

deMIT Open Research: A Cognitively Sustainable Infrastructure for Shared Knowledge

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Abstract

This paper presents deMIT Open Research, an exploratory project developing a digital infrastructure for knowledge sharing within the National Doctoral Programme in Design for Made in Italy. Addressing the fragmentation of research production across a dispersed community, the initiative combines co-design and action research across four phases: co-creation, keyword normalisation, prototyping of an interactive R/Shiny web application, and ongoing integration with the institutional platform ATENA. The resulting tool makes thematic affinities among doctoral projects visible through keyword-based network visualisation, supporting community-building and sustainable open research practices.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; • **Information systems** → *Collaborative and social computing systems and tools*.

Keywords

Open Science infrastructure, Cognitive sustainability, Knowledge management, Human-technology cooperation

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1 Introduction

The development of scientific knowledge is vital to the growth of the cognitive, technological, and know-how heritage necessary for territorial development. The more such knowledge is usable, accessible, queryable and reusable, the more it can proliferate and generate further research. It is precisely from this need that the Open Science movement originates. Its conceptual roots trace back to the Scientific Revolution of the seventeenth century, when figures such as

Galileo Galilei, who advocated the publication of results as a condition of verifiability, and Robert Boyle, a proponent of experimental transparency, introduced the idea that scientific knowledge should be shared and subjected to public scrutiny [8]. In the contemporary era, the advent of information technology made it possible to create the first open archives, among which arXiv, founded in 1991 by Paul Ginsparg, is one of the earliest examples of a repository for the immediate and unrestricted sharing of scientific results. Since then, Open Science has evolved into a global movement, supported not only by academic communities but also by international bodies. A decisive step was the UNESCO Recommendation on Open Science [10], which defines scientific knowledge as a global common good, to be made “open, transparent, accessible and reusable” for all of society. From this perspective, Open Science concerns not only open access to final publications (Open Access) but also the sharing of data, protocols, methods, software, and supplementary materials, to make the entire research process more transparent, verifiable, and collaborative. Nevertheless, despite the obligations introduced by the European Commission under Horizon Europe [2] to promote Open Science practices, we remain far from fully implementing the UNESCO principles. Shared protocols are few, data are often incomplete, and infrastructure is slow and fragmented, further complicated by copyright constraints. All these factors make the widespread adoption of Open Notebook Science, that is, the real-time sharing of the research process – a still distant prospect. In the context of national doctoral programmes funded through the PNRR (National Recovery and Resilience Plan), knowledge production is distributed across a wide and fragmented territory. Doctoral researchers work at different institutions, with limited opportunities to meet, often mediated by online tools that do not facilitate the formation of a cohesive scientific community. This geographical dispersion is compounded by the absence of dedicated institutional tools for the collection, classification, and sharing of research materials: no common platform exists to make developments, bibliographic references, keywords, or intermediate outputs accessible. Knowledge management thus remains entrusted to personal, non-interoperable tools that do not enable the construction of a shared heritage. This lack of infrastructure is also reflected in working processes: the priority assigned to individual research leaves little room for cross-cutting initiatives, which are perceived as ancillary activities not directly connected to the objectives of the doctoral programme. This results in a working model that encourages collaboration “in theory” but provides neither the time

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nor the tools to practise it effectively. The consequence is a community that struggles to recognise thematic affinities; connections between different research projects occur in a casual rather than a systemic way, to the detriment of the potential inherent in the diversity of territorial contexts. The absence of a structured network undermines the capitalisation of individual research pathways, hinders continuity across doctoral cohorts and limits the possibility of transforming the knowledge produced into a shared asset for the scientific community and the Made in Italy system (understood as the cultural, productive and design ecosystem that characterises Italian excellence). From the perspective of cognitive ergonomics and socio-technical systems, this situation generates information dispersion, inefficiencies in research processes, and weak integration among people, tools, and institutions. To address these critical issues, this study provides a specific contribution from the field of design to the cognitive ergonomics of knowledge-sharing processes, aiming to enhance existing dissemination methods through an action research methodology. The project aims to develop a proprietary digital platform, integrated with the existing infrastructure of university management systems, such as ATENA¹, an integrated platform for the comprehensive management of doctoral researchers' careers, which centralises processes and data in real time while adapting to the specific operational workflows of each institution. The platform is designed to overcome current fragmentation and offer a unified environment for bringing together titles, abstracts, and keywords from ongoing research projects, with the possibility of progressively integrating bibliographies, notes, key definitions, conceptual maps, posters, and visual materials. The platform combines the functions of an archive, a search engine, a visualisation tool and a collaborative environment. It includes tagging systems and keyword-based search, and, in future developments, thematic filters and affinity maps that enable the identification of connections between research projects and emerging areas. Content is continuously updated and managed directly by doctoral researchers, with structured review moments at semester and annual milestones. The primary users are the doctoral researchers of the deMIT – National Doctoral Programme in Design for Made in Italy at the Università degli Studi della Campania “Luigi Vanvitelli” – who can consult the content, contribute new materials, and collaborate on the production of shared texts. The objective is to reduce informational dispersion, facilitate the emergence of thematic affinities, and promote forms of collaborative work that currently occur sporadically and informally. In the medium term, the platform aims to become a stable and scalable infrastructure, managed by a dedicated faculty office, capable of sustaining continuity across doctoral cohorts, fostering the construction of thematic networks and enabling the formation of research teams for external projects. Looking ahead, it may constitute a replicable model for other doctoral programmes and contribute to the valorisation of research within the Made in Italy system.

