

Business models for digital innovation intermediaries: evidence from the digital innovation hubs initiative

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Innovation intermediaries are increasingly mobilized in policy programs to support the adoption and diffusion of digital technologies. Yet we still have a limited understanding of how different types of organizations enact this role and which business models they adopt. Drawing on qualitative interviews with 20 (European) Digital Innovation Hubs in Italy, Spain, France, Germany, and the UK, we investigate how intermediaries create and deliver value in policy-driven digital transition initiatives. We identify four recurrent business model configurations that combine technology/sector, or territorial focus (value proposition) with centralized or decentralized governance (value delivery), each associated with specific organizational forms such as Research and Technology Organizations (RTOs), business associations, territorial development organizations, and technology and knowledge transfer networks. The study clarifies how organizational characteristics shape the enactment of digital intermediation and offers guidance for the design and targeting of future policy initiatives.

JEL Classification: O32, O36, O38

1. Introduction

The current wave of digital innovation has profoundly transformed the technological foundations of products and services offered by firms, reshaping both production and consumption activities and significantly affecting the competitive landscape (Ciarli *et al.*, 2021). While new digital technologies have created opportunities for those capable of leveraging them (Russo *et al.*, 2022), they also prove to be challenging for many incumbents who must adapt their traditional strategies and internal competencies to remain competitive, an effort that does not always yield the desired results (Usai *et al.*, 2021; Greenan and Napolitano, 2024).

Against this backdrop and amid renewed interest in industrial policy (Aiginger and Rodrik, 2020; Pianta *et al.*, 2020; Mazzucato and Rodrik, 2026), the “digital agenda” has emerged as a major policy priority. In Europe, this commitment emerged clearly in the Digital Single Market Strategy (European Commission, 2015) and was further reinforced by the European Union (EU)’s Next Generation EU (NGEU) Recovery Plan, which allocates at least 20% of funds for the digital transition (European Commission, 2021a). Building on these European initiatives, national governments have launched complementary strategies to accelerate the digital transition (Teixeira and Tavares-Lehmann, 2022; Serafini *et al.*, 2025). For example, Germany has expanded its digital agenda beyond the pioneering Industrie 4.0 initiative to encompass all facets of a digital society, as reflected in the “Digital Strategy” adopted in 2022 and updated in 2023, as well as in the “Recovery and Resilience” Plan, which prioritized investments in digital infrastructure¹. Similarly, in France, the “France Relance” plan (100 billion euros, 39.4 billion from the EU) supports the digital transition by fostering start-ups, ensuring broad access to digital technologies, providing training for digital technology jobs, and accelerating the digitalization of enterprises and the public sector. In Italy, 27% of the National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza) is dedicated to digital upgrading, with the Government’s Department of Digital Transformation in charge of implementing the Italian digital strategy (“Italia Digitale 2026”)². Similar initiatives can be found across Europe.

Dealing with a complex “Grand Challenge” like the digital transition requires a “transformative” approach to innovation policy, aimed at shifting socio-technical systems rather than just promoting research and development (R&D) and innovation (Mazzucato, 2018; Diercks *et al.*, 2019). Within this paradigm, “transitions-oriented” policies are characterized by a bottom-up approach to complement top-down policies, by multi-faceted policy interventions that comprise policy mixes, and by the involvement of a broad set of actors and multi-level governance (Haddad *et al.*, 2022). In line with these principles, many policy interventions designed to support the digital transition have recruited—in the delivery of their policy objectives—specialized organizations that help individual firms and networks of firms to design and adopt digital technologies, thereby promoting their diffusion across the innovation system (Kanda *et al.*, 2019; Rossi *et al.*, 2022; Doloreux and Turkina, 2023; Lepore, 2024). We refer to these organizations as digital innovation intermediaries³: organizations that facilitate innovation by bridging knowledge gaps, reducing coordination costs, mobilizing resources, and de-risking investments in new technologies (Howells, 2006; Caloffi *et al.*, 2023). They perform these functions through networking, brokering, and providing a broad array of knowledge-intensive services (Howells, 2006; Traoré *et al.*, 2021). As such, it is argued that innovation intermediaries can play a crucial role in socio-technical transitions (Kivimaa *et al.*, 2020), including the digital transition (Howells, 2024; Colovic *et al.*, 2025).

A growing body of literature specifically analyses the role of digital innovation intermediaries in fostering digital awareness, supporting experimentation, monitoring impacts, and building absorptive capacity across firms and innovation systems (Rossi *et al.*, 2022; Spigarelli *et al.*, 2025). This research stream has explored key issues such as: how do intermediaries contribute to firms’ adoption of digital technologies (Abi Saad *et al.*, 2024; Williams and Van Triest, 2023); how do they support institutional change (Colovic *et al.*, 2025) and the digital transformation of entire value chains and innovation systems (Kivimaa *et al.*, 2020); and how do they evolve in response to technological change (Rossi *et al.*, 2022; Holland *et al.*, 2024; Howells, 2024; Anzolin and O’Sullivan, 2025).

Yet, the relationships between the characteristics of digital innovation intermediaries and the roles they play, particularly their ability to deliver on key policy objectives, are not well understood. Gaps persist concerning their organizational and governance characteristics; how they create, deliver, and

¹ <https://digital-strategy.ec.europa.eu/en/library/digital-decade-2024-country-reports> . Germany country report, accessed on June 20, 2025.

² <https://innovazione.gov.it/dipartimento/>, accessed on June 10, 2025.

³ Digital technologies are giving rise to new types of nonhuman intermediaries, such as crowdsourcing platforms and distributed ledgers (e.g., blockchain), which support innovation, widen participation, decentralize business models, and transform sectors such as health, education, or finance (Casino *et al.*, 2019; Chen and Bellavitis, 2020; Paladini *et al.*, 2021). However, in this work, digital innovation intermediaries are understood as organizations endowed with agency, rather as purely technological platforms. More specifically, we refer to those organizations operating at multiple levels: innovation intermediaries engage with individual firms, bridge between firms and other organizations, coordinate networks within innovation systems, and in some cases, act as agents of systemic transformation, by addressing societal challenges through strategic intermediation (Holland *et al.*, 2024).

capture value (their “business models”) and how these dimensions are related. This knowledge gap has practical implications: policymakers often lack clarity about which types of organizations should be part of their policy interventions and therefore tend to issue broad calls for participation based on broadly defined competence criteria.

For example, the EU’s Digital Innovation Hubs (DIHs) initiative, launched in 2016, and the subsequent European Digital Innovation Hubs (EDIHs) program, a cornerstone of the Digital Europe Program (European Commission, 2021b), did not specify any requirements on the type of organizations eligible to apply beyond basic requirements of organizational capacity and financial viability. We suspect that the heterogeneous organizations recruited to act as digital innovation intermediaries enact these roles differently, with implications for both efficiency and policy outcomes. Understanding how their organizational features affect the types of intermediation activities they perform, and how they perform them (in other words, how they affect their *business model*, broadly intended as an organization’s core logic for creating, delivering, and capturing value; Zott et al., 2011)—is thus crucial for informing future policy initiatives and advancing theoretical understanding of these organizations’ business models.

Hence, in this study, we aim to advance the knowledge about *the business models of digital innovation intermediaries recruited into public policy programs by examining whether specific types of business models are associated with the nature of the organizations performing the intermediation role*.

