

#EU4Digital

**EU4Digital:** supporting digital economy  
and society in the Eastern Partnership

# Digital Innovation Clusters Development in the EaP: EU best practices in cluster management

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### List of Acronyms & Abbreviations

Abbreviations	Definition
<b>Cluster</b>	Clusters should be considered as regional ecosystems of related industries and competences featuring a broad array of inter-industry interdependencies. They are defined as groups of firms, related economic actors, and institutions that are located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills. ( <a href="#">ECCP</a> ).
<b>Cluster (management) organisation</b>	Cluster organisations are the legal entities that support the strengthening of collaboration, networking and learning in innovation clusters and act as innovation support providers by providing or channelling specialised and customised business support services to stimulate innovation activities, especially in SMEs. They are usually the actors that facilitate strategic partnering across clusters. ( <a href="#">ECCP</a> ).
<b>DG NEAR</b>	Directorate General for European Neighbourhood Policy and Enlargement Negotiations.
<b>Digital Innovation Clusters</b>	Cluster organisations that work in digital sectors and/or technologies or support digitalisation.
<b>DIH</b>	Digital innovation hub
<b>EaP</b>	Eastern Partnership – countries including Armenia, Azerbaijan, Belarus*, Georgia, Moldova, Ukraine, and the European Union.
<b>Eastern partner countries</b>	Eastern partner countries, namely Armenia, Azerbaijan, Belarus*, Georgia, Moldova, Ukraine.
<b>EC</b>	European Commission
<b>ECCP</b>	European Cluster Collaboration Platform
<b>ECEI</b>	European Cluster Excellence Initiative
<b>EOCIC</b>	European observatory for clusters and industrial change
<b>ESCA</b>	European Secretariat for Cluster Analysis
<b>ERDF</b>	European Regional Development Fund
<b>EY</b>	Ernst & Young
<b>EU</b>	European Union
<b>EU-27</b>	European Union, union of 27 member states that are located primarily in Europe.
<b>EU4Digital</b>	EU4Digital Facility is an EU-funded programme that aims to harmonise digital markets of the EU and the Eastern partner countries. The programme is in its second phase (2022-2025).
<b>Federated Cluster</b>	Network of independent cluster organisations. This network structure allows each cluster organisation to leverage the collective knowledge and capabilities of its members while preserving their individual identities and operational independence.
<b>FTE</b>	Full-time equivalent
<b>GDP</b>	Gross domestic product
<b>GVA</b>	Gross value added
<b>ICT Innovation</b>	Information and communications technologies
<b>Innovation</b>	Process of making changes in something established, especially by introducing new methods, ideas, or products.



Abbreviations	Definition
<b>Industry 4.0</b>	Industry 4.0, also known as smart manufacturing, is the digital transformation of manufacturing processes. It enables real-time decision making, enhances productivity, and provides flexibility and agility, revolutionising how companies produce, improve, and distribute their products.
<b>IPR</b>	Intellectual property rights
<b>LQ</b>	Location quotient, a geographical specialisation indicator
<b>NACE</b>	The 'statistical classification of economic activities' in the European Union.
<b>PCT</b>	Patent cooperation treaty is an international agreement that simplifies the process of filing patent applications across multiple countries.
<b>Purchasing power parity (PPP)</b>	Purchasing power parity is a theory that suggests exchange rates between currencies should reflect the same buying power in different countries.
<b>Public-private partnership (PPP)</b>	Public-private partnership is a partnership between a government agency and private-sector company.
<b>R&amp;D</b>	Research and development is a term referring to the work a business conducts towards the innovation, introduction, and improvement of its products and procedures.
<b>Scaleup</b>	Company that has passed the startup phase and is expected to grow rapidly in terms of revenue or users.
<b>SMEs</b>	Small and medium size enterprises
<b>Spearhead cluster</b>	Spearhead cluster is a leading cluster organisation within a particular industry or sector.
<b>Spin-off</b>	Spin-off is a company that is formed from another existing company
<b>Startup</b>	Startup is a newly established business, often linked to innovation and technology.
<b>S3</b>	Smart specialisation platform (S3) is a policy framework established within the European Union in 2010, that aims to enhance innovation leveraging the unique strengths and competitive advantages of specific regions or nations.
<b>Tacit</b>	Knowledge that is hard to express or communicate to others because it is gained through personal experience and intuition, rather than being written down or spoken.
<b>Transversal sectors</b>	Industries or fields that are not specifically associated with one economic sector, but can apply to a few at the same time (for example consulting, research and development and etc.)
<b>VC</b>	Venture capital is private equity funding provided to early-stage, high-potential, growth companies.

*\*As a result of the Russian military aggression against Ukraine and the involvement of Belarus recognised in the European Council Conclusions of February 2022, the EU is further suspending planned and ongoing programmes and activities with the participation of Belarussian public authorities and state-owned enterprises. The EU will continue to step up its support to Belarussian civil society.*



## Executive summary

This report is a part of a work related to *Innovation clusters* activity. This report concludes the analysis of the EU best practices, with an aim to build a framework for benchmarking cluster organisations within the Eastern partner countries. Following this report, EU4Digital will proceed with analysing the status of the cluster organisations in the Eastern partner countries based on the results of the 'self-assessment questionnaire', which was disseminated in spring 2024. Final recommendations will be formulated in a form of a follow-up report that is anticipated by the end of 2024.

### Challenges in the Eastern partner countries

Cluster organisations in the Eastern partner countries face certain challenges; in particular, they often lack a solid legal basis and struggle with financial sustainability, forcing organisations to prioritise short-term survival activities over strategic objectives. Additionally, there is a shortage of hands-on experience and dedicated training on cluster management, making it challenging to gather skilled teams for support of collaborative projects and innovation.

### Cluster organisations in the EU

Europe hosts more than 2,950 clusters supported by over 1,000 cluster organisations, covering 71 of the 88 economic sectors classified under the NACE 2-digit system. Within the EU-27, cluster organisations align with 14 industrial ecosystems, with the digital ecosystem leading the way with over 100 cluster organisations. Having established that clusters 'emerge' organically rather than being artificially created, it can be assumed that the leading ecosystems (e.g., digital) show the biggest potential for added value to the members of cluster organisations. The size and staffing profiles of these cluster organisations generally correlate with the number of their members, with about 65% employing 1-5 cluster management personnel. On average, cluster organisations have around 170 members each, although 62% of them have fewer than 100 members. The representation of small and medium size enterprises (SMEs), large firms, and research organisations within cluster organisations varies significantly across different industrial ecosystems. For instance, SMEs constitute a higher proportion of memberships within the Textiles, Tourism, and Construction ecosystems, with percentages varying between 83% to 87%. Conversely, their representation is relatively low in the Energy-intensive industries ecosystem, accounting for 55% of memberships. Large firms feature more prominently in cluster organisations within the Mobility-Transport-Automotive ecosystems, with their representation at 20%, which is significantly above the average representation of large firms across all ecosystems (12%). Research organisations hold a higher proportion of memberships within the Energy-intensive industries, Electronics, and Renewable energy ecosystems, with representation ranging from 14% to 19%. Cluster organisations membership structure shall involve at least three key stakeholders: academia, government, and corporate sectors – is called 'triple helix'; and later, along with the cluster development, the structure broadens up to 'quadruple helix' and 'quintuple helix'.

### The EU cluster organisations' business models

Typically, cluster organisations opt for an association model, due to its flexibility. Nevertheless, in cases where commercial activities of a high scope and the membership is fixed, private limited companies are chosen as an alternative. Larger and more complex structures utilise hybrid models. Lastly, it is a usual practice for already existing organisations to take on the role of cluster management.

Funding models for cluster organisations evolve over time. There is an increasing recognition that for cluster organisations to thrive, they must generate sufficient value to achieve financial independence. This involves fostering collaboration and engagement with startups, scale-ups, accelerators, incubators, business angels, venture capital firms, and large investment companies. Initially, when cluster organisations just emerge, they usually heavily rely on public funding sources, such as the EU structural funds and local government subsidies. Over time, cluster organisations gradually shift towards a mix that includes substantial private funding which comprises membership fees and project-based funding. This transition highlights the critical phases of financial development that cluster organisations undergo, emphasising the importance of a sustainable funding strategy for long-term viability. Unfortunately, financial sustainability and strategic balance are paramount yet difficult to achieve, as cluster organisations must navigate short-term financial needs while striving for long-term goals. There is continuous risk that cluster organisations, focused too much on the near term, cannot achieve systemic change in meaningful areas such as digitalisation and/or green transition – areas, which require both stakeholder interest and proactive demand creation.

Cluster organisations offer a wide range of services, with the most crucial being the facilitation of collaboration among members. Additionally, they support research, development, and innovation, while also providing access to finance, markets, expertise, and essential linkages. The value proposition of these services is pivotal, as it significantly enhances the members' perception to the benefits provided by cluster organisations. Digital



innovation cluster organisations deliver specialised services like promoting digital collaborative projects, introducing digital solutions and technology providers, and supporting the digitalisation of processes. To maintain their relevance and effectiveness, cluster organisations must continuously work on enhancing their value proposition to meet the needs of their members.

Significant number of cluster organisations have a digital focus in their offered services. To be more precise, 461 cluster organisations work in digital sectors and/or technologies, 496 organisations support digitalisation, 260 of organisation are both working in digital and supporting digitalisation. Out of them, 187 cluster organisations are participating or involved in a digital innovation hub (DIH), contributing to, or coordinating the specific node of competence supporting digital transformation of SMEs. For the purposes of this study, these organisations are referred to as 'digital innovation cluster organisations'. EU4Digital took this specific group of cluster organisations for identification of best practices, as they represent the European most elaborated practice of digitalisation support.

Another type of actor developing in the EU is the network of cluster organisations. Various networks have been established at regional, national, international, and sectoral levels across the EU. Such networks of cluster organisations are also known as competence centres, which provide different types of services for regional cluster organisations, supporting cluster generation, development, performance monitoring, and assessment. One of the networks offers the cluster organisations free of charge technical support and consultancy vouchers. With the vouchers the cluster organisations are supported on the development of project applications, exploration of financing opportunities, identification of relevant project partners, and design of sustainable business models for cluster organisations.

### **The best EU practices and excellence**

The best practices of cluster organisations can be identified through the lens of cluster management excellence labels, granted by European Secretariat for Cluster Analysis (ESCA)<sup>1</sup>. These labels serve as benchmarks for quality and performance, highlighting key attributes such as effective governance, robust collaboration frameworks, innovative capabilities, and sustainable growth strategies. Out of 87 cluster organisations, that are either participating or involved in digital innovation hubs, 29 have a *Gold Cluster Excellence label*, 14 – *Silver label*, and 52 – *Bronze label*. Key general services provided by over 50% of gold and silver label cluster organisations are facilitation of collaboration between members within the cluster; facilitation of external collaboration such as matchmaking; and support of research, development, and innovation. Key digitalisation services provided by these cluster organisations include identification and promotion of digital collaborative projects; introduction to digital solutions/technology providers; and support towards digitalisation of processes. In addition, successful cluster organisations with any of the labels often have robust membership structures that include large companies, which significantly enhance their financial capabilities and the quality of services they can offer.

### **Limitations and challenges**

Despite cluster organisations demonstrating significant benefits in fostering innovation, enhancing productivity, and driving regional economic development, they also face significant distinct challenges and limitations:

- **Over-specialisation:** cluster organisations that focus narrowly on a specific sector or technology may struggle to adapt to market changes or technological disruptions, making them vulnerable to sector-specific downturns or rapid technological shifts.
- **Reduced competition:** while cluster organisations thrive on collaboration and mutual learning, they can inadvertently lead to a concentration of market power among a few dominant players, stifling competition, and innovation, and creating barriers to entry for new firms.
- **Geographical limitations:** clusters are inherently tied to specific locations, creating disparities in development and opportunities across regions. This geographic concentration can exacerbate regional inequalities, resulting in 'winner-takes-all' scenarios where certain regions become highly prosperous while others lag behind.
- **Dependence on governmental support:** the successful development of cluster organisations often relies heavily on government policies and support. This dependence can lead to vulnerabilities when there

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<sup>1</sup> The European Cluster Excellence Initiative (ECEI), which was initiated by the European Commission DG Enterprise and Industry in 2009. The 13 project partners of the European Cluster Excellence Initiative invented a uniform set of cluster management quality indicators and developed a quality labeling system featuring the three quality labels Bronze, Silver and Gold for professional cluster management. It was next implemented by ESCA (European Secretariat for Cluster Analysis). The EUCLES association has been created in December 2020 with the objective to gradually take over the labelling system currently operated by ESCA. On 30 September 2021, EUCLES signed a partnership with VDI/VDE-IT, which has been operating ESCA for the past 10 years.



are shifts in political priorities or economic constraints, or when cluster organisations struggle to develop sustainable business models without continuous governmental financing.

The dynamic nature of clusters necessitates continual adaptation and evolution. Cluster organisations must constantly monitor changes in technology, market trends, and global economic conditions to stay relevant and competitive, a resource-intensive and challenging process to manage effectively.

### Cluster policy in the EU

The EU provides support to cluster organisations through various platforms. This support strengthens collaboration between clusters and fosters partnerships between different cluster organisations. To address challenges faced by the cluster organisations, policy recommendations include supporting cluster organisations through initiatives like the European Strategic Cluster Partnership (ESCP) and the INNOSUP-1 initiative, which focus on internationalisation, cluster excellence, and smart specialisation.

In 2022, the European Cluster Collaboration Platform (ECCP) analysed cluster policies across 56 countries, including all the EU member states. The study found that 50% of these countries have national or regional cluster policies, most of which were established over a decade ago. Additionally, 12 EU countries, although lacking dedicated cluster policies, include clusters in broader strategic documents like smart specialisation strategies, the European Regional Development Fund (ERDF) programmes, and SME policies.

According to the ECCP research (2021), two key development needs identified by cluster organisations themselves (with other 40% agreeing these are a priority) were: (1) improving their business model, and (2) developing new services. It also states that a typical cluster organisation spends a great number of resources solving operational challenges of survival. Researchers note that cluster organisations still need the most support in the areas such as financial sustainability, resource and service alignment, skill development, inter-cluster linkages, mission orientation, and impact evaluation. Policymakers should focus not only on cluster creation but also on optimising cluster organisations' operational efficiency in order to ensure sustainable growth through robust funding models and strategic support initiatives.

The EU best practices report has facilitated the development of a framework for analysing cluster organisations in Eastern partner countries. This analysis aims to provide deeper insights into the specific conditions and needs of these cluster organisations. The findings and recommendations for cluster managers and policymakers will be detailed in a follow-up report expected by the end of 2024.

## Chapter 1. Background

### 1.1 EU4Digital ICT stream

The ICT Innovation stream builds its activities within the EU funded programme [\*EU4Digital: supporting digital economy and society in the Eastern Partnership\*](#), which aims to connect the innovation and startup ecosystems of the Eastern Partnership (EaP) with those in the European Union (EU). This initiative focuses on sharing the EU best practices, principles, and standards to support innovation and startups, aiming to bridge the gap between the two regions' ecosystems. Its primary objectives include promoting networking, sharing of best practices and tools between the EU and EaP innovation stakeholders, supporting the development of the EaP digital startup ecosystem, and developing a framework and recommendations for new organisational forms like innovation cluster organisations in the Eastern partner countries.

Also, ICT Innovation stream has been focusing on organising targeted networking events with the key EU and Eastern partner countries' organisations, guides for building ICT entrepreneurial ecosystems as well as feasibility studies for new initiatives like the *Digital Innovation and Scale-up Initiative (DISC)*, EU4Innovation programme, *Women in Tech* mentorship programme, aimed at enhancing the growth of the ICT ecosystems. Through EU4Digital, the EU support for the ICT innovation ecosystem will encourage the sharing of research excellence and cross-border investments, open the EU markets to startups and SMEs from the Eastern partner countries, encourage investments and the creation of jobs for talented young people, and lead to an overall increase in knowledge, productivity, and value.

### 1.2 EU4Digital Innovation clusters activity: objectives and approach

Previous activities of the EU4Digital Facility's ICT Innovation stream have identified the general strengths and gaps in the development of new organisational forms supporting innovations such as incubators, accelerators, cluster organisations, platforms, innovation hubs, etc., especially their evolution in the digital economy prompting organisations to adapt and innovate in response to digital advancements and market demands.



In particular, it was revealed that cluster organisations in the Eastern partner countries are yet at the early stage of institutional development, and face both internal constraints of resource base, and external lack of support<sup>2</sup>. Addressing the identified needs, EU4Digital Facility's ICT Innovation stream has launched a dedicated activity focused on fostering innovation cluster organisations development in the Eastern partner countries in the digital economy.

The primary **goal** of the activity is to develop tailored recommendations for the improvement and development of the cluster organisations, that can be taken into action by the Eastern partner countries' cluster organisations, policy practitioners and potential donor organisations, based on the EU best practices and the analysis of the current status of clusters management in the region.

The **focus** of this activity is on cluster organisations that manage existing clusters, and organisations that perform the function of coordinating the activities of an emerging or early-stage cluster, though do not position themselves as such. Such organisations are known as 'proto-clusters'.

The **subject** of this activity is the capacity of these cluster organisations to foster innovation and, particularly, digitalisation among their members.

The activity follows the general **approach** of the EU4Digital Facility. It involves identifying the best EU practices, elaboration of benchmarks for the analysis of the current status in the Eastern partner countries, and consequently, drawing conclusions regarding the potential alignment of policy and innovation infrastructure support frameworks in the Eastern partner countries with those of the EU. To make it practically applicable for immediate use, the research is constructed on the following pillars:

1. Direct communication with the cluster organisations on the top decision-making level, to comprehend the actual problems from the ground;
2. Consultations and gather feedback from the representatives of public authorities and private sector in the EaP countries at each stage of the activity. These discussions encompass the EU best practices, the scope of cluster organisations, findings from strengths and gaps analysis and benchmarking, and the formulation of final recommendations.
3. The EU best practices are identified from specific organisations to enable the further closer study of these practices and direct connection for knowledge transfer;
4. A survey for the Eastern partner countries' organisations, which allows to get acquainted with the EU best practices, evaluate status against these benchmarks, and immediately map the directions for improvement; thus, the survey serves to increase awareness and nurture the understanding of the best practices;
5. Final recommendations are built on the vision of priority areas for action and major support needs as expressed by the stakeholders and leveraged against the general situation across the clusters. The recommendations will be presented directly to cluster organisations, as well as to the interested policy practitioners and potential donor organisations, for informed decision-making about the support needed.

## 1.3 Methodology

### 1.3.1 Conceptual understanding of clusters

This report offers a comprehensive understanding of the EU clusters, covering the concept, management, and policies. It begins with summaries of the main dimensions of innovative cluster development (geography, composition, impact, cycle, management, etc.). Following this, the report covers case studies of the best practices and challenges faced by the EU cluster organisations, concluding with the EU policies on cluster development.

### 1.3.2 Benchmarking the EU cluster management practices

In Section 2.2, the report reviews the top EU-wide approaches to benchmarking of clusters and cluster management organisations, that are utilised: (a) to inform the policymakers about the needs of policy intervention, help them monitor the policies' efficiency; and (b) to inspire the cluster organisations to learn from best practices of the other cluster organisations and help them promote their strong sides.

Following the general overview of the EU cluster organisations in Section 2.3 at a higher level, Section 2.4 of the report delved into the evolving role of digital innovation cluster organisation in the digital economy. Based on the data from the European Cluster Collaboration Platform (ECCP) that maps all the EU cluster

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<sup>2</sup> [Networking of ICT innovation clusters in EU and EaP countries to support cluster organisations development and regional cooperation](#)



organisations, EU4Digital segregated a pool of the EU cluster organisations that include digitalisation into their agenda and summarise their value proposition as a spectrum of services. From this pool, EU4Digital distinguished the top list of best performing cluster organisations that excel: (a) in management and cluster operation practices, which is acknowledged by the recognised EU-wide benchmarking methodology, and (b) in the services that they deliver to their members, supporting them in innovation and digitalisation. In Section 2.5, this top list of selected cluster organisations is taken further for an in-depth review. The report overviews the cluster organisations in the EU through the prism of their:

- Industrial specialisation;
- Structure of membership;
- Operational and financial aspects of business models;
- Services provided (value proposition).

The identified characteristics of top cluster organisations are taken as a foundation for elaboration of the framework for analysis of the cluster organisations in the Eastern partner countries.

In addition, EU4Digital outlines the main limitations and challenges for clusters development in the EU and maps the peculiar features of the cluster support policies in the EU – both on the EU level and the national level policies. This will serve as an additional reference point for drawing recommendations based on the findings of the Eastern partner countries' cluster organisations development.

### 1.3.3 Framework for analysis of the cluster (management) organisations in the Eastern partner countries

Based on the review of the EU cluster organisations' map as well as selected the best practice EU cluster organisations, the number of benchmarks was selected, that have served to build a framework for gap analysis in the Eastern partner countries.

**The framework includes several blocks:**

**Block I. Cluster identification data** helps categorising cluster organisation in terms of its sectoral or technological or application/market focus and composition of the cluster participants. That allows for comparison with similar the EU and Eastern partner countries' cluster organisations.

**Block II. Capacity of cluster organisation to support innovations and digitalisation** is reviewing the qualitative information about: (a) the strengths of the cluster management team; (b) financial sustainability; (c) strategic focus of activities and service package (value proposition) of the cluster organisation, as well as its strategic partnerships and their outcomes. The indicators are based on the best practices of EU cluster organisations, identified through a methodological selection process.

**Block III. Cluster management excellence** is assessing the level of sophistication and maturity of: (a) governance; and (b) strategic and operational planning and performance tracking. This block is fundamentally inspired by the document by European Cluster Excellence Initiative (ECEI, 2013) *The quality label for cluster organisations (Cluster Management Excellence Label GOLD – Proven for Cluster Excellence): Criteria, processes, framework of implementation*<sup>3</sup>. The questions contained in the original document were adjusted for the purpose of initial assessment of the cluster organisations in the Eastern partner countries<sup>4</sup>.

**Block IV. Achievements and outlook** help identify the main achievements of each cluster organisation as well as priority actions and support needs.

**Block V. Looking at cluster from outside** serves to undertake the assessment of cluster life-cycle stage, keeping in mind the uneven development of cluster across lifecycle stages. This block illustrates the features of the cluster that do not always depend on the cluster organisation and are the reflection of the diverse economic factors and market development trajectories. Yet, it provides an insight on the potential areas for intervention both by cluster organisations and policy practitioners and donors.

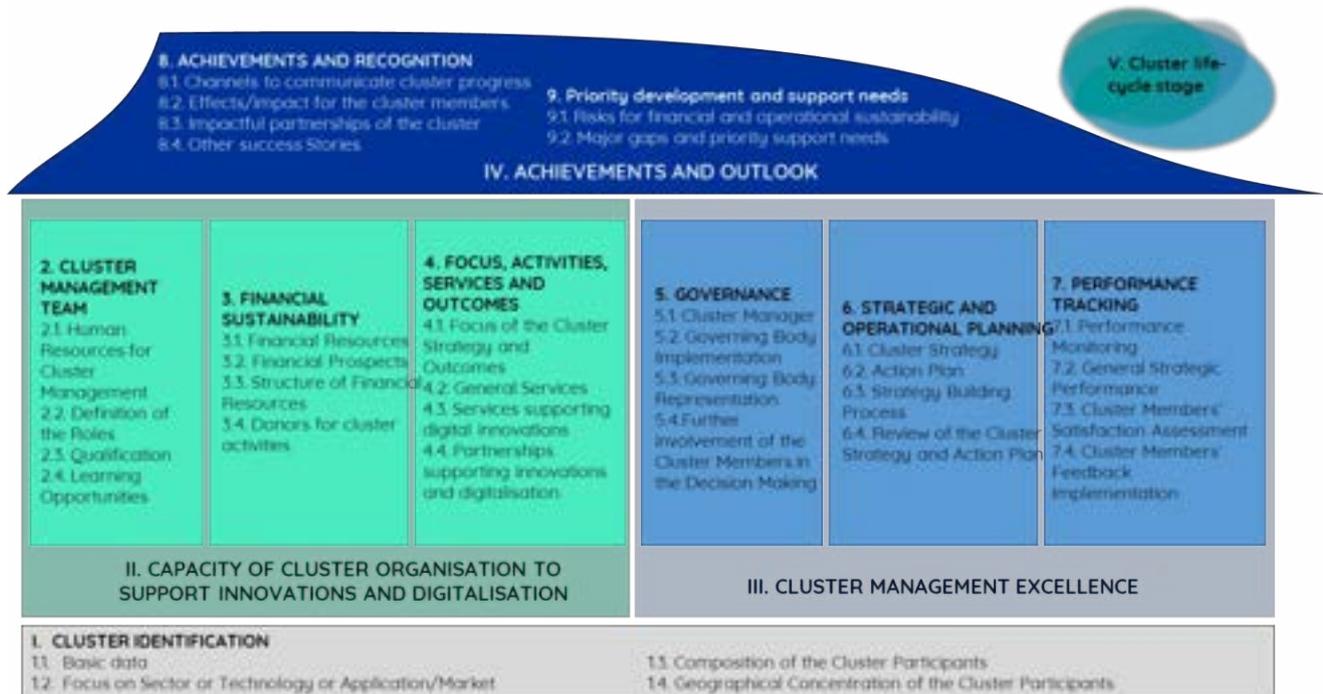
Specific indicators are schematised in Figure 1.

<sup>3</sup> Working Group 2 of ECEI. (2013). [The quality label for cluster organisations \(Cluster Management Excellence Label GOLD – Proven for Cluster Excellence\): Criteria, processes, framework of implementation](#). The European Cluster Excellence Initiative (ECEI).

<sup>4</sup> **Disclaimer.** Taking this survey will not automatically lead to qualification under the European Cluster Excellence Initiative (ECEI) and any label. If based on this pre-assessment the responding cluster organisations will want to apply for the European Cluster Excellence Initiative (ECEI) Quality Label for Cluster Organisations (Cluster Management Excellence Label) or other European/worldwide qualification procedures, they will need to follow the official process with [ESCA](#) or [EUCLES](#) or relevant other organisations.



Figure 1. Framework for strengths and gaps analysis of a cluster organisation



Source: Developed by EU4Digital.

The questionnaire ([self-assessment](#)) built based on this framework helps to review the current status, challenges for development as well as priority support needs of the cluster organisations in the Eastern partner countries, with focus on capacity of cluster organisations to support innovations and digitalisation of their members. It also allows to inform (increase awareness of) the Eastern partner countries' cluster organisations about the EU cluster management best practices and service proposition, help them pre-assess their maturity to engage in the leading European qualification and labelling procedures as well as inspire them to develop strategic and operational plans to increase their competitiveness.

### 1.3.4 Mapping relevant organisations and questionnaire distribution

In line with the described approach, two pools of organisations with potential interest in the activity have been identified:

- **First pool of organisations – the respondents** – includes the existing cluster organisations in all sectors of economy, that are: (a) registered as cluster organisations at the ECCP; (b) positioning themselves as cluster organisations in their countries; (c) de-facto acting as cluster organisations but yet do not promote themselves as such, referred to as 'proto-clusters'.

While identification of the ECCP-registered cluster organisations is easy (which is a strong argument to perform such free of charge registration for cluster organisations that comply with requirements), for identification of the existing but not ECCP-registered cluster organisations a desk study and consultations with ICT Innovation expert network have been undertaken. Similarly, to identify the 'proto-clusters', the long list of potential organisations that might serve as actual cluster organisations was gathered via desk research (including around 100 organisations across five Eastern partner countries), followed by pre-validation by the ICT Innovation expert network. Cluster organisations and 'proto-cluster' organisations were invited to fill out the questionnaire. Based on the data submitted by the organisations, the conclusion was made about the actual phase of their performance as cluster organisations.

The questionnaire designed within the described framework was disseminated among the full list of potential respondents. It was indicated that the questionnaire needs to be completed by cluster executive management body (CEO/Director or Deputy CEO/Director) of the organisation that supports the networking and collaborative activities of the cluster members. This has ensured the comprehensive vision by the respondents of both strategic and operational aspects of activity of the cluster's executive bodies on the high decision-making level.



- **Second pool of organisations – the stakeholders** – include ministerial representatives, governmental authorities, innovation agencies as well as public and private innovation ecosystem actors, and business associations in Eastern partner countries that are interested in the clusters' development. These wide lists of stakeholders are invited to presentation of results of the survey and drawn recommendations, and initiation of discussion of potential joint actions to address the revealed gaps.

### 1.3.5 Further steps following the completion of the EU best practices benchmarking

The report marks the initial phase of the ICT Innovation activity. It outlines the analysis of the EU best practices and introduces a framework designed to enhance and develop cluster organisations. This report serves as a foundation for the subsequent steps in the activity.

In the follow-up report, EU4Digital will analyse the (proto-) cluster (management) organisations in the Eastern partner countries. Based on the data received through the survey, EU4Digital will benchmark cluster organisations in Eastern partner countries across various dimensions, comparing them with the EU best practices and within all Eastern partner countries to identify the champions, pioneers, and strugglers. The strengths and gaps in the capacity of the surveyed cluster organisations in Eastern partner countries to support innovation and digitalisation will be identified based on the EU best practices. The revealed challenges and priority development areas will serve as a basis for drawing recommendations for the clusters' improvement.

Afterwards, EU4Digital will organise an awareness handover session the national stakeholders on the effective implementation of these recommendations to optimise cluster organisation's performance.

Furthermore, up to five of the most qualified Eastern partner countries' cluster organisations that successfully complete at least 80% of the EU4Digital benchmarking questionnaire will receive full coverage of their application costs for the ESCA Bronze Label.

In the final phase, for the countries demonstrating the most commitment and potential, EU4Digital will take a step further by creating detailed, country-specific models for cluster development.

Along with the main course of activities, EU4Digital will gather the success stories of cluster organisations in the Eastern partner countries to identify the practices that work best, using them for international promotion of the surveyed cluster organisations.

A synergetic effect will be provided by organising the dedicated event bridging the best EU and Eastern partner countries' cluster organisations as well as policy practitioners and potential donor organisations, to discuss the achievements, gaps, challenges, and priority support needs of these cluster organisations in their capacity to support innovation and digitalisation.