2 State of the Art

To date, various solutions have sought to systematise scientific research to constitute a universal, accessible, and democratised body of knowledge, capable of being incrementally expanded and

reinvested in generating new research, thereby avoiding the dispersion of efforts and optimising the work of the entire scientific community. The main approaches developed in this direction can be identified as follows (Table 1):

2.1 Institutional Repositories

Developed by research institutions, repositories are infrastructures that aim to collect, preserve and disseminate the scientific output of a university or research body. The primary objective of these digital archives is to make the research outputs developed available to the scientific and institutional community, ensuring long-term accessibility and promoting Open Access [7]. Among the principal examples of institutional repositories are:

- CERN Document Server: Active since the 1990s, it is one of the earliest institutional repositories in the world. It collects and makes accessible publications, preprints, technical data and internal reports produced by CERN. It represents a historic example of institutional infrastructure created to preserve the scientific output of a major research organisation in Open Access.
- HAL: Managed by the CNRS, it is a French national repository. A multidisciplinary platform, it provides long-term archiving of research outputs. It serves as a model of both an institutional and a supra-institutional repository, as it aims to collect and preserve content simultaneously from universities, research bodies, and laboratories across the entire French research system.
- arXiv: Founded in 1991 by Paul Ginsparg at the Los Alamos National Laboratory [5], it is the most widely known preprint repository in the world. Today it functions as a disciplinary archive that, although non-institutional, has played a fundamental role in the development of Open Access.
- IRIS: An institutional repository platform adopted by many Italian universities, it enables the management, preservation and dissemination of scientific output, while also integrating ANVUR research evaluation and performing compliance checks against Italian and European research policies.

Despite the benefits associated with research visibility and archiving, this approach faces several significant limitations. Foremost among these is the lack of dedicated funding, which hampers the service's sustainability and improvement. Similarly, the shortage of personnel specialised in metadata management makes infrastructures difficult to update over time. Finally, the absence of clear policies and legal and copyright obstacles discourages researcher participation, due to the high perceived cognitive load.

2.2 Collaborative Research Programmes

Collaborative research programmes are organisational structures, promoted through the implementation of various policies, to facilitate the exchange of knowledge to resolve common problems and the co-creation of shared value among researchers, institutions and other stakeholders. These initiatives, supported by scientific research alliances, seek to overcome the isolation of individual scholars by promoting the co-sharing of know-how for mutual support [3]. Examples of such structures include:

¹<https://atena.it/index.html>

- Collaborative Doctoral Partnership (CDP): Promoted by the European Union, this programme aims to facilitate doctoral research through collaboration between universities and the Joint Research Centre, to generate institutional synergies between institutions across different countries.
- Doctoral Networks (Marie Skłodowska-Curie Actions): Research programmes funded and managed by the European Commission, to integrate international resources and candidates into pathways co-supervised by multiple universities. Despite their value and often centralised leadership, these systems do not yet feature a unified digital infrastructure. Many European programmes (such as MSCA or CDP) address fragmentation only at an organisational level, but have not yet succeeded in integrating individual research pathways in real time, making them a queryable heritage for the programme as a whole.

