

European Cluster Observatory

REPORT

# European Cluster Trends

## Executive Summary

Prepared by:

Kincsö Izsak, Technopolis Group

Gerd Meier zu Köcker, VDI/VDE-IT

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## European Cluster Observatory in Brief

The European Cluster Observatory is a single access point for statistical information, analysis and mapping of clusters and cluster policy in Europe that is foremost aimed at European, national, regional and local policy-makers as well as cluster managers and representatives of SME intermediaries. It is an initiative of the “SMEs: Clusters and Emerging Industries” unit of the European Commission’s Internal Market, Industry, Entrepreneurship and SMEs Directorate-General that aims at promoting the development of more world-class clusters in Europe, notably with a view to fostering competitiveness and entrepreneurship in emerging industries and facilitating SMEs’ access to clusters and internationalisation activities through clusters.

The ultimate objective is to help Member States and regions in designing smart specialisation and cluster strategies to assist companies in developing new, globally competitive advantages in emerging industries through clusters, and in this way strengthen the role of cluster policies for the rejuvenation of Europe’s industry as part of the Europe 2020 Strategy.

To support evidence-based policy-making and partnering, the European Cluster Observatory provides an EU-wide comparative cluster mapping with sectoral and cross-sectoral statistical analysis of the geographical concentration of economic activities and performance. The European Cluster Observatory provides the following services:

- a **bi-annual “European Cluster Panorama”(cluster mapping)** providing an update and enrichment of the statistical mapping of clusters in Europe, including for ten related sectors (i.e. cross-sectoral) and a correlation analysis with key competitiveness indicators;
- a **“European Cluster Trends” report** analysing cross-sectoral clustering trends, cluster internationalisation and global mega trends of industrial transformations; identifying common interaction spaces; and providing a foresight analysis of industrial and cluster opportunities;
- a **“Regional Eco-system Scoreboard”** setting out strengths and weaknesses of regional and national eco-systems for clusters, and identifying cluster-specific framework conditions for three cross-sectoral collaboration areas;
- a **“European Stress Test for Cluster Policy”**, including a self-assessment tool accompanied by policy guidance for developing cluster policies in support of emerging industries;
- **showcase modern cluster policy practice through advisory support services to six selected model demonstrator regions**, including expert analysis, regional survey & benchmarking report, peer-review meeting, and policy briefings in support of emerging industries. The policy advice builds also upon the policy lessons from related initiatives in the area of emerging industries;
- bring together **Europe’s cluster policy-makers and stakeholders at the European Cluster Conferences** 2014 and 2016 for a high-level cluster policy dialogue and policy learning, and facilitate exchange of information through these webpages, newsletters, videos, etc.

More information about the European Cluster Observatory is available at the EU Cluster Portal at: <http://ec.europa.eu/growth/smes/cluster/observatory/>

## Executive Summary

This paper is the summary of the preliminary European Cluster Trends report that presents the results of the analysis that attempted to identify trends in industrial and cluster dynamics and paid particular attention to cross-sectoral links and internationalisation trends. All of this work has been conducted within the framework of the European Cluster Observatory. The final version of the European Cluster Trends report will also include the findings of the cluster foresight exercise, which will be ready in July 2015.

The objective of the study was to identify and analyse trends in where and how clusters of related industries are transforming themselves and where new specialisation patterns give rise to the renewal, or the development, of emerging industries. Specifically the report identified:

- *Global megatrends that affect industrial transformations;*
- *Cross-sectoral trends in industrial transformations; and*
- *Trends in internationalisation patterns.*

In the first phase of the European Cluster Observatory, ten emerging industries were identified, based on a co-location analysis that was presented in the 2014 European Cluster Panorama. These emerging industries are: **Advanced Packaging, Biopharmaceuticals, Blue Growth, Creative Industries, Digital-based industries, Environmental industries, Experience industries, Logistical Services, Medical Devices, and Mobility Technologies.** This report followed up on this analysis and explored the most recent trends in these ten industries.