Empirically, we consider the above-mentioned DIHs and EDIHs initiatives. DIHs are one of the pillars of the Digitizing European Industry (DEI) initiative, a large-scale policy effort in both geographical scope and financial commitment (European Commission, 2017; Teixeira and Tavares-Lehmann, 2022). Despite the relevance of this policy, relatively few studies have examined these intermediaries, which are known mainly for supporting small and medium-sized enterprises (Crupi et al., 2020) and contributing to regional development (Hervas-Oliver et al., 2021). Some of these DIHs have later been included in the EDIHs initiative, launched in 2021 to “improve [the EU’s] digital capacities (including the deployment of digital technologies, as well as the necessary digital skills for EU workforce) [...] develop key digital infrastructures, innovate and strengthen the EU’s industrial base, enhance its resilience and flexibility both in terms of technologies and supply chains” (European Commission, 2021b).

This policy initiative is well suited to our research question, since (i) it is a large-scale international initiative involving many organizations; (ii) the European Commission did not impose any restrictions on the kinds of organizations that could apply to become EDIHs and DIHs, besides some simple financial viability and organizational capacity requirements, so that (iii) the functions of EDIHs and DIHs are performed by a broad variety of organizational forms, ranging from incubators, accelerators, and research institutes to clusters and associations of private firms. This diversity provides an excellent basis for a comparative analysis of how different types of organizations perform similar intermediation functions within the same policy initiative.

Guided by a literature review which allowed us to identify dimensions and patterns relevant for classifying intermediaries and categorizing their activities, we collected a substantial volume of evidence through semi-structured interviews with 20 digital innovation intermediaries from five European countries (France, Germany, Italy, Spain, and the UK) working for organizations that are EDIHs, DIHs, or components thereof. Indeed, even if some DIHs have not been recognized as EDIHs, they nevertheless continue to support organizations and industries in adopting digital technologies. DIHs are expected to support companies and the public sector in the digital transition. Since they act as enablers and facilitators of such a transition, they can all be considered digital innovation intermediaries.

Recognizing the challenges inherent in examining heterogeneous organizations in different countries, our diversified sample allows us to map common themes and to capture how digital intermediaries that are different in nature support—explicitly or implicitly—the European digital strategy, facilitating a widespread, effective digital transition in their national contexts. Building on a flexible pattern-matching approach (Sinkovics, 2018; Bouncken et al., 2021), our study allows us to identify patterns in the business models of digital innovation intermediaries and to distinguish their different yet complementary roles in the digital innovation systems.

Our findings show that digital innovation intermediaries adopt distinct business models closely aligned with their organizational nature. Research and Technology Organizations (RTOs) primarily support technology and sectoral innovation systems with more centralized governance and their main

activities center on fostering technological development and diffusion. Business associations also operate mainly technology/sectoral innovation systems, but typically rely on more decentralized governance, prioritizing the build-up of technological capabilities within the technology/sectoral innovation system. Territorial development organizations, by contrast, usually have decentralized governance and focus on building technological capabilities within the local innovation system. Finally, technology and knowledge transfer networks focus on building digital innovation systems at the national or local level. By linking different organizational types to different business models, we advance conceptual and empirical understanding of digital innovation intermediaries and derive policy implications for future digital transition policies.

The remainder of the article is organized as follows. Section Innovation intermediaries in the digital transition: a business model perspective sets out the theoretical foundations guiding the empirical analysis. Section Data and methodology describes the research design, including data collection and methodology. Section Findings and patterns presents the findings, highlighting both the evidence supporting the analytical template and the new patterns emerging from the analysis. Section Discussion and conclusions discuss the results, outline the main contributions, and derive concluding policy and research implications.

1.2 Innovation intermediaries in the digital transition: a business model perspective

As digital innovation intermediaries become increasingly central to the implementation of digital transition policies, it is essential to understand not only their roles and functions but also how they create, deliver, and capture value. Beyond a few exceptions (Rossi *et al.*, 2022; Holland *et al.*, 2024), there is limited evidence on the business model logic through which intermediaries configure activities, coordinate partners, and secure resources while responding to evolving technologies and, more importantly, to policy demands.

To address this gap, this section integrates insights from the business model literature and the innovation intermediaries literature. Rather than offering an exhaustive systematic review, this section serves the purpose of building an analytical framework. Specifically: (i) it defines business model dimensions in a way that can be operationalized for innovation intermediaries and (ii) synthesizes how prior studies engage with each dimension, capturing both explicit treatments and implicit discussions where business model terminology is not used. This framework provides *a priori* theoretical patterns for the subsequent flexible pattern matching with interview evidence.

To begin with, we need a working definition of a business model, which we can operationalize using empirical data. According to Amit and Zott (2021: 13), a business model is a “*system of interdependent activities that are performed by a focal firm and by its partners and the mechanisms that link these activities to each other.*” In other words, a business model denotes an organization’s core logic for creating, delivering, and capturing value (Zott *et al.*, 2011). While the business model components or dimensions are articulated differently by different authors, there is broad convergence around the four building blocks: value proposition, value creation, value delivery, and value capture (Chesbrough, 2007; Johnson *et al.*, 2008; Zott *et al.*, 2011; Foss and Saebi, 2017; Zott and Amit, 2024).

The value proposition articulates the value (in the form of product and/or service offerings) proposed to the beneficiaries, emphasizing the targeted beneficiaries. The value creation is about the key organizational resources and capabilities that the firm can mobilize to produce value. The value delivery consists of the organizational processes (including metrics, rules, and norms) used to deliver the value proposition. Finally, the value capture describes the formula that the firm uses to generate profit, including revenue model, cost structure, margin model, and resource velocity (Johnson *et al.*, 2008). Figure 1 summarizes these building blocks.

Having defined the business model and its core dimensions, we apply this framework to reinterpret the innovation intermediaries literature, focusing on intermediaries operating under a public policy mandate, including DIHs, and identifying how each dimension is addressed, explicitly or implicitly, across prior studies.

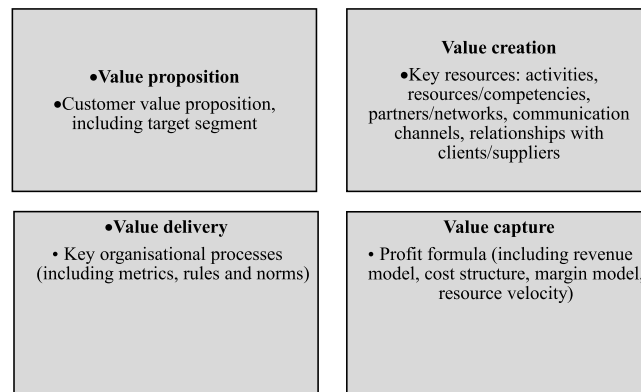


Figure 1 The components of business models in organizations. Source: Chesbrough and Rosenbloom, 2002; Osterwalder *et al.*, 2005; Chesbrough, 2007; Johnson *et al.*, 2008; Zott *et al.*, 2011; Foss and Saebi, 2017.

(i) Value proposition

Innovation intermediation is typically portrayed as a set of activities aimed at supporting other actors' innovation activity, rather than innovating primarily for the intermediary itself. In policy-driven settings, this “acting-for-others” logic is reinforced because intermediaries operate under a public mandate to pursue public objectives on behalf of policymakers. Accordingly, their value proposition is inherently system-oriented. It is defined according to the beneficiary groups that public programs target (e.g., small and medium-sized enterprises (SMEs), municipalities, broader territorial, or sectoral systems) and the kind of system-level objectives it is expected to pursue (e.g., strengthening the capabilities of SMEs, supporting the development of a specific technology, or the innovation efforts of the firms operating in a given territory). This systemic perspective is central in the literature on regional innovation systems (RIS), where innovation intermediaries, including those operating through a public mandate, are expected to strengthen the innovation capacity of regional actors (Lepore, 2024). This logic is echoed in the DIHs literature and EU policy framing (European Commission, 2017, 2021b), which emphasize hubs' regional embeddedness and their contribution to local ecosystems and diffusion dynamics (Hervas-Oliver *et al.*, 2021; Lepore, 2024). At the same time, the literature also documents configurations in which innovation intermediaries are organized around sectoral (Intarakumnerd and Chaoroenporn, 2013) or technological (Kanda *et al.*, 2016) domains, rather than primarily territorial ones. This suggests that “system orientation” can be articulated through territorial, sectoral, or technological focus, or a combination of these dimensions (Russo *et al.*, 2019; Doloreux and Turkina, 2023). The three types of focus—territorial, technological, or sectoral—are hence the initial or “theoretical” patterns of value proposition of innovation intermediaries that we identify in the literature.