2.3 Virtual Communities of Practice (VCoP)

Originally conceived as digital learning spaces, VCoPs are groups of people who, sharing a common interest, voluntarily come together to discuss and compare their knowledge in a specific domain. To qualify as such, they must satisfy three requirements: a domain, meaning a clearly identified problem or area of shared interest; a community, that is, a group engaged in mutual commitment; and a shared practice, comprising the shared repertoire of resources and competencies developed through interaction [6] [9]. To date, several platforms are employed as tools to support shared practice. These include: practice groups on mobile applications, such as private groups on WhatsApp or Telegram organised around academic disciplines; team collaboration platforms, such as Microsoft Teams or Zoom, where online reading clubs, seminars or self-managed discussion groups are organised; digital co-authoring spaces, which use tools such as Google Documents for simultaneous writing and collaborative production of scientific outputs; and university blogs, used to inform, disseminate or create interaction with the academic community. However, the absence of clearly defined objectives, dependence on a single coordinator and the lack of a broader community — which exposes practice groups to the risk of isolation — lead to an inefficient development of VCoPs, limiting the possibility of rendering the knowledge produced a genuinely queryable heritage at the service of the entire scientific community.

2.4 Knowledge Management Systems

Developed by groups of individuals, Knowledge Management Systems (KMS) emerge as intentional technological processes for the development, acquisition, and establishment of an intellectual infrastructure that serves an organisation. Their primary purpose is to make the knowledge acquired available to the organisation, thereby supporting better decisions, increasing efficiency and fostering innovation [4]. The knowledge managed is divided into explicit information — documentable, such as procedures and results — and tacit information, that is, outcomes derived from experience, intuition, or individual judgement. This dual body of knowledge, once archived, is structured, applied to the innovation of the organisation's products and services, and finally disseminated to all project stakeholders. Among the various examples of KMS and

the tools or approaches employed, repositories reappear as central instruments, today enhanced by the integration of artificial intelligence to manage knowledge in an interdisciplinary manner and to improve support for decision-making processes. Beyond the high efficiency of these systems, their complexity — which often discourages adoption by researchers — together with the limited financial resources required for implementation in academic contexts and the absence of metadata standardisation, represent significant barriers to their widespread diffusion and integration into university systems. Consequently, the analysis of existing systems highlights how achieving a genuinely efficient and shared use of scientific knowledge depends on the presence of an integrated system capable of being self-sustaining and cognitively supporting researchers. Only an infrastructure designed to reduce the perceived cognitive load and costs of maintenance can foster authentic and sustainable participation, bringing academic research closer to the principles of Open Notebook Science.

3 Method

The methodological framework of the project combines elements of co-design, action research, and socio-technical systems approaches, with both exploratory and generative purposes. The objective was to understand the state of knowledge produced by deMIT doctoral researchers and, in parallel, to develop a digital artefact to systematise it.

3.1 Approach and Actors involved

The process involved approximately 50 doctoral researchers in the first two phases, along with faculty members and other members of the academic community who participated in institutional dialogue sessions. Activities took place primarily during the deMIT Days and at the working tables of the Matera Symposium, which served as the privileged contexts for co-creation and content validation.

3.2 Tools and Data Collection

Data collection was carried out through two structured surveys, aimed at gathering titles, abstracts, keywords, annotated bibliographies, micro-definitions and contact information. The tools used across the different phases include:

- Obsidian² (a proprietary visual-mapping tool) for the initial visual mapping of connections between keywords and for the preliminary organisation of data.
- Google Forms for the structured collection of content.
- R for prototyping and visualising the relationships between research projects and keywords.
- ATENA, envisaged in future developments, as an infrastructure for the stable integration of the platform.

3.3 Data Analysis

The analysis followed a mixed-methods approach, with a prevalence of quantitative methods (frequencies, recurrences, clustering) integrated with qualitative moments of collective interpretation. Keywords were discussed at working tables among doctoral researchers and subsequently with faculty members, leading to the

²<https://obsidian.md>

Table 1: Summary table of the approaches examined

Approach	Examples	Key value	Main limitations
Institutional Repositories	CERN DS, HAL, arXiv, IRIS	Long-term archiving, Open Access, research visibility	Lack of funding, metadata expertise, copyright barriers, high cognitive load
Collaborative Research Programmes	CDP, MSCA Doctoral Networks	Overcomes researcher isolation, institutional synergies	No unified digital infrastructure, fragmentation addressed only organisationally
Virtual Communities of Practice	WhatsApp/Telegram groups, Teams, Google Docs, university blogs	Peer knowledge exchange, co-authoring, informal learning	No clear objectives, coordinator dependency, risk of isolation
Knowledge Management Systems	AI-enhanced repositories	Supports decisions, efficiency, innovation, manages explicit and tacit knowledge	High complexity, limited funding, no metadata standardisation

revision of the initial set: in the second survey, a pre-validated list was introduced to avoid synonyms and semantic ambiguities.