### 1.1 Global Megatrends

Global mega trends can be understood as a sustainable force on a global and macro-economic level, influencing the developments of business, economy, society, cultures and personal lives, on local as well as on a global level. Thus, the mega trends are also defining the appearance of the future world, regulating its pace of change and affecting the growth or decline of clusters of related industries and institutions. According to the definition that EEA provided in 2007, Mega Trends<sup>1</sup> are “*those trends visible today that are expected to extend over decades, changing slowly and exerting considerable force that will influence a wide array of areas, including social, technological, economic, environmental and political dimensions.*”

***Twelve global mega trends have been identified that are seen as the fundamental catalysts for growth in markets and clusters***

Global mega trends can be seen as providing a major support and a strong foundation for the introduction of new products and services. Additionally, by influencing price, performance, availability and quality improvements, mega trends also unlock latent demand and revitalise growth in existing, mature markets, whilst harnessing additional resources to promote the growth of new market opportunities. As a result, companies have to align their strategic decisions to the influences of these trends, if they are to maintain their competitiveness and safeguard it in the future. Based on an international expert panel composed of industry, science and cluster managers, the following mega trends have been identified:

*Related to the nature of innovation:*

- Changes in innovation dynamics (such as more dispersed knowledge, sources of innovation etc.);
- Changes in entrepreneurship culture (role of entrepreneurs, use of crowd-funding etc.);
- Changes of geo-economical dynamics;

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<sup>1</sup> European Environment Agency (EEA), GMT Report 2007

*Related to advancements in information technologies:*

- Consumerisation, proliferation and ubiquity of IT;
- Cross-linkage of subjects & objects (Internet of Things);
- Impact of social media;
- Convergence of products, devices and services;
- Big data;

*Related to changes in consumer behaviours and expectations:*

- Personalisation of products & services;
- Immediate availability of products & services;
- Shortening of lifetime cycles;
- Carbon foot-print reduction.

## 1.2 Cross-sectoral trends

In real life, innovations are often nurtured through novel combinations of ideas, technologies, assets and supply chains, which can also connect businesses and industries that had been previously been unrelated. Clusters are cross-sectoral by their nature, as they refer to a concentration of related industries and institutions, and thus, they can be platforms for innovation and industrial change.

Clusters transform and reinvent themselves in response to changes in the external environment (such as to global mega trends) or changes initiated within the cluster (such as cross-sectoral trends), which can be amplified through positive feedback between this external environment and the cluster itself. Clusters are therefore in a constant dynamic state, both shaping and being shaped by the industries and by the group of firms in which they operate, which leads to shifting specialisation patterns across Europe.

The ten emerging industries identified through the European Cluster Panorama represent a diverse group of related industries and clusters. Some of them are very broad and ubiquitous such as **Environmental industries**, **Digital-based industries** and **Logistical Services**, which are cross-sectoral by nature, span many other industries and are relevant to many types of clusters. Other emerging industries identified have a well-defined core industry such as **Medical Devices**, **Biopharmaceuticals**, **Advanced Packaging** or **Mobility Technologies** that demonstrate new industrial dynamics both through cross-technological spill-overs and cross-industrial linkages. **Blue Growth** is an emerging industry that connects three big industrial themes such as maritime industries, fisheries and offshore drilling. The **Creative and Experience industries** are diverse groups of industries and include many design and human creative and recreational activities.

Based on the analysis of indicators such cross-sectoral and cross-technological activities on-going in patenting and co-patenting; mergers and acquisitions; joint ventures, strategic alliances and innovation networks (in the period of 2000-2014), the following general observations have been made across all the ten emerging industries:

***The share of cross-sectoral activities varies across industries but it is gaining importance over time***

The analysis found a varying pattern of cross-sectoral activity related to the ten emerging industries. The cross-sectoral nature of the Environmental and Digital-based industries has been shown by the patent analysis, which revealed that around 50-70% of the patents related to these industries that

Between 35-80% of the patents related to the ten emerging industries addressed several technological areas (with the lower end medical devices and upper end environmental services)

The share of mergers and acquisitions which happened between organisations coming from different industries varies a lot – eg. Logistics 11,16%; 26,74% Medical Devices; or Digital-based industries 98%.

had been filed addressed several technological areas and not only specific environmental or digital technologies. At the other end of the spectrum, industries such as Medical Devices and Packaging are more often related to one core technological area.

The shares of cross-sectoral mergers and acquisitions exhibit lower percentages overall that point to the fact that cross-sectoral linkages are sometimes less important in industry partnerships. There are, however, exceptions as Environmental and Digital-based Industries that again exhibit high cross-industry activity.