(ii) Value creation

For innovation intermediaries, value creation lies in enabling and accelerating innovation outcomes rather than in producing innovation itself. Their contribution stems from performing intermediation functions at various stages of the innovation process. Their activities include scanning and diagnosing needs, identifying and matching partners, processing and recombining knowledge, supporting validation and evaluation, and enabling downstream steps such as protecting results and facilitating commercialization (Howells, 2006). This perspective is well established in the literature, which has extensively mapped and classified intermediaries' activity portfolios across different organizational forms and innovation settings (Bergek, 2020; Caloffi *et al.*, 2023). Within this broader landscape, the European Commission presents (E)DIHs as “one-stop shops” supporting firms, especially SMEs and mid-caps, and public sector organizations in their digital transformation (European Commission, 2021b). It outlines a broad set of core service areas: access to technical expertise and experimentation facilities (often framed as “test before invest”), training and skills development, support in accessing funding, and networking (European Commission, 2017, 2021b), while leaving hubs substantial discretion in how these activities are combined and operationalized in practice. Hence, the theoretical patterns for value

Table 1 Theoretical patterns emerging from the literature on business models and innovation intermediaries

Business model dimensions	Theoretical patterns
Value proposition	Territorial focus Technological focus Sectoral focus
Value creation	Technical expertise and support Training Support for accessing funding Networking
Value delivery	/
Value capture	Public funding Private funding

creation we identify are those formulated by the EU policymaker: technical expertise and support, training, support for accessing funding, and networking.

(iii) Value delivery

The third key component of the business model is value delivery, understood as the governance arrangements and organizational routines through which intermediaries coordinate and execute their activities, including the degree of centralization and formalization (i.e., how tasks and responsibilities are distributed across individuals and groups) (Good *et al.*, 2019). In publicly funded innovation intermediaries, which are constrained by mandates and performance targets (Russo *et al.*, 2019), decision-making matters because it shapes how policy objectives are interpreted and implemented by setting priorities or guiding operational routines. However, this internal governance perspective remains comparatively underdeveloped in the literature on innovation intermediaries, which more often emphasizes intermediaries' roles and functions rather than their internal organizational arrangements and decision rights. Hence, no clear theoretical pattern can be derived from the literature regarding the value delivery dimension of innovation intermediaries.

(iv) Value capture

Value capture concerns how intermediaries secure returns from intermediation activities. In policy-driven settings, value capture cannot be reduced to profit appropriation; rather, it concerns the mechanisms through which intermediaries secure the resources needed to sustain their operations and mandate over time. While these intermediaries are often publicly funded (Russo *et al.*, 2019), especially in peripheral regions where private provision is limited or absent (Feser, 2023), the literature identifies diversified funding models including membership fees, service revenues, and competitive project-based grants which typically complement, rather than fully substitute, public funding (Rossi *et al.*, 2022). Illustrative examples of mixed funding models include the UK Catapult centers (Kitagawa *et al.*, 2025), which combine public support with industry and collaborative project income. For DIHs, systematic evidence on funding configurations remains limited. However, EU policy discussions have explicitly promoted a hybrid business model combining public and private financing sources and encouraged hubs to develop more sustainable revenue logics beyond purely public funding (European Commission, 2017). Hence, two main theoretical patterns can be distinguished: public and private funding. Table 1 summarizes the theoretical patterns related to business models of innovation intermediaries that we identified in the literature.

1.3 Data and methodology

To explore the variety of business models underpinning DIHs across different European contexts, we adopted a flexible pattern-matching approach (Sinkovics, 2018; Bouncken *et al.*, 2021). This approach combines theoretical categories from prior literature on innovation intermediaries and business models (outlined in Section Innovation intermediaries in the digital transition: a business model perspective and summarized in Table 1), with patterns emerging from the data, enabling iterative interaction between

induction and deduction (Sinkovics, 2018), allowing empirical insights to enrich, adapt, or challenge existing theoretical assumptions.

As a first step, we generated a set of a priori theoretical patterns from the literature. Using the business model lens as an organizing device, we specified the four business model components and developed operational definitions tailored to innovation intermediaries operating under a public mandate, acknowledging that the literature on innovation intermediaries often addresses these components implicitly rather than via explicit labels connected with business models. This concept-driven synthesis resulted in an initial framework that informed the interview protocol and guided the subsequent pattern matching.

We then conducted semi-structured interviews with stakeholders working within digital innovation intermediaries funded as DIHs and/or EDIHs in five countries (hereafter referred to as DIHs). Given our exploratory purpose, we adopted a purposive sampling method to capture the business model variety behind the DIH label. DIHs were identified via the official website of the EU. We targeted DIHs of different natures (RTOs, incubators, clusters, and development agencies) and with different ownership structures (public, private, or mixed). Based on these criteria, we preselected DIHs (9 in Spain, 17 in France, 21 in the UK, 45 in Italy, and 49 in Germany) and invited them to participate in our study. Our final sample is composed of the 20 organizations that responded positively: 7 in Spain, 4 in Italy, 1 in Germany, 2 in the UK, and 6 in France. Although unevenly distributed across countries, the sample reflects the diversity of existing DIHs.

The list of interviewees and organizational details is provided in Table 2. Interviews were conducted online, recorded, and transcribed verbatim. They lasted between 45 and 90 minutes (average $\approx$ 1 hour).⁴ During the data collection process, we initially observed considerable variation in responses. As data collection progressed, we noted increasing convergence of responses, indicating saturation. Rather than predefining a target sample size, we applied a code meaning saturation strategy (Hennink and Kaiser, 2022). This involves tracking each identified code and evaluating whether subsequent interviews reveal any new aspects, dimensions, or nuances. Saturation was considered achieved when no new codes or dimensions emerged.

We developed an interview guide before the start of the interview process and applied it consistently across all interviews. It was structured around several themes: the national landscape of intermediaries, their ownership and legal form, objectives/mission and activities put in place by the intermediary, governance and funding model, network involved, and its outputs/results. The interview guide is provided in Table A1 of the Appendix.

Data analysis was performed as follows. Each co-author coded between five and seven transcripts, ensuring that each transcript was coded by at least two co-authors. Codes attributed by the coders independently were subsequently discussed and consolidated collectively. The coding process was inspired by the Gioia methodology (Gioia *et al.*, 2013), but rather than being completely inductive, it was guided by the categories derived from the literature, as part of the flexible pattern matching approach. First- and second-order codes were grouped into aggregate dimensions, which reflect the business model components, which are categories that were drawn from the business model literature (see the coding structure in Figure 2).

The second-order codes in Figure 2 that emerged from the data correspond to the patterns that characterize each of the business model components. These observed patterns were then matched with the theoretical patterns presented in Table 1, similarly to previous studies (Bouncken and Barwinski, 2021; Qiu *et al.*, 2023). Table 3 presents the pattern-matching analysis, comparing theoretical patterns with those observed in the data.