## Chapter 2. Understanding clusters in the EU

### 2.1 Evolution of clusters and cluster (management) organisations

#### 2.1.1 Cluster definition and main features

Clusters, stemming from the efforts of Prof. Michael Porter in the mid-1980s, signify interconnected networks of firms, associated industries, and related institutions, strategically grouped within a specific geographical area<sup>5</sup>. Now recognised as fundamental components of national and regional economies, clusters were first observed and identified because of the geographical concentration, originally identified as 'industrial districts' by Alfred Marshall and later termed as 'clusters' by Porter<sup>6</sup>.

*“Clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, trade associations) in a particular field that compete but also cooperate.”<sup>7</sup>*

*“Cluster is an alternative way of organising the value chain”<sup>8</sup>.*

<sup>5</sup> [European Cluster Collaboration Platform. \(n.d.\). Cluster definitions.](#)

<sup>6</sup> Porter, M. E. (1990). *The Competitive Advantage of Nations*. Free Press, New York.

<sup>7</sup> Porter, M. E. (2000). [Location, Competition, and Economic Development: Local Clusters in a Global Economy](#). *Economic Development Quarterly*, 14(1), 15-34.

<sup>8</sup> Porter, M.E. (1998). [Clusters and the New Economics of Competition](#). *Harvard Business Review*, 76, pp.77-90.



The main characteristics of clusters include<sup>9, 10</sup> :

- **Geographic concentration** with the possibility of dispersion beyond the country's borders (territorial localisation of economic entities that are cluster participants).
- **Complex composition.** The structure of a cluster is at least 'triple helix' model (business, academia, government) and can evolve into 'quadruple helix' (incl. civil organisations) or even 'quintuple helix'. SMEs are the heart of the clusters as they form the core of the value chain. There are several 'key leading enterprises' that determine the long-term economic and innovation strategy of the entire system, as they stand out by their market share or hold critical position in a value chain. The geographical proximity of such enterprises to suppliers and auxiliary enterprises allows reducing costs and increasing cooperation. The 'critical mass' (including a critical mass of human resources) is an important feature of a mature cluster, ensuring the sustainability of the value chain. 'Specialisation' between the cluster enterprises determines the ability of enterprises to partially replace each other through the mechanism of competition, and partially to complement each other through the mechanism of cooperation.
- **Network structure.** Enterprises and other cluster participants in a cluster are not just territorially localised, but are also interconnected through various types of linkages—'vertical', 'horizontal', and 'informal', which helps them to transfer their knowledge and competencies. In a cluster organisation, competition and cooperation are the complementary mechanisms implemented through vertical and horizontal connections.
- **Multiple effects** at the microlevel and regional level, including synergetic effect and externalities. There are distinct effects on innovativeness of the cluster members: competition between enterprises creates incentives to increase their innovativeness, and cooperation provides opportunities for its faster expansion; yet the effects are not straightforward and sometimes rigid cluster structures may hinder innovations, which recalls for the need of clusters' openness and evolution.
- **Life cycle.** The cluster does not emerge mature, and the government cannot create a mature cluster from the moment of its launch; it develops through certain stages and undergoes changes.

Along with these general attributes, each cluster is unique due to its specific composition and set of competencies, as well as development trajectories impacted by resource base, technological or sectoral focus, market conditions and institutional environment. Today, after 40 years of research, clusters still evoke large interest as an economic phenomenon, both enriching the research agenda<sup>11</sup> and provoking new initiatives on utilising their potential for SMEs growth.

### 2.1.2 Geographic concentration

Porter's efforts were instrumental in analysing and describing the correlation between the geo-specific location of enterprises and their competitive advantage, success in the market. According to Porter, *"The enduring competitive advantages in a global economy are often heavily local, arising from concentrations of highly specialised skills and knowledge, institutions, rivals, related businesses, and sophisticated customers.... Needed assets, skills, inputs, and staff are often readily available at the cluster location... Local financial institutions and investors, already familiar with the cluster, may require a lower risk premium on capital... An entrepreneur may benefit from established relationships. All these factors reduce the perceived risks of entry—and of exit, should the enterprise fail."*<sup>12</sup>

This unique relationship and its influence on regional specialisation and industrial concentration were analysed to understand their role in catalysing innovation and influencing regional prosperity.

According to existing research, clusters, by nature, most often arise organically<sup>13</sup> and tend to concentrate in geographic regions (usually their central/largest locations) that have more resources and better access to them. However, there are also some 'geographically dispersed clusters', which is due to the nature of the industry in which they arise<sup>14</sup>. In cases where there is a need for a close connection to fixed capital, heavy production infrastructure, or transportation costs occupy a large share of costs, enterprises are more likely to concentrate in geographic proximity to such infrastructure or to major suppliers/consumers. However, if the product of the

<sup>9</sup> Karlsson, C. (Ed.). (2008). [Handbook of research on innovation and clusters: Cases and policies](#) (Vol. 2). Edward Elgar Publishing.

<sup>10</sup> Nomaler, Ö., Verspagen, B. (2016). [River deep, mountain high: of long run knowledge trajectories within and between innovation clusters](#), *Journal of Economic Geography*, 16(6), 1259–1278.

<sup>11</sup> Lazzarotti, L., Capone, F., Caloffi, A., & Sedita, S. R. (2019). [Rethinking clusters. Towards a new research agenda for cluster research](#). *European Planning Studies*, 27(10), 1879–1903.

<sup>12</sup> Porter, M.E. (1998). [Clusters and the New Economics of Competition](#). *Harvard Business Review*, 76, pp.77-90.

<sup>13</sup> Izsak, K., Meier zu Köcker, G., Ketels, C. et al. (2016). [Smart guide to cluster policy](#). EC Publications Office.

<sup>14</sup> Torre, A. & Gallaud, D. (Eds.). (2022). [Handbook of Proximity Relations](#). Cheltenham, UK: Edward Elgar Publishing.



enterprise is less dependent on the capital equipment (especially when cooperation between participants in the production process is facilitated by information technologies), the cluster can go beyond national borders.

According to Porter, the geographic scope of a cluster depends on the distance at which informational, transactional, and other types of positive effects act, that stimulate the activities of enterprises<sup>15</sup>. There are a number of examples where clusters are formed as a connection of nodes in different countries, which provide a competitive advantage to this particular region only when acting jointly. Geographical proximity can be important for customer transactions that require personal interaction<sup>16</sup> for building trust.

On the practical level, first comprehensive cluster mapping model was developed and used in the US<sup>17</sup>, and then this system was quickly adopted and implemented across the globe and made its way to Europe.

In 2004, first exercise mapping of clusters of EU-10 countries was carried out, which two years later was followed up by EU-27+5 (the EU and Iceland, Israel, Norway, Switzerland, and Turkey) cluster analysis. The mapping part of the project which was implemented at the time later became the European observatory for clusters and industrial change (EOCIC) initiative and continued with the development of methodological approach of evaluating clusters. In other parts of the original mapping project, a number of cluster case studies and analysis of cluster policies was also carried out<sup>18</sup>.

#### Cluster presence in a region can be measured by two specific indicators:

- **Industry-relevant specialisation nodes**, it gauges if a region has a higher concentration of a particular industry (or 'industrial ecosystem') compared to others. This is measured by a factor called the Location Quotient (LQ), which shows how concentrated a particular industry is in a region compared to the entire EU. If the LQ is greater than 1.5, it means the industry is more concentrated in that region than the average of the EU. Secondly, that industry must make up over 1% of total employment in the EU to be considered a significant part of the larger economy.
- **Region-relevant specialisation nodes**, it also uses the LQ to gauge if a region is especially concentrated in a particular industry (with an LQ over 1.5). However, it checks if over 1% of employment within that region itself is in that industry. Location quotients show a ratio of employment in a given industry in the region in comparison to other industries, and typically ratios higher than 1 imply high regional specialisation, with location quotient of 2 showing that there are twice as many employees in an industry that would be expected if employment was distributed evenly, without any clusterisation/specialisation. Therefore, any region with LQ above 1 shows a high potential for further development and clusterisation (setting up cluster organisations and tailored policies).

### 2.1.3 Cluster networks and connections

#### Importance of a network

The network structure of a cluster is more efficient compared to isolated enterprises. A network involves different forms of economic interaction between independent participants. This economic network consists of independent entities that establish relationships based on equality and partnership. They share a similar value system, which helps them build trust and operate according to informal rules.

In geographically localised clusters, business and innovation collaboration *“rely heavily on social networking dynamics based on combined forms of proximity (geographical, organisational, cognitive and institutional), on trustworthiness and its sustainability, on local cross-learning and co-learning processes, and on formal as well as informal inter-individual and inter-organisational interactions”*<sup>19</sup>.

In the innovation network, soft integration of participants in the innovation process takes place. It is confirmed that networks *“contribute significantly to the innovative capabilities of firms by exposing them to new sources of ideas, enabling fast access to resources, and enhancing the transfer of knowledge”*<sup>20</sup>. Innovation networks

<sup>15</sup> Porter, M. E. (2000). [Location, Competition, and Economic Development: Local Clusters in a Global Economy](#). *Economic Development Quarterly*, 14(1), 15-34.

<sup>16</sup> Rosenfeld, S.A. (2002). [Creating Smart Systems: A guide to cluster strategies in less favoured regions](#). European Union Regional Innovation Strategies. – 2002. – 36 p.

<sup>17</sup> Ketels, C. (2017). [Cluster Mapping as a Tool for Development](#). Institute for Strategy and Competitiveness. Harvard Business School.

<sup>18</sup> Sölvell, Ö., Ketels, C., Lindqvist, G. (2009). [The EU Cluster Mapping and Strengthening Clusters in Europe](#). Center for Strategy and Competitiveness. [https://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.02/DOC\\_1](https://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.02/DOC_1)

<sup>19</sup> Hamdouch, A. (2009). [Networking, clustering and innovation dynamics in the global economy: general presentation](#). *Journal of Innovation Economics & Management*, 4, 5-13.

<sup>20</sup> Powell, W. W., & Grodal, S. (2005). [Networks of innovators](#). In Fagerberg, J., Mowery D., Nelson R. (Eds.), *The Oxford handbook of innovation* (pp. 56-85). Oxford University Press.



enable its members to “pool, exchange and jointly create knowledge and other resources, ... [helping them] to achieve much more than they could individually”<sup>21</sup>.

Unlike a traditional cluster, an **innovation cluster** is the institutionalised, long-term collaboration between regional industrial and research partners. It differs from a traditional cluster in that its network structure grows around central nodes that specifically generate scientific knowledge and business ideas, and train highly qualified specialists. Its typical activities include application-oriented projects that engage companies, science, and research institutions. The attempts to quantify the definition of an innovation cluster refer to either “clusters which have displayed a high level of innovative outputs”, or “those clusters whose sectoral specialisation is in high-tech industries defined on the basis of innovation inputs”.<sup>22</sup> In a digital economy, innovation cluster is evolving to address the new challenges: it enriches its composition with members that hold specific competencies, infrastructure and technologies<sup>23</sup>.

### Types of beneficial connections within clusters

A cluster is bridging together diverse stakeholders via diverse linkages. Enterprises are a spine of a cluster, but in the cluster, they interact with a large number of other participants: they accumulate specialised supplier bases and establish deep connections with consumers and enterprises in related industries. Three main types of connections (linkages) can arise between cluster members: ‘vertical’, ‘horizontal’, and ‘informal’ (the latter two making the network relationships).

**Vertical connections** (linkages) between enterprises develop due to the specialisation of participants at different stages of the production process. When enterprises complement each other in manufacturing a final product, supply chains are created, often through subcontracting or outsourcing. These vertical connections are typically formalised through contractual relationships between an enterprise and its suppliers.

**Horizontal connections** (linkages) involve enterprises engaging in joint activities that do not necessarily involve cash flows or equity financing. These connections include two main types: (a) the use of additional products and services, and (b) the joint incurrence of specialised costs — see Table 1. Eric von Hippel demonstrates how innovation development, production, distribution, and consumption processes can be structured horizontally<sup>24</sup>.

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<sup>21</sup> Schilling, M. (2016). [Innovation Networks](#). In: Augier, M., Teece, D. (eds) *The Palgrave Encyclopedia of Strategic Management*. Palgrave Macmillan, London.

<sup>22</sup> Maggioni, M. A., Riggi, M. R., & Riggi, M. (2008). High-Tech Firms and the Dynamics of Innovative Industrial Clusters. In C. Karlsson (Ed.), *Handbook of Research on Innovation and Clusters: Theories, Cases and Policies*.

<sup>23</sup> Koch, T., & Windsperger, J. (2017). [Seeing through the network: Competitive advantage in the digital economy](#). *Journal of Organisation Design*, 6, 1-30.

<sup>24</sup> von Hippel, E. (2007). [Horizontal innovation networks—by and for users](#), *Industrial and Corporate Change*, 16(2), 293–315.



Table 1. Horizontal connections

Types of horizontal connections	Examples of joint activities
Use of additional products and services	Use of similar specialised technologies
	Sharing of technologies available at one enterprise
	Sharing of equipment
	Mobility of labour between enterprises
	Use of common technical infrastructure
	Use of common specialised institutions (support organisations)
Joint incurrence of specialised costs	Accounting and auditing
	Cleaning and security of premises
	Purchase of equipment
	Acquisition of products from other enterprises
	Conducting marketing research
	Promotion (advertising) of services in the domestic or international market
	Labor resources (part-time/joint projects)
	Financing the functioning of institutions that are important for enterprises

Source: EU4Digital based on literature review.

**Informal connections** (linkages/social relationships) promote collaboration and enable rapid knowledge dissemination and learning across the cluster, generating benefits for the businesses involved.

Examples of specific types of knowledge that can be transmitted via informal connects but impact the economic performance of enterprises are:

- Professional knowledge;
- Knowledge about market conditions for selling services on the domestic and foreign markets;
- Knowledge about the conditions of employment for specialists in the specific industrial sector;
- Knowledge about available technical and institutional infrastructure;
- Knowledge about legislation.

Initially, the informal connections can arise as the first type of relationship between enterprises, which is then transformed and developed into contracts or joint projects. Conversely, the opposite situation can also occur, for example, enterprises learn about each other from well-known sources, enter contracts for the implementation of certain works, and during their implementation informal contacts are established, which can develop into the implementation of joint projects.

Proximity of the companies in the cluster facilitates the establishment of multiple informal connections, which increase collaboration and knowledge sharing<sup>25</sup>. Close interpersonal interactions between the enterprises that make the core of the cluster are sources of exchange of tacit, uncodified knowledge, accelerating learning, disseminating best practices, and stimulating innovation in the cluster<sup>26</sup>. Exchange of uncodified knowledge may also occur at the level of strategic alliances with universities, research institutes, consulting agencies, and infrastructure organisations. Relations at this level often are built on the basis of horizontal cooperation.

The constellation of vertical and horizontal connections leaves space for both competition and cooperation between the cluster members. Competition and cooperation can co-exist in a cluster when they are carried out at different levels (competition - regarding the core activity of the enterprise, and cooperation – complementary to the core activity, to attract resources and services that would not be available to enterprises in isolation). For example, SMEs in the textile cluster may compete on the market of final products, but may cooperate by joint purchase and usage of expensive equipment. Also, cooperation may be part of a strategy for winning the competition. For example, enterprises can compete for customers, but cooperate in vertical relationships (supplier-buyer) with related industries and with local institutions.

<sup>25</sup> Balland, P., R., Boschma and K. Frenken (2022). [Proximity, innovation and networks. A concise review and some next steps](#). In: A. Torre and D. Gallaud (eds.), *Handbook of Proximity Relations*, Cheltenham: Edward Elgar, pp. 70-80.

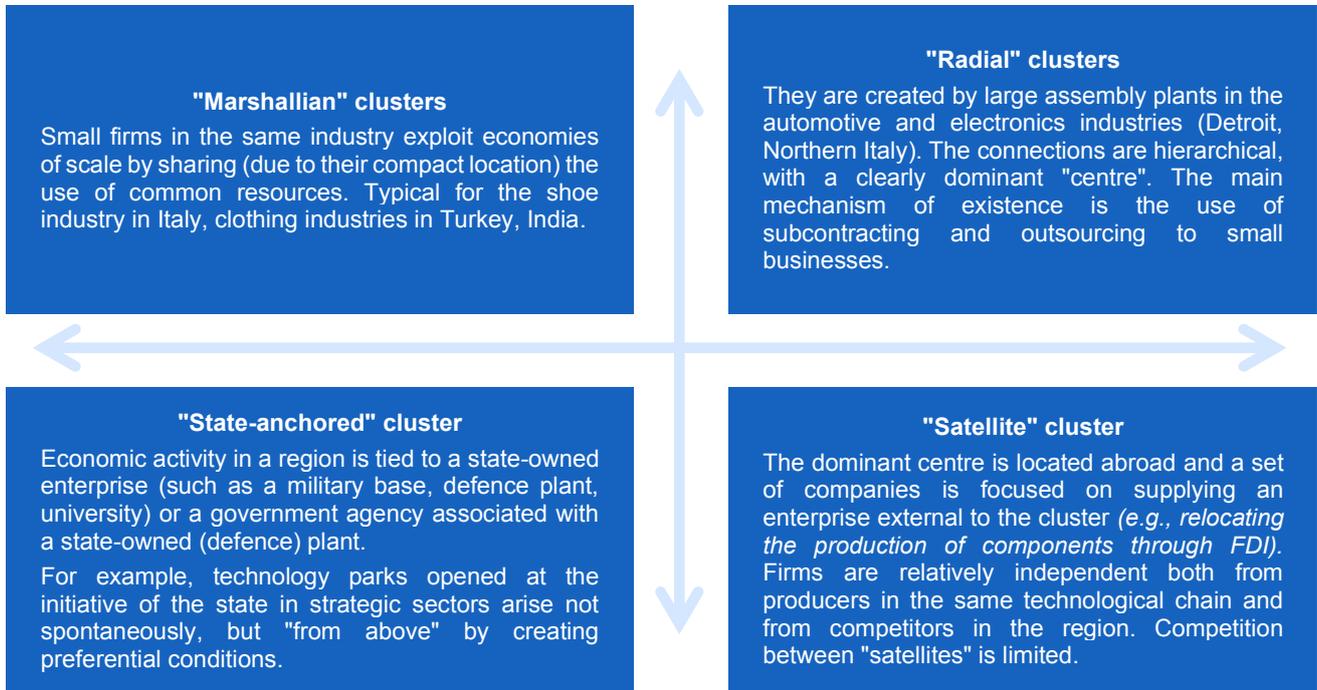
<sup>26</sup> Seidler, R., & Hartmann, E. (2008). [The use of tacit knowledge within innovative companies: Knowledge management in innovative enterprises](#). *J. Knowledge Management*, 12.



### Models of clusters' organisation

Several classic organisational models of clusters' structure are distinguished: 'the Marshallian type', 'the hub-and-spoke (radial) clusters', 'the satellite industrial platforms', and 'the state-anchored clusters'<sup>27</sup>.

Figure 2. Main cluster models



Source: EU4Digital adaptation based on Porter, M.E. (1998). *Clusters and the New Economics of Competition*. Harvard Business Review, 76, pp.77-90<sup>28</sup>.

The structure of a cluster organisation, including its dominant firms and inter-firm relationships, largely determines which entities are most likely to benefit from innovation returns. The unique makeup of each cluster is influenced by industry dynamics, cost structures, and product characteristics, making it impractical to enforce a universal approach.

Moreover, clusters can be categorised into three main integration types:

- Vertical integration clusters, which encompass sequential stages of production (e.g., from suppliers to manufacturers to marketers to clients).
- Horizontal integration clusters, involving industries that share a common market for their end products.
- Technological integration clusters, where industries utilise similar technologies, require specific workforce skills, or depend on identical natural resources.

#### 2.1.4 Cluster effects and impact

According to Porter, "Clusters affect competition in three broad ways: (a) by increasing the productivity of companies based in the area; (b) by driving the direction and pace of innovation, which underpins future productivity growth; and (c), by stimulating the formation of new businesses, which expands and strengthens the cluster itself... A cluster allows each member to benefit as if it had greater scale or as if it had joined with others without sacrificing its flexibility."<sup>29</sup>

<sup>27</sup> Markusen, A. (1996). *Sticky places in slippery space: A typology of industrial districts*. *Economic Geography*, 72(3), 293-313.

<sup>28</sup> Markusen, A. (1996). *Sticky places in slippery space: A typology of industrial districts*. *Economic Geography*, 72(3), 293-313.

<sup>29</sup> Porter, M. E. (1998). *Clusters and the New Economics of Competition*. *Harvard Business Review*, 76, pp.77-90.



Participation in a cluster provides a lot of additional opportunities for the companies,

- **Markets:**
  - Opening new markets and jointly entering them by leveraging combined resources and knowledge;
  - Expanding access to information about market needs and ways to promote products and services in the market for specific products or customer segments;
  - Enhancing connection establishment with foreign partners, e.g. through cluster brand.
- **Harmonisation of procedures and rules:**
  - Coordinated requirements to the main business, and production processes for suppliers and dealers;
  - Elaboration of the general rules of the engagement in the market that allow individual enterprises to function effectively;
  - Reduction in costs and improvement in the quality of knowledge-intensive services due to the synergy effect;
  - Unification of approaches in quality management, logistics, engineering, technology, etc.
- **Competencies:**
  - Opportunity to share positive experiences through informal communication;
  - Increasing the competencies of strategic management of enterprises through targeted trainings and informal communications with the peers (about determining directions for business development, innovations, increasing labour productivity, reducing production costs);
  - Consolidated lobbying of the interests of cluster participants in various government bodies.

Clusters as innovation networks are characterised by a 'synergistic (system) effect' - an increase in the efficiency of activity as a result of integration of individual parts into a single system. In innovation networks, a synergistic effect can arise as a result of operational synergy, agglomeration, expansion of the range of innovative products, combination of complementary resources, functional synergy, trade synergy, financial synergy and savings, team synergy, etc. The main and critical role in ensuring of a synergistic effect in a cluster is played by 'informal connections' that ensure intensified knowledge exchange and accelerated learning of enterprises, and, consequently, their competitiveness.

Specialisation in a cluster between several enterprises interacting with each other strengthens them due to:

- Risk redistribution;
- Product and market processes rationalisation;
- Regularity of innovation (because enterprises interact not only through cooperation, but also through competition which makes enterprises to regularly innovate);
- More efficient nature of collective innovation in knowledge-intensive industries;
- Flexibility in responding to sudden changes in market conditions (including flexibility in interactions).

Clusters create 'externalities', i.e., benefits produced by some participants that are captured by other participants due to the fact that access to these benefits cannot be limited or access limitation requires prohibitively high costs<sup>30</sup>. These include:

- Increasing the scale and efficiency of production;
- Expanding the scope of activity;
- Sharing of costs and risks;
- Increasing the stability and sustainability of market positions;
- Reducing costs for the acquisition and dissemination of knowledge and technologies;
- Adapting to changes in the external environment;
- Increasing share of intellectual products in the products of the cluster;
- Improving of the main indicators of production and economic activity (income, sales volume, profit, profitability, capital productivity, production, material productivity, etc.).

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<sup>30</sup> Rosenfeld, S.A. (2002). *Creating Smart Systems: A guide to cluster strategies in less favoured regions*. European Union Regional Innovation Strategies. – 2002. – 36 p.



Another classification distinguishes externalities according to the directions of their distribution:

**Table 2.** Externalities in a business cluster

Cost and production efficiency externalities	
Vertical	Opportunity of decrease in supplier prices
	Opportunity of decrease in the cost of production of enterprises
Horizontal	Formal and informal cooperation between two or more enterprises in the same industry, such as joint marketing and export transport solutions, transfer of market information
Demand effects	The scale of local demand makes it easier for cluster companies to exploit economies of scale
	The scale of local labour demand shifts the labour market towards the supply of labour with specialised skills
Knowledge and innovation externalities	
Vertical	Intensifying knowledge flows from clients to suppliers
	Intensifying knowledge flows from suppliers to manufacturers
Horizontal	Formal and informal knowledge flows between enterprises in the same industry, for example, joint research and development (R&D) based on collaborative ties; pure unpaid knowledge spillovers
Demand effects	The scale and diversity of local demand facilitates experimentation and communication with customers during product development in the early phases of the production cycle
	The scale and diversity of local demand generates an influx of scientists and highly qualified workers

Source: Karlsson C. (2007). *Clusters, Functional Regions and Cluster Policies*. Royal Institute of Technology, CESIS<sup>31</sup>.

The emergence, development and increase in the competitiveness of various clusters do not necessarily occur through the entire variety of external effects, but may embrace some combinations of effects, which should be taken into account when developing economic policy in relation to a specific cluster.

Clusters, when they emerge naturally, are the outcome of entrepreneurial initiatives, innovative strategies, and novel business model implementations within a specific geographical area. Different locations provide different types of opportunities for specific companies to invest, succeed, and grow. This spontaneous assembly of interconnected businesses might seem uncoordinated but is part of the 'invisible hand' of market mechanisms. The flow of entrepreneurial actions significantly dictates the progress or regress of the larger cluster landscape: investment decisions, innovations, and improvements fuel the organic growth of the cluster, whereas decisions to exit the region could trigger a decline.

Some numbers illustrate the effects of clusterisation for the involved businesses:

- **Improved economic productivity and competitiveness.** Cluster organisations facilitate mutual learning between companies and other associated entities, resulting in a surge in productivity and competitiveness. Evidence suggests more than a four-fold increase in productivity and innovation propensity following one year of cluster participation<sup>32</sup>. Overall, economic activities that are located in clusters account for about 39% of European jobs and 55% of European wages, employees in strong clusters earn on average 11 % higher wages than their colleagues in the same industries but located outside of clusters, which is further evidence of higher productivity achieved within clusters<sup>33</sup>.
- **Enhanced innovation capabilities.** Cluster participation bolsters innovation, shown via the increased propensity to innovate and development of new products and services. For instance, 55% of clustered companies in Denmark had generated or were planning to generate new offerings as a result of being a part of a cluster<sup>32</sup>, while in the US organisations which are part of clusters account for more than 87% of all patents<sup>33</sup>.
- **Strong international attractiveness and competitiveness.** Participation in clusters enhances a company's international appeal and competitiveness. In Denmark, 12% of companies reported that their involvement in cluster activities contributed to increased exports<sup>32</sup>, which is consistent with the

<sup>31</sup> Karlsson C. (2007). *Clusters, Functional Regions and Cluster Policies*. Royal Institute of Technology, CESIS.

<sup>32</sup> Wilson, J., Wise, E., Smith, M. (2022). [Evidencing the benefits of cluster policies: towards a generalised framework of effects](#). *Policy Sciences*, 55.

<sup>33</sup> Izsak, K., Meier zu Köcker, G., Ketels, C. et al. (2016). [Smart guide to cluster policy](#). EC Publications Office.



observation that majority of clusters develop around industries that are export-prone, where clustering can provide the biggest competitive advantage without directly negatively affecting and exacerbating competition in the local market<sup>34</sup>.

- **Tangible impacts on regional economic development.** In France, 33% of companies involved in clusters reported that involvement contributed to their revenue growth<sup>37</sup>. Research in the US has shown that new business formation is higher in strong clusters, and that new firms are more likely to succeed and grow if located in strong clusters<sup>36</sup> while regions that have a higher proportion of their employment in strong clusters register higher overall levels of prosperity<sup>38</sup>.
- **Resilience.** According to data from the post-crisis period of 2008-2014, strong clusters recorded a consistent annual job growth rate of 0.2%. This stands in contrast to non-clustered industries which saw an average annual decrease of -1.7%. Evidently, strong clusters can maintain job stability and foster growth, even under economic stress. This resilience highlights how clusters can guard against broader economic turbulence, thus providing a degree of economic stability in their regional environment<sup>38</sup>.

Apart from more general benefits that can be observed to the members of successful cluster organisations, correlation between cluster organisations and their impact on regional competitiveness has been observed and studied. According to Delgado, *“The presence of strong clusters in a region enhances growth opportunities in other industries and clusters. The findings highlight the important role of cluster-based agglomeration in regional economic performance.”*<sup>39</sup> The EOCIC has developed a 25-indicator system to evaluate this relationship (Figure 3).

Altogether, positive effects of cluster organisations at microlevel are aggregated into positive impact on the regional level. Research has shown that presence of cluster organisations has a significant and positive correlation with a number of regional competitiveness indicators. For example, the following effects are observed:

- Boosting human resources in science and technology: increasing the number of employed ICT specialists and enhancing employment in technologically advanced and knowledge-intensive industries.
- Increase in public and business R&D expenditures: they are associated with a higher number of patents per million populations, particularly in the realm of ICT.
- Positive correlation is identified between cluster organisations and gross domestic product (GDP) per capita, apparent labour productivity, share of ICT in the gross value added (GVA), and regional competitiveness, especially in relation to digital elements.

However, not all effects are positive; negative impacts are observed in the following indicators, for example:

- Higher competitive environment in specialised regions potentially leads to a negative impact on the survival rate of enterprises in certain industries.
- Cluster presence was also found to be positively related to a higher level of air emissions, implying a potential negative impact on the environment, and the growing challenge for cluster organisations to tackle environment sustainability issues, as well as social goals.
- Other findings from the literature do as well indicate that the location in a cluster does not per se lead to more innovations. The innovative output of firms is rather affected by the presence of other innovative firms.

All the 25 indicators of negative and positive correlations are presented in the table below.

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<sup>34</sup> Franco, S., Murciego, A., Salado, J. P., Sisti, E., & Wilson, J. (2021). [European Cluster Panorama 2021: Leveraging clusters for resilient, green and digital regional economies](#). An initiative of the European Union (pp. 116). Orkestra.

<sup>36</sup> Delgado, M., Porter, M. E., & Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, 10(4), 495–518.

<sup>37</sup> Wilson, J., Wise, E., Smith, M. (2022). [Evidencing the benefits of cluster policies: towards a generalised framework of effects](#). *Policy Sciences*, 55.

<sup>38</sup> Izsak, K., Meier zu Köcker, G., Ketels, C. et al. (2016). [Smart guide to cluster policy](#), EC Publications Office.

<sup>39</sup> Delgado, M., Porter, M.E., Stern, S. (2010). [Clusters, Convergence, and Economic Performance](#). Research Policy. 43.