A further analysis of patent trends across all the eight core industries (where a patent analysis has been possible) shows that while patenting activity decreased over the most recent period, with other studies pointing to the effects of the economic and financial crisis, the share of patents that mention several technological areas, in the total number of patents increased over the years. This indicates that more interdisciplinary research and technological collaboration has existed in the economy. Similar trends could be observed in the cases of other indicators.

### **Dynamics along traditional value chains can be as promising as dynamics related to new enabling and industrial technologies**

The analysis of mergers and acquisitions revealed that in some of the industrial linkages, cross-sectoral activity takes place close to the core industry and along more traditional value chain linkages<sup>2</sup> (such as between biopharmaceuticals and food industry), while in others there are dynamic cross-sectoral patterns emerging in relation to industries, whose linkages used to be weak and hence, these dynamic patterns were less expected (such as packaging and nano-technology).

Weaker linkages that gained importance are also often related to enabling industries that bring a new source for advancement in the product or service. For instance in the case of Logistical Services such enabling linkages have been the ICT, transportation and machinery industries.

Cross-sectoral dynamics close to the core industry have been more relevant in Advanced Packaging, Blue Growth, Experience industries and Mobility Technologies. Nevertheless, industries such as Biopharmaceuticals, Creative industries, Digital-based industries, Environmental industries, Logistical Services and Medical Devices exhibit dynamics related to more unexpected areas. Many of the strong links of the latter appear to have decreased slightly in importance, which can also reflect the fact that these links have become well-established.

The analysis also revealed a pattern of certain types of linkages predominantly taking place across the ten emerging industries and these refer to mainly linkages that

- enable new applications of certain technologies or solutions (e.g. in the area of environmental services and ICT or linkages related to nano-technology);
- traditional linkages that have been existed for long but constitute an important driver behind industrial development (e.g. health care packaging; mobility and electronics; maritime and engineering services); and
- taking inspiration from other industries and develop new products and services (e.g. medical devices and mobility technologies; fisheries and pharmaceuticals).

### **Cross-sectoral dynamics are important both on the upstream and downstream side of the value chain**

The value chain analysis also showed that while in certain cases cross-sectoral activity happens on the upstream side closer to research and development, there are lots of dynamics on-going on the downstream application side of all the ten emerging industries that should not be overlooked.

In the case of *Digital-based Industries*, linkages to other industries occur predominantly as other industries being users of information technology to enhance their existing processes and products or even create new ones. In the case of *Environmental Services*, downstream linkages also dominate.

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<sup>2</sup> In the analysis strong links between industries represent those that have exhibited and kept the highest number of links throughout the whole period under investigation. Weak links have been regarded as those that have been smaller in number but show a strong growth over the period under investigation.

Related to *Mobility Technologies* location-based smartphone applications in airports have been developed such as the application My Way Aéroports de Paris that allows the collaboration between Airport terminals and Android providers in order to assist travellers among shops, restaurants but also towards their terminals and flights (Crossovers:). Apps are also developed to encourage more carpooling. This means a cross-over of Automotive, Air Transport, Public transport and Web, Telecommunication. At the interconnection of public transport and food and beverage, customers are offered meal/drinks on public transportation, while having a tour across the city/see. With Tram Experience, clients enjoy a gourmet dinner on a tram while touring Brussels by night for two hours. Bars on boats are another example in many cities enjoying from seaside, rivers or canals.

With regard to *Biopharmaceuticals*, the trend that many pharmaceutical companies acquired pharma wholesalers and pharmacies reflects the strategy of strengthening their partnerships in order to offer an even larger range of services in the specific markets and countries.

***Whilst some of the cross-sectoral links happen explicitly between different industries or technological areas, some businesses are “born” as cross-sectoral and might need another analytical angle***

The analysis of cross-sectoral activity in the ten emerging industries showed that the nature of how different sectors and technologies influence each other differs both across industries and throughout the industrial value chain. Some of the cross-sectoral linkages are created as a result of technological convergence and the cross-fertilisation of different fields such as biotechnology, telecommunication technology, nanotech or environmental technologies. Some of the value chain reconfigurations happen explicitly between industries for instance when Dell, IBM and other ICT firms are entering the healthcare market or when Logistical Services companies enter the book retail or e-commerce business.