Next, we grouped intermediaries based on the business model dimensions (Figure 2). Two business model components, value proposition (focus) and value delivery (governance), served as the basis for developing a typology of digital intermediaries' business models (Figure 3). Value proposition (focus)

⁴ We interviewed representatives of the DIHs themselves, rather than beneficiary organizations, as our goal was to understand how digital innovation intermediaries perceive and articulate their own business models. Further research could explore the perspective of beneficiary organizations and other actors within the same innovation systems.

Table 2 List of respondents and their organizations

Interview ID	Respondent's job title	(E)DIH ID	Nature of the (E)DIH	Technologies	Main services	Industry (sector) specialization	Country
L_1	Chairman	1	Network of private and public organizations	All digital technologies	Knowledge intensive services, helping access financial support	None	Spain
L_2	Vice Director	2	Network of public and private organizations	All digital technologies	Providing information, training, and consultancy; helping access financial support	None	Spain
L_3	EUNext Funds Manager; Senior Policy Manager	3	Association of private companies (sectoral)	All digital technologies	Political lobbying, information provision, and networking	None	Spain
L_4	Project Management, Innovation, and Dissemination	4		All digital technologies	Knowledge intensive services	None	Spain
L_5	Director	5	Association of private companies (regional)	All digital technologies	Political lobbying; accelerating firms, training, information, networking, knowledge-intensive services, putting together project bids, and managing projects	None	Spain
L_6	Director for International Development	6		All digital technologies	Providing knowledge-intensive services	None	Spain
L_7	Responsible for industry issues	7	Association of private companies	All digital technologies	Networking, lobbying	Metal-mechanics	Spain
L_8	Coordinator	8	Network of public and private organizations	Industry 4.0	Providing information, training, project management, innovation brokering, digital assessment, networking, and innovation system support	Cross-sectoral	Italy
L_9	Coordinator	9	Network of public and private organizations	Cyber-physical systems; internet of things; AI; robotics; cybersecurity; high performance computing	Providing information, training, project management, and providing services	Manufacturing	Italy
L_10	Coordinator	10	Network of public and private organizations	AI; cybersecurity; IoT; high performance computing; extended reality; digital twin; blockchain	Providing information, training, digital assessment, digital services, and helping access financial support	Heritage, culture and creativity	Italy

(continued)

Table 2 Continued.

Interview ID	Respondent's job title	(E)DIH ID	Nature of the (E)DIH	Technologies	Main services	Industry (sector) specialization	Country
L_11	Chief Executive Officer and Head of Development Strategy	11	Network of public and private organizations	Big data; cloud computing; cybersecurity; IoT	Information provision, networking, service provision (technology scouting, access to finance), and innovation brokering	Cross-sectoral	Italy
L_12	Economist	12	Public organizations (EDIH)	All digital technologies	Providing services, sharing information, and SMEs networking	Providing services, sharing information, and SMEs networking	Germany
L_13	Innovation Program Manager; Manufacturing Lead	13	RTO	All digital technologies	Providing services, innovation brokering, putting together, and managing and coordinating projects	None	UK
L_14	Director of Policy	14	RTO	All digital technologies	Providing services, innovation brokering, sharing information, networking, putting together, and managing and coordinating projects	None	UK
L_15	Directeur délégué, Project Coordinator	15	RTO	Digital technologies in general, with a focus on IoT, sensors, and AI	Providing knowledge-intensive services, applied research, development of technological solutions, and testing technology	Mobility	France
L_16	Project Coordinator	16	Network of public organizations (EDIH)	All digital technologies	Providing EDIH services (determined by the EU)—training, R&D services, and innovation	Mobility	France
L_17	Project Coordinator	17	Network of public organizations (EDIH)	All digital technologies	Providing EDIH services (determined by the EU)—training, R&D services, and innovation	None	France
L_18	Délégué General (Cluster Manager)	18	Association of private companies	Robotics-related digital technologies	Networking, matching, information provision, and putting together value chains	Robotics	France
L_19	Head of Innovation and European Projects	19	Pôle de compétitivité	All digital technologies	Networking, labeling of innovation projects, and information provision	None	France
L_20	Manager European Affairs	20	Public organizations (EDIH)	All digital technologies	Providing EDIH services (services are determined by the EU)—training, R&D, innovation, networking, . . .	None	France

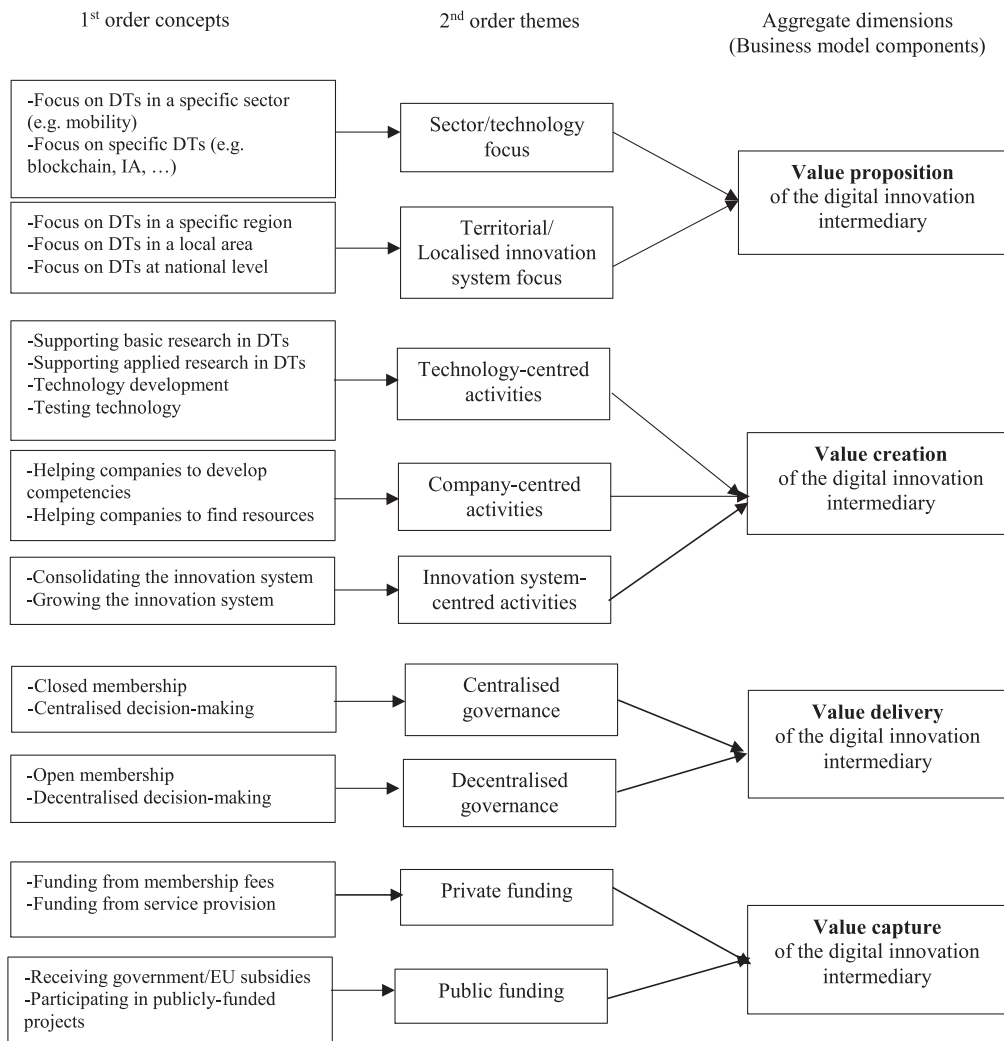


Figure 2 Coding structure.

was selected because the data analysis yielded patterns that both confirm and extend previous studies, whereas value delivery (governance) revealed governance patterns not explicitly discussed in the literature. Given the sufficient variation in responses observed with respect to both dimensions, we conceptualized four business model types, based on these two dimensions, which together form a new categorization grounded in both theoretical and empirical patterns. Finally, we matched the four business model types with the types of intermediaries, linking each business model type with the nature of the organizations that are most likely to adopt it.