Figure 3. Correlation between cluster organisations and their impact on regional competitiveness, 25 indicators

	Positive correlation	Negative correlation
<b>Outcome indicators</b> 	1. GDP per capita (Purchasing Power Parity) 2. Employment in technology and knowledge-intensive sectors 3. Share of ICT in GVA 4. Air emissions in fine particulates (PM2.5) in Industry	1. Sales of new-to-market and new-to-enterprise product innovations as percentage of total turnover
<b>Intermediate performance</b> 	1. Employment rate 2. Apparent labour productivity 3. Gross fixed capital formations as % GDP 4. PCT patents per million population 5. ICT PCT patents 6. Green PCT patents	
<b>Firm's behaviour</b> 	1. Business R&D expenditures 2. Public-private co-publications per million population 3. Employed ICT specialists 4. Share of 'Green Employment'	1. Innovative SMEs collaborating with others 2. SMEs that introduced a business process innovations (percentage of SMEs) 3. SMEs that introduced a product innovation (percentage of SMEs)
<b>Business environment</b> 	1. Public R&D expenditures 2. Human resources in science and technology 3. Birth of enterprises 4. European Quality of Government Index (EQI) 5. Number of recovery facilities	1. Survival rate of enterprises (3 years) 2. Individuals who have above basic overall digital skills
<b>Legend</b> Digital Transformation       Green Transition		

Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition.](#)

### 2.1.5 Cluster life cycle stages

Based on several classifications, the following stages of the cluster life cycle can be distinguished <sup>40, 41, 42</sup>:

1. **Agglomeration.** There are a number of scattered enterprises and other economic agents in the region. The structure of the cluster is unevenly developed, individual elements are poorly developed, however, there are distinctive competitive advantages and fundamental factors contributing to further development of the cluster. Such clusters of enterprises have the ability to integrate into a cluster, but either do not yet realise the need for this or have not yet reached the critical mass.

2. **Emergence.** Some participants in the agglomeration begin to cooperate around their core activities and realise common opportunities through their interactions. While these connections are sporadic, they arise

<sup>40</sup> Enright M.J. (1996). Regional clusters and economic development: A research agenda. Business Networks: Prospects for Regional Development.

<sup>41</sup> Arthurs D., Cassidy E., Davis C.H. and D. Wolfe. (2009). Indicators to support innovation cluster policy, *Int. J. Technology Management*, 46(3/4).

<sup>42</sup> Fornahl, D. and Hassink, R. (eds.). (2017). [The life cycle of clusters: A policy perspective.](#) Northampton, MA: Edward Elgar, 308 pp.



between specific enterprises to realise their common interests and can be carried out in foreign markets; however, the number of enterprises, as well as connections, is still small, and the internal self-awareness of the cluster participants and its external recognition are poorly developed. M. Enright calls such clusters 'latent' clusters.

3. **Development.** The interactions between cluster members are expanding, new participants are being involved at the regional level in the same or related activities. A network of regular contacts is formed between these participants, for example, they unite into an association, and certain rules of the engagement and norms of interaction between these enterprises are developed, including moral and ethical standards of their behaviour in the market. New formal and informal institutions are being formed. Cluster participants are aware of belonging to it. A brand can emerge, and overall cluster marketing activities can begin. There is high level of innovation in the cluster. Despite the positive dynamics of all elements of the cluster and intra-cluster interaction, the cluster has not yet reached the required level of development to harvest big stable benefits from being united.

4. **Maturity.** Several types of networks of interactions between enterprises and other organisations are emerging; they are united not only by the association, but by multiple other institutional structures (work groups, partnership agreements, joint projects, common venues for networking, etc.). The cluster acts with a synergistic effect and is self-aware.

At the maturity stage, both main and related production and specialised services are well developed and balanced; service delivery processes become routine. The dynamics of development of the environment favours the emergence of new enterprises (startups, spin-offs) and joint ventures. The number of enterprises is large, internal competition is high, imitators appear. The cluster is based on SMEs. At the maturity stage, several groups of SMEs can be distinguished: final producers; suppliers of components, raw materials, services, downstream industries (distribution channels); producers of by-products. If there are enterprises in the cluster that produce the same product, i.e., are direct competitors, joint actions of all enterprises - members of the cluster to maintain trust and willingness to cooperate are of particular importance. These clusters gain from the world-class research and innovation potential, intensive intra-cluster interaction is carried out within the framework of joint projects and the work of inter-industry organisations. A developed cluster includes various institutions interacting with each other. There is external recognition of the cluster benefits [43].

An essential characteristic of a mature cluster is that the cumulative cluster assets qualitatively change the characteristics of the cluster's actors. This happens when a sufficient number of resources, connections and competencies is accumulated to create a critical mass that provides cluster participants with a key position in their economic industry with a significant competitive advantage over other regions. The mature cluster has already developed connections in the external environment, with other clusters, areas of activity, regions, i.e., may take on a distributed geographical form. The presence of a critical mass allows for the formation and long-term maintenance of constantly renewed connections between flexible small enterprises and large resource suppliers. Critical mass can make a cluster resilient to external influences or other pressures, including the loss of enterprises, even when these enterprises can be classified as key enterprises, until a critical threshold of the number of remaining participants is exceeded. The lack of critical mass may, on the contrary, make the cluster vulnerable to the loss of specific resources and skills.

5. **Transformation.** Clusters change as their markets, technologies, and processes change. Following the dynamics of changes in the socio-economic system, clusters are formed, expand (geographically, by the number of participants, by volume of production, sales, revenue, profit), deepen (by specialisation of activity), but can also narrow, collapse, and disintegrate over time. Such dynamism and flexibility of clusters is one of their advantages compared to other forms of organisation of the economic system. At a certain stage of its development, a cluster can transform into one or more new clusters that centre around other activities or change the mechanisms of its functioning. Individual types of activities can be separated from the cluster and can become so developed that they can be defined as an independent cluster.

In an economy in which production is constantly developing, an increase in factor costs (the market value of resources) under the influence of more productive industries (which have higher profitability and, therefore, are able to offer a higher price for resources, "luring" them from other industries) will inevitably lead to a decrease in some clusters. Those industries and segments that use resources less productively due to lower technology complexity and lack of product differentiation may lose competitive advantage. Those activities in the value chain that are least productive compared to foreign enterprises may be pushed outside the country's borders. Finally, a country may significantly lose its position in some segments, but in more highly developed segments it will remain in the presence of healthy competition. To ensure that the destruction of a cluster does not damage the economy of the region, "aged" clusters need targeted actions to foster innovations (new products, markets,

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<sup>43</sup> Arthurs D., Cassidy E., Davis C.H. and D. Wolfe. (2009). Indicators to support innovation cluster policy, *Int. J. Technology Management*, 46(3/4).



technologies) and review the value chain to ensure it is not broken or overloaded with unnecessary links that increase industry costs. Since clusters have finite life cycles, it is necessary to regularly monitor technological and market trends and have consistent succession plans for transformations<sup>44</sup>.

### 2.1.6 Cluster (management) organisations

Existing as spontaneous regional agglomerations of firms or being a result of an orchestrated policy effort, clusters represent a unique combination of market-driven spontaneity and strategic intention.

As clusters evolve, they reach a stage where the creation of governing bodies or cluster (management) organisations becomes advantageous. These organisations act as intermediaries, coordinating and integrating cluster members through the promotion of joint projects or collaborative activities (cluster initiatives).

**Cluster initiatives**, according to Izsak, are “*organised efforts to support the competitiveness of a cluster and thus consist of practical actions related to the capacity of these clusters to self-organise and increasingly to proactively shape the future of the cluster. They usually follow a bottom-up approach, are implemented through a competitive process, and are often managed by specialised SME intermediaries, such as cluster organisations.*”<sup>45</sup>

Collaboration within specific cluster initiatives is typically organised as a project with a dedicated resource base and a binding, goal-oriented participation from various cluster members, requiring coordination by a dedicated organisation. The feature of cluster initiatives is the possibility to cover different stages of the value chain (vertical networking) as well as different industries and disciplines (horizontal networking).

**Cluster organisations**, according to Izsak, are defined as “*legal entities that support the strengthening of collaboration, networking and learning in innovation clusters and act as innovation support providers by providing or channelling specialised and customised business support services to stimulate innovation activities, especially in SMEs. They are usually the actors that facilitate strategic partnering across clusters.*”<sup>45</sup>

Thus, cluster organisations are special institutional structures that emerge to assist cluster participants in realising their interests by adapting them to the requirements of the external environment, and by influencing the external environment, making it more favourable for cluster participants.

The establishment of a cluster organisation within a cluster is not a mandatory feature. However, incorporating a cluster organisation becomes a natural, progressive step in a cluster's growth trajectory. By facilitating streamlined interaction, management and coordinating cooperative endeavours, they help to advance the cluster's aims and objectives. In essence, the decision to formalise relationships within the cluster by creating a cluster organisation can serve as an accelerator, driving the cluster's development and enhancing its impact within an increasingly competitive economic landscape.

Cluster organisations serve as pivotal enablers of intra-cluster interaction and collaboration, fostering an innovation-friendly ecosystem, especially in knowledge-intensive industries. Regions equipped with robust cluster organisations tend to exhibit greater attractiveness in terms of foreign direct investment (FDI), indicating their positive influence on cluster competitiveness, albeit the effect is not substantial<sup>47</sup>. This effect is less apparent in less knowledge-intensive sectors, such as Retail, Tourism, Construction and others as evident and explained in greater detail in Section 2.3.1. – the more complex the product/service being developed, the more R&D is required, the more business sense there is to look for synergies between similar entities, which is the basis of clusters and also a prerequisite to support an operation of any cluster organisation.

Another observation is that these organisations have been found to play a crucial part in facilitating the integration of multinational corporations into local clusters by counteracting the challenges of foreignness. This integration can lead to knowledge spillovers and process innovation, which further boosts the competitiveness of these clusters<sup>47</sup>.

However, the impact of cluster organisations significantly depends on their ability to apply effective, context-sensitive strategies, considering the unique needs of a cluster and the broader regional context. Thus, the presence of cluster organisations, along with the strategic effectiveness of their implementation, can be a determinant factor in the evolution, development, and performance of clusters. This highlights the underlying importance of establishing supportive cluster organisations within regional economic planning and continuous work to improve their capacity, which is increasingly supported by national or regional cluster policies.

<sup>44</sup> Rosenfeld, S.A. (2002). [Creating Smart Systems: A guide to cluster strategies in less favoured regions](#). European Union Regional Innovation Strategies. – 2002. – 36 p.

<sup>45</sup> Izsak, K., Meier zu Köcker, G., Ketels, C., et al. (2016). [Smart guide to cluster policy](#). EC Publications Office.

<sup>47</sup> Burger, M. J., Karreman, B., & van Eenennaam, F. (2015). [The competitive advantage of clusters: Cluster organisations and greenfield FDI in the European life sciences industry](#). *Geoforum*, 65, 179-191.



## 2.2 Benchmarking

### 2.2.1 Benchmarking of clusters

Initially, the benchmarking methodology for assessing clusters incorporated three distinct indices: (a) the scale of the cluster, (b) level of specialisation, and (c) the focus of a regional labour market. Each index served as a different measurement of the cluster's characteristics and operations. To visually simplify this multifaceted evaluation, a 'star rating system' was employed, where clusters excelling in all three measurements were anointed as 'three-star' clusters. This star-rating methodology served as an effective, easily comprehensible tool to define the extent of the cluster's agglomeration.

Later, in 2020, this approach was improved by expanding the criteria for measuring cluster strength to include:

- **Size:** total number of employees.
- **Specialisation:** level of specialisation measured by location quotients (ratio between share of industry's total employment in the region against all regions and countries considered in the analysis).
- **Productivity:** measured by the average wage per employee.
- **SME performance:** measured by number of high growth firms.
- **Innovation leaders:** measured by the number of global frontier firms (top 5% in terms of productivity).

This methodology remains the core of cluster assessment, supplemented by development of 88 distinct cluster categories<sup>48</sup>. These categories have been employed by the European Observatory for Clusters and Industrial Change (EOCIC) and the European Cluster Collaboration Platform (ECCP), which have used these classifications to form an essential base for the creation of the [European Cluster Panorama](#) reports — a practice that has been consistently upheld since the inception of the first report in 2008.

Policy makers can leverage data from these reports and country factsheets<sup>49</sup> by the ECCP to inform decisions related to regional development, investment, and innovation. The reports offer insights into successful policies and practices that support clusters' missions, fostering resilient, green, and digital industrial ecosystems. By understanding cluster dynamics, policy makers can tailor strategies to enhance competitiveness, promote collaboration, and drive economic growth within their regions.

### 2.2.2 Benchmarking of cluster (management) organisations

Cluster organisations, on other hand, are evaluated by the by European Cluster Excellence Initiative (ECEI), launched in 2009, and, since 2021, managed independently from the European Commission<sup>50</sup>. Active in nearly every European region, cluster organisations forge connective bonds among SMEs, research institutions, policy makers, training providers, and other key organisations, addressing challenges and capitalising on opportunities pertaining to specific sectors, value chains, and a wide range of economic activities.

Cluster organisations are also largely professionalised, with a high proportion (68%) having some form of **quality label**. Currently, the ECEI is the leading initiative of cluster labelling and has a comparative portfolio of more than 1,200 cluster organisations from 47 European and overseas countries and assesses cluster organisations by assigning them bronze, silver and gold badges, depending on their performance on 31 different indicators<sup>51</sup>.

The requirements for the type of badge fall under the categories: (a) structure of the cluster, (b) typology, (c) governance, (d) co-operation, (e) financial cluster management, (f) strategy, (g) objectives, (h) services, (i) achievements, and (j) recognition. For instance, the 'Structure' of the cluster focuses on committed cluster participation and the composition of cluster participants. In another example, the category of 'Strategy' evaluates aspects such as the strategy building process, implementation plan, financial controlling system, among others.

In essence, while the minimum requirements serve as the fundamental standard for cluster organisations, the gold label level represents an elevated standard of excellence and quality management in the realm of cluster organisations. As of 2023, 148 cluster organisations have been awarded the gold label.

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<sup>48</sup> Franco, S., Murciego, A., Salado, J. P., Sisti, E., & Wilson, J. (2021). [European Cluster Panorama 2021: Leveraging clusters for resilient, green and digital regional economies](#). An initiative of the European Union (pp. 116). Orkestra.

<sup>49</sup> ECCP. (2022). [Country factsheets on cluster policies and programmes](#)

<sup>50</sup> European Commission. (n.d.). [European Clusters Excellence. Single Market, Economy, Industry & Innovation - European Commission](#).

<sup>51</sup> ESCA. (2024). [Overview of cluster benchmarking indicators](#).



## 2.3 Cluster organisations in the EU

### 2.3.1 Industries

#### Sectors

According to the ECCP, Europe has more than 2,950 clusters, supported by over 1,000 cluster organisations<sup>52</sup>. The cluster organisations, that are profiled on the ECCP, cover 71 of the 88 economic sectors classified under the NACE 2-digit system. However, within the EU cluster organisations, most of the activity is concentrated in the top 25 economic sectors; where over 70% of the cluster organisation are engaged. A look at the leading sectors in Figure 4 gives a clear picture of clusters' concentration; they display the highest number of cluster organisations along with a trend for larger memberships.

The **leading sectors** are transversal, meaning they apply across a wide range of activities. These are: (a) programming, consultancy, and related activities (J62), (b) scientific research and development (M72). Other prevalent sectors are related to: (c) manufacture of machinery and equipment (C28), (d) crop and animal production, hunting and related service activities (A01), and (e) the manufacture of food products (C10).

Among the more specific sectors stand out: (f) the manufacture of machinery and equipment (C28), (g) manufacture of food products (C10), (h) human health activities (Q86), and (i) information services (J63) — these sectors have an especially high prevalence in the EU cluster landscape.

**Figure 4.** Top 25 economic sectors of cluster organisations in the EU-27



Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Sample size 577 cluster organisations. 1-100, etc. – members within the cluster organisation. Data extracted on 14 October 2022.

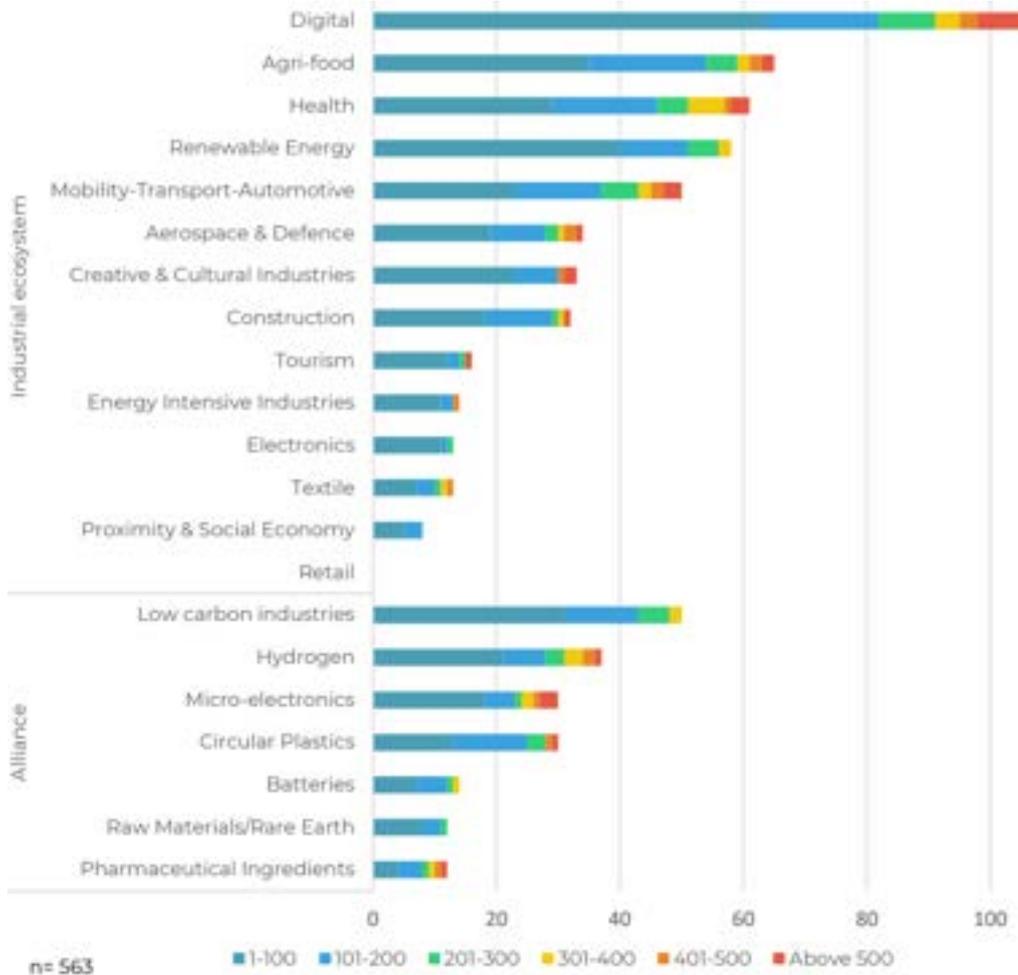
<sup>52</sup> Cluster Collaboration. (2022). [Cluster business models fit for accelerating the twin transitions: Key actions for clusters to implement transition pathways](#). ECCP Discussion Paper.



### Industrial ecosystems

Additionally, the activities of EU-27 cluster organisations can be evaluated in terms of the 14 industrial ecosystems. The leading ecosystem is digital ecosystem with more than 100 cluster organisations; it is followed by agri-food and health ecosystems, each having at least 50 cluster organisations. In contrast, the retail ecosystem does not have any cluster organisations listed in the ECCP, and the proximity and social economy ecosystem has very few. Therefore, it can be assumed that the leading ecosystems show bigger potential for added value to the members of clusters, given that clusters usually “emerge” rather than are artificially created.

**Figure 5.** Cluster organisations in industrial ecosystems and industrial alliances by number of members



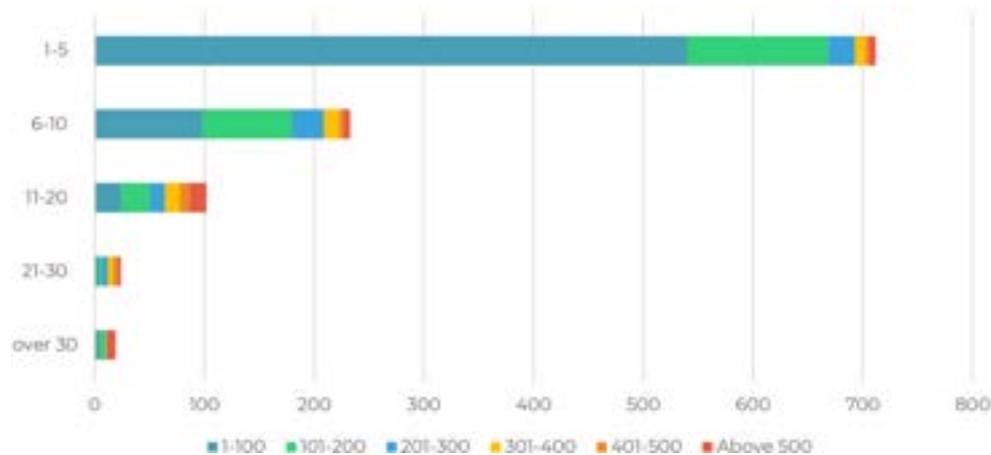
Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Sample size 563 cluster organisations. 1-100, etc. – members within the cluster organisation. Cluster organisations can select multiple industrial ecosystems. Data extracted on 14 October 2022.

### 2.3.2 Administration

European cluster organisations bear a specific profile in terms of size and staffing, with size typically correlating with the number of members of cluster organisation. About 65% of these organisations have a relatively small administrative team, employing between 1-5 cluster management personnel. On the other end of the spectrum, only a minor fraction, about 4%, operate with a larger team of more than 20 cluster management staff members.



Figure 6. Number of staff in cluster organisations



Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Sample size 1090 cluster organisations. 1-100, etc. – members within the cluster organisation. Data extracted on 14 October 2022.

### 2.3.3 Members

According to the 2022 Cluster Policy report, cluster organisations in the EU-27, as profiled on the ECCP, have an average of around 170 members each. The distribution of cluster organisation membership is as follows:

- 62% have less than 100 members;
- 22% have between 101 and 200 members;
- 5% have more than 400 members.

To be precise, EU-27 cluster organisations, represented on the ECCP, have profiles indicating a total member pool of approximately 160,000. This collective membership is majorly composed of:

- 84% SMEs,
- 9% large firms,
- 7% research organisations<sup>53</sup>.

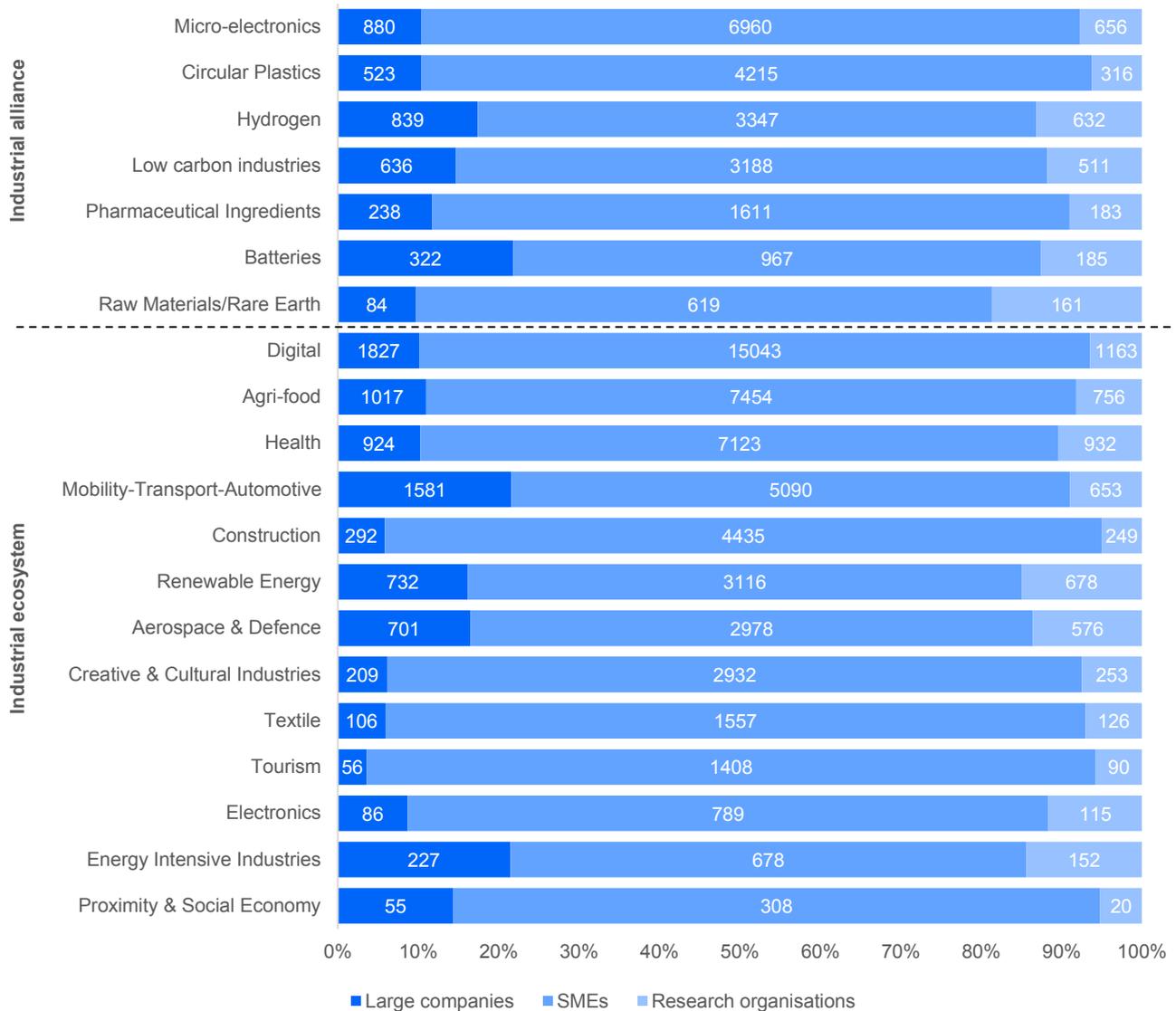
The representation of SMEs, large firms, and research organisations within cluster organisations varies significantly across different industrial ecosystems:

- SMEs constitute a higher proportion of membership (83%-87%) within the Textiles, Tourism, and Construction ecosystems. Conversely, SMEs membership representation is relatively low (55%) in the Energy-intensive industries ecosystem.
- Large firms feature more membership (20%) in cluster organisations within the Mobility-transport-automotive ecosystems, significantly above the average.
- Research organisations hold a higher proportion of membership (14%-19%) within the Energy-intensive industries, Electronics, and Renewable energy ecosystems.

<sup>53</sup> ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#).



Figure 7. Number of member organisations in a cluster organisation



Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Data extracted on 14 October 2022.

This typical cluster organisation’s membership structure in cluster research is sometimes reference as the ‘triple helix’ structure, where three key types of stakeholders are involved in the success of any cluster – academics (universities, research institutions, etc.), government (with cluster policy and financial instruments), and corporate (businesses operating in specific geographical area or industry. Recently, however, there has been a debate about the change in this paradigm, suggested by Rangen et al<sup>54</sup>. It is suggested that the current and future paradigm should move towards a pentagon structure involving two new key types of stakeholders – entrepreneurs and capital. This reflects a growing understanding that successful cluster organisations must create enough value to be financially independent and collaborate/involve such actors as startups, scale-ups, accelerators, incubators, business angels, venture firms and large investment companies. This argument is explained in greater detail in Section 2.3.4. of the report about the business models of cluster organisations.

<sup>54</sup> Haze, V., & Rangen, C. (n.d.). [Cluster Business Models: Exploring Business Models in Global Innovation Clusters](#). A report by Strategy Tools & The Global Community. Design by Jolene Foo-Hodne.



### 2.3.4 Cluster (management) organisations business models

This report has established that clusters themselves in most cases emerge, but cluster organisations have to be set up, and as is the case with any organisation, need to create enough value to justify its existence. Adopting an appropriate **legal structure** is essential for reflecting strategic orientation of cluster organisations:

- **Association:** typically, cluster organisations opt for the model, due to its flexibility allowing to integrate new members;
- **Private limited companies:** in cases where commercial activities are significant and the membership tends to be fixed;
- **Hybrid models:** for larger, more complex structures, where private limited companies and associations are combined.

Moreover, it is common for already existing organisations to take on the role of cluster management.<sup>55</sup> Regarding organisational structure, cluster organisation's management generally incorporates their key stakeholders and their expertise. The management framework often includes a **cluster board** with representatives from business, government, research, and academia. Furthermore, aligned with the strategic focus, some structure models include **advisory boards** with relevant industry experts. Additionally, **working groups** are organised to involve and engage members, stimulate cooperation, and initiate concrete projects and activities, such as business development, incubation and acceleration, education, and training<sup>55</sup>.

Moving forward, typically, cluster organisations have three types of **available funding**<sup>56</sup>:

- **Private funding:** this type of funding comes from membership fees and services provided by the cluster organisation to its members and other actors;
- **Public funding:** in the EU usually comes from structural and other European funds, special programmes, central and/or local/regional subsidies;
- **Project funding:** this type of funding to implement specific projects can come from both private and public funding sources.

Typical cluster organisation, in its lifetime, usually passes through different phases with regards to funding structure. As noticed in the *Cluster business models* report, in the beginning organisations often start with heavy dependence on public funding (for example 60% national and 40% local government funding) and move towards private-only funding in the span of 10 years, with 3-5 years into the cycle, when substantial income comes from membership fees and member funded projects<sup>56</sup>. This also suggests the timeframe any cluster policy has to adhere to, if the objective is to meaningfully assist creation of new cluster organisations.