3.4 Phase Structure

The methodology was developed across four phases consistent with the results presented in this paper:

- Phase 1 – Exploration and co-creation (June 2024): definition of the initial format and entry of data into Obsidian.
- Phase 2 – Normalisation and semantic definition (October 2024, deMIT Days): discussion with the academic community, integration into the deMIT through the deMIT – Open Research project, reflections on privacy and proprietary software, working tables with faculty members.
- Prototyping (July 2025): development of the prototype in R.
- Future developments: hypothesis of integration with ATENA and consolidation of the platform.

3.5 Operational Constraints

The work was constrained by extended timelines and the participants’ research commitments. To manage these constraints, a core group of three doctoral researchers and one faculty member coordinated the process, dividing tasks and scheduling periodic calls to ensure continuity and progress.

4 The DeMIT Open Research Project Results

4.1 Phase 1 | Ideation

Phase 1 took place in Matera, on the occasion of the Symposium “The Beautiful, the Ugly and the Sustainable: Interdisciplinary Perspectives for Made in Italy in the Context of the New European Bauhaus (NEB)”, and represented the first structured moment of collective exploration of the project. The main objective was twofold: on the one hand, to collect the first data useful for understanding the state of knowledge produced by the doctoral researchers of the National Doctoral Programme; on the other, to test, in a real and participatory context, the feasibility of a platform dedicated to the sharing and capitalisation of ongoing research. Activities took place entirely in person and involved approximately 20 doctoral

researchers, faculty members, and external guests invited to deliver introductory presentations. The day was designed as a progressive pathway: first, a series of theoretical and methodological contributions on the theme of Made in Italy and the interdisciplinary perspectives of the NEB; then, a moment of open dialogue aimed at surfacing perceptions, needs, and critical issues related to knowledge sharing within the doctoral programme. The central part of the phase was devoted to a co-creation activity: participants, divided into groups, worked on producing two collective manifestos, constructed using keywords, symbolic images, and brief annotations. The manifestos, produced in paper form, constituted the first nucleus of qualitative data for the project, enabling immediate visualisation of the emerging thematic areas, shared sensitivities, and differences in approach among the various research trajectories. In parallel, the core group of four doctoral researchers responsible for the project introduced an exploratory format for structured data collection. The format, not yet conceived as a definitive component of the future platform, required participants to enter titles, abstracts, keywords, annotated bibliographies and micro-definitions related to the key concepts of their research. Completion took place partly during the Symposium and partly in the days immediately following, via a first post-event survey. The data collected were entered into Obsidian, used as a visual mapping environment. By constructing a graph network, it was possible to represent the connections among keywords, themes, and research profiles, highlighting recurrences, semantic distances, and potential clusters. This initial visualisation allowed an understanding of the complexity of the doctoral programme’s research landscape and the identification of the first areas of overlap or complementarity. During this phase, several significant critical issues emerged: the considerable heterogeneity of keywords, the length of the format and the limited homogeneity of the data entered. Many terms appeared similar but not identical, generating semantic ambiguities and making it difficult to construct a shared taxonomy. These critical issues proved fundamental in orienting the design of Phase 2.

4.2 Phase 2 | Normalisation and Semantic Definition

Building on the outcomes of the previous phase, the research project subsequently focused on analysing the keywords associated with the various doctoral works. Given that keywords are one of the principal indexing tools for research outputs, and that the implementation of artificial intelligence systems capable of analysing the entire corpus of produced content and automatically identifying semantic connections between research projects was not envisaged, there arose a need to identify forms of alignment among indexing terms. During the keyword collection and analysis phase — also integrated with in-depth interview activities — it became evident that several research projects operated in related domains or partially overlapping fields. However, the entirely free selection of keywords did not allow the graph network used for project visualisation to highlight possible connections between research projects, as well as potential thematic overlaps or levels of correlation between different works. For this reason, it was decided to introduce a keyword normalisation process articulated on two levels:

