of co-creation to effectively engage society in science, technology and innovation • Deploying design-related making culture for the advancement of digital fabrication knowledge and open and distributed design possibilities • Building awareness in patient innovation through design and digital fabrication adoption • Strengthening the importance of the distributed design innovative solutions created, to a broad audience • Reinforcing and improving the reputation of the research group in the field of innovation through design driven digital production	#6	societal impact
		• Informing and nurturing the development and transferability of innovative solutions by overcoming geographical and know-how limitations • Strengthening the footprint of the European Fab Labs network in direct and distributed manufacturing	#7	technological /economic impact
		• Fostering the development of a design-led innovation strategy through the use of digital fabrication	#9	
Includi.Mi 5 keywords	Entrepreneurship, Public sector, Public spaces, Social innovation	• Fostering the proposal, advocacy, and experimentation of a pragmatic policy making model, and implementing a new model of policy making • Deepening and expanding knowledge on the theme "Design for Policy" and policies for Social Innovation in urban contexts	#1	scientific impact

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Expanding the research team and subsequently attracting a Ph.D student	#2	
		• Raising transdisciplinary knowledge and improving the reputation of the research group at the national level • Promoting and sharing "Design for Policy" for academic research	#3	
		• Strengthening of social innovation policies, linked to civil servants for an improvement of the local social innovation ecosystem • Understanding better the barriers in PA procedures to support social innovation • Aligning better policy priorities to the real needs of the local social innovation ecosystem.	#4	societal impact
		• Strengthening the perception of the importance of social entrepreneurship for the management of public assets and the provision of social services • Strengthening social innovation among the different subjects involved, for better inclusion of various competences	#6	
NESTORE 5 keywords	Design methodologies, Health, ICT	• Increasing knowledge of healthy ageing design-based solutions in diverse European contexts	#1	scientific impact
		• Expanding the research group • Reinforcing and improving the reputation of the research group in the field of innovation through design driven digital production	#2	
		• Better understanding of co-design processes for developing strategies, methods and tools to better support the healthy ageing • Better understanding of strategies, methods, and tools to measure usability, acceptance and user experience of ICT solutions for the elderly	#3	
		• Improving the development of strategies and methods to manage personal data in research and innovation processes, that complies with the GDPR • Fostering the development of a design-led innovation strategy for promoting and supporting healthy lifestyle	#5	societal impact
		• Knowledge sharing/transfer and increased exchanges among those who are active in PM-15 projects • Better understanding of social determinants, factors and conditions • Spreading the culture of co-design and bridge the gap between ideation and implementation of ICT solutions for elderly • Guidance to promote healthy ageing through multi-domains coaching activities and ICT solutions	#6	

PR	CLUSTERS	IMPACT	ImP	ImCat
		• Implementing ICT innovative solutions for elderly, through co-design actions, for new possible application	#7	technological /economic impact
		• Improving the approach and the strategies to promote healthy ageing across a wide range of population	#9	

Authors

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

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

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

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

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

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

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

FrancoAngeli
La passione per le conoscenze