For majority of cluster organisations navigating the financial aspects of their operations take a significant amount of their time and energy, which can prevent from long term value creation<sup>58</sup>. The main value of cluster organisations and cluster development in general lie in the long term, however resource-challenged organisations need to solve short-term financial sourcing and delicately balance their long-term strategic goals and operational necessities. There is continuous risk that cluster organisations, focused too much on the near term, cannot achieve systemic change in meaningful areas such as digitalisation and/or green transition – areas which need both pull factor (interest from stakeholders) and push (influencing the demand for such transition).

### 2.3.5 Services

Within the wide array of services provided by cluster organisations, a prominent component pertains to facilitating **collaboration among their members**. This core function aligns with the inherent purpose of clusters to encourage interconnectedness and interaction between firms and other related entities. Closely following this service is the provision of specific support for **research, development, and innovation**, which plays a pivotal role in driving the growth of knowledge-intensive sectors.

Knowledge-intensive sectors or industries are typically characterised by a high reliance on intellectual capabilities and a need for continual innovation. As evidence suggests, in such sectors, where cluster organisations are more prevalent (such as digital, health ecosystems), the role of cluster organisations can be crucial.

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<sup>55</sup> German economic team. (2020). [Cluster initiatives in Germany – common activities, organisational and financing models](#).

<sup>56</sup> Haze, V., & Rangen, C. (n.d.). [Cluster Business Models: Exploring Business Models in Global Innovation Clusters](#). A report by Strategy Tools & The Global Community. Design by Jolene Foo-Hodne.

<sup>58</sup> Cluster Collaboration. (2022). [Cluster business models fit for accelerating the twin transitions: Key actions for clusters to implement transition pathways](#). ECCP Discussion Paper.



Therefore, it is logical that the main services provided by cluster organisations align closely with the needs of knowledge-intensive sectors. Services such as facilitating collaboration among firms and support for research, development, and innovation are precisely what knowledge-intensive companies require to thrive. Additionally, aiding in the facilitation of external collaborations or match-making, and seeking public funding, further empower these companies to extend their reach and secure valuable resources.

**Figure 8. Services provided by cluster organisations**



Source: ECCP profile data; sample of 468 cluster organisations with updated profiles on 29 November 2021.

## 2.4 Organisation and value proposition of digital innovation clusters in the EU

### 2.4.1 Clusters' evolution into digital innovation hubs (DIHs)

In an increasingly digitalising economy, the role of business clusters is also evolving. More and more cluster organisations are setting their objectives to assist their members in adjusting to the new competition challenges and adopting advanced digital technologies and business models. This can be achieved via enhancing of internal capacities of the cluster, or by partnerships with the external providers of technological expertise and business advice. Various organisational forms may be applied for partnerships that help innovation clusters to enhance their capacity to support members in a digital economy. Some of the forms are memberships in national and international alliances, networks, associations.

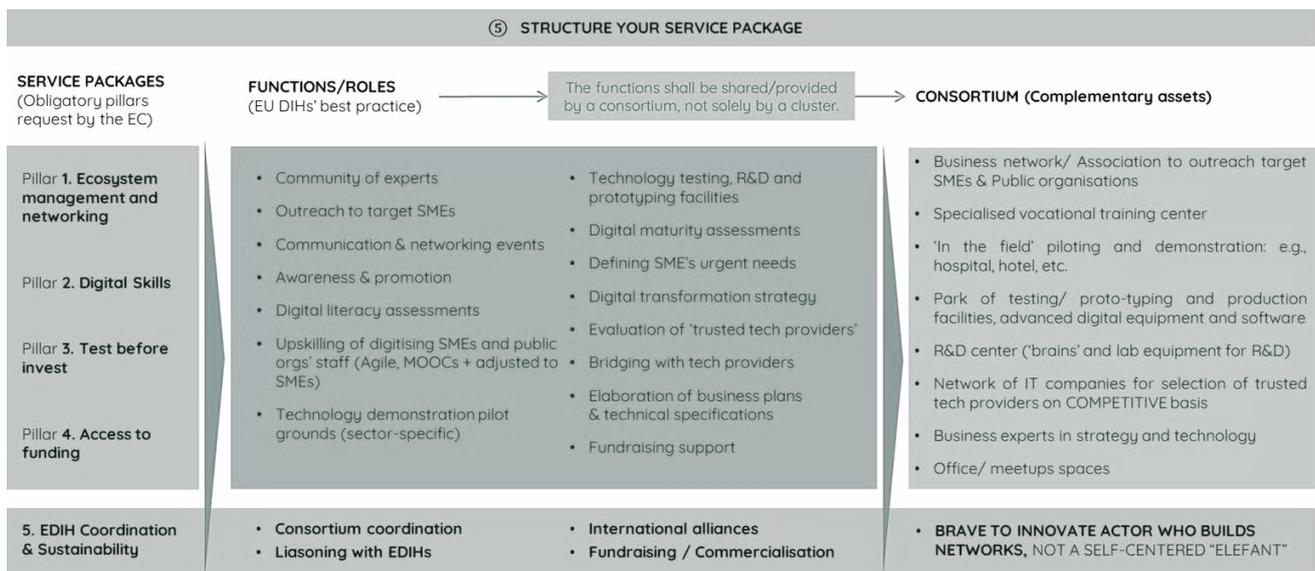
Digital innovation hub (DIH) is a specific organisational form that unites business and technological expertise to support SMEs in the digitalisation; it is usually focusing on specific technological or sectoral dimensions. As emphasised by the European Expert Group on Clusters (EEGC)<sup>59</sup>, cluster organisations may perform a driving role in the establishment and successful operation of DIHs. In particular, the role of clusters as groups of enterprises is indispensable as they can “contribute to strategic decisions, represent the voice of business actors, and, therefore, can make the activities of the Digital Innovation Hubs more relevant for local business and other actors of industrial ecosystems”. Additionally, cluster organisations can leverage the already established trust among cluster members. Thanks to their in-depth understanding of the business processes and challenges in the specific sector, they can tailor the relevant awareness-raising campaigns on digital transformation opportunities, build digital competence programmes, organise demonstration and testing, or contests. Driving the development of a specialised DIH may be seen as one of scenario for any sectoral cluster to become successful in the digitising economy; though of course cluster organisations can create their own approaches.

<sup>59</sup> Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. (2020). [European Expert Group on Clusters Recommendation Report \(1st ed.\)](#).

Evidence underlines, that the model of an innovation cluster fits well to “enable industry growth based on cooperation and joint action”, as they are “networked, sectorial and location-based”. However, this is not enough to ensure the digitalisation<sup>60</sup>. Innovation clusters can take the leading role in gathering the proper set of competencies, which can be exposed realised via cluster throughout the value chains. When liaising with the other specialised actors, innovation clusters can jointly elaborate the very strong knowledge-based targeted and impactful value proposition driving the digital transformation of their sector.

In a nutshell, the spectrum of services to be delivered by a DIH embraces the services from awareness building and networking to training, testing, and piloting of digitalisation solutions. Each service may require specific competence which is the core competence of specific actors (Figure 9). It is important to identify, which actors in the region possess the necessary competences, and bring them together, so that they can jointly adjust their proposition to fit the challenges of specific target group of SMEs and deliver it via DIH.

Figure 9. Service package of a DIH and consortium composition



Source: EU4Digital based on research of European DIHs.

The example of the Transilvania Digital Innovation Hub (DIH), an initiative developed by the Transilvania IT cluster and a non-profit organisation ARIEST in 2017, exhibits how collaborative projects of diverse stakeholders can activate digitalisation of companies in various areas (creative industries, agriculture, furniture, energy efficiency and agriculture). Now, Transilvania DIH offers services for testing advanced digital technologies, skills development and training, support in finding investments and creating an innovation ecosystem and networking. The leading technologies that the hub focuses on are artificial intelligence, big data, HPC and edge computing, cybersecurity, robotics, and VR/AR. One of the Transilvania DIH clients said, “It is very difficult for me to see an actor other than Transilvania DIH that has so many ramifications and understands the market so well, the needs of the market and the supply that exists in the region.”<sup>61</sup>

## 2.4.2 Digitalisation in focus of the EU clusters: DIHs and Networks

### Clusters involved in DIHs

Search into the map of cluster organisations in Europe allows identifying the number of cluster organisations that either work in digital sectors and/or technologies (461 cluster organisations) or support digitalisation (495 cluster organisations); 260 cluster organisations are both working in digital and supporting digitalisation<sup>62</sup>. For the purposes of this study, further the cluster organisations that work in digital sectors and/or technologies and support digitalisation are called ‘digital innovation clusters’.

<sup>60</sup> Sermuksnyte-Alesiuniene, K. (2023). [The Role of Clusters in Digital Innovation Hubs](#). ECCP.

<sup>61</sup> [Transilvania DIH Success stories](#). (2024).

<sup>62</sup> [In this section numbers are given as retrieved from ECCP in June 2024](#); following the hyperlinks at later dates will adhere to the same selection criteria but will reflect the actualised data. In order to see the number of cluster management organisations specialising in a specific digitalisation expertise, use the ‘Digitalisation expertise’ filter to select the desired expertise.



Out of them, **187 cluster organisations are participating or involved in a DIHs**, contributing to, or coordinating the specific node of competence supporting digital transformation of SMEs. This specific group of cluster organisations was taken for identification of best practices, as they represent the European most elaborated practice of digitalisation support.

They are distinguished by a spectrum of **digitalisation expertise**<sup>62</sup> which will be helpful for SMEs. In particular,

- Identifying and promotion of digital collaborative projects ([123](#) cluster organisations);
- Introduction to digital solutions/technology providers ([81](#) cluster organisations);
- Support towards digitalisation of processes ([93](#) cluster organisations);
- Scouting digital services/innovations ([76](#) cluster organisations);
- Expertise in Industry 4.0 processes ([67](#) cluster organisations);
- Digital training courses for members ([65](#) cluster organisations);
- Definition of members' digital strategies and new business models ([61](#) cluster organisations);
- Digital market studies and observation ([39](#) cluster organisations);
- Talent attraction/development ([37](#) cluster organisations).

A number of cluster organisations involved in the DIHs offer **training services**:

- for companies' workforce (104 cluster organisations across Europe, covering replacement, life-long learning, upskilling, competence development, on-the-job training, vocational training, staff mobility, mentoring, talent attraction, hiring of specialists and involvement of local skills strategy).
- for cluster organisations or for policy makers (50 cluster organisations). This includes:
  - (a) support of knowledge sharing (28 cluster organisations);
  - (b) connecting to other organisations in the regional ecosystems (28 cluster organisations);
  - (c) facilitation of collaboration between members, e.g. in joint training programmes (24 cluster organisations);
  - (d) promotion of activities, e.g. job fairs and exhibitions (22 cluster organisations);
  - (e) facilitation of cross-sectorial cooperation, like reskilling staff from other sectors (20 cluster organisations);
  - (f) collecting needs from company members (17 cluster organisations);
  - (g) provision and facilitation of access to training for members (15 cluster organisations);
  - (h) trend-scouting i.e., latest trends on skills (12 cluster organisations);
  - (i) access to finance to upskill/reskill (11 cluster organisations);
  - (j) connecting to other actors or directing to vocational training (6 cluster organisations);
  - (k) staff mobility (3 cluster organisations).

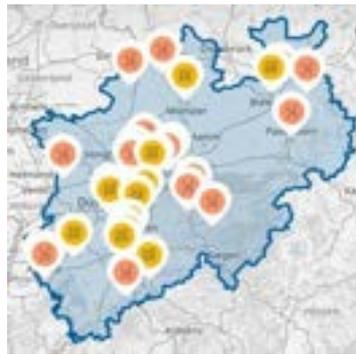
It is also possible to search for specific cluster organisations that work in specific industries (sectoral dimension as per NACE2 or cross-sectoral industries); alliances/ecosystems; or in specific technology fields (IPC/WIPO).

Majority ([168](#) out of [187](#) European digital innovation cluster organisations that are participating or involved in the DIHs), are also supporting internationalisation and can be considered as gateways to find partners for joint projects, expertise sharing of twinning for capacity building.

### Networks of clusters

Another type of actors developing in the EU are the **networks of clusters**. There are already a number of networks that are established on the [regional](#), [national](#), [international](#) and [sectoral](#) levels across the EU. One example of such network of clusters working in the area of ICT as well as manufacture of machinery and equipment is [Competence center NRW.innovativ](#), located in Duesseldorf, Germany. It unites a number of clusters acting on the regional and lands' level, located in Nordrhein-Westfalen, and serves as the focal point for networking among the cluster organisations and other innovation stakeholders in North Rhine-Westphalia.

Figure 10. "Competence center NRW.innovativ" network's distribution of clusters



Source: <https://nrwinnovativ.de/akteure/>

This competence centre provides different types of services for regional cluster organisations to support in generation and development of clusters, and cluster performance monitoring and assessment. With cluster vouchers, *NRW.innovativ* facilitates the development of project applications, the exploration of financing opportunities, the identification of relevant project partners and the design of sustainable business models for cluster organisations. It also provides the venue for interested NRW cluster organisations to network, and informs them in a monthly newsletter about innovation policy trends as well as new topics and instruments at national and international level.

Cluster vouchers offer technical support and consultancy services free of charge. Clusters and networks in NRW can apply for these vouchers by filling out the form 'express of interest', which entitles them to up to six days of consulting. Project proposals can be submitted at any time, and vouchers are awarded on a first-come, first-served basis.

### 2.4.3 Spectrum of services of digital innovation clusters

Distinguishing the best practices of digital innovation cluster organisations can be made via the prism of cluster excellence labels. Out of 187 European digital innovation cluster organisations that are participating or involved in the DIHs, where 29 can boast of the *Gold Cluster Excellence label*, 14 have *Silver label*, and 52 have *Bronze label*<sup>63</sup>.

The spectrum of general services provided by cluster organisations to its members covers: (a) the access to finance (both public and private funding); (b) access to markets (both domestically with the EU and to third countries, complemented with location branding); (c) access to expertise (advisory services; support of R&D and innovation; IPR Management; human resources); (d) access to resources (equipment, components, infrastructure), and (e) building linkages (communication; facilitation of collaboration among cluster members and externally [beyond cluster]).

As for general services of cluster organisation, the following are peculiar for the clusters that participate or are involved in the DIHs.

Table 3. General services of European digital innovation clusters that are participating or involved in the DIHs

General services of digital innovation cluster organisations that are participating or involved in the DIHs	Total number or organisations delivering the service	of them, holding:		
		Gold label	Silver label	Bronze label
Facilitation of collaboration between members (within the cluster)	<u>120</u>	<u>16</u>	<u>9</u>	<u>31</u>
Support of research, development and innovation	<u>96</u>	<u>20</u>	<u>8</u>	<u>24</u>
Facilitation of external collaboration (beyond cluster) such as matchmaking	<u>89</u>	<u>16</u>	<u>7</u>	<u>15</u>
Access to finance: public funding	<u>88</u>	<u>19</u>	<u>5</u>	<u>18</u>

<sup>63</sup> In this section numbers are given as retrieved from ECCP in June 2024; following the hyperlinks at later dates will adhere to the same selection criteria but will reflect the actualised data.



General services of digital innovation cluster organisations that are participating or involved in the DIHs	Total number or organisations delivering the service	of them, holding:		
		Gold label	Silver label	Bronze label
Internationalisation support (access to third countries markets)	<u>63</u>	<u>11</u>	<u>3</u>	<u>18</u>
Communication	<u>56</u>	<u>7</u>	<u>4</u>	<u>15</u>
Advisory services	<u>50</u>	<u>9</u>	<u>3</u>	<u>13</u>
Development of human resources, such as staff mobility, access to training	<u>32</u>	<u>2</u>	<u>2</u>	<u>11</u>
Access to the European internal market	<u>35</u>	<u>7</u>	<u>0</u>	<u>5</u>
Access to finance: private funding	<u>28</u>	<u>5</u>	<u>1</u>	<u>5</u>
Location branding	<u>7</u>	<u>1</u>	<u>0</u>	<u>3</u>
IPR management	<u>3</u>	<u>1</u>	<u>0</u>	<u>0</u>
Other services	<u>35</u>	<u>6</u>	<u>6</u>	<u>15</u>

Source: Analysed by EU4Digital based on ECCP.

As for digitalisation-related services, the following are peculiar for the cluster organisations that participate or are involved in DIHs.

**Table 4.** Digitalisation-related services of digital cluster organisations

Digitalisation-related services of digital cluster organisations that are participating or involved in the DIHs	Total number or organisations delivering the service	of them, holding:		
		Gold label	Silver label	Bronze label
Identifying and promotion of digital collaborative projects	<u>123</u>	<u>22</u>	<u>11</u>	<u>33</u>
Support towards digitalisation of processes	<u>93</u>	<u>18</u>	<u>6</u>	<u>23</u>
Introduction to digital solutions/technology providers	<u>81</u>	<u>16</u>	<u>7</u>	<u>18</u>
Scouting digital services/innovations	<u>76</u>	<u>14</u>	<u>7</u>	<u>16</u>
Expertise in Industry 4.0 processes	<u>67</u>	<u>12</u>	<u>5</u>	<u>12</u>
Digital training courses for members	<u>65</u>	<u>8</u>	<u>6</u>	<u>13</u>
Definition of members' digital strategies and new business models	<u>61</u>	<u>11</u>	<u>6</u>	<u>13</u>
Digital market studies and observation	<u>39</u>	<u>8</u>	<u>4</u>	<u>7</u>
Talent attraction/development	<u>37</u>	<u>5</u>	<u>2</u>	<u>9</u>

Source: Analysed by EU4Digital based on ECCP.

A detailed landscape of general and digitalisation-related services provided by the gold label and silver label cluster organisations involved in DIHs (43 organisations mapped at ECCP as of June 2024) is provided in Annex 1. Its analysis discloses the following trends.

Most important general services that are provided by over 50% of gold and silver label cluster organisations are:

- Facilitation of collaboration between members (within the cluster);
- Support of research, development and innovation;
- Facilitation of external collaboration (beyond cluster) such as matchmaking.

Additionally, gold label cluster organisations intensively provide access to finance through public funding (66% of gold label organisations deliver this as a service), and internationalisation support (access to third countries markets) (38%).



Most important digitalisation services that are provided by over 50% of gold and silver label cluster organisations are:

- Identifying and promotion of digital collaborative projects;
- Support towards digitalisation of processes;
- Introduction to digital solutions/technology providers.

Around 40% of gold and silver label cluster organisations also possess expertise in the area of Industry 4.0 processes, and support their members in scouting digital services/innovations, and definition of members' digital strategies and new business models.

The findings reflect that general services of cluster organisations pair well with digitalisation services. This complementarity happens because the clusters in specific sectors/industries accumulate specialised knowledge pools from their members' expertise and focus on this core competence. The primary responsibilities of a cluster organisation, which aims to drive cluster development, include integrating this specialised expertise within the cluster, connecting it with complementary actors outside the cluster, and ensuring members have access to advanced scientific research and innovations. When supporting the digitalisation of cluster members, cluster organisations also focus on their core competencies to enhance the performance of sector-specific business processes and drive innovation through collaboration, facilitated by information technologies. This insight helps us to understand the most wanted components of the value proposition of the well performing cluster organisation to its members in the digital economy.

The capacity of the cluster organisation to deliver knowledge intensive value proposition to its members, is however very much dependent on financial constraints. Notably, out of the 29 EU gold label cluster organisations involved into DIHs, all have large companies in their member structure, herewith 10 benefit of 1-14 large companies, other 10 have 15-49 large companies, and 9 benefits of 50-150 large companies, which is a significant source of funding for delivery of knowledge-intensive high-quality services. Among silver label cluster organisations, just one benefit of over 50 large companies, and other two – of 15-49 large companies; at the same time all of them except for one cluster organisation have some large companies as their members. This factor should be considered when reviewing the financial capacity of the Eastern partner countries' cluster organisations to deliver knowledge intensive value proposition to its members.

Analysing the EU cluster organisations' service landscape in the digital area identifies the best practice cluster organisations, which deliver a wide spectrum of services for their members (Table 5).

**Table 5.** The EU cluster organisations participating in DIHs with the wider spectrum of services

European Cluster Excellence Label	Clusters' name	Country	Sector	Composition	Total services spectrum	General services	Digitalisation services
Gold label	<a href="#">Transilvania IT Cluster</a>	Romania	Information and communication	Large firms: 21 SME's: 52 Research organisations: 17	13	5	8
Silver label	<a href="#">Latvian IT Cluster</a>	Latvia	Information and communication	Large firms: 4 SME's: 40 Research organisations: 5	13	5	8
Gold label	<a href="#">DigitalLead</a>	Denmark	Information and communication	Large firms: 75 SME's: 503 Research organisations: 15	12	4	8
Gold label	<a href="#">POOL-NET - Portuguese Tooling &amp; Plastics Network</a>	Portugal	Manufacturing: C22 Manufacture of rubber and plastic products	Large firms: 19 SME's: 56 Research organisations: 12	12	5	7



European Cluster Excellence Label	Clusters' name	Country	Sector	Composition	Total services spectrum	General services	Digitalisation services
Silver label	<a href="#">Bron Innovation / Govtech Sweden</a>	Sweden	Manufacturing: C17 Manufacture of paper and paper products, Information and communication	Large firms: 7 SME's: 80 Research organisations: 2	12	4	8
Silver label	<a href="#">Cluster Sensor technology Bavaria / Strategic Partnership for Sensor Technologies</a>	Germany	Manufacturing: C26 Manufacture of computer, electronic and optical products	Large firms: 15 SME's: 55 Research organisations: 10	12	5	7
Gold label	<a href="#">Flanders' FOOD</a>	Belgium	Manufacturing: C10 Manufacture of food products	Large firms: 100 SME's: 210 Research organisations: 37	11	5	6
Gold label	<a href="#">HABIC BASQUE HABITAT, WOOD, OFFICE &amp; HOSPITALITY CLUSTER</a>	Spain	Manufacturing: C16 Manufacture of wood and of products of wood and cork, except furniture	Large firms: 5 SME's: 90 Research organisations: 5	11	5	6
Gold label	<a href="#">PRODUTECH - Production Technologies Cluster</a>	Portugal	Manufacturing: C28 Manufacture of machinery and equipment n.e.c., Information and communication	Large firms: 23 SME's: 65 Research organisations: 25	11	2	9
Gold label	<a href="#">Cap Digital</a>	France	Administrative and support service activities	Large firms: 64 SME's: 872 Research organisations: 71	10	5	5

Source: EU4Digital research based on the ECCP.

It is worth noting that the cluster organisations that deliver the bigger spectrum of digitalisation services belong to the group of cluster organisations that deliver the bigger spectrum of general services. Thus, the cluster organisations indicated above were mapped based on the total amount of their services but are distinguished by their digitalisation focus as well.

Another notable, though not surprising, finding is that the top cluster organisations offering the most digitalisation services majorly consist of ICT and manufacturing cluster organisations.

**The cluster organisations identified above are taken for closer consideration of their business models and partnerships in the subsequent chapter as well as identification of best practices in value proposition.**

## 2.5 Best practices of clusters with digital innovation focus in the EU

### 2.5.1 Operational and business models of cluster organisations

In this section, the report delves into European cluster organisations participating in DIHs, distinguished by gold or silver labels, and varying in size in terms of membership. We review their operational and financial models,



which enable them to offer a wide range of services and excel in management. Some further cases will exhibit the importance of the business model adaptation for ensuring the cluster sustainability and development.

Note: In the section the clusters are referred in the context of cluster organisations, using the names as listed on their respective websites. In certain instances, a specific legal entity may serve as the cluster organisation; however, for the purposes of this report, the focus is primarily on their role in managing the specific cluster.

#### **Bron Innovation / GovTech Sweden<sup>64, 65</sup>**

**Composition.** [Bron Innovation](#) cluster, founded in Sweden in 1988, operates a 'quadruple helix' collaboration network, focusing on ICT, digitalisation, and is functioning as a DIH. The cluster's network comprises: (1) around 100 private companies, (2) national agencies, regional authorities, municipalities, (3) academia and R&D, and (4) NGOs, primarily located in the county of Västernorrland, Sweden. Its mission is to attract new talent, investment, and enterprises to Västernorrland while strengthening and advancing existing businesses in the region.

**Focus.** Focus areas of the cluster are GovTech, Industrial digitising and digital information management services. The cluster is engaged in a variety of projects and activities, with a technical focus on the internet of things (IoT) and artificial intelligence (AI).

**Value proposition.** Bron Innovation organises annual conferences, webinars, workshops, hackathons, and various events aimed at uniting companies, academia, and society. These events are designed to enhance knowledge, foster new connections, and initiate collaborations. Member companies of Bron gain access to an extensive network, opening up new business opportunities, facilitating the exchange of experiences, and further strengthening the region's robust IT sector.

#### **Lesson: non-profit association as a legal structure and membership-focused funding**

Bron Innovation AB is entirely owned by the non-profit association Bron. Bron Innovation oversees the operational activities in alignment with the owner's directives, as determined by the association. Operating on a non-profit basis, the company's structure mirrors that of the association's board, showcasing a balanced mix of public and private stakeholders in accordance with Bron's activities. The board of directors (BofD), reflecting this diversity, is elected annually at the annual general meeting (AGM) and is steered by a chairman and a vice chairman, while the CEO manages the day-to-day operations.

Bron Innovation cluster's main source of funding comes from membership fees. The membership fee structure is: established companies and organisations pay an annual fee of SEK 5,000 (approx. EUR 445), while startups are charged a reduced rate of SEK 1,000 (approx. EUR 89).

#### **Flanders' FOOD<sup>66, 67</sup>**

**Focus and composition.** [Flanders' FOOD cluster](#), founded in 2005 by Fevia Vlaanderen and 20 founding members, stands as a distinguished cluster organisation, honoured with a gold label by the ECEI. Serving as the premier cluster for the agri-food industry in Flanders, Belgium, it comprises around 300 company members, predominantly SMEs, with roughly 70% operating within the agri-food sector. Flanders' FOOD encompasses members from food companies, related sectors, as well as partners and knowledge institutions.

**Value proposition.** Mission of the cluster is to support the Flemish food industry in maintaining and enhancing its competitiveness locally and globally through research and innovation, addressing the challenges in nutrition and sustainability. To accomplish this mission, the cluster performs the following key roles:

- Central contact point: acts as the primary contact for companies, social profit organisations, knowledge institutions, and governmental bodies within the Flemish agri-food sector.
- Cooperation initiatives organiser: facilitates collaboration among stakeholders to strengthen the food industry's competitiveness.
- Innovation resource management: manages specific innovation resources earmarked for project budgets via VLAIO to execute strategic research and innovation agendas.

Flanders' FOOD employs a process-driven strategy (covering the defined procedures for consistent, efficient outcomes), centralising the activities of its employees. It develops themes for research and innovation through collaborative programs and roadmaps with Flemish companies, clusters, and research partners. The strategy is divided into four key areas, focusing on meeting both companies' needs and industry demands by leveraging

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<sup>64</sup> ECCP. [Bron Innovation](#)

<sup>65</sup> [Bron Innovation](#)

<sup>66</sup> ECCP. [Flanders' FOOD](#).

<sup>67</sup> [Flanders' FOOD - Speerpuntcluster voor de agrovoedingsindustrie \(flandersfood.com\)](#)



and sharing the latest advancements in knowledge, techniques, and practices, while also exploring new horizons of knowledge:

- Lead in knowledge: on the basis of a strategic research and innovation agenda (SRIA), various roadmaps will be drawn up that will lead to (joint) knowledge development for the benefit of cluster members;
- Lead to knowledge: disseminating the available state-of-the-art and newly generated knowledge to a wide audience of food companies;
- Accelerate efficient & effective innovation: supporting companies in transforming knowledge into new products, processes, and concepts;
- Cross/create value chain: bringing stakeholders together to create an open culture of innovation to create win-wins, fill gaps and find new business opportunities.

#### **Lesson: structured operational model**

Flanders' FOOD, a non-profit organisation, operates under the guidance of an 18-member board of directors (BofD), consisting of the Flemish food industry and academia. These directors, offering their expertise on a voluntary, uncompensated basis, meet three times a year to oversee the organisation's strategic direction. The organisation's day-to-day operations are managed by a core team including a chairman, vice chairman, and treasurer. Strategic and roadmap committees provide advisory inputs to the management. The managing director leads the execution of strategies with the support of a management committee. The structure further includes specialised roles such as research managers, program managers, innovation managers, new business development managers, knowhow & inspiration manager, and an internationalisation manager. Operational support is provided by a management assistant, community manager, HR & finance personnel, and a communication manager with an accompanying communication officer. Postdoctoral researchers are also noted as integral to the organisation, contributing to research and development activities.

#### **DigitalLead<sup>68, 69</sup>**

**Focus.** [DigitalLead](#), Denmark's national digital technology cluster, founded in 2020, serves as a core centre for digital innovation. It connects businesses developing digital solutions with sectors seeking innovative technologies, fostering collaboration among businesses, academia, public authorities, and citizens.

**Composition.** According to ECCP, the cluster has a total of 600 member organisations, including top universities and over 500 companies, ensuring a rich collaboration across research, education, and industry sectors for fostering digital advancements.

**Value proposition.** With its nationwide presence, DigitalLead offers a platform for digital enterprises and researchers to innovate and grow, facilitating access to digital knowledge, fostering national and international partnerships, and encouraging cross-sector collaboration. Its vision is to create Denmark's leading digital innovation platform, fostering the innovation capacity, growth, and societal impact of Danish companies, thereby advancing Denmark's position as a premier digital leader. Focused on leveraging Denmark's strengths in digital and technological solutions, DigitalLead engages with a wide array of technologies including AI, IoT, blockchain, machine learning, and quantum technology, with an emphasis on themes like the green transition, resilience, and ethics.

For their members DigitalLead cluster offers plenty of benefits, including matchmaking, professional networking groups, project participation, innovation workshops, living labs, events, webinars, internationalisation and export, visibility, entrepreneurship. In 2020-2024, 'Digital & Green' stream of the cluster's activities address the areas where members and stakeholders experience a great demand for digital competences: digital sector coupling, Smart City, circular economy, and data science. Within 'Digital Resilience' stream, cluster members and the digital ecosystem are particularly concerned with Connectivity (IoT and 5G), GovTech, Industry 4.0 / servitisation and cybersecurity.

In addition, there are three cross-cutting themes that are always taken into account to increase the power of innovation among the cluster member companies, business partners and knowledge partners: internationalisation, business development and ethics.