- generic keywords
- specific keywords

Generic keywords, assigned to doctoral researchers through a closed list from which three terms could be selected, served to define the principal thematic domains and scientific fields of reference. In this way, research projects could be clustered and positioned within radiant bands of the relational map of the works. Once the relevant radiant band had been identified, specific keywords were introduced: two keywords freely chosen by the doctoral researcher to describe the most distinctive elements of their research. Following an initial phase of desk-based work and in line with the project's objective of promoting greater openness and transparency in research processes, a working table on generic keywords was organised with the doctoral programme's scientific community during the deMIT Days. Organised by the National Doctoral Programme in Design for Made in Italy at the Università degli Studi della Campania "Luigi Vanvitelli" in San Leucio (Caserta), the deMIT Days are an annual forum for dialogue between doctoral researchers and faculty members on ongoing research. On the second day, a plenary working table was organised with the doctoral researchers in attendance to confirm, validate, or propose new generic keywords to be used in subsequent data-collection instruments. The collective discussion led to the approval of 129 generic keywords, 66 of which were related to the theme "Design for Made in Italy" (Figure 1). Subsequently, the deMIT – Open Research project was presented to the entire academic community of the doctoral programme to share research developments and identify any critical issues.

Two principal issues emerged from the discussion. The first concerns sharing the research process in line with the principles of Open Notebook Science, which promotes the circulation of knowledge but raises questions about protecting sensitive data and researchers' intellectual property. The second concerns the use of Obsidian as a tool for visualising connections between research projects. Despite offering advanced functionalities, it is a non-institutional software, which raises questions about data security and the suitability of adopting university digital infrastructures. These reflections led to a subsequent evolution of the project, with

greater integration within the deMIT doctoral programme and a re-thinking of the tools used, favouring more secure and institutional solutions, culminating in the formalisation of the deMIT – Open Research project as a shared initiative of the doctoral programme's scientific community.

4.3 Phase 3 | Development and Prototyping in R

In June 2025 during a meeting of the deMIT research committee the issues and the possible developments of the Open Research project were discussed. It was first decided to extend the data collection about the doctoral students' projects to include the students that had entered the PhD programme after the original data collection was conducted. The original Google form was revised in order to include the generic and specific keywords used in phase 2, and the link was distributed to the new students. The link was also sent to the students who had already filled in the form, so that they could eventually update the information about their own project (e.g. status of the research, references list...). In the light of the issues which emerged from the discussion in phase 2, it was decided to build a prototype of a web application to navigate the database of the doctoral projects including interactive network visualization of the keywords. The application was built in July 2025 using the R programming language and Shiny, a free and open source tool to build interactive web applications and dashboard using R (or Python)³. [1]

The app UI is divided into 3 main areas (Figure 2). On the upper left side of the screen there is an interactive network visualization of the keywords associated with the doctoral research projects. Each keyword is a node, and the radius of the nodes represents the number of projects that are associated with the keyword. Next to the network visualization, on the right side of the UI, there is a list of all the doctoral research projects. By clicking on a node/keyword in the visualization, the list of projects is filtered, and only the projects that are associated with that keyword are shown. Moreover, in the network visualization only the keywords that are associated in at least one doctoral project to the selected node are highlighted, and the remaining keywords/node are grayed out. By clicking on a project in the list, the page scrolls down to the third UI area, the project information sheet. In this area all the information about the project are shown, including: phd student personal information and contact details, project title/subtitle, abstract, thematic area, keywords, project status, relationships for the project with the NEB thematic areas, references, and link to research materials and outcomes produced by the project. The initial prototype was presented in September 2025 during a workshop about the Open Research project organized at the Officine Vanvitelli (San Leucio, Caserta) attended by the PhD students and faculties. The current and envisioned features of the app were presented and the link distributed to the attendees. A survey was conducted to gather feedback from the users about the current and potential features of the app, about the presence of bugs and about the perceived usefulness of the tool for fostering the connections between PhD students enrolled in the deMIT programme. The survey collected responses from 11 participants and revealed a broadly positive reception of the tool. On a scale from 1 to 7, the perceived usefulness averaged 6.5, with