The impact of cross-sectoral linkages on cluster dynamics can be a result of the activity of different actors, which need different cluster strategies:

- Technological convergence or technological cross-fertilisation;
- Growth strategies of large enterprises entering new markets (eg. ICT to Health);
- Businesses born as cross-sectoral with entirely new product or service offerings and business models.

Other emerging businesses are, however, “born” as cross-sectoral, and are the result of entrepreneurship thinking in a completely new product or business model right from the start. Hence, they cannot be captured by traditional industry classifications. It is important to identify if there are such new groups of businesses within the regional clusters that can change the rules of the game.

***New cross-sectoral value chain linkages are developing among partners located geographically closer, even if there is a potential for more internationalisation***

The regional analysis revealed that most of the cross-sectoral activity is linked to metropolitan areas or capital cities, which might be less surprising since cities usually are a good source for knowledge spillovers and offer a good framework in which to develop cross-sectoral links. It should also be highlighted that the most active regions are usually to be found in the Western and Northern part of Europe. It is important to bear in mind that the analysis relies on specific indicators that cannot capture all the ongoing dynamics, but even with this limitation, it is somewhat alarming that several parts of Europe remain white in the maps in the following sections of this report, as this reflects no or low cross-sectoral activity.

The links between European regions are usually forged within relatively limited geographical areas meaning that the regions that cooperate in cross-sectoral activity are those that are closer together. Hence, there are patterns of Northern Continental Europe, UK and Ireland working together, and the same is true of France and Southern Europe and Germany and Central Europe.



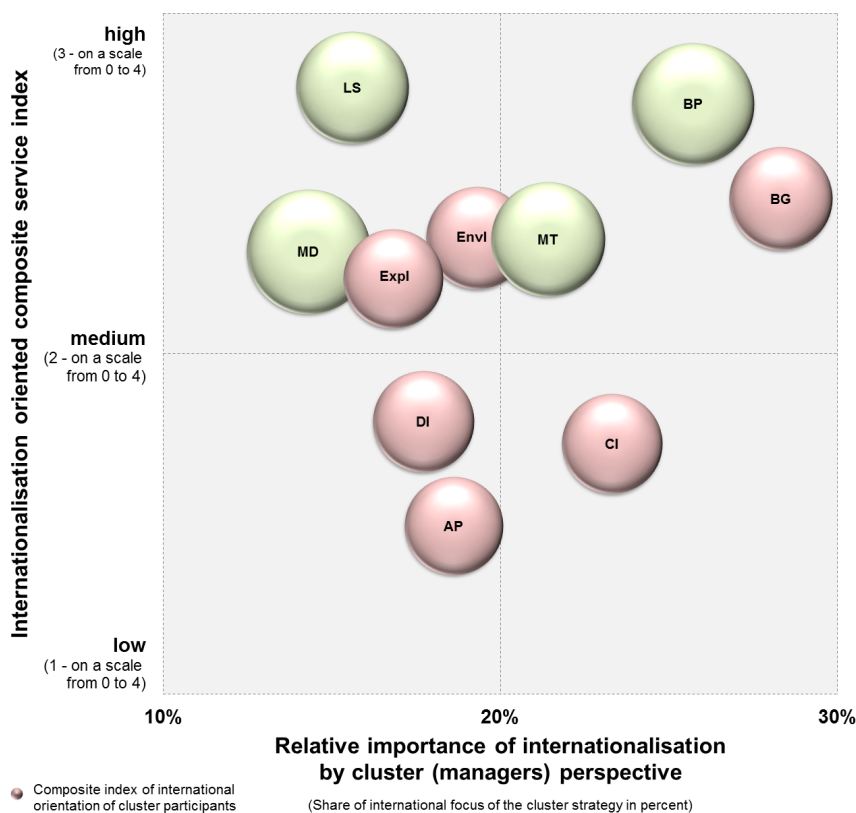
### 1.3 Internationalisation trends

Although closer location and geographical clustering helps knowledge flows and the accumulation of social capital, industries that retain a local focus might not be able to achieve their goals because they lack any connections to related sources of external knowledge or to additional markets. Geographic proximity can play a secondary role in terms of relationships not only between buyers and sellers (Markgren, 2001), but also between researchers and innovation partnerships. In addition, the emergence of an industry can occur in locations other than where the original science base existed (Bloom and Griffith 2001). Thus, today, businesses need to become, or even to be born, global.