#### **Lesson: strategic management and mixed funding model**

The operational model of DigitalLead encompasses a comprehensive management structure that integrates strategic oversight with functional operational roles. This includes a board of directors as well as local steering groups. Operational management involves CEO, COO, CFO, innovation, network managers, etc. ([Kontakt](#)

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<sup>68</sup> ECCP. [DigitalLead](#).

<sup>69</sup> [DigitalLead - Danmarks nationale klynge for digitale teknologier](#)



[DigitalLead \(digitallead-dk.translate.google.com\)](https://digitallead-dk.translate.google.com). Additionally, the cluster manager at DigitalLead oversees various strategic and operational aspects to enhance digital innovation and transformation.

DigitalLead's financial model combines public funding and membership fees. It receives co-financing from the Danish Agency for Education and Research, the Danish Business Promotion Board, and the European Fund for Regional Development. Membership fees, which vary based on the size and type of member organisation, contribute to its revenue. Figure 11 illustrates the approach to breakdown of fees charged to organisations based on the number of employees and type of organisation. For example, a private company with 11-20 employees is charged DKK 5,500, which is approximately EUR 738 (EUR 1 – DKK 7,46).

Figure 11. DigitalLead Membership Fees

**Quota rates**

From July 1, the membership fee for the rest of the year is 50% of the price listed below:

Private companies		Public companies/organisations	
0-1 employees	DKK 1,250	Universities	DKK 35,000
2-5 employees	DKK 2,500	GTS institutes	DKK 15,000
6-10 employees	DKK 3,500	Other educational institutions	DKK 10,000
11-20 employees	DKK 5,500	Municipalities (<= 100,000 inhabitants)	DKK 15,000
21-49 employees	DKK 8,000	Municipalities (> 100,000 inhabitants)	DKK 25,000
50-99 employees	DKK 10,000	Regional	DKK 25,000
100-199 employees	DKK 15,000	Other public institutions (including government agencies, business houses, etc.)	DKK 10,000
200-499 employees	DKK 25,000		
500-999 employees	DKK 35,000		
> 1000 employees	DKK 45,000		

Departments	
<= 100 employees	DKK 10,000
> 100 employees	DKK 20,000

Associations	
<= 200 members	DKK 10,000
> 200 members	DKK 20,000

Source: [Prices and terms \(digitallead-dk.translate.google.com\)](https://digitallead-dk.translate.google.com)

### Construction cluster of Slovenia<sup>70, 71</sup>

**Focus.** Construction Cluster of Slovenia is a cross-sectoral cluster, focusing on the global value chain of sustainable and circular buildings, infrastructure, cities, and related industries. The main goal of the Construction Cluster of Slovenia is to improve domestic and international competitiveness of its members through commercial cooperation and networking, R&D and innovation, education, training, and policy action.

**Composition.** Founded in 2004 on the initiative of the Ministry of Technological and Economic Development, its founding members were the main Slovenian construction companies. Currently, the cluster unites 10 SMEs and 1 large company, also performing R&D.

**Value proposition.** The cluster offers support for its members through engagement in international R&D projects, including *Horizon Europe*, *COSME*, *Life*, *Interreg*. Additionally, cluster informs the members about the latest advancements in materials, technologies, and business models. It plays an active role in knowledge and competence transfer. As a member of the *Renovate Europe* project, the cluster seeks to elevate energy renovation standards within the EU and promotes these goals within Slovenia, demonstrating a commitment to sustainable practices. The focus extends to circular economy, digitalisation, new business models, and international cooperation in energy-efficient sustainable construction. By offering a comprehensive suite of

<sup>70</sup> ECCP. [Construction Cluster of Slovenia](#)

<sup>71</sup> Haze, V., & Rangen, C. (n.d.). [Cluster Business Models: Exploring Business Models in Global Innovation Clusters](#). A report by Strategy Tools & The Global Community. Design by Jolene Foo-Hodne.



consulting services tailored to the development priorities of its companies, the cluster acts as a mentor and coach. This support equips members for sustainable, circular, and digital transformations, preparing them to meet future challenges effectively.

Currently, the cluster's strategy focuses on three main points: becoming financially independent with sustainable financing, increasing recognition, and building up cross-sectoral and transnational synergies and value chains with construction, energy efficiency, and renewable energy source industries.

**Lesson: financial independence while addressing the member's needs**

Initially, the cluster was partly financed through subsidies from the Ministry for Technology and Economic Development and membership fees determined by company size. However, by 2006, as state subsidies ended, the cluster sought new sources of financing and began participating in the EU-funded research and innovation projects. This strategic step was not just a financial necessity but also a step towards becoming a leader in new construction technologies and paradigms. The cluster extended its network in the EU and beyond and became more experienced in collaboration in R&D. However, due to increased focus on research projects, the cluster experienced diminishing engagement with its members. The economic crisis of 2010 increased this discrepancy, leading to a significant reduction in its founding member base and membership fees. Lacking national subsidies and reduced to minimal communication efforts, such as monthly emails, the cluster's survival became solely reliant on its involvement in various R&D projects.

From its experience, the cluster has gleaned several lessons: the importance of understanding and clear communication of the value provided by the cluster organisation; supporting members effectively; striving for financial independence from unstable sources like subsidies; developing valuable services; maintaining regular communication and continuously learning and adapting. It also emphasises the importance of knowing member goals and tailoring cluster services, accordingly, connecting with other clusters, and maintaining optimism and a solution-focused approach even in hard times.

**Health Valley Netherlands<sup>72, 73</sup>**

**Focus.** [Health Valley](#) stands out as an exemplary innovation cluster founded in 2006. Initially a purely economic program, it later adopted the traditional triple helix model involving government, academia, and industry. The cluster primarily focuses on three areas: medical devices & robotics, personalised medicine, and digital health.

**Composition.** The Health Valley network unites around 250 member organisations, including 25 larger companies, 160 SMEs, 10 startups from healthcare sector, 25 academia members (universities and applied sciences' research centres), 5 civil society members and government, that aim to rapidly develop, implement, and scale innovative technological solutions in Life Sciences, MedTech and Health sectors.

**Partnerships.** Over the years, Health Valley has been a partner in various EU-funded projects and is well-connected internationally. Since 2022, Health Valley has joined forces with Health Innovation Park (HIP) achieving the milestone of becoming the most progressive healthcare innovation network for their partners. Moreover, Health Valley's collaboration with Th!nk East Netherlands – a dynamic consortium of cluster member organisations, educational and research institutions, business associations, regions and the provinces of Gelderland and Overijssel in the Netherlands – further amplifies its impact.

**Value proposition.** Health Valley's strategy revolves around three key points: Connect, Inspire, and Facilitate. They aim to bridge connections between different stakeholders, inspire innovation and improvement, and facilitate growth and collaboration in the healthcare sector. For example, before the Covid-19 pandemic, they held around 30 events for partners focusing on matchmaking and project partnerships and now, in March 2024 organised the largest Life Sciences and Health (LSH) event in the Netherlands – [the Health Valley Event](#).

**Lesson: strategic shift in business model towards member-centric approach**

Health Valley began predominantly with public funding (90-10% public-private) but over the years has transitioned to a more balanced mix of public and private funding (40-60%). The cluster noted an imbalance in their partnership model, where the low pricing did not foster enough engagement or reflect the value inherent in the network. As a result, the Health Valley significantly restructured their partnership fee model moving from a flat fee to a progressive model based on the size of an organisation, measured in full-time employment (FTE). Membership fees now depend on size-specific classifications, ensuring that the financial contribution required from each member is proportionate to its size.

Due to the change, it was expected to have some loss of partnership numbers due to the higher price range, as for example, this change led to a tenfold increase in fees for the largest corporations. However, the restructuring

<sup>72</sup> Haze, V., & Rangen, C. (n.d.). [Cluster Business Models: Exploring Business Models in Global Innovation Clusters](#). A report by Strategy Tools & The Global Community. Design by Jolene Foo-Hodne.

<sup>73</sup> ECCP. [Health Valley Netherlands](#)



of business model led to a surprising outcome: increased engagement and involvement from their partners. The partners started to perceive a higher value and became more active in the network. In particular, they voiced the expectation that they would receive more from the model and the activities per level. The cluster learned that precise fulfilment of expectations and a 'user-centred approach' in their offerings are crucial. They are now exploring ways to enhance the perceived value further, like offering customised events and services that partners would value highly.

Health Valley Netherlands exemplifies how a strategic shift in business model and funding structure can significantly enhance partner engagement and perceived value. By transitioning from a reliance on public funding to a balanced mix and rethinking their partnership model and service proposition, they have not only ensured their sustainability but also maximised the value for all stakeholders involved.

### Cap Digital<sup>74</sup>

**Focus.** [Cap Digital](#) is a cluster acting as the French DIH for digital and ecological transformation in the Paris Region, the first digital innovation ecosystem and the largest business cluster in Europe. Cap Digital was created because of a public policy for the development of economic sectors with strong growth potential located in the same geographical area. Since 2006, the cluster has been implementing the Paris Region's strategy for digital content and services, supporting innovative SMEs in this field.

**Composition.** The cluster has more than 1,000 members, including over 800 SMEs and 64 corporations, which are focused on a specific tech-driven industry, as well as over 70 universities, higher education establishments and research labs. The cluster unites a diverse range of sector-specific communities and experts from within its member companies. Cluster's goal is to establish and foster connections among market participants; to facilitate collaborative research, innovation, and development.

**Value proposition.** Cap Digital provides four sets of services to its members:

- R&D support – the cluster's R&D team supports the ecosystem through comprehensive services aimed at enhancing funding opportunities for its members. These include informational sessions on calls for proposals and tenders, identification of right funding opportunities, personalised guidance. Additionally, they offer expert assessment of projects, certification of projects with Cap Digital label, assistance in partner search and networking, and promotion and monitoring on the progress of member projects.
- Business coaching & acceleration – members receive guidance on global pitching, market adaptation, overseas expansion, funding acquisition, and achieving recognition in the French ecosystem.
- Digital transformation & open innovation – cluster supports open innovation program and accompanies the development of functional prototypes to solve problems defined by sponsors.
- Strategic studies and surveys – focuses on offering members competitive insights for anticipating future innovations, utilising tools for market analysis, trend forecasts, and preparing targeted publications.

To inspire and support cluster's members and partners, each year Cap Digital (co)organises more than 100 events. For example,

- *Futur.e.s in Paris festival* – held from 2008 to 2019, this was the largest free digital festival in Europe, presenting the newest digital innovations from France and around the world to both industry professionals and the general public.
- The annual *How I Met My Startup meeting* – event during which startups from Paris and surrounding region invites students to their premises and shares knowledge on digital world.
- *Rendez-vous with Futur.e.s #* – debates on a specific booming topic, while showcasing a selection of interesting projects.

For its achievements, the cluster has been accredited with *ECEI gold label excel in cluster excellence* since 2014.

**Partnerships.** Since creation of the cluster in 2006, the cluster participated in 1,624 labelled R&D projects, and attracted EUR 1,7 billion of R&D investment. 16 of cluster's startups belong to [Next40](#) programme - government support programme dedicated to the 120 most successful French startups. The cluster has been involved in 40+ EU-funded projects as a Coordinator or WP leader. The recent project *Cap Digital* was involved in is [DigiCirc](#), an EU-supported initiative to drive the innovation ecosystem focused on enhancing sustainability through a circular economy. It advocates for using digital technologies to efficiently manage resources, reduce waste, and repurpose byproducts. The initiative includes a three-part accelerator program aimed at empowering SMEs and startups in sectors like circular cities, bioeconomy, and the blue economy. Also, Cap Digital is involved in an Interreg project *CDR Europe (2023-2025)*, which is focusing at supporting the adoption of

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<sup>74</sup> ECCP. [Cap Digital](#)



corporate digital responsibility in SMEs. In this project Cap Digital leads the stakeholder group to define some guidelines for the Paris Region and its SMEs.

#### **Lesson: integrated governance and diverse funding model**

The cluster's governance includes representatives from public institutions, university labs, and the private sector, focusing on information sciences and new technologies. It also comprises private investors and local authority representatives who financially support the cluster's efforts. The leadership structure features a president, two vice-presidents, and a treasurer. The board of directors, consisting of representatives from small to large enterprises, educational and research institutions, investors, and local authorities, oversees strategic decisions and policy development. Additionally, the cluster has an executive board responsible for the day-to-day management and execution of the cluster's strategy and initiatives.

Cluster has around 40 highly qualified staff members, that are supported by various experts and external consultants. Cluster's organisation has different departments to support the functioning of the cluster. Cluster has teams 'Europe', 'Members relationships', 'Innovation & Experimentation', 'R&D', 'Finance Service', 'Office Service' that are working to support the cluster members.

Cap Digital maintains its financial stability through a mixed funding approach. The core of this model lies in membership fees, starting from EUR 200 annually (excluding taxes), which provide a steady stream of support from companies and organisations within the cluster. Additionally, Cap Digital actively participates in project-based initiatives, attracting targeted funding aligned with the specific goals of each project. Finally, the cluster fosters strategic partnerships with private investors and local authorities, securing financial contributions that align with their development objectives and contribute to the overall success of Cap Digital.

### 2.5.2 Value proposition of cluster organisations

In this section, the report delves into European cluster organisations, which are participating in DIHs, are distinguished with the gold or silver labels for their management excellence or provide the biggest spectrum of digitalisation services from the viewpoint of their value proposition for members.

#### **Pool-Net<sup>75</sup>**

**Focus.** Founded in October 2008, [Pool-Net](#), the private, non-profitable institution, officially known as the Portuguese Tooling & Plastics Network, is the entity responsible for the management of the Portuguese Engineering and Tooling Cluster. The network fosters the collaboration within Portugal's mould, special tools, and plastics sector. It sets as its goals to place Engineering & Tooling sector in top 5 at worldwide level, according to the International Special Tooling & Machining Association (ISTMA) key performance indicators, and assure at least a 2% production value growing by year on mould making area<sup>75</sup>. The cluster also aims to reduce the sector's dependence on the automotive industry and ensure *"a significant increase in the weight of other strategic sectors such as energy, environment, electronics, medical devices and pharmaceuticals and aeronautics in total cluster sales"*.

**Composition.** The cluster encompasses around 90 members, bridging 19 larger companies, 53 SMEs, 12 universities and R&D centres, industrial associations, and public entities. Generally, the engineering & tooling sector in Portugal unites approximately 2,500 companies and supports around 45,000 jobs, more than 90% of cluster members' production being exported to over 120 countries<sup>76</sup>.

**Value proposition.** The cluster organisation offers two main benefits of participation in the cluster: (a) cooperation, *"allowing companies to achieve synergies that would be difficult to develop if they worked isolated from their partner-competitors"*, and (b) internationalisation, to be intensified via usage of collective brand.

#### **Lesson: creating a brand as a collective asset**

While cluster member companies perform tangible works, the cluster organisation undertakes joint promotion of the companies at the international market. To make a brand an even more "elite" asset, the cluster has established an official procedure of formalisation for brand adhesion. Interested entities must comply with the conditions provided in the Regulation for the Use of the Collective Brand, which include, i.e. the following: has a production, engineering or other offer within the *Engineering & Tooling Collective Efficiency Strategy*; complies with the legal requirements; organises due accounting and performs its taxation and social security obligations; has obtained all necessary licenses; demonstrates a balanced economic and financial situation, is certified by the ISO 9001 Standard, or is in the certification process; and identifies a person from the entity, who ensures

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<sup>75</sup> ECCP. [Pool-Net](#)

<sup>76</sup> [The Cluster and the Collective Brand: Engineering & Tooling](#)



compliance with the requirements for using the brand *Engineering & Tooling from Portugal* and that guarantees its adequate promotion, in accordance with its user manual.

The usage of the collective brand helps cluster member companies to “facilitate the identification of the origin of products, services and companies”, and “differentiate national supply from international competition”.

### Strategic Partnership for Sensor Technologies/ Cluster Sensorik<sup>77</sup>

**Focus and composition.** Founded in 2006, in Bavaria, Germany, the [Strategic Partnership for Sensor Technologies \(SPS\)/Cluster Sensorik](#) is a Bavarian network aimed at enhancing the industry of sensor technologies. With its membership increasing five times since the founding of the cluster, the cluster now boasts over 90 members – globally leading companies and institutions from the fields of science, research and development, vocational education, and, additionally, more than 250 highly innovative partners.

**Value proposition.** Funded through a mix of sources including the Bavarian Ministry of Economic Affairs' [Cluster Initiative Bavaria](#), member contributions, and state, federal, and the EU levels funding, the cluster is organising around 200 events annually, has completed 119 projects with 386 partners, and leveraged EUR 36 million in project volume. The cluster also holds Silver label of the ECEI for its advanced cluster management practices.

### Lesson: focus on member-driven innovation to drive global leadership

The cluster's mission focuses on securing and expanding Bavaria's technological and market leadership in sensor technologies globally, with an emphasis on areas such as digitalisation, safety, and security, automotive, automation, and electronic systems. To support this mission, the SPS/Cluster Sensorik offers an extensive range of services, including an information portal, networking opportunities, innovation management, and support in organisational and personnel development. Central to its efforts, the SPS/Cluster Sensorik focuses intently on its members, by providing essential support to foster the development of innovative business models and technologies. In particular, the cluster assesses the needs of its members to facilitate the identification of appropriate cooperation partners in technology and HR sectors. The cluster has developed a targeted matching platform for professionals and companies for companies and potential employees to get in touch with one another easily. Additionally, it actively promotes members' products and services and represents them at various industry events, delegation trips, and university and career fairs, ensuring their interests and innovations are well showcased and connected with potential opportunities.

What sets the cluster apart is its unique approach to fostering innovation through collaborative identification and evaluation of new technologies, holistic development offers of the framework *Human – Technology – Organisation (HTO)*, and a commitment to knowledge exchange in a close-knit community setting. This approach aims: (1) to strengthen people's skills through open transfer of knowledge and the development of practice-oriented training concepts in relevant innovation areas; (2) to promote the use of smart, sustainable sensor technology across industries, enhancing regional expertise to address current challenges with smart technology; (3) to boost innovation, adaptability, and resilience through open strategies and transparent collaboration within its network.

This emphasis on member-driven innovation, supported by scientifically informed strategic advice to political stakeholders regarding future-proof technological development<sup>78</sup>, aims not only to sustain but also to elevate Bavaria's position as a global leader in the sensor technology sector.

### Habic Basque habitat, wood, office & hospitality cluster<sup>79, 80</sup>

**Focus and composition.** [Habic](#) is the equipment, furniture, and design cluster, established in Spain, Basque Country in 2007. It brings together the main companies in the sector whose scope of action is the equipping of collectives, homes, hospitals, hotels, offices, and work environments. The mission of the cluster is to support the competitiveness of companies within the design sector by promoting innovations and business transformation through collaboration and knowledge sharing. The cluster consists of around 100 members, including 80 industrial companies, out of which the majority (around 97%) are SMEs.

### Lesson: advancing industry sustainability through an SDG-oriented framework

Habic cluster is committed to sustainability and is contributing to environmental Sustainable Development Goals (SDGs) in the areas such as health and wellbeing, education, and gender

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<sup>77</sup> [Cluster Sensorik](#)

<sup>78</sup> Future-proof technological development is creation of plans or strategies for technology development that are designed to remain relevant and effective over the long term, adapting to future changes and advancements in technology. Source: [Cluster Sensorik](#)

<sup>79</sup> ECCP. [Habic](#)

<sup>80</sup> [HABIC - Clúster del equipamiento, mobiliario y diseño del País Vasco](#)



equality. The experience of Habic provides a strategic lesson in “*integrating sustainability at the core of cluster’s operations to foster the overall innovation ecosystem of the furniture industry*”, where innovation initiatives involving mainly raw materials, technology, skilled-labour, and design carries a significant environmental weight. To raise awareness of SDGs and improve the performance of members in sustainability, Habic’s cluster organisation has established the SDG and Sustainability working group, which objectives include:

- Addressing key sustainability issues that directly affect businesses;
- Keeping up to date with upcoming environmental innovations and (legal) requirements;
- Identifying joint action initiatives to perform collaborative sustainability development projects among the member companies;
- Sharing business experiences and best practices on sustainability related issues.

In addition, Habic requires commitment to sustainability and continuous improvement of the members, therefore, each member company is obliged to obtain management system and production certifications, which incentivise to carry out improvement processes, both in products and in services and management.

Cluster’s efforts extend beyond internal improvements. Habic has developed various initiatives and tools such as [Cluster Habic ODS](#) which help companies to understand and enhance their contribution to SDGs. These resources are instrumental in identifying relevant stakeholders, fostering partnerships, and organising collaborative projects that enhance the industry’s overall contribution to the SDGs.

The Habic cluster serves as a prime example of how structured efforts and a strong commitment to sustainability can accelerate change within an industry. By focusing on strategic direction, mandatory sustainability commitments, and providing practical tools for SDG engagement, Habic not only enhances the furniture industry’s competitiveness but also makes a substantial contribution to global sustainability goals. This model presents a clear path for other clusters looking to integrate sustainability into their core operations, demonstrating that a concerted approach can yield significant environmental and business benefits.

### Produtech cluster and its DIHs in Portugal<sup>81</sup>

**Focus and composition.** The [Produtech Cluster](#), established in 2008, is a ‘Production Technologies Cluster’, aims to promote the sustainable development and internationalisation of Portugal’s manufacturing technology industry. The cluster acts as an articulated network of manufacturing technology providers delivering innovative, flexible, integrated, and competitive solutions, including 23 large companies and 65 SMEs, partnering with 25 research organisations. Cluster members encompass the spectrum of entities along the value chain, including capital goods providers, machine-tool manufacturers, industrial equipment and system integrators, software houses, developers of industry-oriented computer applications, engineering, and consultancy companies.

**Partnerships.** Produtech collaborates closely with a broad spectrum of partners, including technology providers for machines, equipment, and systems as well as information technologies, technology centres, end users, the Portuguese Science and Technology Network (SCT), and key sectors of the manufacturing industry, among other stakeholders. Notable collaborations with Produtech include well-recognised names such as Bosch and Amorim Cork.

**Funding model.** The cluster’s base funding is sourced from membership fees supplemented by a variety of funding sources for carrying out projects. These include the European Regional Development Fund (ERDF), national basic research funding, regional funding, and private investments, showcasing a diversified funding model that supports the cluster’s wide-ranging initiatives.

### Lesson: industry advocacy and contribution to the bigger ecosystem<sup>82</sup>

Produtech has actively contributed to the regional Smart Specialisation Strategy (S3). Positioning themselves as an advisory body, they influence both regional and national strategies by highlighting industry needs and ensuring policy relevance. This method of stakeholder engagement and industry advocacy is a notable best practice of the Produtech DIH.

Produtech Cluster is also engaged in building a collaborative ecosystem that bridges stakeholders across various sectors. The cluster currently coordinates two DIHs: Produtech DIH Platform, established in 2008, and iMan Norte Hub, introduced in 2016. While the Produtech Platform has a national focus, pooling regional initiatives across Portugal, the iMan Norte Hub targets the specific needs of the Norte region.

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<sup>81</sup> [Produtech](#)

<sup>82</sup> Rissola, G., & Sörvik, J. (2018). *Digital innovation hubs in smart specialisation strategies: Early lessons from European regions*. European Commission.



The [Produtech DIH Platform](#) gathers regional initiatives and stakeholders in a one-stop gateway for digitalisation support. The platform serves as a venue for cooperation of competence centres, labs, R&D organisations, sectoral technology centres, industry associations, technology providers, key industry players, SMEs, startups, educational institutions, and incubators, alongside collaboration with government and venture capital entities. The hub offers an extensive set of services, including strategic planning, development, and implementation of large-scale R&D and innovation projects, alongside facilitating awareness, matchmaking, and advanced training and mentoring, and providing access to financial resources and funding opportunities.

The mission of the [iMan Norte Hub](#) is to foster the digital transformation of manufacturing enterprises in the Norte Region, while also enhancing the innovation ecosystem, particularly focusing on cyber-physical production systems (CPPS) and robotics. The iMan Norte Hub specifically showcases the offerings of its service providers, which encompass research and development, feasibility analysis, technology road mapping, advisory services on technology choices and deployment, and educational programs.

#### **Latvian IT cluster: international ICT collaboration<sup>83</sup>**

**Focus and composition.** [Latvian IT cluster](#), located in Riga, was founded in 2007 as a non-profit association dedicated to fostering the technology and market-oriented cooperation of Latvian ICT companies, focusing on international markets. For over a decade, the cluster has played a key role in business intelligence and development, aiming to scale up Latvian ICT companies through a variety of services and fostering a community of 40+ exporting members.

**Value proposition.** The cluster's services include:

- **Export support and Internationalisation:** Latvian IT cluster offers comprehensive services for internationalisation, including networking, matchmaking events, trade missions, market research, and access to international projects.
- **Cross-industry collaboration and digitalisation:** the cluster connects IT with other industries to come together and form innovative partnerships. As a DIH, it has launched *the Digital Training Programme* to drive business innovation and digital transformation. In particular, the programme includes events, called 'digi-meetups' that are organised for industry players to get educated about new technologies, understand their potential, and learn about best digital practices. These meetups feature discussions on evolving technology trends and practical use cases tailored to particular sectors. These gatherings are enriched by companies sharing their digital transformation journeys, highlighting various lessons learnt.
- **Community:** the cluster curates a networking and knowledge-sharing space for Latvian ICT companies focused on international business development.

The cluster also operates as a DIH, promoting digital transformation across companies. It offers a [digital solutions catalogue](#), featuring tools from various suppliers aimed at enhancing business processes. Additionally, this DIH provides consultations on support mechanisms, assists in partner search and project application preparation, offers mentoring, develops digital development strategies, and conducts digitalisation training. Soon, it will also introduce technology testing services.

Recognising cluster's commitment to maintaining high standards in cluster management the Latvian IT cluster has received the Silver Label of the ECEI.

#### **Lesson: Internationalisation and export through learning and collaboration**

Latvian IT cluster acts as a 'business gateway to a smarter IT export', assisting Latvian tech companies grow strong and enter new markets. The scope of services supporting the business internationalisation emphasises the role of tacit and implicit knowledge of the new markets, new technological and business opportunities, as well as nurturing strong complementary partnerships – on the level of individuals, businesses, and sectors.

#### **Transilvania IT cluster: fostering technological innovation and growth<sup>84</sup>**

**Focus and composition.** Founded in 2013 by Aries Transilvania, [Transilvania IT Cluster](#) is a thriving tech community located in the heart of Transilvania, Romania. The cluster serves as a vital link between visionary tech professionals, experts, research institutes, entrepreneurs, local government, which fosters a culture of innovation, growth, global connectivity, regional development opportunities supported by modern, digital technologies. With over 180 members and 20+ completed projects, the cluster is continuously adding value for member companies and fostering the growth of the regional tech ecosystem.

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<sup>83</sup> [Latvian IT Cluster](#)

<sup>84</sup> [Transilvania IT Cluster](#)



**Value proposition.** From the establishment, the Transilvania IT Cluster was focused on improving the skillset of member companies' employees, providing comprehensive support in the acquisition of technical and soft skills, and fostering a platform for knowledge and training in collaborative project implementation.

The cluster creates value to its members through strategic initiatives in three main areas:

**Table 6.** Transilvania IT cluster strategic areas

Competence area	Description		Featured projects
1. <a href="#">Capacity and Capabilities Building</a>	As an accredited training centre, Transilvania IT Cluster runs comprehensive competence-building program aimed at fostering digital transformation and tech innovation skills across various stakeholders.	Digital Competences and Digital Transformation Training	4.0 Digital Innovative Transilvania
		Training of Trainers and Facilitators	
		Other business-enhancing and technical trainings	
2. <a href="#">Innovation services</a>	These services are part of larger European projects or standalone initiatives that tackle regional to international challenges. They focus on providing digitalisation solutions and developing innovative digital sector-related curricula.		2023: Cluj Innovation Year ROCK REFLOW INNOCAP BOWI Smart by Design ZEROW UIA Spire Baia Mare GILL Skills4Cities
3. <a href="#">Matchmaking &amp; Internationalisation</a>	Cluster offers counselling and support for member companies aiming to innovate and expand globally. It facilitates participation in national IT missions, international conferences, and networking events, enhancing their presence in the international business arena.		DIH <sup>2</sup> Enterprise Europe Network

Additionally, Transilvania IT Cluster delivers a wide range of services to support its member companies. These services include managing technology requests and offers, facilitating technological transfer, and coordinating participation in matchmaking and brokerage events. Moreover, the cluster assists SMEs with accessing the research and innovation programs of the European Commission. In terms of partnerships, the cluster aids in finding suitable collaborators for projects and actively promotes and represents its members on an international level. Furthermore, the cluster guides members in identifying, disseminating, and attracting the necessary financial resources tailored to their needs.

The cluster's operational excellence was recognised by the ECEI, which awarded it the gold label for cluster management excellence. This award signifies the cluster's exceptional performance and management capabilities.



### Lesson: from cluster to EDIH via sectoral partnerships

To follow cluster’s mission, Transilvania IT cluster in 2017 has initiated Transilvania DIH, which advances the digital transformation of both organisations and public administrations through a cross-sectoral approach. Functioning as a dynamic ecosystem, it enables collaboration among companies, research institutes, public authorities, and universities. The hub is the first operational DIH in Romania, recognised in 2019 as ‘Fully Operational DIH’ by the European Commission JRC.

The Transilvania DIH’s strategy focuses on key digital technologies and sector-specific applications. Its focus is concentrated on two main verticals: (1) Industry 4.0 – reflecting the future of manufacturing with smart technology integration, and (2) Digital Health – which emphasises the application of digital innovations to healthcare. Supporting these verticals, the DIH emphasises three foundational technological pillars: AI, Big Data, and High-Performance Computing (HPC). Each of these plays a crucial role in driving sector-specific innovation and operational efficiency. Furthermore, the DIH is exploring emerging industries such as ‘Smart/Digital Cities’, and other. The hub’s cross-sectoral strategy has led to the development of innovative applications and high value-added jobs in industries like creative arts, agriculture, and energy.