³https://stefano-guidi.shinyapps.io/DeMIT_OpenResearch/

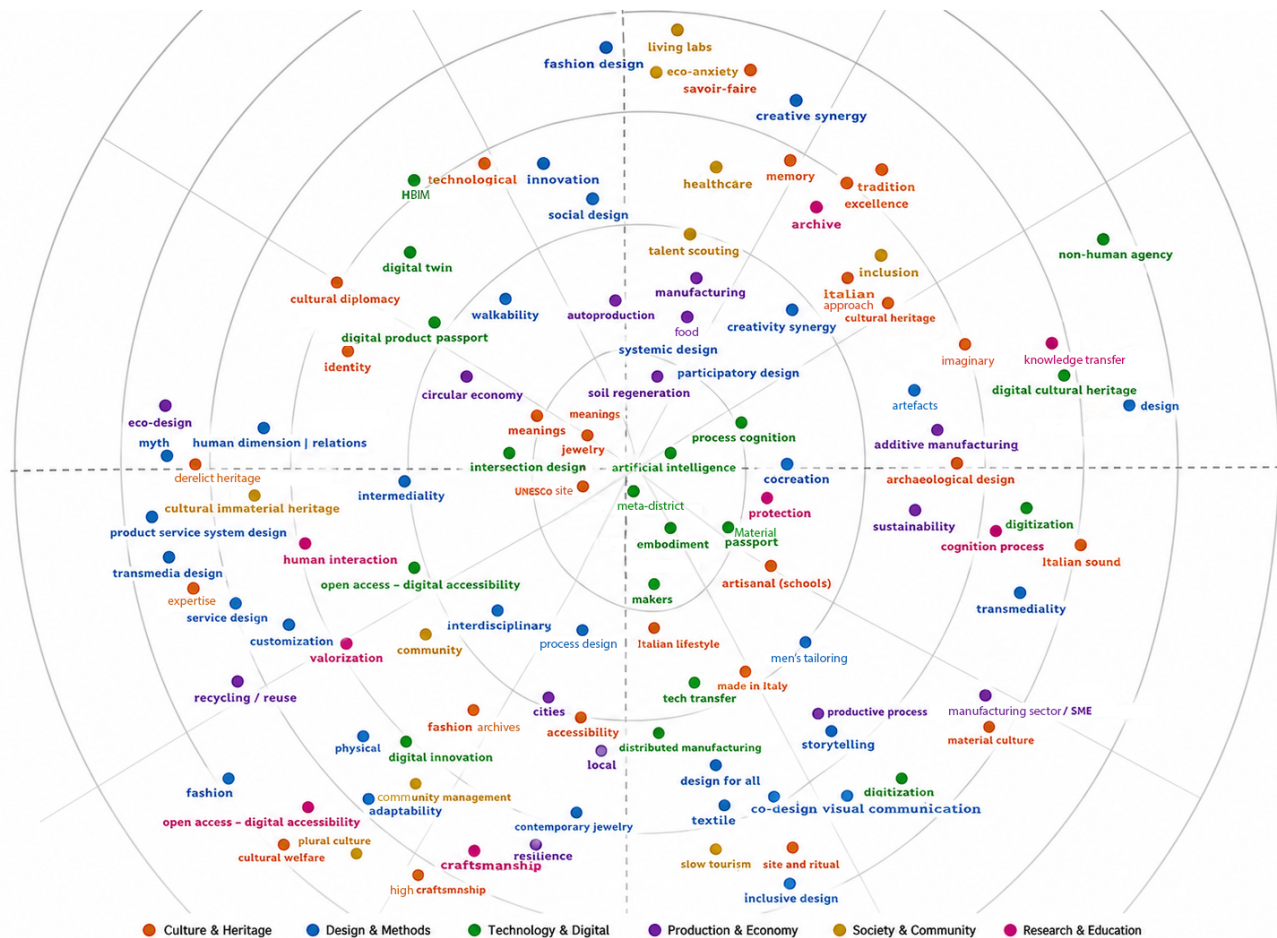


Figure 1: Map of keywords clustered by semantic affinity – Authors’ rights

the majority of respondents rating it 7. The keyword network visualisation and the project list were the most appreciated features, consistently rated as “very useful”. Participants recognised the platform’s potential to surface thematic connections between ongoing research projects and to support peer exchange, knowledge sharing, and future collaborative work: a necessary tool for scientific community. Critical feedback focused primarily on interaction issues within the network visualisation: clickable nodes were reported as too small, and unintended zoom-out caused the map to disappear from the viewport. Some users noted that the visual design could be more impactful and that the keyword taxonomy lacked clear labelling. First-time navigation was occasionally disorienting, reinforcing the demand for an onboarding guide. Among the most requested functions: advanced search and filtering tools, an author profile section enabling direct contact between researchers, interactive commenting spaces, and the ability to update data in real time.

The current prototype is still lacking a series of features that were envisioned to support open research and collaboration between researchers. The next version will include a toolbar with search functionality (by keyword combination, full text search),

and a backoffice that will allow registered users (the PhD students enrolled in the programme) to add a new project (new students), or edit and update the information about existing projects (already in the database). It will also include AI-powered translation of the contents, to overcome language barriers for non-Italian speaking users, and a user guide in the form of a guided tour of the UI and its functionalities, designed to support first-time navigation, especially for users less familiar with digital media environments, thereby supporting a more inclusive design.