2. Findings and patterns

2.1 The digital innovation intermediaries' business models

2.1.1 Value proposition: focus

Despite being often depicted as demand-led organizations mandated to support the digital transformation of the RIS (Hervas-Oliver *et al.*, 2021; Lepore, 2024), the interviews suggest that digital innovation intermediaries support different types of innovation systems and some span more than one. The systems they engage with include:

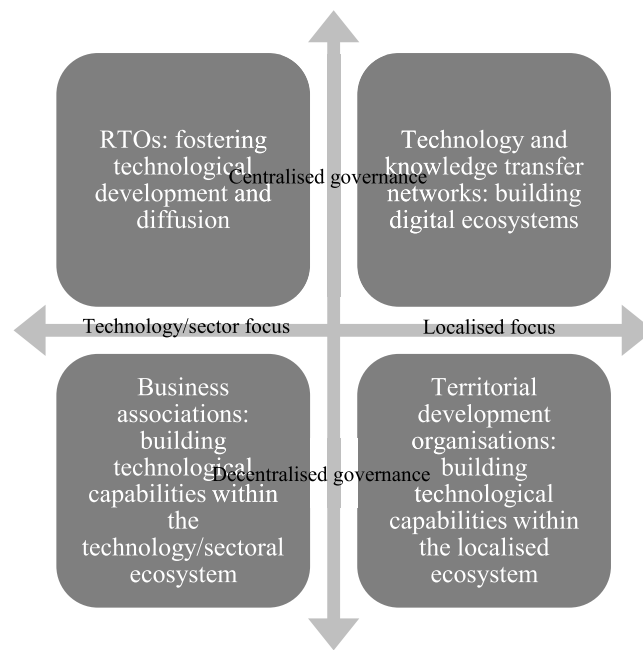


Figure 3 Digital intermediaries' business models based on the intersection of value proposition (innovation system focus) and value delivery (governance) dimensions.

- Territorial or localized innovation systems: It is the typology that comes closest to the ideal type described by the European legislator. The identity of the intermediary revolves around the territorial (local, regional, and sometimes national) business community it serves and to which it belongs. For example, a recently created EDIH in France states:

"Our objective is to contribute to the deployment of digital technologies in the ecosystem and in the regional territory. By ecosystem, I mean the economic fabric in New Aquitaine." (I_16, Project Coordinator, DIH 16, France)

- Sectoral innovation systems: In this case, the intermediary promotes an innovation system populated by organizations operating in specific industrial sectors (e.g., service provision or manufacturing);

"The main founding member is [business association A]. Then there are two other manufacturing associations: [business association B] and [business association C] (an association of SMEs in our Region). We also have some sponsoring partner members, along with about a dozen manufacturing and service companies that believed in this initiative not for commercial reasons, but as part of their associative policy and support for an initiative they found meaningful: helping SMEs begin their digital transformation journey." (I_11, Chief Executive Officer and Head of Development Strategy, DIH 11, Italy)

- Technology-centric innovation systems: These are intermediaries that promote innovation systems that specifically and primarily focus on the development and the adoption of a specific technology (e.g., robotics or artificial intelligence). This is the case for a DIH focusing on the robotics sector:

"So initially, that was the idea, it was to have an association or a grouping of companies that work in robotics." (I_18, Cluster Manager, DIH 18, France)

Table 3 Pattern matching

Business model dimension	Theoretical pattern	Observed pattern	Pattern matching result	Explanation
Value proposition	Territorial focus	Localized/territorial focus	Pattern enriched	The territorial focus of the intermediary is not necessarily regional, as it is frequently described in the literature. Some intermediaries have a local (city), some regional and some national-level focus. The localized nature of the value proposition is observed
	Technological focus	Sector/technology focus	Two theoretical patterns merged in one	Digital innovation intermediaries often have a sector and technology focus simultaneously
Value creation	Sectoral focus			
	Technical expertise and support	Technology-centered activities	Theoretical pattern confirmed	
	Training	Company-centered activities	Theoretical patterns merged and enriched	Digital innovation intermediaries provide a number of company-centered activities ranging from advice, training, and help to find resources and funding
Value delivery	Support for accessing funding			
	Networking	Innovation system-centered activities	Theoretical pattern enriched	Besides networking, digital innovation intermediaries consolidate and grow the innovation system
		Centralized governance	New pattern	Literature has not explicitly dealt with the governance of innovation intermediaries
		Decentralized governance	New pattern	
Value capture	Public funding	Public funding	Theoretical pattern confirmed	
	Private funding	Private funding	Theoretical pattern confirmed	

Out of the 20 intermediaries in our sample, only a few concentrate on a single type of innovation system: four focus exclusively on technology-centric systems, and two focus only on territorial systems. The remaining 14 intermediaries operate across combinations of these innovation system types. For example, some intermediaries simultaneously target technology-oriented and territorial innovation systems:

“Our key mission is to support and facilitate knowledge transfer on enabling technologies to manufacturing and service businesses by public and private research centers . . . we specifically focus on AI, robotics, IoT, cybersecurity and cyberphysical systems. The main stakeholder and target has been initially [Region A, Italy] - then it spanned in terms of activities also in [Region B, Region C and Region D, Italy]” (I_9, Coordinator, DIH 9, Italy)

Other intermediaries combine technology and sectoral focus:

“We’re a very technology driven organisation. We’re an organisation of 120 people and 40 of those are all technology experts. What we do as an organisation to make sure that we apply them properly is we have two industry verticals that we focus in, which is the manufacturing sector and creative industries” (I_13, Innovation Program Manager; Manufacturing Lead, DIH 13, UK)

The main combinations are: sector and territorial (5), technology and territorial (5), sector and technology (2), and technology, sector, and territorial (1). More than half of the intermediaries (65%) engage with territorial innovation systems (alone or in combination with other dimensions). Since a technology or sectoral focus is present for most intermediaries, it seems that the main distinction between intermediaries concerning innovation system focus is *based on whether they have a territorial focus or not*. When they do, we group them under the label “territorial innovation system focus” intermediaries, as their primary focus lies in serving actors based in a specific territory. When, instead, their primary focus lies in supporting organizations operating in a specific sector or working with a specific digital technology, we categorize them as “technological-sectoral innovation system focus” intermediaries.

2.1.2 Value capture: sources of funding

Ensuring the sustainability of digital innovation intermediaries’ business models is a crucial objective for European policymakers (European Commission, 2017: pp. 16–17). This has led to strong incentives for intermediaries to expand their financing model beyond public funding toward a more commercially oriented business model, combining services that generate profits (e.g., service provision) with other nonprofit activities (e.g., digital awareness). In our sample, the main sources of funding are: (i) public funding, including public subsidies and project funding (through competitive bids); and (ii) private funding, including funding from membership fees and funding from service provision.