The services provided by Transilvania DIH aim to address the needs of member organisations. In particular, to address the challenges faced by organisations, Transilvania DIH organises hackathons within key priority areas, facilitating collaborations between technical and digital experts and organisations seeking digital solutions. Moreover, the DIH organises networking events and provides access to regional innovation ecosystem, aimed at strengthening the connections between the beneficiary organisation and potential solution providers. These services are complimented by awareness raising sessions about digital transformation and innovation opportunities, including matchmaking events and direct intermediation activities.

The effectiveness of Transilvania DIH can be exemplified by its role in the success story of RF Meters – an innovative smart metering solution that utilises wireless technologies. RF Meters addressed challenges in existing metering solutions, such as ensuring consistent communication every fifteen minutes and enabling over-the-air software updates, through their innovative WiSmartM (Wireless Smart Metering) solution. Transilvania DIH played a significant role in the development of the solution by facilitating company’s access to technical expertise and business know-how. Additionally, it supported the project with a funding of EUR 60,000. In 2023, Transilvania DIH was officially designated as the European Digital Innovation Hub (EDIH), in recognition of its significant efforts to drive digital transformation, acknowledged by the European Commission for its excellence. Additionally, the team behind the DIH was awarded with the prestigious *Gold Label i-Space award*, highlighting their significant contribution to promoting digital innovation in Romania’s North-West region. The reward validates the team’s impactful strategies and continuous work towards the digital progression of the area.

### 2.5.3 Summary of best practices and lessons learnt

**Table 7. Summary of best practices and lessons learnt in business model**

Name of the Cluster	Sector	Lesson Learnt
<b>Business model best practices</b>		
<a href="#">Bron Innovation</a>	GovTech, Telecommunications	<p><b>Non-profit association as a legal structure and membership-focused funding</b></p> <p>Employing a non-profit association model for cluster establishment facilitates the easy integration of new members. Effective management and strategic direction is ensured through a well-structured board of directors.</p> <p>Establishing clear funding sources, such as membership fees, is crucial for cluster’s sustainability.</p>



Name of the Cluster	Sector	Lesson Learnt
<b>Business model best practices</b>		
<a href="#">Flanders' FOOD</a>	AgriFood	<p><b>Structured operational model</b></p> <p>Operating a cluster management organisation may benefit from an engaged and committed board of directors, consisting of the industry and academia representatives, who oversee the organisation's strategic direction. Maintaining the day-to-day operations of the cluster organisation requires a dedicated and knowledgeable core team. The managing (executive) director leads the execution of strategies, supported by specialised managers who address key strategic action areas, along with a community manager and a financial officer. Specific areas of cluster member joint initiatives and actions may be directed by specialised committees or working groups / taskforces.</p>
<a href="#">DigitalLead</a>	ICT	<p><b>Strategic management and mixed funding model</b></p> <p>The operational model will benefit from a comprehensive management structure that integrates strategic oversight with functional operational roles. Local steering groups may be another way of members' involvement in the territories with peculiar needs.</p> <p>Financial model may combine public funding and membership fees, which may vary based on the size and type of member organisation.</p>
<a href="#">Construction Cluster of Slovenia</a>	Construction	<p><b>Financial independence while addressing the member's needs</b></p> <p>At initial stages of cluster development, it is justified to support the cluster organisation through direct subsidies from the relevant ministries. However, with the time, the cluster organisation should seek new sources of competitive financing like research and innovation projects funded by the government/regional authorities. Such steps also allow enhancing the partnerships with complementary organisations that get involved into joint activities. At the same time, it is critical to maintain engagement with cluster members, since the disregarding of members' interests may lead to diminishing founding member base and membership fees. Tailoring cluster services to members' needs and clear communication of the value proposition are fundamental to gaining of financial independence from unstable sources like subsidies.</p>
<a href="#">Health Valley Netherlands</a>	Healthcare	<p><b>Strategic shift in business model towards member-centric approach</b></p> <p>Gradual transition from predominantly public funding (90-10% public-private) to a more balanced mix of public and private funding (40-60%) comes with the change in the spectrum of activities of a cluster organisation. Value proposition may become more fine-tuned to specific segments of customers (member companies), which may imply the shift from the flat membership fee to progressive model based on the size of an organisation, measured in full-time employment (FTE). Such restructuring of a business model may lead to increased engagement and involvement from their partners, who seek for more value from the network, articulate their needs more precisely, and dedicate human resources to benefit from the partnership.</p>



Name of the Cluster	Sector	Lesson Learnt
<b>Business model best practices</b>		
<a href="#">Cap Digital</a>	Digital Innovation	<p><b>Integrated governance and diverse funding model</b></p> <p>The diverse cluster's governance can benefit from including representatives from public institutions, university labs, the private sector and local authority representatives. Altogether they make decisions that help involving the resources of each of them.</p> <p>The bigger the membership, the bigger operational team may be required for 'customers care' and targeted services. Yet, the team of the executive body of a cluster may not include some deep competencies – so gathering external experts and consultants from cluster members is a significant augmenter (or multiplier) of the cluster organisation's capacity to accumulate expertise and drive innovations in partnerships.</p> <p>A mixed funding approach that helps maintaining the financial stability of the cluster organisation has in its core the membership fees, which provide a steady inflow of resources to cover the essential activities of the executive team. Additionally, project-based initiatives help attracting targeted funding aligned with the specific goals of each project. Strategic partnerships with private investors and local authorities may unlock new financial resources for the actions of interest to external investors.</p>

**Table 8.** Summary of best practices and lessons learnt in value proposition

Name of the Cluster	Sector	Lesson Learnt
<b>Value proposition best practices</b>		
<a href="#">Cluster Sensorik</a>	Sensor Technologies	<p><b>Focus on member-driven innovation to drive global leadership</b></p> <p>In cluster management it is important to centre the activities around member-driven innovation to achieve global leadership in specific sectors. By providing tailored services such as networking, innovation management, and targeted matching platforms, clusters can effectively support their members' growth and technological advancements. Emphasising collaborative exploration of new technologies and opportunities for business models optimisation as well as fostering a community-centric approach for knowledge exchange are essential strategies.</p>
<a href="#">Habic Basque Habitat, Wood, Office &amp; Hospitality Cluster</a>	Wood, Office & Hospitality	<p><b>Advancing industry sustainability through an SGD-oriented framework</b></p> <p>Seeking for a way to distinguish its value proposition, cluster organisation may consider integrating sustainability in the target industry at the core of cluster's operations. Identifying the major risks for sustainability with the biggest impact through the whole value chain may lay the solid ground for cluster management organisation focus areas. The multifaceted action plan may be elaborated, starting from awareness building to improving the performance of members in sustainability by facilitating access to relevant technologies and solutions. Another aspect that may incentivise the companies to improvements is the request to comply with specific standards in order to be eligible to join the cluster community and participate in big partnerships.</p>
<a href="#">Produtech</a>	Manufacturing Technologies	<p><b>Industry advocacy and contribution to the bigger ecosystem</b></p> <p>Clusters can serve as industry advocates and advisory bodies, influencing regional and national strategies to ensure that the industry needs are highlighted and policies for that industry remain relevant. The 'weight' of the cluster voice is ensured by the efforts of a cluster organisation to build a collaborative ecosystem that bridges stakeholders across various sectors.</p>



Name of the Cluster	Sector	Lesson Learnt
<b>Value proposition best practices</b>		
<a href="#">Latvian IT Cluster</a>	ICT	<p><b>Internationalisation and export through learning and collaboration</b></p> <p>Effective support for member companies for export and internationalisation through market research, matchmaking, and trade missions is crucial for scaling businesses globally. Facilitating cross-industry collaboration leading to innovative partnerships enhances technological advancement. Additionally, practice-oriented trainings and curating a community facilitates knowledge sharing and business development.</p>
<a href="#">Transilvania IT Cluster</a>	ICT	<p><b>From cluster to EDIH via sectoral partnerships</b></p> <p>Cluster organisation may launch its activity from addressing specific burning needs of the cluster members, like upskilling of member companies' employees. Further, service portfolio may expand to address the strategic areas, like innovating and outreach to international markets. The services list can include both general and 'niche' propositions, addressing the specific demand of the focused groups of companies but also inspiring them to share knowledge and collaborate, thus bringing up the common spirit of being the cluster members. The nurtured trust of companies, blended with meaningful and impactful partnerships, can become the base for spinning off the more specialised actor – DIH – which functions as a dynamic ecosystem dedicated to advance the digital transformation of SMEs and public administrations. The success of cluster adaptation to the needs of digital economy leans on delivery of an engaging and practical value proposition, like focus on essential digital technologies and sector-specific applications ('verticals') as well as exploring emerging industries.</p>

**Table 9.** European cluster management gold and silver label ICT clusters

ESCA Label	Name of the Cluster	Comparative portfolio	Country of the Cluster	Label's Expiration Date
Gold	Danish Sound Cluster	ICT	Denmark	30 September 2025
Gold	DigitalLead	ICT	Denmark	31 August 2024
Gold	Estonian ICT Cluster	ICT	Estonia	31 January 2025
Gold	Mobile Heights	ICT	Sweden	31 October 2026
Gold	Transilvania IT Cluster	ICT	Romania	31 August 2026
Silver	Estonian Defence & Security Industry Innovation Cluster	ICT	Estonia	21 October 2024
Silver	InnoZent OWL e. V.	ICT	Germany	31 October 2026
Silver	Polo di Innovazione ICT (Fondazione Torino Wireless)	ICT	Italy	31 July 2024



ESCA Label	Name of the Cluster	Comparative portfolio	Country of the Cluster	Label's Expiration Date
Silver	REGINA e. V. – Regionaler Industrieclub Informatik Aachen	ICT	Germany	31 December 2025
Silver	ScotlandIS	ICT	United Kingdom	31 March 2025

Source: [ECEI Gold Label — ESCA \(cluster-analysis.org\)](#); [ECEI Silver Label — ESCA \(cluster-analysis.org\)](#) as of 30 May 2024.

## 2.6 Limitations and challenges in cluster management

While cluster organisations have demonstrated significant benefits in fostering innovation, enhancing productivity, and driving regional economic development, they also face distinct challenges and limitations which need to be addressed in order to develop robust and sustainable clusters:

- **Over-specialisation.** Clusters that focus narrowly on a specific sector or technology may struggle to adapt to market changes or technological disruptions. This lack of diversification can lead to vulnerability in times of sector-specific downturns or rapid technological shifts<sup>85</sup>.
- **Reduced competition.** While clusters thrive on collaboration and mutual learning, they can inadvertently lead to a concentration of market power among a few dominant players, stifling competition, and innovation. This situation can create barriers to entry for new firms and potentially lead to monopolistic or oligopolistic market structures, contrary to the intended collaborative nature of clusters<sup>86</sup>.
- **Geographical limitations.** Clusters are inherently tied to specific locations, which can create disparities in development and opportunities across regions. This geographic concentration can exacerbate regional inequalities, as clusters tend to attract resources and talent, potentially draining them from less developed areas. Such imbalances can result in 'winner-takes-all' scenarios, where certain regions become highly prosperous while others lag behind<sup>87</sup>.
- **Governmental support.** The successful development of clusters, which often involves the coordinated efforts of cluster organisations, typically relies heavily on government policies and support. This dependence on governmental intervention and assistance can lead to vulnerabilities, particularly when there are shifts in political priorities or economic constraints, difficulties in making political decision about strategic direction of a region or country (balancing different sectors), or dependency on financing the operations of cluster organisations without them developing a sustainable business model<sup>88</sup>.

Lastly, the dynamic nature of clusters necessitates continual adaptation and evolution. Cluster organisations must constantly monitor changes in technology, market trends, and global economic conditions to stay relevant and competitive. This requirement for ongoing adaptability and innovation can be resource-intensive and challenging to manage effectively<sup>89</sup>.

## 2.7 Cluster policy in the EU

Clusters often form as a result of a prolonged, cumulative process, where the success of a single enterprise lays the groundwork for others to follow. This evolution is generally organic and inherently uncertain, with a successful outcome not always guaranteed. The growth and development of these clusters are largely influenced by distinct characteristics of the business environment, which are often cultivated by governments to provide locations with a unique, sustainable advantage.

However, the challenge is designing these attributes, so they align with market needs. Throughout Europe, there have been substantial investments in assets like airports or universities in many regions; yet, only a few

<sup>85</sup> Franco, S., Murciego, A., Salado, J. P., Sisti, E., & Wilson, J. (2021). [European Cluster Panorama 2021: Leveraging clusters for resilient, green and digital regional economies](#). An initiative of the European Union (pp. 116). Orkestra.

<sup>86</sup> Izsak, K., Meier zu Köcker, G., Ketels, C. et al. (2016). [Smart guide to cluster policy](#). EC Publications Office.

<sup>87</sup> European Commission, Executive Agency for Small and Medium-sized Enterprises, Notten, A., Delponte, L., Wintjes, R. et al., [Cluster programmes in Europe and beyond](#). Publications Office.

<sup>88</sup> ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#).

<sup>89</sup> ECEI. (2011). [European cluster excellence baseline](#).

have successfully converted these investments into critical competitive resources. The ability to integrate these investments with a range of attributes (from infrastructure to research institutions, tax incentives, incubators, access to capital and others) usually determines their success, often making their location more desirable for a particular cluster.

### 2.7.1 The EU-level policies

#### Initiatives shaping the policy agenda for clusters development in the EU

At a broader level, the EU provides support to clusters through various platforms, i.e., comprehensive policy frameworks that work as a foundation for cluster policy implementation. This support strengthens collaboration between clusters and fosters partnerships between different cluster organisations. In the last decade, the EU has focused its cluster policy priorities on cross-border cooperation, cluster excellence, and smart specialisation.

(1) *The European Strategic Cluster Partnership (ESCP) platform* funded under the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME), has been significant in creating partnerships between European clusters from different countries, focusing on internationalisation, cluster excellence, and smart specialisation. An evaluation study of this initiative confirmed its success, providing recommendations to diversify European cluster partnerships with newcomer clusters and less experienced clusters.

Figure 12. The three cluster platforms under COSME

 INTERNATIONAL	 EXCELLENCE	 SMART SPECIALISATION
<p><b>ESCP-4i</b></p> <ul style="list-style-type: none"> <li>• <b>64 partnerships targeting 32 different markets</b></li> <li>• Effective support for development of <b>joint internalisation strategies</b></li> <li>• Creation of <b>critical mass of clusters</b> as advantage when going to third countries</li> <li>• Focus on the establishment of <b>sustainable partnerships</b></li> </ul>	<p><b>ESCP-4x</b></p> <ul style="list-style-type: none"> <li>• <b>24 partnerships with 147 cluster organisations</b></li> <li>• Relevant support for <b>enhancement of cluster managers skills</b></li> <li>• <b>Thematic focus</b> on urban mobility, emerging technologies, advances manufacturing, ICT...</li> <li>• Optimise the <b>Cluster exchange mobility scheme</b> with involvement of SMEs</li> </ul>	<p><b>ESCP-S3</b></p> <ul style="list-style-type: none"> <li>• <b>9 partnerships with 57 cluster organisations</b></li> <li>• Effective in strengthening <b>interregional &amp; intersectoral cluster collaboration</b></li> <li>• Strong thematic focus on digital transformation</li> <li>• Better <b>alignment of the ESCP-S3 with the smart specialisation strategy</b> process of DG Regio</li> </ul>

Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#), based on the *Evaluation Study of and Potential Follow-Up to Cluster Initiatives under COSME, H2020 and FPI (2021)*.

(2) Another initiative *INNOSUP-1* was funded under the *EU Horizon 2020* programme focused on developing new cross-sectoral industrial value chains in Europe. It aimed to boost cross-sectoral and cross-border cooperation, using a cascade funding approach where cluster organisations provided support to their SME members. The evaluation of this initiative showed positive results.

(3) From 2021 to 2027, the European Commission, under the EU Industrial Strategy goals, has begun implementing *the Joint Cluster Initiatives* – the first 30 so-called ‘Euroclusters’ have been started, covering all 14 industrial ecosystems. The goal was to promote green and digital transformation and built the resilience of these sectors. EUR 42 million were allocated to cluster organisations and cluster networks, which were later further cascaded to SMEs with many funding calls ending in 2023<sup>90</sup>. Following the recent approval and allocation of funding, the scopes and results of the project are currently pending.

<sup>90</sup> [Euroclusters are launching their first cascade funding calls! - European Commission \(europa.eu\)](#)

**Figure 13.** Breakdown of the Joint Cluster Initiatives ‘Euroclusters’

Industry		30 Initiatives
1.	Textile	EuroBoostEX, <a href="#">xBUILD-EU</a>
2.	Tourism	EU Rural Tourism, IKAT, MedBAN
3.	Mobility-Transport and Automotive	E-BOOST, RESIST, GEMSTONE, MedBAN, POLREC, AIBC EUROCLUSTERS
4.	Electronics	Silicon Eurocluster, POLREC
5.	Digital Industries	DREAM, EPICENTRE, RE-CENTRE, <a href="#">xBUILD-EU</a> , AIBC EUROCLUSTERS
6.	Renewables	ELBE EUROCLUSTER, POLREC, MedBAN
7.	Energy Intensive Industries	INGENIOUS, POLREC, GEMSTONE, CirInWater, PIMAP4Sustainability
8.	Construction	AEC EUROCLUSTER, SUSTAIN, <a href="#">xBUILD-EU</a> , POLREC
9.	Cultural & Creative Culture Industries	CREATHRIV-EU, FRIEND CCI, SILEO, RE-CENTRE
10.	Agri-food	SUAVE, B-Resilient, POLREC, GEMSTONE, EPICENTRE, CirInWater
11.	Health	BioMan4R2, DESIRE, EPICENTRE, GEMSTONE, POLREC
12.	Proximity and social economy	SocialTech4EU
13.	Retail	SILEO, POLREC
14.	Aerospace & Defence	LEVIATAD, METASTARS, GEMSTONE, PIMAP4Sustainability

Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Repeatedly named initiatives in the table foster the development of multiple sectors within their scope.

It is evident that the EU focus has been more inclined towards strengthening pre-existing clusters. Naturally, this has tended to be in favour of regions in which multiple clusters and cluster organisations have already been established - namely, larger, more developed nations such as Spain, France, and Italy. As these countries already have a strong cluster base, the EU initiatives could more effectively build on the existing framework,



essentially multiplying the impact of their strengthening efforts. In smaller nations, there is a need for national-level policies to guide and encourage the development of clusters, if it is feasible to implement such policies.

### Innovation cluster definition in the EU

Regarding the implementation of stricter regulations concerning clusters within the EU, specific definitions are established to support innovative cluster organisations, recognising them as crucial components of innovation infrastructure. These definitions enable these organisations to access state aid and exempt innovative projects from anti-monopoly regulations. Namely,

The EU [Framework for State aid for research and development and innovation](#) (Commission Communication 2014/C 198/01) in Section 1.3(s) defines **innovation clusters** as “structures or organised groups of independent parties (such as innovative startups, small, medium and large enterprises, as well as research and knowledge dissemination organisations, non-for-profit organisations and other related economic actors) designed to stimulate innovative activity by promoting sharing of facilities and exchange of knowledge and expertise and by contributing effectively to knowledge transfer, networking, information dissemination and collaboration among the undertakings and other organisations in the cluster.”

Under the EU framework, **state aid for innovation clusters** can be granted if it “aims at tackling market failures linked with coordination problems hampering the development of clusters or limiting the interactions and knowledge flows within and between clusters. State aid could contribute to resolving this problem, first by supporting the investment in open and shared infrastructures for innovation clusters, and second by supporting, for no longer than ten years, the operation of clusters for the enhancement of collaboration, networking, and learning”<sup>91</sup>.

The following definitions are used to distinguish activities that are covered by the state aid<sup>91</sup>:

- **Innovation support services** – the provision of office space, data banks, libraries, market research, laboratories, quality labelling, testing and certification for the purpose of developing more effective products, processes or services;
- **Innovation advisory services** – consultancy, assistance, and training in the fields of knowledge transfer, acquisition, protection and exploitation of intangible assets, use of standards and regulations embedding them.

The EU practice of state aid for innovative clusters includes:

- Investment aid to cover costs in tangible and intangible assets;
- Operating aid to cover personnel and administrative costs, which also includes overhead costs, in association with:
  - Facilitation of collaboration, information exchange and channelling support of specialised and personalised business support services to the clusters;
  - Support of the cluster in its marketing to increase active partaking of new undertakings or organisations, as well as its visibility;
  - Effective management of facilities of the cluster;
  - Organising training programmes, workshops, and conferences for supporting knowledge exchange, networking, and transnational collaboration.
- Increasing the intensity of aid for innovative clusters in the EU ranges from 50% to 65% contingent to the region and size of supported businesses, including large enterprises.

According to Commission Regulation (EU) No 1217/2010 (European Commission, 2010)<sup>92</sup> and Commission Regulation (EU) No 316/2014 (European Commission, 2014)<sup>93</sup>, R&D agreements and technology transfer agreements concluded within innovative cluster projects and consortia with an innovative project are exempted from anti-monopolistic regulation (should not be treated as a regular monopolistic cartel or syndicate in the traditional market) – to avoid the blocking of innovations.

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<sup>91</sup> European Commission. (2014). [Framework for State aid for research and development and innovation](#). Publications Office of the European Union.

<sup>92</sup> European Commission. (2010). *Commission Regulation (EU) No 1217/2010 of 14 December 2010 establishing a framework for the Community's activities in support of European standardisation*. Official Journal of the European Union.

<sup>93</sup> European Commission. (2014). *Commission Regulation (EU) No 316/2014 of 27 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements*. Official Journal of the European Union.



### 2.7.2 National level policies

An analysis of national level cluster policy and instruments was carried in 2022 by ECCP, analysing 56 countries, including all the EU members states. It showed that 50% of the 56 countries analysed had either national and/or regional cluster policies in place to harness the value clusters can create, and most have established such policies more than a decade ago – 46%. 12 countries in the EU do not have a dedicated policy, but all have clusters mentioned in other, broader strategic documents – smart specialisation strategies, ERDF programmes, regional development policies, SME policies and other.

The objectives of such national cluster policies vary as much as the type of strategy designed in each country, although most of them can be described as general business and innovation support measures. 89% of strategic cluster policies aim to strengthen innovation ecosystem and SME support:

- 88% - R&D support;
- 85% - Industry-research collaboration;
- 82% - Internationalisation;
- 80% - Upskilling;
- 38% - Creating new cluster organisations;
- 21% - Cluster analysis and support for policymaking<sup>94</sup>.

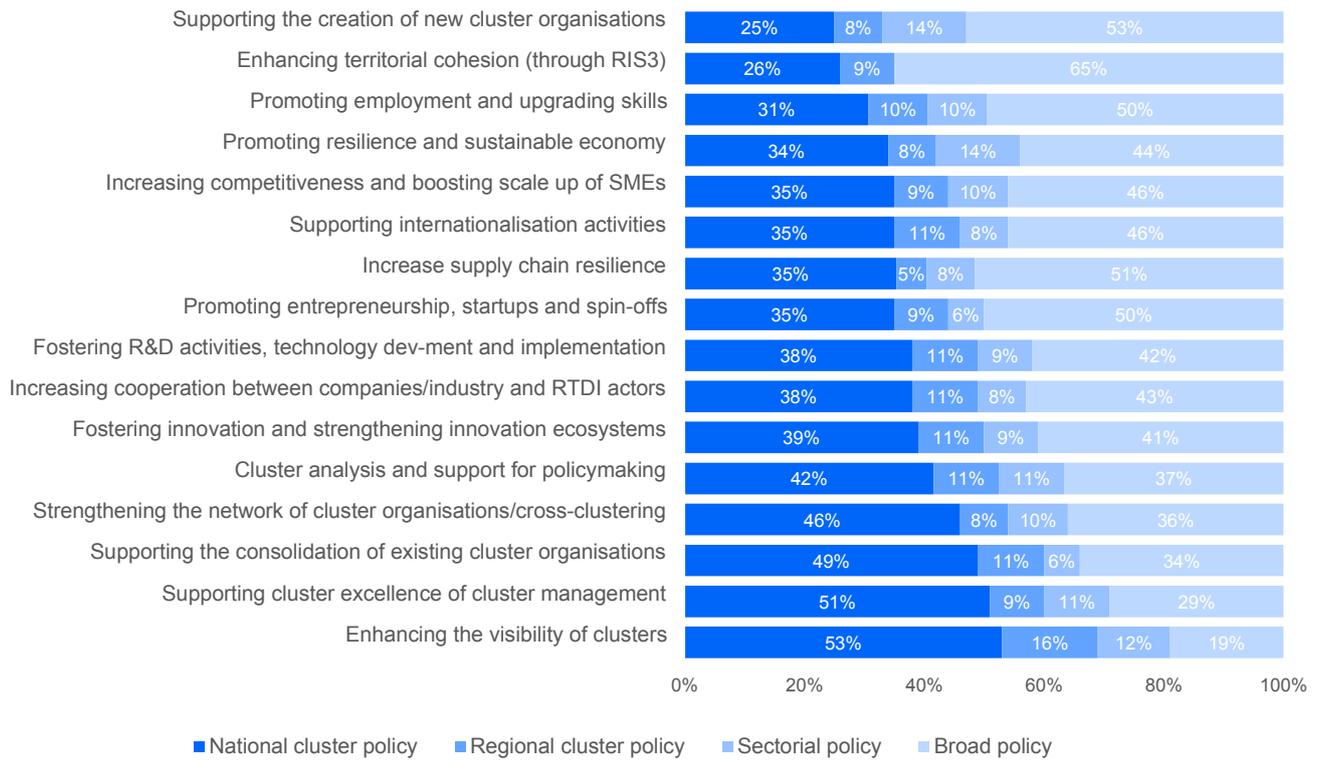
The disparities between objectives and the type of strategy (whether it is a national strategic document, regional plan, sectoral strategy, or broad policy document) are significant but logical. Objectives aimed at advancing cluster-related goals often receive less emphasis within broader policies compared to dedicated national cluster policies where, as expected, they rank among the top priorities. Notably, broad business and innovation support policies acquire a middle ground, as they equally feature in both dedicated national cluster policies and broader policies.

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<sup>94</sup> ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries](#)



Figure 14. Disparities between objectives and the type of strategy



Source: Source: ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#). Sample size 90 cluster policies; based on information gathered through desk research and validation by National Authorities.

Interestingly, there exists an anomaly in this pattern - the objective of supporting the creation of new cluster organisations manifests itself in twice as many broad policy strategies than specific cluster policies. This may be due to the attractive political proposition it presents: the easy declaration of intent to establish cluster organisations and an easy way to measure the success of such policy. It could also be explained by the fact that if cluster creation related objectives find themselves in the broad policy instruments at all, it already shows that there are probably less developed clusters and cluster organisation in the first place, therefore, the political objective could be to initiate such developments. Contrastingly, when cluster, and/or potential cluster organisations existence is evident, a specific cluster policy instruments can be used to target and develop existing structures further<sup>95</sup>.

From the bottom-up perspective, according to the ECCP research of 2021<sup>96</sup>, two key development needs identified by cluster organisations themselves (with other 40% agreeing these are a priority) were improving their business model and developing new services, further proving that a typical cluster organisation spends a great number of resources solving operational challenges of survival. Researchers note that cluster organisations need the most support in the areas of:

- Financial sustainability (improving their business plan and funding structure);
- Resources and services (support in tailoring their service to the overall needs of regional, national and the EU level objectives);
- Skills (training of cluster managers and entrepreneurs);
- Inter-cluster linkages (support in linking cluster vision to the wider ecosystem and value chains);
- Mission orientation (developing a clear understanding of value proposition);
- Evaluation (measure and understand the impact of cluster organisation activities).

<sup>95</sup> ECCP. (2022). [Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition](#), page 40.

<sup>96</sup> Cluster Collaboration. (2022). [Cluster business models fit for accelerating the twin transitions: Key actions for clusters to implement transition pathways](#). ECCP Discussion Paper.



In conclusion, while achieving the political milestone of cluster creation might be an attractive proposition to policymakers, the policy focus should extend further to the optimisation and enhancement of operational efficiency of the clusters. Meeting these needs requires nuanced cluster policy instruments and calls for persevering efforts in clustering policy intervention to cultivate well-developed, efficient, and value-driven cluster organisations.

### 2.7.3 Best practices in cluster policy

With majority of the European countries having more than a decade of experience with cluster policy, it can be relevant to look at few selected case studies to see various approaches used. In this section, the report delves into one comprehensive EU-level initiative, two national and two regional policies implemented recently in the EU. Case studies were selected by evaluating the available information in the cluster policy mapping reports of the ECCP, having in mind a consistent policy approach and commitment from the countries, showing positive results to the industry.

#### The EU-level

In 2017, DG Grow initiated [the European Observatory for Clusters and Industrial Change \(EOCIC\)](#) project<sup>97</sup>. This project's objective was to assist 10 regions undergoing industrial transition by crafting detailed strategies<sup>98</sup> to promote regional economic transformation. It aimed to uncover opportunities for collaboration and funding, while also facilitating connections with other regions through regional and cluster partnerships. The project, designed to offer tailored advice on contemporary cluster policies to support industrial modernisation, served as a prime example of applying a unified approach to research diverse regional scenarios and come up with unique tailored strategies. It showcased effective methodology for developing cluster-centric policy instruments which could be further used within the EU partner countries.

1. The process commenced with an initial diagnostic phase, wherein a thorough examination of the regional characteristics was conducted through SWOT and PEST analyses, alongside an assessment of the influence of global megatrends on the regional territories.
2. The subsequent phase pinpointed several challenges and hurdles impeding successful industrial transition. While some challenges were unique to specific regions, others were common across multiple pilot areas.
3. In the third phase, the focus shifted to evaluating how cluster organisations could assist regions in devising solutions to these identified challenges. Cluster organisations can contribute significantly at two primary levels: (a) strategically, in the formulation and implementation of strategies, and (b) operationally, by enhancing existing networks or creating new ones and facilitating skills development.
4. In the final stage, these analyses and insights informed the creation of tailored measures for each region, adhering to the concept of a '[managed industrial transition](#)'.

This methodological approach to devise tailored regional strategies leverages the inherent potential of the pilot regions, acknowledges existing pathways and economic compromises, and emphasises economic sustainability. It also promotes cooperation, integration into global value chains, and the development of mutually reinforcing policies.