4.4 Phase 4 | Implementation in ATENA

Once the tool was developed and prototyped, the project entered its fourth phase, which is currently ongoing. In collaboration with the organising institution of the deMIT, the working group is working to identify the best way to integrate the platform into daily research activities. As noted previously, an Open Science activity, and, similarly, an Open Notebook Science activity; to be adopted continuously must meet the requirement of generating the lowest possible cognitive impact on researchers. From this perspective, integrating the platform with archives or tools already used by scientific communities is necessary, and in this direction, ATENA

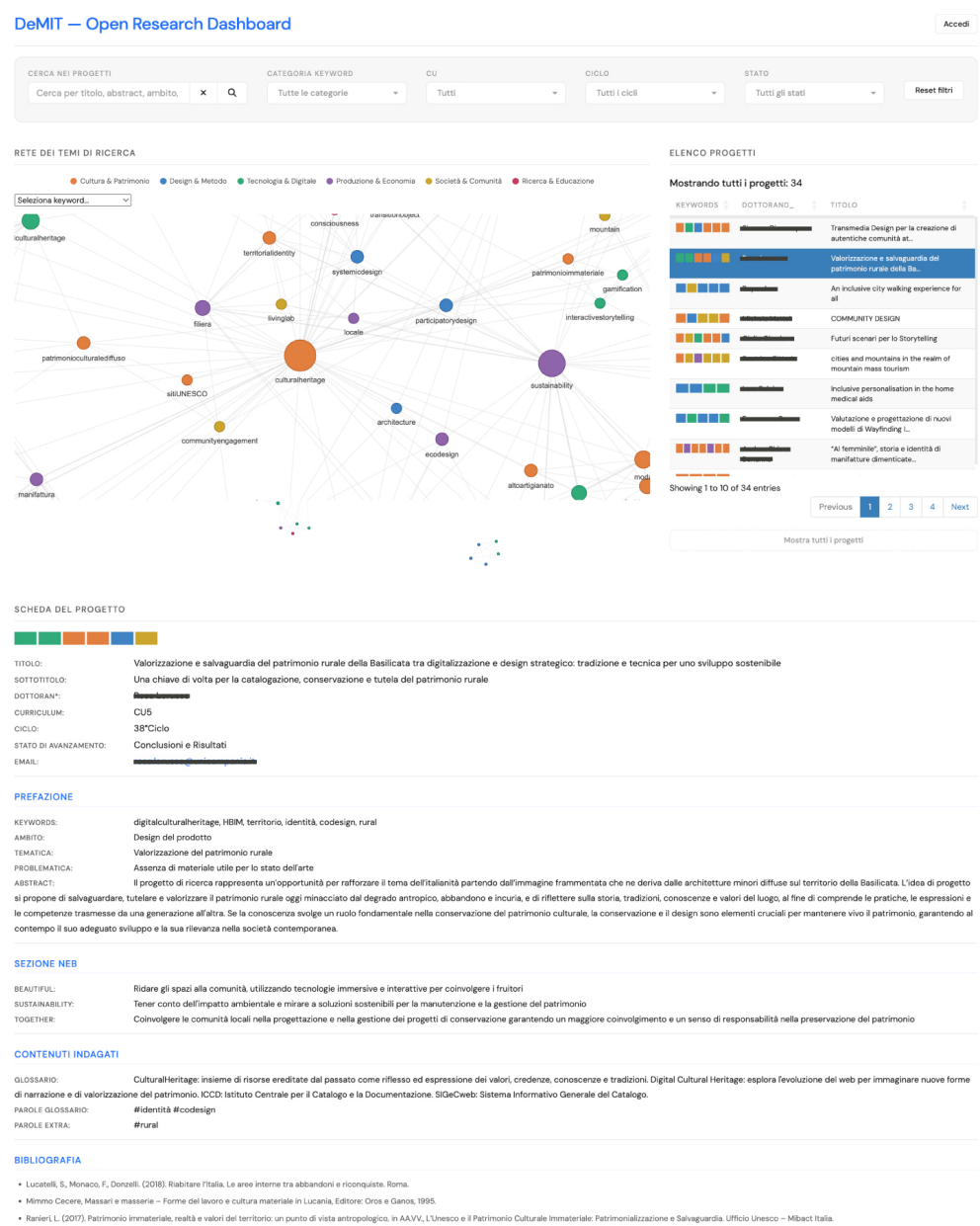


Figure 2: Screenshot of the UI of the prototype of the deMIT Open Research project dashboard