The most frequent sources of funding are public subsidies (16 intermediaries, or 80%) and private funding from service provision (13 intermediaries, or 65%), followed by project funding from competitive bids (9 intermediaries, or 45%) and membership fees (8 intermediaries, or 40%). Public funding remains crucial: only four intermediaries do not receive public subsidies, yet even these accrue some public funding, by bidding for competitively allocated grants. Indeed, interviewees consistently confirmed the importance of public funding streams originating from different government levels (regional, national, and supranational):

“We are strongly supported by the Regional Government . . . and closely linked to the 3S – Smart Specialisation Strategy at Regional level. I would say our business model is not ‘commercial’ – our main revenue source is public, also from EU funds and bids.” (I_10, Coordinator, DIH 10, Italy)

“We don’t have to sell anything, so we don’t have to make like revenue or profit, which is a good thing when talking about initiatives funded by the ministry because it’s funded from tax income. And so we really only have the opportunity to [involve SMEs] because of that” (I_12, Economist, DIH 12, Germany)

At the same time, while public funding is crucial for these organizations to operate, it is often not sufficient to keep them financially afloat. This is frequently a purposeful choice of policymakers, aimed at fostering greater financial independence from subsidies and incentivizing intermediaries to engage in commercial activities such as providing commercial services and applying membership fees. Apart from one intermediary, which is entirely funded through public subsidies, all other 19 intermediaries combine multiple funding sources.

“The DIH should not be a ‘burden’ on businesses, but an additional tool. The DIH carries out its activities 100% based on transfers (money or in kind) by our members . . . While other DIHs are more in the ‘service centre’ model: mostly based on revenues from services provided” (I_8, Coordinator, DIH 8, Italy)

“Our DIH relies on: 1) regional funds, which are often available to SMEs who want to use audit services, 2) additional funding allocated by managerial unions of the innovation managers; 3) additional

funding from [business association A]; 4) revenues coming from a portfolio of about twenty services” (I_11, CEO and Head of Development Strategy, DIH 11, Italy)

“Having commercial income of course keeps you focused on what industry needs. Having collaboratively won R&D income keeps you at the leading edge. And the core grant from government means that you’re able to fund the capability that keeps you at the leading edge.” (I_14, Director of Policy, DIH 14, UK)

Sources of funding and legal forms tend to be linked. All three fully public organizations (including associations of public bodies) receive public subsidies, which typically represent their main source of financial resources. All private for-profit organizations (including associations or private organizations) also receive public subsidies, but they complement these with revenue from service provision, and, in about half of the cases, with membership fees and project funding. Private not-for-profit organizations report a variety of sources of funding. Not all of them receive public funding (only 8 out of 12). An example of a private nonprofit funding structure is evident from the following verbatim:

“We are a non-profit association, type association of law of 1901, i.e. an association of private law. However, we have public funding. We have about half of our funding coming from public funds, therefore national, regional, European funds and also from communities, local territorial communities. And the other half or so comes from private funds, so both from the membership, the memberships paid by our members and from the services, certain services being paid, that we provide to our members.” (I_19, Head of Innovation and European Projects, DIH 19, France)

2.1.3 Value creation: activities

Respondents mentioned numerous activities performed in their role as digital innovation intermediaries. We grouped them into three categories: technology-centered activities, company-centered activities, and innovation system-centered activities (see [Figure 2](#)).

- Technology-centered activities support basic and applied research and technological development. These activities involve helping firms to participate in tenders, putting together project bids, managing and/or participating in competitively funded projects, and performing collaborative or contract research with firms.

“We have a partnership and more particularly contractual research activity with companies.” (I_15, Project Coordinator, DIH 15, France)

“We do a lot of work – our 5G work is pretty much all funded through collaborative research and development at the moment because it’s quite a long way off. We’ve got some really cool projects coming up in AI and machine learning with aerospace applications with some young start-ups that were using that funding to help them develop the next stage. Help productise the initial ideas that they’ve got. We like to bring in industry partners to all of these so that it helps the solution scale.” (I_13, Innovation Program Manager; Manufacturing Lead, DIH 13, UK)

- Company-centered activities focus on building firms’ capabilities and access to resources. They include providing information, training, and upskilling services, and knowledge-intensive services that foster firms’ ability to engage in digital innovation (e.g., business development, innovation brokering, and strategic foresight activities). They also involve resource-oriented support, such as incubation and acceleration, investment in spinoff companies, and venture capital investment. The following verbatims illustrate the company-centered activities of digital innovation intermediaries.

"We support our members in their growth, in particular companies, private companies, essentially SMEs, which represent three-quarters of members, we support them in their growth, in their market, in their technology as well. That goes through a number of actions to support financing, support for growth, visibility, and so on." (I_19, Head of Innovation and European Projects, DIH 19, France)

"Our main focus is to support SMEs. Dissemination is done extensively, with a strong bottom-up approach. The main activity is related to intermediation between supply and demand of R&D and education/training. Needs evaluation is based on an assessment of businesses' specificities. We also joined two large-scale national assessment projects to map the digital maturity of entire supply chains in the manufacturing and services ecosystems." (I_9, Coordinator, DIH 9, Italy)

"Our main goal is to diffuse awareness on the main emerging technologies (which is very low in the Region and specifically in cultural industries). Relevant is also the matching activity, finding financing for startups and spinoffs which are a result of innovative techs." (I_10, Coordinator, DIH 10, Italy)

- Innovation system-centered activities aim to consolidate and grow the innovation system through activities such as networking and political lobbying, on behalf of innovation system members:

"The second objective we have is to expand what we call the local ecosystem. This is really all that makes up the digital domain in the region. We are therefore working in the [Region A - France] in order to have cross-fertilisation between private companies, but also large groups and the research institutes, the universities that actually make up the local economic landscape in the field, in the digital field." (I_19, Head of Innovation and European Projects, DIH 19, France)

"To aid our Associates by promoting the economic policy and legislative environment that best facilitate the development and implementation of digital technologies. We work as constructive partners with national and European public and private institutions, as well as with other international organisations." (I_3, EUNext Funds Manager; Senior Policy Manager, DIH 3, Spain)

Company-centered activities are the most widespread: 18 intermediaries provide knowledge-intensive services, 15 provide information, and 10 provide training and upskilling services. This is consistent with the natural mission of innovation intermediaries, which primarily consist of strengthening firms' capabilities to understand, access, and effectively use digital technologies. Many intermediaries also engage in supporting basic and applied research and technological development, although it must be noted that while many intermediaries (11) focus on project coordination and management activities, only a few of them (3) directly engage in collaborative/contract research. This can be expected from organizations that are intermediaries rather than research performers. Also, activities related to consolidating and growing the innovation system are frequent: 12 intermediaries engage in networking, reflecting intermediaries' role in connecting actors, and reinforcing interactions within the innovation system. By contrast, few intermediaries engage in political lobbying (3), indicating that only a minority engage in advocacy and representation, which appear to be treated as specialized functions rather than core intermediation activities.

2.1.4 Value delivery: governance

In terms of value delivery, we focus on the nature of the decision-making process and governance within the intermediaries. We identify:

- Centralization, when there is a closed membership: This involves tight public influence on (i) what is possible to do, and (ii) who can be a member, e.g., there is a significant fee for new members and/or

members need to be invited or have a high share of board votes or a share of votes is kept for only a few members. The following verbatims illustrate centralized governance and decision-making:

“Our initiative is government-driven. So this initiative was initiated by the Ministry of Economy, Economy and Climate Action. And so they also set our agenda. [...] And myself, I’m working for an institution that has sort of a centralisation and press-related work and networking task to it. We tried to coordinate all the centres, we do some press-related things and we receive those agenda settings from the governmental level and then we drop it down to the digitalisation centres.” (I_12, Economist, DIH 12, Germany)

“We went through a big transformation. There were a lot of people moved out of the business. Our current CEO came in and gave us a new direction. Basically, looked at the organisation and said that we needed to [...] have a tech focus. They picked these three key areas to begin with, which are our strategic focus.” (I_13, Innovation Program Manager; Manufacturing Lead, DIH 13, UK)

- Decentralization, when there is open membership: This involves loose public influence on (i) what is possible to do, and (ii) who can be a member, e.g., there is a low fee for new members and/or members do not need to be invited or board votes can be diluted, and each member can have one vote. Coordinated decentralization, a form of decentralization where in the decision-making process there is a combination of founders and new members conditional on votes.