In most regions of the project, the dominant sectors were traditional industries, often rooted in historical regional strengths, such as machinery, food production and processing, metals, and pharmaceuticals. For example, forestry and mining in East & North Finland, cosmetics, and pharmaceuticals in Centre-Val de Loire, automotive, energy and machine building in Saxony. Although the 10 pilot regions undergoing industrial transition exhibit several common features, they markedly vary in aspects such as geographical and demographic scale, economic diversity, and specialisation, as well as in the innovation capacity and development of cluster organisations. In some regions, the decline of traditional industries has precipitated a profound transformation in the region's economic structure.

The methodology employed by the EOCIC is grounded in the belief that gradual change is not only more feasible but also more prone to success compared to sweeping reforms. It underscores the necessity of fostering political unity, backing, and guidance.

The diagram from the original EOCIC report categorised the **recommended actions within the pilot regions** into two dimensions and four distinct types. Each suggested measure necessitates a detailed plan of specific actions (short, medium, and long-term) along with a clearly defined implementation roadmap. These sort of

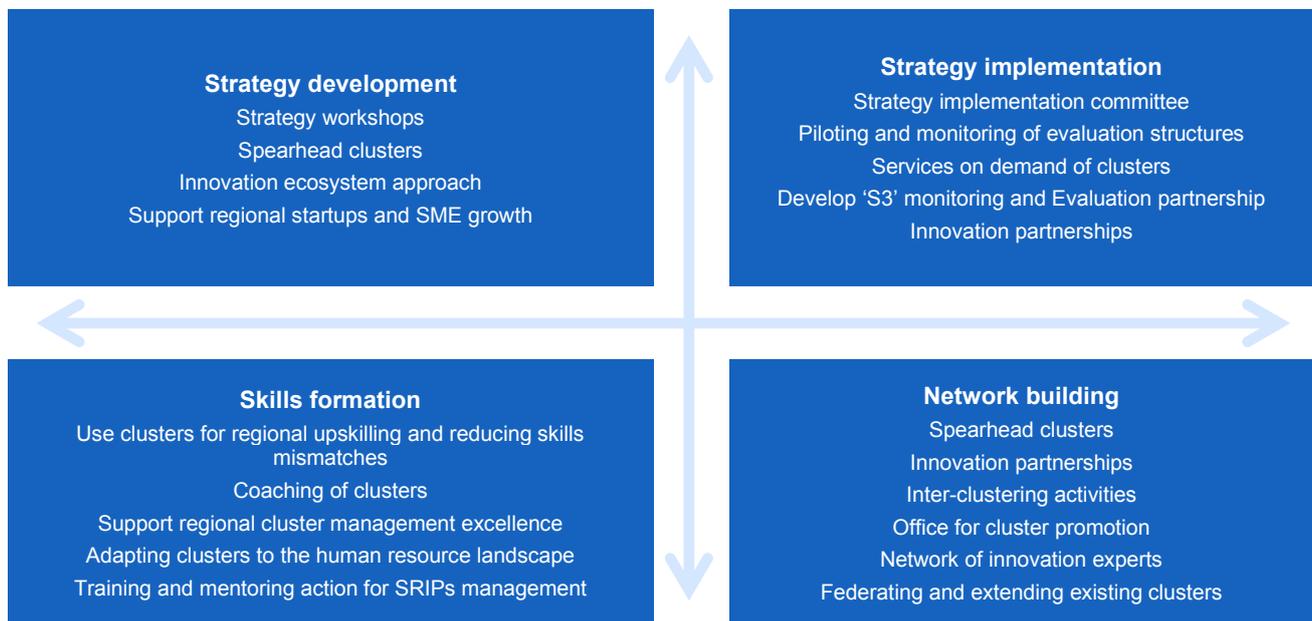
<sup>97</sup> Hausemer, P., Porsch, L., Nunu, M., & Eckhardt Rodriguez, A. (2019). [Summary report on lessons learnt from fostering modern cluster policy in regions in industrial transition](#). EOCIC.

<sup>98</sup> Seel, L. (2019, November 5). [ECCP news: Policy briefings for 10 European regions](#). ECCP News.



policy tools could be predicted as relevant in any comprehensive approach that a specific country would seek to employ.

Figure 15. Proposed measures in pilot regions



Source: EOCIC (2019). *Report on Cluster policy in pilot regions*, p. 21.

### National-level: German go-cluster

Germany belongs to the countries that pioneered cluster policy and introduced the first cluster development programmes approximately 25 years ago, and it stands at the forefront of cluster policy development in the EU, characterised by its multifaceted and evolutionary approach towards fostering innovation, competitiveness, and collaboration among businesses, research institutions, and government entities<sup>99</sup>.

Germany has three distinct and different national level cluster policy programmes – (1) *Clusters4future*, which strengthens cooperation between companies and R&D organisations, (2) *Clusters-Networks-International*, a program set to support internationalisation activities of clusters, and (3) *Go-Cluster programme*, which support clusters excellence and management<sup>100</sup>.

*Go-cluster* programme, initiated by the Federal Ministry for Economic Affairs and Climate Action, is a prime example of Germany's commitment to enhancing the cluster landscape. It is the oldest among cluster policies and can be considered a staple of German approach to clusters building. It builds upon its predecessor, the *Competence Networks Germany*. Launched in 2012, *go-cluster* emphasises cluster excellence and the professionalisation of cluster management. It seeks to increase innovation and competitiveness across all major sectors of the German economy by facilitating cross-clustering and improving services offered by cluster organisations to their members.

*Go-cluster* programme offers comprehensive support to its participating clusters, combining financial aid with a range of services. With 85 members currently in [the Cluster Alliance](#) (as of 2024) and annual budget of just over EUR 1 million, the programme aims to boost innovation and competitiveness through various initiatives. Financially, it provides direct funding for efforts aimed at expanding international reach, embracing digital transformation, and weaving clusters into the fabric of global value chains. The support includes:

- Awarding a quality and efficiency certificate to cluster organisations, ensuring they meet European standards;
- Covering the costs for achieving the Bronze or Silver Label from the ECEI;
- Granting the right to use the *go-cluster: Excellently connected!* trademark/logo as a mark of quality;
- Enhancing visibility in governmental economic initiatives and among key decision-makers from the government, business sectors, and administrative bodies;

<sup>99</sup> German economic team. (2020). [Cluster initiatives in Germany common activities, organisational and financing models](#).

<sup>100</sup> ECCP. (2022). [Country factsheet: Germany](#).



- Showcasing cluster achievements and innovative project successes through public presentations (including events, newsletters, websites, and the publication of [Selected Cluster Successes](#));
- Facilitating networking with leading innovation clusters from Germany and across Europe;
- Offering participation in workshops and seminars on current cluster and management topics;
- Providing personalised advice to cluster management on strategy development and more;
- Eligibility to apply for additional funding resources.

This blend of financial support and enrichment activities aims not just to foster growth and innovation within clusters but also to elevate their national and international profile, facilitating a collaborative and dynamic environment for members.

Additionally, the programme offers subsidies for hiring personnel, infrastructural support (like offices and equipment), and project funding that encourages collaborative R&D among cluster members. Through all its iterations in the past decade and more, this programme created the base of policy approach to cluster development in Germany and has since released reports detailing multiple cluster success stories<sup>101</sup>.

On the non-financial side, *go-cluster* focuses on coaching, networking, and the promotion of cross-clustering to create a robust platform for exchange and collaboration. It runs the German cluster platform, supporting strategy development and facilitating national and international networking activities. This aspect of the programme is crucial for enhancing the visibility of clusters and fostering a culture of innovation and excellence<sup>102</sup>.

One of the programme's key initiatives is the support for cluster organisations in achieving the ECEI Labelling, which is a mandatory requirement for member clusters. This process aids cluster organisations in establishing a framework for continuous improvement and excellence. By guiding cluster organisations through the bronze, silver, and eventually gold label processes, *go-cluster* ensures that German cluster organisations maintain high standards of operation and management, thereby reinforcing their competitiveness and innovation capacity.

In order for a cluster organisation to be included in the *go-cluster* funding programme, it must meet the following criteria<sup>103</sup>:

- **Structure and composition**
  - Must have an independent office or organisational unit;
  - A minimum of 30 committed actors, with at least 50% being SMEs and 10% research institutions;
  - At least 60% of these actors must be located within a 150 km radius of the office;
  - Industry-specific, appropriate participation of R&D institutions is required.
- **Cluster management and control**
  - A minimum of three years of activity from the formal founding;
  - Appropriate management staffing based on the number of members;
  - Representation of various actors in control and decision-making processes;
  - Inclusion of cluster actors in the strategy process, with a written document strategy and a rough concept for revision;
  - The self-contribution of the cluster actors and the economic income must amount to at least 20% of the total budget of the cluster management;
  - Provable financing security for 24 months with prospects beyond that.
- **Activities and collaborations**
  - Establishment of internal communication structures;
  - Needs-based services aligning with the strategy, including international and cross-sectoral focus activities;
  - Support for cluster actors in the innovation process, digitalisation, and sustainable business practices;
  - Implementation of innovation and transformation projects, even with actors outside the cluster;
  - Existence of actively operational structures (e.g., working groups or cluster forums).
- **Visibility and impact**

<sup>101</sup> Federal ministry for economic affairs and energy. (2015). [Selected Cluster Successes. Results from the promotion of innovative services.](#)

<sup>102</sup> Bundesministerium für Wirtschaft und Klimaschutz. (2024).

<sup>103</sup> Go-Cluster. (2024). [Program description.](#)



- External communication and public relations must be appropriate;
- Evidence of visibility to external actors and knowledge of the three most significant (national and international) competitors;
- Presentation of three success stories from the last 24 months.

An evaluation carried out for the first three years (2012-2015) affirmed its valuable contribution to promoting innovation through cluster organisations. The programme has been successful in enhancing cluster excellence, with 60% of cluster organisations consulted stating that they could improve their know-how thanks to *go-cluster*. *Go-cluster* programme, while a highly effective cluster policy instrument, may not break new ground in terms of originality. Germany has demonstrated consistent support for cluster organisations, providing funding for over two decades without interruption since 1995. This consistency underscores the importance of predictable financing, enabling cluster organisations to strategise their long-term activities and leverage their own resources more effectively.

Programmes like *go-cluster* have shown that competitive funding allocations, contingent upon meeting specific criteria, enhance the efficacy of support. However, they might not be a one-size-fits-all approach. Poland presents a distinct case study, with substantial shift in its approach to cluster policy over the past decade.

### National level: Key National Cluster Poland (KNC)

The evolution of Poland's cluster policy, its implementation challenges, successes, and the strategic pivot towards more focused support underline the complexity and necessity of adaptive policymaking in the face of changing economic landscapes.

Between 2003 and 2007, the push to foster a culture of clustering marked a foundational phase in Poland's cluster policy. This era, primarily funded through structural funds, focused on educating potential leaders to rally entrepreneurs towards collaborative ventures. This early phase was critical in nurturing the clustering concept across the entrepreneurial landscape, laying the groundwork for the initial wave of cluster initiatives rooted in grassroots efforts. In 2008, with the launch of the EU-funded programmes explicitly tailored to bolster clusters, around 50 cluster management organisations emerged<sup>104</sup>.

The early policy of cluster development support in Poland had the following characteristics<sup>105</sup>: (a) strong role of the coordinator; (b) inter-regional differentiation; (c) lack of coordination between the regional and the national level; (d) high dispersion; (e) soft support (as opposed to financial support for investment); (f) cluster cooperation (as opposed to business cooperation).

This phase of Poland's cluster policy illuminated several challenges. A significant number of cluster organisations sprang up, incentivised by the EU structural funds, only to find themselves unsustainable or significantly scaling down post-funding. This period, unfortunately, saw a considerable allocation of resources that did not yield lasting outcomes, as the majority of these cluster organisations folded or diminished their operations following the cessation of financial support. The insights gleaned from this era underscore the necessity of directing public assistance towards cluster initiatives or organisations that demonstrate substantial engagement and potential for sustainability.

A study conducted by the Polish Agency for Enterprise Development in 2015 identified 134 clusters across Poland, highlighting the widespread adoption of the cluster approach. Despite the robust support mechanisms in place for fostering cluster development, a considerable number of these entities struggled to maintain viability in the market landscape.

The present policy on clusters development support in Poland is clearly a direct consequence of the prior approach. As even the most recent policy instruments do require for cluster organisation applying for funding to be operational for at least 18 months beforehand.

The concept of KNC crystallised towards the end of 2014, establishing a cornerstone for Poland's cluster support system. It was instituted to address the shortcomings observed in previous support mechanisms. The KNC status aimed to acknowledge and validate a cluster's competitive edge and its economic importance on regional, national, and international scales. Eligibility hinged on various stringent criteria, including a cluster's critical mass, its capacity for innovation and growth, the extent of its current and future collaborations, the experience and market potential of its lead organisation, and the efficacy of its management. 16 clusters were selected, based on the criteria<sup>106</sup>:

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<sup>104</sup> Kuberska, D. Mackiewicz, M. (2022). [Cluster policy in Poland – Failures and Opportunities](#).

<sup>105</sup> Haberla, M. (2016). *Cluster development strategy in the context of the "key national cluster" competition*.

<sup>106</sup> Skowron-Grabowska, B. (2017). [Criteria of evaluating key national clusters in the 6 value chain and with reference to the local 7 conditions](#). Zeszyty naukowe politechniki śląskiej.



- **Formal organisation and duration.** Clusters must be formally organised, with a cluster agreement that has been in effect for at least three years at the time of application, ensuring a stable and committed partnership among members.
- **Membership critical mass.** To be considered a KNC, a cluster must consist of at least 51 members, emphasising the importance of a substantial network of cooperation among businesses, scientific institutions, and public authorities.
- **Dominant enterprise participation.** Over 70% of the cluster's composition should be enterprises, underscoring the centrality of entrepreneurial activity within the cluster.
- **Inclusion of medium and large enterprises.** The cluster should include medium and large enterprises, known for their innovation capabilities, serving as "flagships" that drive the cluster's economic potential and innovativeness.
- **Scientific excellence.** The participation of scientific units with high research classifications (A or A+) is critical, enhancing the cluster's innovation and research capacity.
- **Geographical concentration.** Clusters should be geographically concentrated, with an optimal distance of 150 km between member units to facilitate effective cooperation, with at least 70% of members meeting this criterion.

Securing the KNC designation is still challenging due to the rigorous and comprehensive nature of the application requirements. These stringent criteria underscore the programme's intent to confer recognition only on those cluster organisations that demonstrate exceptional promise and strategic importance.

After the KNC implementation, subsequent phase of decline ensued, with the cluster policy landscape experiencing a narrowing of focus. Exclusive, albeit limited support for cluster internationalisation under *the Smart Growth Operational Programme* was reserved for KNCs, underscoring a shift towards prioritising clusters with the most potential. This phase was characterised by a move towards the professionalisation of cluster management, with KNCs emerging as leaders within the ecosystem.

In 2020, Poland's cluster policy embarked on a phase of rejuvenation, signalling a renewed commitment to leveraging clusters as key drivers of economic development. This refined cluster policy framework comprises two distinct but complementary strands:

- **Cluster development policy.** Aimed at invigorating the expansion and operational dynamics of cluster organisations themselves, this aspect adopts an actor-centric view. It seeks to catalyse the growth of clusters by directly stimulating their internal development processes and activities.
- **Cluster-based economic development policy.** This strategy marks a strategic pivot from direct financial support to clusters towards integrating clusters into broader policy objectives. This functional approach envisions clusters as instrumental in driving innovation, digital transformation, and sustainable economic growth, essentially "utilising" clusters to fulfil ambitious developmental and innovation policy goals.

In light of the varied developmental stages and distinct needs of clusters, the revised policy introduces a structured support framework categorised into three segments: emerging clusters, growing clusters, and KNCs. This strategic classification paves the way for customised support mechanisms finely tuned to each cluster's developmental phase, ensuring that interventions are both pertinent and effective<sup>107</sup>.

**Financial support avenues include:**

- **Collaboration initiatives.** Funding to encourage cooperative ventures among clusters.
- **R&D projects.** Financial assistance for innovative projects within clusters.
- **SME integration.** Support for SMEs to join and benefit from cluster ecosystems.
- **Networking events.** Funding to facilitate networking opportunities, fostering connections within and across clusters.
- **Startup innovation vouchers.** Financial incentives to spur innovation in startups within cluster frameworks.
- **Hiring of PhD graduates.** Grants to enable cluster organisations to recruit PhD holders, enriching their research and innovation capabilities.
- **Collaboration with research and innovation (R&I) actors.** Support to strengthen ties between clusters and R&I entities, promoting knowledge exchange and joint ventures.

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<sup>107</sup> ECCP. (2022). [Country factsheet: Poland](#).



### Non-financial support encompasses:

- **Hard skill development.** Initiatives aimed at enhancing knowledge transfer, intellectual property management, entrepreneurship, export strategies, and market intelligence.
- **Soft skill enhancement.** Programmes focusing on coaching, management training, and upskilling/reskilling activities to elevate the competencies of cluster members.
- **Networking and partnership building.** Facilitation of networking opportunities, both nationally and internationally, to expand clusters' reach and collaboration potential.
- **Marketing activities support.** Assistance in advertising, communication, event organisation, and participation in fairs to elevate clusters' visibility and market presence.

Currently, there are 71 Polish clusters registered at the portal of the ECCP.

### Regional level: Flanders, Belgium

In Belgium, the approach to cluster policy is characterised by a strong emphasis on regional development, acknowledging the unique economic landscape and needs of different regions within the country. The Flemish region, for instance, has been at the forefront of implementing cluster policies since the late 1980s, demonstrating a consistency in support and evolution of these initiatives through various governmental tenures<sup>108</sup>. In 1999, the Flemish government made a significant move by incorporating cluster initiatives into *the Innovation Decree*. This adjustment allowed for the expansion of R&D policies to include a broader spectrum of entities, such as SMEs and research organisations. Following this, in 2005, the concept of demand-driven cluster networks, known as 'Competence Poles', was introduced. Advancing further, in 2006, the government launched *the Flanders in Action* programme, focusing on smart specialisation strategies. Building on the foundation laid by *the Flanders in Action* programme, the region has now adopted *the Flanders Innovation Clusters policy*, which continues to guide its strategic direction today.

All clusters in Flanders emerged from a bottom-up approach, initiated by the business sector rather than being directly established by policymakers. The government of Flanders chose to facilitate innovation by supporting these clusters without leading their creation. However, this approach does not preclude government efforts to enhance cluster membership through promoting its benefits. Joining a cluster offers companies a straightforward path to engage with innovation and co-creation through various financial mechanisms, leading to long-term financial advantages<sup>109</sup>.

The Flemish regional cluster policy is recognised as one of the most developed and effective frameworks in the field, having received top marks in evaluations of its scope, consistency, and implementation tools by the ECCP. The primary goals of this policy are to foster greater cooperation between researchers, the industrial sector, and businesses, and to enhance the competitive edge of these businesses. It provides comprehensive support across various domains including R&D, business advisory services, entrepreneurial development, financial investments, incubation programmes, entrepreneurship enhancement, and networking opportunities with experts and innovators<sup>110</sup>. Financial backing for these initiatives is evenly split, with 50% coming from Flemish government subsidies and the remaining 50% sourced from private investments. It provides:

- **Financial support:** includes backing for collaborative ventures, assistance for R&D projects, facilitating SME integration into clusters, and capital provision for new enterprises.
- **Technical support:** encompasses the provision of critical infrastructure like incubators, accelerators, research facilities, and technology parks. There's a strong focus on enhancing hard skills through knowledge exchange, intellectual property guidance, entrepreneurial counselling, export recommendations, and market insights. Additionally, there's an emphasis on refining soft skills via mentorship, managerial training, and continuous professional development. The support extends to fostering connections and partnerships across both domestic and international spheres.

This policy distinguishes between two distinct cluster models: spearhead clusters and Innovative Business Networks (IBN). Spearhead clusters represent large-scale, high-ambition projects aimed at significant sectoral impact, whereas IBNs focus on smaller, grassroots efforts aimed at fostering innovation in emerging areas through a bottom-up approach. At present, seven spearhead clusters have been pre-selected, along with nine IBNs<sup>110</sup>. Both cluster types are designed to serve SMEs operating within Flanders, as well as knowledge institutions and larger corporations, providing a strategic framework to stimulate growth and innovation across the regional ecosystem.

<sup>108</sup> ECCP. (2022). [Country factsheet: Belgium](#).

<sup>109</sup> Invest in Flanders (2019). Cluster practices in Flanders. [5 open innovation cluster best practices from Flanders](#).

<sup>110</sup> VLAIO. (2023). [Innovation clusters in Flanders: Cluster policy in Flanders](#).



This strategic distinction between spearhead clusters and IBNs allows for a nuanced approach to economic development, catering to the diverse needs of the Flemish economic landscape. Clusters have a maximum financing of up to 10 years (with the current programme ending in year 2026), while IBNs have a maximum financing of three years.

The spearhead clusters receive up to EUR 500,000 in operating resources per year, provided that the participating companies and organisations contribute the same amount. In addition, EUR 95 million is made available each year for individual research and innovation projects that are launched via the clusters to strengthen the competitiveness of their members.

The IBNs initially receive financial backing from Flanders Innovation & Entrepreneurship organisation (VLAIO) for three years, after which they are expected to be self-sufficient. Recognising the challenge these organisations face in sustaining themselves post-funding, a coaching programme has been introduced to aid in developing a sustainable business model. The Flemish government engaged KPMG Advisory Belgium to offer personalised coaching for crafting a viable business plan and model. Alongside, a guideline was created for all clusters to devise their sustainable business plans, drawing from successful strategies and insights.

This guideline encompasses five stages: initiation, analysis of the current model, exploration of strategic opportunities, assessment of feasibility and impact, and formulation of a future business plan. These stages are designed to help clusters evaluate their present and future scenarios, enabling them to create or refine a sustainable business strategy. While third party advisory is not provided, the guideline offers directions, tools, and practical advice for clusters to enhance their business plans.

The process aims to clarify the future path for each cluster organisation, which might include continuing independently, merging with a strategic partner, or, in some cases, ceasing operations. A decision tree within the guideline aids in making informed choices, guiding clusters towards a robust business model for the future.

Within three years of implementing the current cluster policy in 2016, there was a notable surge in company engagement within cluster organisations, increasing by over 3,000. This period also saw the initiation of 62 cluster projects, which collectively garnered EUR 79 million in support, showcasing significant progress by the year 2019. An evaluation of the programme's effectiveness during its first three years revealed remarkable outcomes: an additional EUR 1.1 billion in turnover and an expansion of the workforce by 915 employees. This underscores the tangible benefits of cluster participation, with 70% of member companies acknowledging or anticipating a boost in their competitiveness in the short term due to their involvement in cluster activities.

### Regional level: Catalonia, Spain

Spain's 17 autonomous communities each implement their own unique cluster policies, varying in their levels of development and sustained effort. The Basque Country is highlighted for its long-standing and notably successful approach to cluster policy<sup>111</sup>.

Catalonia's cluster policy, initiated in 1993, was pioneering, with a specific focus on micro-clusters. This approach was acknowledged by Michael Porter in his foundational research on clusters over three decades ago. Post-2004, Catalonia undertook a comprehensive mapping of its cluster landscape and established key support organisations, such as the Observatory for Industrial Foresight (OPI) and ACCIO, which now serves as the executive agency spearheading Catalonia's cluster initiatives. ACCIO has developed into a central hub for the cluster community, offering not only a physical space for collaboration but also technical services and specialised training aimed at fostering management excellence. Furthermore, ACCIO facilitates training sessions and events, including international learning journeys to global best practices, and plays a critical role in strategically identifying cluster opportunities.

In 2019 Catalonia's cluster policy was recognised with three out of the five awards by the National Cluster Association, namely: best management, best cluster project, and best cooperation project between clusters<sup>112</sup>.

The latest iteration of Catalonia's cluster policy, outlined in *the Cluster Policy of the Government of Catalonia* from 2021, focuses on rejuvenating Catalan clusters through the principle of subsidiarity. This approach decentralises policy development and execution to the cluster level, fostering enhanced and more agile collaboration between businesses and institutions. The policy aligns with priority sectors identified in the Basque Country's RIS3 strategy; part of the EU's framework aimed at stimulating regional economic growth. Specifically, it targets advanced manufacturing, energy, and health/biosciences, emphasising areas crucial for future development and innovation within the region<sup>113</sup>.

<sup>111</sup> Kramer, J.-P., Komendzinski, M.-K., Galdiga, L., Welford, M., & Schmidt, F. (2022). *Clusters meet Regions' event "Boosting talent as a key driver for a future sustainable competitiveness" – The case of Catalonia*. ECCP series of events "Clusters meet Regions" input paper.

<sup>112</sup> ECCP (2022). *Country factsheet: Spain*.

<sup>113</sup> ACCIO (2021). *Política de Clústers de la Generalitat de Catalunya*.



In 2023, Catalan cluster programme was supporting 27 cluster organisations (with, on average, 100 members each) and engaged in over 100 collaborative projects per year. The beneficiary cluster organisation needs to have a Strategic cluster plan and a Cluster action plan, as well as a sufficient critical mass. This is understood as at least 30 companies affiliated (of which 60% should be SMEs), with profits that account for over 1% of the Basque Country's GDP<sup>114</sup>. Then, organisations are entitled to<sup>115</sup>:

- **Financial support:** funding collaboration initiatives; support to R&D projects, SMEs becoming cluster members, etc.; subsidies for cluster infrastructure (e.g., offices, equipment); supporting market entry (e.g., testing, proof-of concept, prototyping, demonstration projects); innovation: voucher, support to hire PhDs, cooperation with R&I actors.
- **Technical assistance:** infrastructure such as coworking spaces, offices, incubation and accelerator spaces, research centres, technology parks etc. Support for hard skill development: knowledge transfer, intellectual property, entrepreneurship, export advice, market intelligence Support for soft skills development: coaching, management training, upskilling/reskilling Support for networking and partnership building (at national and/or international level).

This approach facilitated deep strategic analysis and capacity building within specific industry segments, enabling firms to better position themselves in the global market. Over the years, Catalonia's cluster policy has adapted to changing economic conditions, incorporating more comprehensive and formalised support mechanisms, including the establishment of Catalonia Clusters and the introduction of financial support programmes like *the New Business Opportunities (NON)* scheme, and, more recently, creating shared value (CSV) framework, encouraging cluster organisations to pursue projects that benefit society alongside economic growth<sup>114</sup>.

*NON* programme, with an annual budget of EUR 6 million is designed to stimulate strategic transformation and innovation within SMEs that are part of Catalonia's clusters (cluster organisations can also apply). It provides financial support for developing new business plans and co-financing for training, technical support, R&D, and investments in fixed assets necessary for implementing new strategies. By offering grants and co-financing, *the NON* encourages firms to explore and pursue new business opportunities, facilitating strategic repositioning and competitiveness enhancement within the global market.

The CSV framework, on the other hand, emphasises the importance of clusters not only in driving economic growth but also in creating societal value. It encourages cluster organisations and their members to engage in projects that have a positive social impact alongside their economic objectives. By integrating CSV concepts into the cluster policy, Catalonia promotes a holistic approach to development, ensuring that the benefits of economic activities extend beyond the companies to the wider community. This alignment with CSV principles is supported through training provided by ACCIÓ and eligibility of CSV-oriented projects under *the NON* scheme, thus fostering a more sustainable and inclusive economic ecosystem within the region. By 2023, EUR 2.3 million were awarded for projects with the CSV component.

According to an evaluation by ACCIÓ – the Catalan business competitiveness agency running the region's cluster programme – businesses taking part in the cluster initiative generally consider it a significant benefit. 79% of the members confirm that belonging to a cluster initiative has improved their competitiveness, while over 90% recommend taking part in a cluster, taking part in organised activities, and believe it creates value for the sector. Finally, 85,5% of the members say that they have established useful contacts and/or alliances as a result of their participation in a cluster<sup>116</sup>.

## Closing remarks

This part of the report focused on the evolution and current trends of cluster development from the perspective of the EU. Although the concept of clusters is relatively new, it has already attracted significant research and attention of policy and industry practitioners. Most European countries have either specific cluster policies or support clusters within national/regional level policies. For successful cluster development, the best-case scenario involves organic cluster emergence, which can be measured by analysing employment data in various

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<sup>114</sup> Ketels, C. (2023). *Three decades of Cluster policy in Catalonia: what's next?* Harvard business school.

<sup>115</sup> ECCP (2022). *Country factsheet: Spain*.

<sup>116</sup> Kramer, J.-P., Komendzinski, M.-K., Galdiga, L., Welford, M., & Schmidt, F. (2022). *Clusters meet Regions' event "Boosting talent as a key driver for a future sustainable competitiveness" – The case of Catalonia*. ECCP series of events "Clusters meet Regions" input paper.



industries using the LQ method and benchmarking against other industries and regions. This approach helps to identify whether a specific concentration of an industry is present<sup>117</sup>.

Clusters provide numerous benefits, including enhanced productivity and innovation, increased employment, and more competitive business environments. Governments can influence the emergence of clusters both directly, by creating specific market conditions such as regulation, infrastructure, and financial tools; and indirectly, through policies and initiatives that foster an environment conducive to cluster development<sup>118</sup>.

It is evident that clusters are more likely to emerge in industries that are knowledge-intensive and export-oriented. In the EU, the digital ecosystem is a prominent industry showing the formation of clusters. The digital sector's rapid growth and the increasing importance of ICT for various industries make it a fertile ground for clusters development.

Setting up cluster (management) organisations represents a pivotal stage in the evolution of clusters, particularly within the EU context. Cluster organisations in the EU primarily offer a range of services focused on fostering collaboration, innovation, and business development. Key services typically include facilitating networking and collaboration among members, supporting research and development activities, providing access to training and skills development programmes, and assisting in accessing finance and funding opportunities. They also often play a role in advocating for policy changes beneficial to their members and sectors.

In terms of size and membership, cluster organisations in the EU vary significantly. However, a common structure includes a diverse mix of SMEs, larger corporations, research institutions, and academic entities. This mix is instrumental in fostering a rich exchange of knowledge and resources, vital for innovation and growth. With an average size of 170 members, a typical cluster organisation would have up to five employee-strong administration.