Based on the comprehensive cluster benchmarking data from 154 cluster organisations conducted by the European Secretariat for Cluster Analysis (ESCA) and assessed for the period of July 2012 to June 2014, the following general observations have been made with regard to the internationalisation patterns in the ten emerging industries:

*There is often a mismatch between the importance of internationalisation for the specific industry and the support received from cluster management organisations*

Figure 1: Portfolio analysis of selected internationalisation aspects of European Clusters in the different Emerging Industries



Notes: LS=logistical services; BP=biopharmaceuticals; MD=medical devices; Expl=experience industries; Envi=environmental industries; DI=digital based industries; AP=advanced packaging; CI=creative industries; BG=blue growth; MT=mobility technologies; Source: VDI/VDE-IT

Cluster participants from industries like *Medical Devices or Biopharmaceuticals* seem to be more internationalised than cluster participants from *Advanced Packaging or Experience or Creative Industries*. Reasons for this might be that Medical Devices or Biopharmaceuticals are quite well established and international R&D and business cooperation are state-of-the-art, whereas Advanced Packaging is a quite young and small sector, not yet much dominated by international R&D or business cooperation. However, it seems to be quite interesting that cluster participants from *Digital-based Industries and Environmental Industries* are comparably less internationalised.



In terms of services that are offered to support internationalisation of businesses, cluster organisations in the field of *Blue Growth, Biopharmaceuticals, Environmental and Mobility Industries* offer relatively strong support to their cluster members, since the importance to act internationally is considered to be high (upper right square). In these cases, the services spectrum is often considered as a dedicated demand due to the high importance.

Fewer services are offered in the field of *Digital-based Industries and Advanced Packaging*, as the importance for internationalisation is considered to be comparably low.

There are also cases where there is a mismatch between strategic importance for internationalisation and the amount of services for internationalisation. In *Creative Industries*, although the importance for internationalisation is high, the services offered are relatively low. Inversely, cluster organisations in the field of *Logistical Services*, whose cluster members are already quite internationalised, still offer a lot of support services (like match-making, strategic partnerships, etc.), although the strategic importance of internationalisation is considered to be decreasing.

**The sources of internationalisation and trans-regional cooperation in Europe are increasingly innovation partnerships compared to traditional export of goods**

Traditionally, internationalisation by exporting has been considered as a way to increase the growth of firms. The export of goods still remains significant, but during the studies conducted by the ESCA expert pool over the past, some interesting changes could be identified. Many firms within the investigated clusters have re-directed their focus on business activities of internationalisation such as cross-border partnerships with foreign companies, foreign investments and cross-border networking. These types of international collaborations have become increasingly important as opportunities to facilitate the exchange of technology and knowledge.

In Northern Europe, international business cooperation is state-of-the art, value chains are developed across these regions. The intensity of cooperation is at least medium or even higher with other strong regions within Europe (Northwest Europe, Central Europe or Southwest Europe). Weaker cooperation exists with emerging markets (Eastern Asia, but also Eastern Europe). Africa, South America, Australia are virtually hidden. On the contrary, the internationalisation efforts of cluster participants in Southwest Europe have the peculiarity that both - in the own region as well as with other regions - no strong cooperation but only comparably weak links can be observed. Table 1 illustrates the strongest directions of business cooperation between the different parts of Europe.

**Table 1: Cluster-driven trans-regional cooperation matrix in the field of emerging industries with focus on business cooperation**

	Northern Europe	Northwest Europe	Central-Western Europe	Southwest Europe	Central-Eastern Europe	Southeast Europe
Northern Europe		o	++	+	-	-
Northwest Europe	o		o	-	-	-
Central-Western Europe	++	o		++	o	o
Southwest Europe	+	-	++		-	-
Central-Eastern Europe	-	-	o	-		-
Southeast Europe	-	-	o	-	-	

++ very strong cooperation, + strong cooperation, o medium strong, - weak cooperation



**For further information, please consult the European Cluster Observatory Website:**

<http://ec.europa.eu/growth/smes/cluster/observatory/>



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