“It is a private business association that has 125 members to date [...] with people who are elected by others, other participants, other members. So, there is an office that represents the association made up of ten people. [...] So there are parts of the objectives which are my proposals, which bring ideas to develop the cluster. Another part, which are proposals that come from members who ask us “Well I would like the cluster to carry out this kind of mission”, so it has evolved over time, that is to say that we adapt as we go.” (I_18, Cluster Manager, DIH 18, France)

Both public and private for-profit intermediaries are more likely to exhibit decision-making processes that are characterized by centralization or some coordinated form of decentralization. Only some private not-for-profit intermediaries have fully decentralized decision-making processes. In terms of funding, public subsidies and revenue from service provision are associated with centralized decision-making, while funding from membership fees is associated with decentralized decision-making, consistent with members exercising greater influence over decision-making processes when they financially support the organization through fees.

2.2 Organizational types and business models

Considering our evidence base, we have identified emerging associations between key business model dimensions and organizational forms. We first classify business models along two key dimensions: (i) value proposition, for which we confirm and enrich the theoretical patterns with our observed patterns; and (ii) value delivery, where we observed patterns that were not explicitly dealt with in prior research. The remaining two dimensions (value capture and value creation) show less distinctive variation across cases and are therefore used to characterize each business model type, describing its typical activities profile (value creation) and funding mix (value capture).

The first axis is the value proposition, operationalized as the type of innovation system that the intermediary primarily serves. Since most intermediaries have a technology and/or sectoral focus, but only some display a territorial focus, we distinguish between “territorial innovation system focus” digital innovation intermediaries and “technological or sectoral innovation system focus” digital innovation intermediaries. Intermediaries’ value-creating activities differ accordingly. Territorial-focused

intermediaries more often engage in company-centered and system-building activities (service provision, training, incubation/acceleration, innovation brokering, and networking), whereas technological-sectoral-focused intermediaries more often concentrate on technology-oriented activities (setting up, managing and coordinating projects, collaborative/contract research, and investing).

Overall, this suggests that technological-sectoral digital innovation intermediaries are more focused on activities related to basic and applied research and technological innovation, while territorial digital innovation intermediaries place greater emphasis on helping companies develop competencies and access resources. In technology readiness level (TRL) terms, the former tend to operate closer to the lower TRLs, while the latter more often engage in activities associated with higher TRLs.

In terms of value capture, territorial digital innovation intermediaries are more likely to receive public subsidies and membership fees, while technological-sectoral intermediaries more often rely on project funding. This is consistent with technological-sectoral intermediaries' stronger orientation toward coordinating and managing competitively funded projects, which generate project-based revenues. More generally, competitive research projects tend to be tied to R&D-oriented activities (often closer to lower TRLs), while public subsidies are granted to intermediaries to perform more applied work (at higher TRL), making the observed funding patterns consistent with the activity profiles emerging from our interviews.

The second axis, or key differentiating dimension, is the value delivery, captured by the governance of the intermediary's decision-making processes. Intermediaries with decentralized governance tend to prioritize activities that create value for specific innovation system actors (very often, the members of the intermediary, if it has a membership model), such as the provision of information and training services, putting together applied projects, and incubating or accelerating companies. On the other hand, intermediaries with more centralized governance are more likely to offer services that create value for the whole innovation system, such as collaborative research projects around early-stage technology development and investing in new initiatives.

Taken together, the intersection of value proposition and value delivery yields four different types of business models. We then examine how these configurations tend to align with specific organizational forms, identifying recurrent associations between organizational archetypes and the business model types observed in our sample.

1. Intermediaries with technology-sectoral focus and centralized governance. These are mainly RTOs, i.e., science-industry interfaces with a strong focus on applied research aiming at scaling up technologies characterized by a systemic failure in their preproduction phase. In the DIH/EDIH context, RTOs often operate at the national level, and they mainly focus on supporting early-stage digital technology development and diffusion within technology or sector-specific innovation systems. Their activities target lower TRLs, such as collaborative research projects around early-stage technology development, and they typically rely more heavily on project funding. Overall, their mission can be summarized as “fostering technological development and diffusion.”

“Every year we report on all our collaborative research activity. (. . .) We also have a breakdown by type of activity, whether it is contractual research, which gives us subsidies and therefore funding to be able to launch internal research programs intended to develop future offers for companies in the years to come. But we also have to respond to our ability to generate collaborative research and fundamental research.” (I_15, Project Coordinator, DIH 15, France)

2. Intermediaries with technology-sectoral focus and decentralized governance. These are mainly organizations that have been created to promote business interests, such as business associations, professional, and trade associations. In the DIH/EDIH context, they typically prioritize providing information, training, and other knowledge-intensive services for their members or key stakeholders in the technology or sectoral innovation system, and they tend to rely on membership fees and service revenues. Overall, we can identify their main mission as “building technological capabilities within the sector/technology innovation system.”

“Our Hub is a consortium promoted by three business associations . . . Other partners are manufacturing and service companies affiliated with the above-mentioned associations. The main objective is to engage SMEs and convince them to embark on a process of digital transformation to help them understand the importance of digitising their processes to compete in the new data-driven competitive environment.” (I_11, CEO and Head of Development Strategy, DIH, 11, Italy)

“Before we started, our networks were mostly at the Regional level. The National Competence Centres are strong partners, as well as the whole regional system of Universities and public/private research centres. The ecosystem then scaled, including 4 more EU Universities with even more prototyping and technical skills. The national ecosystem in Italy is very fragmented and different from other EU contexts, such as France and Germany, which invested in a limited number of huge centres, while in Italy there is a huge number of actors, so the businesses are sometimes disoriented. In this light, orientation and information are key.” (I_9, Coordinator, DIH 9, Italy)

3. Intermediaries with territorial focus and decentralized governance. This type is mainly represented by territorial development organizations, typically established in response to local or regional policy initiatives to support the economic development of a specific locality (from the municipality to the region, and in some cases nationwide). They include organizations funded by regional or sometimes national government with a mission to promote local development. In the context of the DIH/EDIH programs, territorial development organizations focus on providing training and knowledge-intensive services for their members or key stakeholders, particularly around more applied activities at higher TRLs, such as managing and coordinating applied projects. They tend to rely more on public subsidies and membership fees. Overall, their main mission can be summarized as “building technological capabilities within the territorial innovation system.”

“So here are the activities, roughly speaking: dissemination and communication to raise awareness, prospecting and diagnosis, testing and experimentation service, training services, fundraising services, service for linking with other EDIHs in Europe or elsewhere, and other people in the regional ecosystem. And we end up again with the dissemination of the results, so success stories to start attracting new customers again.” (I_16, Project Coordinator, DIH 15, France)

“We are an association of research centres and businesses. Our KPIs are essentially based on: 1) awareness about opportunities from innovative techs and capacity building for SMEs and public organisations; 2) positioning on EU funding opportunities (strong focus on EU projects).” (I_10, Coordinator, DIH 10, Italy)

4. Lastly, intermediaries with a territorial focus (although for some of them the geographical focus is as wide as the national level) and centralized governance. This type is mainly represented by technology and knowledge transfer networks with a system-building mission operating at the local level. They focus on activities that benefit the innovation system, such as networking, lobbying, innovation brokering, and putting together value chains. They also have the mission to help organizations (especially SMEs) to overcome the digital divide. They tend to rely on public subsidies, often including EU funding. Overall, we can identify their main mission as “building digital innovation systems.”