Regarding their business model, cluster organisations often rely on a combination of membership fees, public funding (such as the EU grants and regional development funds), and income generated through services provided to their members. This blended financial model enables them to maintain a focus on delivering value to their members while ensuring operational sustainability. Some cluster organisations also engage in collaborative projects that can generate additional revenue streams, further enhancing their financial stability and capacity to provide high-quality services to their members. Yet, this balanced financial model is built on gradually: on its early development stage, clusters are often financed by public funding, which gives cluster organisations time to create strong value proposition, accumulate competences, and increasingly generate income from membership fees and paid services.

The support for clusters in the EU involves a mix of policy tools and approaches that operate at both the EU and national/regional levels:

- **The EU-Level:** At the EU level, the focus is on enhancing competitiveness and innovation through various initiatives and programmes. Key tools include the ECEI which aims at improving cluster management, the ECCP for facilitating inter-cluster cooperation, and the EU funding programmes like Horizon 2020, COSME, and the ERDF. These programmes provide financial support for collaborative research, innovation, and SMEs development.
- **National/Regional-Level:** At this level, policies include setting up cluster support programmes that focus on the most competitive clusters within the country, guided by national priorities or specific objectives. These programmes often involve selecting clusters for additional funding or support based on their performance or strategic importance to the region or country.

In summary, the EU has developed a comprehensive strategic approach in cluster development with over a decade of experience of implementing both the EU-level and national policies to support clusters. For countries that intend to develop their own approach, cluster recognition and support mechanisms are the two critical areas to focus.

As we conclude the report on the EU best practices in cluster management, which has guided the establishment of a methodology and framework for benchmarking cluster management organisations in the Eastern partner countries, several key insights have emerged from EU4Digital's analysis. The study underscores effective management practices, diverse membership structures, and sustainable funding models as pivotal. Concurrently, initial findings indicate that the Eastern partner countries' cluster organisations face significant challenges concerning legal frameworks, financial stability, and operational efficiency.

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<sup>117</sup> ECEI. (2011). *European cluster excellence baseline*.

<sup>118</sup> Franco, S., Murciego, A., Salado, J. P., Sisti, E., & Wilson, J. (2021). [European Cluster Panorama 2021: Leveraging clusters for resilient, green and digital regional economies](#). An initiative of the European Union (pp. 116). Orkestra.



EU4Digital's ongoing assessment through a self-assessment questionnaire launched in spring 2024 aims to further elucidate current practices and challenges among the Eastern partner countries' cluster organisations. By year-end 2024, EU4Digital plans to publish a comprehensive report offering recommendations aimed at advancing clusters of Eastern partner countries. These recommendations will serve as a strategic guide for cluster managers and policymakers in fostering cluster development within their respective countries. See more about the activity in the article: [EU4Digital activity supports Eastern Partnership innovation clusters.](#)



## References

- ACCIO. (2021). *Política de Clústers de la Generalitat de Catalunya*. Retrieved from: [https://www.accio.gencat.cat/web/.content/01\\_Serveis/processos-acreditacio/Acreditacio-clusters/docs/2021/politica-de-clusters.pdf](https://www.accio.gencat.cat/web/.content/01_Serveis/processos-acreditacio/Acreditacio-clusters/docs/2021/politica-de-clusters.pdf)
- Arthurs, D., Cassidy, E., Davis, C. H., & Wolfe, D. (2009). Indicators to support innovation cluster policy. *International Journal of Technology Management*, 46(3/4).
- Balland, P., R., Boschma, P., & Frenken, K. (2022). Proximity, innovation and networks. A concise review and some next steps. In A. Torre & D. Gallaud (Eds.), *Handbook of Proximity Relations* (pp. 70-80). Cheltenham: Edward Elgar. Retrieved from: [https://www.researchgate.net/publication/370556653\\_Proximity\\_innovation\\_and\\_networks\\_a\\_concise\\_review\\_and\\_some\\_next\\_steps](https://www.researchgate.net/publication/370556653_Proximity_innovation_and_networks_a_concise_review_and_some_next_steps)
- Bron Innovation. Retrieved from: <https://www.broninnovation.se/>
- Burger, M. J., Karreman, B., & van Eenennaam, F. (2015). The competitive advantage of clusters: Cluster organisations and greenfield FDI in the European life sciences industry. *Geoforum*, 65, 179-191. Retrieved from: <https://www.sciencedirect.com/science/article/abs/pii/S0016718515001906>
- Cluster Collaboration. (2022). Cluster business models fit for accelerating the twin transitions: Key actions for clusters to implement transition pathways. *ECCP Discussion Paper*. Retrieved from: <https://clustercollaboration.eu/sites/default/files/2022-01/Cluster-business-models-fit-for-accelerating-the-twin-transitions.pdf>
- Cluster Sensorik. Retrieved from: <https://www.sensorik-bayern.de/en/who-we-are/>
- Delgado, M., Porter, M. E., & Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, 10(4), 495–518. Retrieved from: <https://doi.org/10.1093/jeg/lbq010>
- Delgado, M., Porter, M. E., & Stern, S. (2010). Clusters, convergence, and economic performance. *Research Policy*, 43.
- DigitalLead - Danmarks nationale klynge for digitale teknologier. Retrieved from: <https://digitallead.dk/>
- Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. (2020). European Expert Group on Clusters Recommendation Report (1st ed.). Retrieved from: [https://clustercollaboration.eu/sites/default/files/news\\_attachment/European\\_Expert\\_Group\\_on\\_Clusters\\_-\\_Recommendation\\_Report.pdf](https://clustercollaboration.eu/sites/default/files/news_attachment/European_Expert_Group_on_Clusters_-_Recommendation_Report.pdf)
- ECCP. (2022). Country factsheet: Spain. Retrieved from: [https://clustercollaboration.eu/sites/default/files/2023-06/ECCPfactsheet\\_Spain\\_2022\\_final.pdf](https://clustercollaboration.eu/sites/default/files/2023-06/ECCPfactsheet_Spain_2022_final.pdf)
- ECCP. (2022). Summary report on cluster policies and programmes across Europe and priority third countries: 2022 edition. Retrieved from: [https://www.astar.agency/wp-content/uploads/2023/02/ECCP\\_Summary\\_report\\_cluster\\_policies\\_2022\\_EN.pdf](https://www.astar.agency/wp-content/uploads/2023/02/ECCP_Summary_report_cluster_policies_2022_EN.pdf)
- ECCP. (2022). Country factsheet: Germany. Retrieved from: <https://clustercollaboration.eu/in-focus/policy-acceleration/country-factsheets-on-cluster-policies-and-programmes>
- ECCP. (2022). Country factsheet: Poland. Retrieved from: <https://clustercollaboration.eu/in-focus/policy-acceleration/country-factsheets-on-cluster-policies-and-programmes>
- ECCP. (2022). Country factsheet: Belgium. Retrieved from: <https://clustercollaboration.eu/in-focus/policy-acceleration/country-factsheets-on-cluster-policies-and-programmes>
- ECCP. Bron Innovation. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/04bfd682-cdc6-4fc3-9df6-9249e1e0d5e7>
- ECCP. Cap Digital. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/0fc027d4-63f1-4411-a1cb-5ea9f935519d>



ECCP. Construction Cluster of Slovenia. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/b3747733-c0d3-45ae-b9cc-4e4ab9c221e0>

ECCP. DigitalLead. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/8736ae4d-56c8-433e-b8ef-e7a5f7b56873>

ECCP. Flanders' FOOD. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/c1cbd480-e267-49ee-a166-99c28c16d867>

ECCP. Habic. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/9b5b7768-47f8-4826-8183-928012a83c18>

ECCP. Health Valley Netherlands. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/af1e1858-cad1-404a-a35a-c43adaea12f9>

ECCP. Pool-Net. Retrieved from: <https://profile.clustercollaboration.eu/profile/cluster-organisation/da2fbdfc-765d-4da0-9671-c918aa8d15ce>

ECEI. (2011). European cluster excellence baseline.

Enright, M. J. (1996). Regional clusters and economic development: A research agenda. *Business Networks: Prospects for Regional Development*.

ESCA. (2024). Overview of cluster benchmarking indicators. Retrieved from: [https://www.cluster-analysis.org/benchmarking-in-a-nutshell/copy\\_of\\_Overviewofclusterbenchmarkingindicators.pdf](https://www.cluster-analysis.org/benchmarking-in-a-nutshell/copy_of_Overviewofclusterbenchmarkingindicators.pdf)

European Cluster Collaboration Platform. (n.d.). Cluster definitions. Retrieved from: <https://clustercollaboration.eu/cluster-definitions>

European Commission, Executive Agency for Small and Medium-sized Enterprises, Notten, A., Delponte, L., Wintjes, R., et al. (n.d.). Cluster programmes in Europe and beyond. *Publications Office*.

European Commission. (2010). Commission Regulation (EU) No 1217/2010 of 14 December 2010 establishing a framework for the Community's activities in support of European standardisation. *Official Journal of the European Union*.

European Commission. (2014). Commission Regulation (EU) No 316/2014 of 27 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements. *Official Journal of the European Union*.

European Commission. (2014). Framework for State aid for research and development and innovation. *Publications Office of the European Union*. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52014XC0627%2801%29>

European Commission. (n.d.). European Clusters Excellence. *Single Market, Economy, Industry & Innovation - European Commission*. Retrieved from: [https://single-market-economy.ec.europa.eu/industry/strategy/cluster-policy/european-clusters-excellence\\_en](https://single-market-economy.ec.europa.eu/industry/strategy/cluster-policy/european-clusters-excellence_en)

Federal Ministry for Economic Affairs and Energy. (2015). Selected cluster successes. Results from the promotion of innovative services. Retrieved from: [https://clustercollaboration.eu/sites/default/files/selected\\_cluster\\_successes\\_in\\_Germany.pdf](https://clustercollaboration.eu/sites/default/files/selected_cluster_successes_in_Germany.pdf)

Flanders' FOOD - Speerpuntcluster voor de agrovoedingsindustrie. Retrieved from: <https://www.flandersfood.com/nl>

Fornahl, D., & Hassink, R. (Eds.). (2017). *The life cycle of clusters: A policy perspective*. Northampton, MA: Edward Elgar. Retrieved from: <https://www.e-elgar.com/shop/gbp/the-life-cycle-of-clusters-9781784719272.html>

Franco, S., Murciego, A., Salado, J. P., Sisti, E., & Wilson, J. (2021). *European Cluster Panorama 2021: Leveraging clusters for resilient, green and digital regional economies*. An initiative of the European Union. Retrieved from: [https://clustercollaboration.eu/sites/default/files/2021-12/European\\_Cluster\\_Panorama\\_Report\\_0.pdf](https://clustercollaboration.eu/sites/default/files/2021-12/European_Cluster_Panorama_Report_0.pdf)

German Economic Team. (2020). Cluster initiatives in Germany common activities, organisational and financing models. Retrieved from: [https://www.german-economic-team.com/wp-content/uploads/2022/01/GET\\_BLR\\_PB\\_05\\_2020\\_EN-1.pdf](https://www.german-economic-team.com/wp-content/uploads/2022/01/GET_BLR_PB_05_2020_EN-1.pdf)



Go-Cluster. (2024). Program description. Retrieved from: [https://www.clusterplattform.de/CLUSTER/Redaktion/DE/Downloads/Publikationen/foerderkonzept\\_gocluster.pdf?blob=publicationFile&v=4](https://www.clusterplattform.de/CLUSTER/Redaktion/DE/Downloads/Publikationen/foerderkonzept_gocluster.pdf?blob=publicationFile&v=4)

Haberla, M. (2016). Cluster development strategy in the context of the “key national cluster” competition.

HABIC - Clúster del equipamiento, mobiliario y diseño del País Vasco. Retrieved from: <https://habic.eus/>

Hamdouch, A. (2009). Networking, clustering and innovation dynamics in the global economy: General presentation. *Journal of Innovation Economics & Management*, 4, 5-13. Retrieved from: <https://www.cairn.info/revue-journal-of-innovation-economics-2009-2-page-5.htm>

Hausemer, P., Porsch, L., Nunu, M., & Eckhardt Rodriguez, A. (2019). Summary report on lessons learnt from fostering modern cluster policy in regions in industrial transition. *EOC/C*. Retrieved from: [https://clustercollaboration.eu/sites/default/files/news\\_attachment/summary\\_report\\_on\\_cluster\\_policy\\_in\\_regions.pdf](https://clustercollaboration.eu/sites/default/files/news_attachment/summary_report_on_cluster_policy_in_regions.pdf)

Haze, V., & Rangen, C. (n.d.). Cluster business models: Exploring business models in global innovation clusters. A report by Strategy Tools & The Global Community. Design by Jolene Foo-Hodne. Retrieved from: [https://clustercollaboration.eu/sites/default/files/document-store/Cluster Business Models Report.pdf](https://clustercollaboration.eu/sites/default/files/document-store/Cluster_Business_Models_Report.pdf)

Invest in Flanders. (2019). Cluster practices in Flanders. 5 open innovation cluster best practices from Flanders. Retrieved from: <https://invest.flandersinvestmentandtrade.com/en/news/5-open-innovation-cluster-best-practices-flanders>

Izsak, K., Meier zu Köcker, G., Ketels, C., et al. (2016). Smart guide to cluster policy. *EC Publications Office*. Retrieved from: <https://data.europa.eu/doi/10.2873/729624>

Karlsson, C. (2007). Clusters, functional regions and cluster policies. *Royal Institute of Technology, CESIS*.

Karlsson, C. (Ed.). (2008). *Handbook of research on innovation and clusters: Cases and policies* (Vol. 2). Edward Elgar Publishing. Retrieved from: [https://books.google.com/books?hl=en&lr=&id=uKprAwAAQBAJ&oi=fnd&pg=PR1&dq=C.+Karlsson+\(Ed.\),+Handbook+of+Research+on+Innovation+and+Clusters:+Theories,+Cases+and+Policies&ots=zkh40KdmeV&sig=Xrv5fdF8PjMyPqp21YCtCvIRCQw](https://books.google.com/books?hl=en&lr=&id=uKprAwAAQBAJ&oi=fnd&pg=PR1&dq=C.+Karlsson+(Ed.),+Handbook+of+Research+on+Innovation+and+Clusters:+Theories,+Cases+and+Policies&ots=zkh40KdmeV&sig=Xrv5fdF8PjMyPqp21YCtCvIRCQw)

Ketels, C. (2017). Cluster mapping as a tool for development. *Institute for Strategy and Competitiveness, Harvard Business School*. Retrieved from: [https://www.hbs.edu/ris/Publication/Files/Cluster Mapping as a Tool for Development \\_ report\\_ISC WP version 10-10-17\\_c46d2cf1-41ed-43c0-bfd8-932957a4ceda.pdf](https://www.hbs.edu/ris/Publication/Files/Cluster%20Mapping%20as%20a%20Tool%20for%20Development_report_ISC_WP%20version%2010-10-17_c46d2cf1-41ed-43c0-bfd8-932957a4ceda.pdf)

Ketels, C. (2023). Three decades of cluster policy in Catalonia: What’s next? *Harvard Business School*. Retrieved from: <https://hbsp.harvard.edu/product/724404-PDF-ENG>

Koch, T., & Windsperger, J. (2017). Seeing through the network: Competitive advantage in the digital economy. *Journal of Organisation Design*, 6, 1-30. Retrieved from: <https://link.springer.com/article/10.1186/s41469-017-0016-z>

Kramer, J.-P., Komendzinski, M.-K., Galdiga, L., Welford, M., & Schmidt, F. (2022). Clusters meet Regions’ event “Boosting talent as a key driver for a future sustainable competitiveness” – The case of Catalonia. *ECCP series of events “Clusters meet Regions” input paper*. Retrieved from: [https://clustercollaboration.eu/sites/default/files/document-store/ECCP Input paper\\_CmR\\_Catalonia\\_final.pdf](https://clustercollaboration.eu/sites/default/files/document-store/ECCP_Input_paper_CmR_Catalonia_final.pdf)

Kuberska, D., & Mackiewicz, M. (2022). Cluster policy in Poland – Failures and opportunities. Retrieved from: <https://www.mdpi.com/2071-1050/14/3/1262>

Latvian IT Cluster. Retrieved from: <https://www.itbaltic.com/>

Lazeretti, L., Capone, F., Caloffi, A., & Sedita, S. R. (2019). Rethinking clusters: Towards a new research agenda for cluster research. *European Planning Studies*, 27(10), 1879–1903. Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/09654313.2019.1650899>

Maggioni, M. A., Riggi, M. R., & Riggi, M. (2008). High-tech firms and the dynamics of innovative industrial clusters. In C. Karlsson (Ed.), *\*Handbook of Research on Innovation and Clusters: Theories, Cases and Policies\**. Retrieved from: <https://www.e-elgar.com/shop/gbp/handbook-of-research-on-innovation-and-clusters-9781849800877.html>



Markusen, A. (1996). Sticky places in slippery space: A typology of industrial districts. *Economic Geography*, 72(3), 293-313. Retrieved from: <https://www.jstor.org/stable/144402>

Nomaler, Ö., & Verspagen, B. (2016). River deep, mountain high: Of long-run knowledge trajectories within and between innovation clusters. *Journal of Economic Geography*, 16(6), 1259–1278. Retrieved from: <https://academic.oup.com/joeg/article-abstract/16/6/1259/2562968>

Porter, M. E. (1990). *The Competitive Advantage of Nations*. Free Press, New York.

Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, 76, 77-90. Retrieved from: <https://hbr.org/1998/11/clusters-and-the-new-economics-of-competition>

Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, 14(1), 15-34. Retrieved from: <https://themys.sid.uncu.edu.ar/~rpalma/Industrial/Casos/089124240001400105.pdf>

Portugal Ferreira, M., et al. (2012). Impact of the types of clusters on the innovation output and the appropriation of rents from innovation. *Journal of Technology Management & Innovation*, 7(4), 70-80.

Powell, W. W., & Grodal, S. (2005). Networks of innovators. In Fagerberg, J., Mowery D., Nelson R. (Eds.), *The Oxford handbook of innovation* (pp. 56-85). Oxford University Press. Retrieved from: [https://www.researchgate.net/publication/200465375\\_Networks\\_of\\_Innovators](https://www.researchgate.net/publication/200465375_Networks_of_Innovators)

Produtech. Retrieved from: <http://www.produtech.org/about-us>

Rissola, G., & Sörvik, J. (2018). Digital innovation hubs in smart specialisation strategies: Early lessons from European regions. *European Commission*. Retrieved from: <https://core.ac.uk/download/pdf/162257008.pdf>

Rosenfeld, S. A. (2002). Creating smart systems: A guide to cluster strategies in less favoured regions. *European Union Regional Innovation Strategies*. Retrieved from: [https://www.researchgate.net/publication/237285965\\_Creating\\_Smart\\_Systems\\_A\\_guide\\_to\\_cluster\\_strategies\\_in\\_less\\_favoured\\_regions](https://www.researchgate.net/publication/237285965_Creating_Smart_Systems_A_guide_to_cluster_strategies_in_less_favoured_regions)

Schilling, M. (2016). Innovation networks. In: Augier, M., Teece, D. (Eds.), *The Palgrave Encyclopedia of Strategic Management*. Palgrave Macmillan, London. Retrieved from: [https://link.springer.com/referenceworkentry/10.1057/978-1-349-94848-2\\_540-1](https://link.springer.com/referenceworkentry/10.1057/978-1-349-94848-2_540-1)

Seidler, R., & Hartmann, E. (2008). The use of tacit knowledge within innovative companies: Knowledge management in innovative enterprises. *Journal of Knowledge Management*, 12. Retrieved from: [https://www.researchgate.net/publication/220363073\\_The\\_use\\_of\\_tacit\\_knowledge\\_within\\_innovative\\_companies\\_Knowledge\\_management\\_in\\_innovative\\_enterprises](https://www.researchgate.net/publication/220363073_The_use_of_tacit_knowledge_within_innovative_companies_Knowledge_management_in_innovative_enterprises)

Sermuksnyte-Alesiuniene, K. (2023). The role of clusters in digital innovation hubs. *ECCP*. Retrieved from: [https://clustercollaboration.eu/sites/default/files/WYSIWYG\\_uploads/role\\_clusters\\_dih\\_agrifood\\_lithuania.pdf](https://clustercollaboration.eu/sites/default/files/WYSIWYG_uploads/role_clusters_dih_agrifood_lithuania.pdf)

Skowron-Grabowska, B. (2017). Criteria of evaluating key national clusters in the value chain and with reference to the local conditions. *Zeszyty naukowe politechniki śląskiej*. Retrieved from: [https://www.researchgate.net/publication/321872461\\_Criteria\\_of\\_Evaluating\\_Key\\_National\\_Clusters\\_in\\_the\\_Value\\_Chain\\_and\\_with\\_Reference\\_to\\_the\\_Local\\_Conditions](https://www.researchgate.net/publication/321872461_Criteria_of_Evaluating_Key_National_Clusters_in_the_Value_Chain_and_with_Reference_to_the_Local_Conditions)

Sölvell, Ö., Ketels, C., & Lindqvist, G. (2009). *The EU Cluster Mapping and Strengthening Clusters in Europe. Center for Strategy and Competitiveness*. Retrieved from: [https://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.02/DOC\\_1](https://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.02/DOC_1)

The Cluster and the Collective Brand: Engineering & Tooling. Retrieved from: <https://app.toolingportugal.com/en/o-cluster/>

Torre, A., & Gallaud, D. (Eds.). (2022). *Handbook of Proximity Relations*. Cheltenham, UK: Edward Elgar Publishing. Retrieved from: <https://www.elgaronline.com/edcollbook/edcoll/9781786434777/9781786434777.xml>

Transilvania DIH Success Stories. (2024). Retrieved from: [https://transilvaniadih.ro/en/success\\_stories/](https://transilvaniadih.ro/en/success_stories/)

Transilvania IT Cluster. Retrieved from: <https://www.transilvaniait.ro/matchmaking-1>



VLAIO. (2023). Innovation clusters in Flanders: Cluster policy in Flanders. Retrieved from: <https://www.vlaio.be/en/clusterorganisaties/het-clusterbeleid/het-vlaamse-clusterbeleid>

von Hippel, E. (2007). Horizontal innovation networks—by and for users. *Industrial and Corporate Change*, 16(2), 293–315. Retrieved from: <https://academic.oup.com/icc/article-abstract/16/2/293/668931?redirectedFrom=fulltext&login=false>



## Annex 1. Selection of the best EU clusters by value proposition

Legend: Selected as the best EU practice

Excellence label	Gold label clusters	Country	Sector	Composition	Small cluster (1-50 members)	Growing cluster (50-100 members)	General services of digital cluster organisations													Digitalisation-related services of digital cluster organisations					Total services	Number of general services	Number of digitalisation services	
							Support of Research, Development and Innovation	Access to finance: Public funding	Facilitation of collaboration between members (within the cluster)	Facilitation of external collaboration (beyond cluster) such as matchmaking	Internationalisation Support (access to third countries markets)	Advisory Services	Access to the European Internal Market	Communication	Access to finance: Private funding	Development of human resources, such as staff mobility, access to training	Location branding	IPR Management	Identifying and promotion of digital collaborative projects	Support towards digitalisation of processes	Introduction to digital solutions/technology providers	Scouting digital services/innovations	Expertise in industry 4.0 processes	Definition of members' digital strategies and new business models				Digital training courses for members
Gold	<a href="#">HABIC BASQUE HABITAT, WOOD, OFFICE &amp; HOSPITALITY CLUSTER</a>	Spain	Manufacturing: C16 Manufacture of wood and of products of wood and cork, except furniture	Large firms: 5 SME's: 90 Research organisations: 5			✓	✓	✓	✓	✓							✓		✓	✓		✓	✓	✓	11	5	6
Gold	<a href="#">Kosice IT Valley</a>	Slovakia	Information and communication	Large firms: 10 SME's: 19 Research organisations: 3		✓	✓				✓		✓					✓								5	3	2
Gold	<a href="#">Logistics-Initiative Hamburg Management GmbH</a>	Germany	Manufacturing: C30 Manufacture of other transport equipment, Transportation and storage	Large firms: 50 SME's: 250 Research organisations: 41			✓	✓	✓	✓				✓				✓	✓	✓	✓					9	5	4
Gold	<a href="#">Mechatronics Cluster @ Business Upper Austria - OÖ Wirtschaftsagentur</a>	Austria	Manufacturing: C25 Manufacture of fabricated metal products, except machinery and equipment, Manufacturing: C26 Manufacture of computer, electronic and optical products	Large firms: 40 SME's: 260 Research organisations: 10														✓					✓			3	1	2
Gold	<a href="#">Minalogic</a>	France	Activities of membership organisations	Large firms: 34 SME's: 381 Research organisations: 20			✓	✓						✓				✓	✓	✓	✓	✓	✓			9	3	6
Gold	<a href="#">Mobile Heights</a>	Sweden	Information and communication	Large firms: 13 SME's: 91 Research organisations: 4				✓	✓	✓			✓	✓					✓	✓						7	5	2
Gold	<a href="#">Photonics cluster OPTITEC</a>	France	Professional, scientific and technical activities	Large firms: 15 SME's: 120 Research organisations: 55			✓	✓	✓		✓											✓				5	4	1
Gold	<a href="#">Pôle SCS</a>	France	Manufacturing: C26 Manufacture of computer, electronic and optical products	Large firms: 28 SME's: 227 Research organisations: 16			✓	✓	✓	✓				✓				✓						✓		10	5	5
Gold	<a href="#">Polymeris</a>	France	Manufacturing: C20 Manufacture of chemicals and chemical products,	Large firms: 50 SME's: 280 Research organisations: 50			✓	✓		✓			✓					✓	✓	✓	✓	✓				8	5	3
Gold	<a href="#">POOL-NET - Portuguese Tooling &amp; Plastics Network</a>	Portugal	Manufacturing: C22 Manufacture of rubber and plastic products,	Large firms: 19 SME's: 56 Research organisations: 12		✓	✓	✓			✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	12	5	7
Gold	<a href="#">PRODUTECH - Production Technologies Cluster</a>	Portugal	Manufacturing: C28 Manufacture of machinery and equipment n.e.c., Information and communication	Large firms: 23 SME's: 65 Research organisations: 25						✓		✓						✓	✓	✓	✓	✓	✓	✓	✓	11	2	9
Gold	<a href="#">secpho deep tech innovation cluster</a>	Spain	Manufacturing: C28 Manufacture of machinery and equipment	Large firms: 37 SME's: 86 Research organisations: 27				✓		✓		✓		✓				✓	✓	✓	✓	✓				10	5	5



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Legend: Selected as the best EU practice

Excellence label	Gold label clusters	Country	Sector	Composition	General services of digital cluster organisations													Digitalisation-related services of digital cluster organisations										Total services	Number of general services	Number of digitalisation services			
					Small cluster (1-50 members)	Growing cluster (50-100 members)	Support of Research, Development and Innovation	Access to finance: Public funding	Facilitation of collaboration between members (within the cluster)	Facilitation of external collaboration (beyond cluster) such as matchmaking	Internationalisation Support (access to third countries markets)	Advisory Services	Access to the European Internal Market	Communication	Access to finance: Private funding	Development of human resources, such as staff mobility, access to training	Location branding	IPR Management	Identifying and promotion of digital collaborative projects	Support towards digitalisation of processes	Introduction to digital solutions/technology providers	Scouting digital services/innovations	Expertise in industry 4.0 processes	Definition of members' digital strategies and new business models	Digital training courses for members	Digital market studies and observation	Talent attraction/development						
Silver	<a href="#">Propell</a>	Sweden	General tagging of new technological developments	Large firms: 8 SME's: 50 Research organisations: 3		✓	✓			✓								✓													3	2	1
Silver	<a href="#">ROHEALTH- The Health and Bioeconomy Cluster</a>	Romania	Human health and social work activities	ME's: 43 Research organisations: 18		✓		✓	✓			✓						✓	✓		✓									8	4	4	
Silver	<a href="#">Silesia Automotive &amp; Advanced Manufacturing</a>	Poland	Manufacturing: C26 Manufacture of computer, electronic and optical products	Large firms: 80 SME's: 70 Research organisations: 10														✓			✓	✓		✓	✓	✓				7	1	6	
Silver	<a href="#">South West Hungarian Engineering Cluster</a>	Hungary	Manufacturing: C25 Manufacture of fabricated metal products, except machinery and equipment	Large firms: 6 SME's: 33 Research organisations: 1	✓															✓				✓						2	0	2	
Silver	<a href="#">SpectroNet c/o Technologie- und Innovationspark Jena GmbH</a>	Germany	Information and communication	Large firms: 6 SME's: 36 Research organisations: 9		✓	✓		✓	✓				✓						✓		✓					✓			8	4	4	
Silver	<a href="#">Transylvania Energy Cluster</a>	Romania	Professional, scientific and technical activities	Large firms: 3 SME's: 28 Research organisations: 6	✓		✓													✓										2	1	1	
<b>GOLD label: number of clusters providing the service</b>					<b>Total</b>	<b>20</b>	<b>19</b>	<b>16</b>	<b>16</b>	<b>11</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>22</b>	<b>18</b>	<b>16</b>	<b>14</b>	<b>12</b>	<b>11</b>	<b>8</b>	<b>8</b>	<b>5</b>			<b>114</b>	<b>114</b>			
<b>GOLD label: share of clusters providing the service (colored within the service group)</b>						69%	66%	55%	55%	38%	31%	24%	24%	17%	7%	3%	3%	76%	62%	55%	48%	41%	38%	28%	28%	17%							
<b>SILVER label: number of clusters providing the service</b>					<b>Total</b>	<b>7</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>1</b>			<b>38</b>	<b>46</b>			
<b>SILVER label: share of clusters providing the service (colored within the service group)</b>						50%	29%	57%	50%	21%	21%	0%	21%	7%	14%	0%	0%	79%	36%	43%	43%	29%	36%	36%	21%	7%							

Gold ([www.cluster-analysis.org](http://www.cluster-analysis.org))  
 Silver ([www.cluster-analysis.org](http://www.cluster-analysis.org))  
 Bronze ([www.cluster-analysis.org](http://www.cluster-analysis.org))  
 ECCP

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