has been identified as a potential integration infrastructure. In this framework, the platform is conceived as a tool to amplify the dissemination of the research work that researchers already regularly input into academic and administrative databases, without adding further cognitive load to their daily workflow. The system is designed to seamlessly integrate with these existing administrative

archives, acting as a bridge that automatically channels the data into institutional websites to support public dissemination and university third-mission activities. When a doctoral researcher or researcher interfaces with a single institutional dashboard that allows them to access, track and document their scientific activity, the sharing of research with the entire community also becomes

not only more immediate but potentially useful for the researcher themselves: they will be able to annotate, archive and query their own research process without losing track of it, immediately activating dialogues and exchanges that expand, verify or introduce the individual narrative contributions formulated during the pathway. Such an approach would also add value for coordinating institutions: faculty members and administrators would have access to already validated and updated material, useful for third-mission activities and for transparent administrative reporting of ongoing research, without needing to directly prompt doctoral researchers and researchers. Given that the primary objective of this research is to foster the dissemination and proliferation of European academic and scientific capital, while simultaneously safeguarding the authorship and security of research lines, the governance of the tool remains strictly within the purview of individual academies. This decentralized management ensures that each institution can autonomously determine which contents to make public and which to keep private, thereby establishing a robust safeguard for sensitive data and the intellectual property of researchers. In this sense, the deMIT, Open Research project aims to produce a tool integrable into the institutional management systems currently in use, one that, without requiring constant maintenance, can overcome the current funding difficulties of universities, the technical complexities of managing an institutional archive and the proliferation of researchers and cognitive efforts that do not communicate with one another. The objective is to connect three actors who are currently poorly integrated, the researcher, the academic group, and the organisational institution, through a tool that makes knowledge sharing an ordinary and sustainable practice.

5 Conclusions

The process described demonstrates how technology, when designed in an intentional and participatory manner can support complex human processes without replacing them. The platform envisaged and prototyped during the project does not aim to automate research, but to amplify its human dimension: to make visible what is currently dispersed, to facilitate connections that would otherwise remain latent, to support the construction of a community that often navigates its own path in isolation. In this sense, the project fully embodies the theme of the conference – a sustainable alliance between humanity and technology – showing how digital infrastructure can serve as a means of continuity and mutual recognition. The platform responds to a real need: the need to be part of a broader research ecosystem, to recognise thematic affinities, to find interlocutors, and not to proceed in isolation. The possibility of building a community of practice are outcomes that emerge with force from the very first phases of the work. Technology, in this case, is not an end in itself but a means: a support that allows sharing, seeing, understanding and collaborating more effectively. From a technological standpoint, the project demonstrates the value of data visualisation as a tool for insight. The graph map, the prototype in R and the initial classification structures show how the visual representation of knowledge can generate new forms of understanding and orientation. The platform thus takes shape as a cognitive infrastructure: an environment that not only archives data but also renders them navigable, interpretable, and useful for generating

new research questions. The project is also an act of creativity and innovation. Creativity, because it employs visual and participatory tools to surface shared meanings; innovation, because it imagines an infrastructure that does not yet exist, capable of transforming how a national doctoral programme produces, organises and valorises knowledge. Looking ahead, as already indicated, the priority is the integration request with ATENA, which will enable the prototype to be transformed into a stable, institutional infrastructure within the ecosystem of the National Doctoral Programme. The evolution of the infrastructure opens up the possibility of extending the model to other national doctoral programmes, fostering the construction of inter-university thematic networks and the creation of research teams capable of collaborating on shared projects. In this sense, the platform could also assume a strategic role in research evaluation processes, offering analysis, monitoring and visualisation tools useful for understanding the evolution of themes, the distribution of competences and the emergence of new areas of interest. Several open challenges remain, however, which determine its sustainability in the medium and long term. The first concerns the need for technical and organisational governance capable of ensuring maintenance, updating and data quality. The second concerns the active participation of the community: an infrastructure of this type can generate value only if nourished by shared practices and a constant commitment from doctoral researchers and future cohorts. These elements do not represent limitations, but structural conditions that require design and institutional attention. The project demonstrates how an integrated approach that combines creativity, technology, and experience design can produce tools capable of sustaining contemporary research, valorising both the human and technological dimensions. The proposed platform does not merely organise information; it helps redefine how a scientific community collaborates and constructs knowledge, making relationships more visible and accessible.

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