“And there are four types of services that we offer to SMEs. Those that will allow to develop the business, in fact, to develop the market of an SME by giving them contacts, for example with other EDIHs in French

Table 4 Conceptualizing business models of digital innovation intermediaries based on the value proposition (focus) and value delivery governance

Dimensions used for the identification of different business models	Technology/sector focus and centralized governance	Technology/sector focus and decentralized governance	Territorial focus and centralized governance	Territorial focus and decentralized governance
Value proposition	Sector and technology innovation system focus	Sector and technology innovation system focus	Localized innovation system focus	Localized innovation system focus
Value creation	Lower technology readiness levels (TRL) activities: supporting early-stage technological development and the diffusion of technology	Higher TRL activities: information, training, and other knowledge-intensive services	Intermediation activities positioned more toward the higher TRL: networking, lobbying, innovation brokering, and putting together value chains	Intermediation activities positioned more toward the higher TRL: putting together applied projects, training, and other knowledge-intensive services
Value delivery	Centralized decision-making	Coordinated decentralization or fully decentralized decision-making	Centralized decision-making	Coordinated decentralization or fully decentralized decision-making
Value capture	Project funding	Membership fees, services provision	Public subsidies, project funding	Public subsidies, membership fees, services provision
Business model summary	Fostering technological development and diffusion within a sector/technology innovation system, with centralized decision-making and mainly public (project) funding	Building technological capabilities within a sector/technology innovation system, with decentralized decision-making and mainly private funding	Building digital innovation systems within a specific territory, with centralized decision-making and mainly public funding	Building technological capabilities within a territorial innovation system, with decentralized decision-making and mixed public and private funding
Most frequent type of digital innovation intermediary	RTO-type organizations	Business associations	Technology and knowledge transfer networks	Territorial development organizations

or European regions. The ecosystem [service] is the participation of these SMEs, integrating them into the ecosystem that concerns them. And then there is a technological service offer, a support service to understand what their digital technology needs are. What could bring them something? And then, there is training, new skills.” (I_20, Manager of European Affairs, DIH 20, France)

The typology of business models of digital innovation intermediaries is presented in Table 4, where, for each business model, we summarize the features of each business model component, and the types of organizations that are most frequently associated with that business model.

3. Discussion and conclusions

Drawing on original qualitative evidence on digital innovation intermediaries in five European countries, our study shows that these organizations adopt heterogeneous business models, which can be meaningfully grouped into four types, along two key dimensions: value proposition, which we conceptualized in

terms of their focus (territorial innovation system focus versus technology/sector focus), and value delivery, which we conceptualized in terms of their governance model (centralized versus decentralized). These four business models align with the organizational nature of the intermediaries and contribute in different ways to an ecology of digital innovation intermediaries that fulfill complementary roles within digital innovation systems. This implies that there is not a one-size-fits-all digital intermediary and that, importantly, different types of intermediaries and different business models contribute in distinct ways to the implementation of digital policy strategies. Organizations positioned at a lower TRL advance fundamental research and push the knowledge boundaries in digital technologies, while those closer to users focus more on the diffusion and acceptance of digital technologies and on strengthening the innovation systems around them.

Building on this, our findings suggest that different types of intermediaries can complement each other while advancing digital policy agendas. This is particularly relevant, as recent work has shown that, in several EU countries, the public sector still relies predominantly on internal hierarchical collaborations rather than on formalized external partnerships to advance digital transformation (Hammerschmid *et al.*, 2024). Our study sets forth the idea that policymakers have at their disposal a larger palette of options when programs are designed in a multilateral setting, such as the DIH/EDIH initiatives, where distinct intermediary types can serve different purposes under different conditions. It is therefore crucial for policymakers to be aware of the specificities of different types of organizations that perform the role of digital innovation intermediaries. Given their differing missions, competencies, and organizational governance, these organizations perform their role differently. The selection of different types of organizations into the policy program is thus not neutral: it affects which activities will be performed and the types of organizations that will ultimately benefit from them. The first waves of implementation of policies recruiting digital innovation intermediaries can foster policy learning, driving better-informed and more tailored policy interventions in the future (McKelvey and Saemundsson, 2018).

The analysis also underscores the importance of public funding in advancing the digital policy agenda (Rossi *et al.*, 2022). Most of the intermediaries in our sample, both private and public, receive public funding and support public missions and the digital policy agenda by creating public value and offering services that the market alone would not supply (e.g., allowing free access to innovative infrastructure). This is particularly valuable for small companies, which often lack the resources to afford such services (Rossi *et al.*, 2022). Yet, our cases point to significant coordination challenges among the actors involved in digitalization initiatives, heightening the risk of underinvestment and fragmentation. Therefore, public funding needs to be paired with a strong coordinating and orchestrating role for public authorities, in line with arguments that the government needs to take on a coordinating role in the context of policies designed to address complex Grand Challenges (Cherif and Hasanov, 2021).

While this study contributes to the academic literature by shedding light on the organizational and business model variety of digital innovation intermediaries involved in a policy initiative and by mapping and explaining their ways of operating in the digital technology landscape, it also generates practical insights for policymakers and practitioners aiming to foster and manage such intermediaries effectively.

First, when it comes to public funders, we show that intermediaries rely on public funding to implement digital policy initiatives, regardless of ownership (public, private, or mixed). Public authorities should therefore deepen their understanding of the best practices, displacement effects, and the longevity and impact of intermediaries, to design appropriate policy schemes. This also points to the issue of evaluation of intermediaries: different intermediary types exist and there is therefore a need to use different criteria to evaluate their actions. For intermediaries themselves, clearer impact assessment, through data-driven analyses, for example, would help optimize their programs and activities, avoid overlaps, and engage more effectively in collaborative intermediation. In line with mission-oriented innovation policy literature (Kattel and Mazzucato, 2018; Mazzucato, 2018), developing coherent policy mixes (instruments and funding) and coordination capabilities appears fundamental to policy success, particularly as the innovation policy debate shifts the focus from the quantity or rate of innovation toward its quality and direction (Haddad *et al.*, 2022).

Moving from macro-level design to regional implementation, our findings also speak to sub-national actors. Regional agencies can draw on this study to analyze how intermediaries can be integrated into

their local industrial strategies and contribute to maximizing the clustering benefits. Finally, firms, and SMEs in particular, can use these insights to identify the intermediaries best placed to meet their needs during the digital transition.

For further research, our study helps to focus the direction of innovation through a first definition of an ecology of digital intermediaries based on their business models. Building on this, additional studies could categorize the most desirable outcomes of different typologies of intermediaries to further assess the quality and desirability of DIH/EDIH activities within their innovation systems, and align these with the EU's digital transformation mission. Future research could also examine how different approaches to policy formation and implementation across EU, national and regional levels affect intermediaries' business models and operations, as prior research has shown that there are trade-offs and complementarities between innovation policies developed at different levels (Roper *et al.*, 2025). Furthermore, beyond the role of individual actors, the interaction or clustering between the different types of intermediaries identified here could be studied to understand how they could address different digitalization needs by offering a mix of competencies and activities. Further studies could dive deeper into the specificities of these networks and collaborations to evaluate how this impacts intermediaries' structures and business models.

Despite its contributions, our study has several limitations that constrain the generalizability of its findings but also open avenues for future research. We analyzed 20 DIHs/EDIHs across five European countries, so the findings may not fully extend to other contexts, although they provide insights for future testing (Buchanan, 2012). We also did not investigate whether a narrow focus on specific technologies (e.g., artificial intelligence - AI) rather than a broader range of digital technologies shapes intermediaries' activities, nor did we examine in depth the role of different types of intermediaries in supporting specific policies, whether regional, national, or European. This could be the focus of future studies.

Supplementary data

[Supplementary material](#) is available at *Industrial and Corporate Change* online.

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