

European Cluster Observatory

Case Study

Framework Conditions to Support Emerging Industries in the Area of Digital-based Services

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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 Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) of the European Commission 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 Ecosystem Scoreboard”** setting out strengths and weaknesses of regional and national ecosystems 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/index_en.htm.

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Key Findings at a Glance

Heterogeneous industry trends in the IT sector: ‘tale of two industries’

The vast majority of current IT market growth is based on novel information technologies especially mobility, cloud, big data and social business. In 2014, activities based on these technologies accounted for a market share of around 30 % and for nearly 100 % of observed growth. In contrast, digital services and products based on traditional business models and established technologies begin waning. This especially refers to the classical client/server model and stationary internet devices connected by Ethernet.

Digital transformation of services is a cross-sectoral trend

While the concrete applications differ from service sector to service sector, the use of new technologies leads to massive reconfigurations of value chains. This holds true for both, the IT industry and various other service sectors. Processes of intermediation and disintermediation will bring forward new actors and undermine former roles. Typically, the ongoing transformations in sectors and clusters are driven by the interplay of different innovative technologies.

Advancements in the telecom sector fuel the development of digital-based services

The telecom sector is crucial in a cloud- and mobile-dominated IT world. In the telecom world, wireless data is already the largest market segment in terms of worldwide spending and is still the fastest growing one. At the same time, price wars among the mobile data providers fuel the development of cloud and mobile-based services.

Start-ups challenge and stimulate established companies

The role of start-ups is discussed very prominently in the context of digital industries. Despite their importance for innovation and entrepreneurship, it is worth keeping in mind that still only a minority of companies engaging in digital-based services are start-ups. However, through new business models, they challenge and stimulate established companies. Cooperation between start-ups and established companies further contributes to innovation in regional clusters.

Readiness of user industries is a key factor for further growth

The actual adoption rate of new information technologies in European companies is still relatively low. This holds especially true for the smaller SMEs. As SMEs which embrace digital technologies tend to grow faster than others, this leaves a large economic potential underexploited. Often the knowledge of available services and the related added value is limited in SMEs of user industries. So far, policies especially target at the supply side of technologies.

The emergence of digital-based services requires cross-sectoral skills

Companies need to learn how to deal with huge amounts of data and how to extract value from these. They face the challenge to build the necessary capabilities and attract specialists with technical and entrepreneurial skills. As the added value of information technologies depends on the context of application cross-sectoral skills are required in the technology supplying IT sector as well as in service sectors which become user industries of new technologies. Further training will gain in importance in this respect.

Scaling up of digital services offers opportunities for early internationalisation

The more digital a service is, the less effort is necessary for scaling up or implementing the service in a new business environment. This offers a huge potential for fast growth and early international activities. Though, such a transfer of an established service still is no no-brainer as many failed examples show.

Mutual learning in clusters is vital

In the area of digital-based services, collaboration is vital for the development and spread of new digital services. Joint research projects and collaboration between start-ups and established companies give fresh impetus to the cluster and the digital transformation of business models. Start-ups gain access to potential customers, well-financed partners and business know-how while established companies profit from innovative approaches and ideas developed by the start-ups.

Access to finance is crucial

Access to venture capital and funding as well as public and private investments in research, development and innovation activities are highly important factors for the development of a digital-based service industry. This factor is absolutely crucial for small companies which have not started to generate constant revenues. European start-ups still suffer from a relatively low level of venture capital activities in Europe. So far, traditional models of financing are regarded as more important, but innovative models like crowd funding become more important.

Clear rules about data security and privacy are needed

With data being considered as the new oil of the digital economy, clear rules about data security and privacy are very important framework conditions for the digital-based service industry. However, policy faces the challenge of setting rules for an emerging and constantly changing business sector. This can lead to the absence of clear and reliable rules how to handle data and can create uncertainty about the sustainability of business models based on the analysis of data.

Usage of public open data possesses untapped economic potential

The public sector collects and possesses a huge amount of data. The commercial exploitation of this data would be a big business opportunity for digital-based service providers. Potential fields of application are diverse and include healthcare, energy or the transport sector. The discussion of how to make public open data accessible is closely connected to the question how standards of data security and privacy can be complied to.

Introduction

This case study aims at analysing the characteristics of favourable innovation and entrepreneurship ecosystems for the development of emerging industries and clusters in the area of *digital-based services*. In this report, clusters are understood as being “geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions in particular fields that compete but also cooperate” (Porter 1998). A clear distinction is made between ‘clusters’ as the phenomenon and ‘cluster initiatives’ or ‘cluster organisations’ that represent deliberate, often politically driven, endeavours to support national and regional strongholds.

It is well documented that innovation and entrepreneurship thrives in particular contexts and under particular framework conditions. They are nurtured by interactions between actors with different resources and capabilities such as firms, users in downstream sectors, consumers, research organisations, investors, business support providers, public institutions, etc. These framework conditions can be very specific for different types of emerging industries.

Emerging industries are considered as the establishment of an entirely new industrial value chain, or the radical reconfiguration of an existing one, driven by a disruptive idea (or convergence of ideas), leading to turning these ideas/opportunities into new products/services with higher added value (EFCEI 2013). Emerging industries are often grown out of existing industries and can be both, newly formed or re-formed industries that have been created by technological innovations, shifts in relative cost relationships, emergence of new consumer needs, or other economic and sociological changes that elevate a new product or service to the level of a potentially viable business opportunity (Porter 1980).

In this context, the key research questions of this case study with a focus on the cross-cutting theme of *digital-based services* are the following:

- What are favourable framework conditions that nurture innovation and entrepreneurship?
- What are the bottlenecks in unsuccessful regional contexts that need to be addressed?
- How can cluster initiatives and cluster policy support the creation of a favourable business ecosystem and how it can stimulate the necessary cross-sectoral linkages?

In this regard, the term “digital-based services” describes no service sector with clearly defined boundaries, but addresses the digital transformation of service industries. It encompasses IT services and ongoing changes within the IT sector on the one hand. On the other hand, digital-based services emerge in a variety of other service sectors. The application of novel digital technologies enables a digital transformation and upgrade of existing services as well as the development of innovative service models which challenge established ways of doing business. Examples for such transformations are illustrated in section 1.3. Digitalisation of manufacturing is not the focus of this report. Nevertheless, various digital-based services influence developments in manufacturing through linkages along the value chain as well.

This study is intended to provide policy-makers insights into the strengths and weaknesses of regional business ecosystems and how to improve overall regional capacity. Understanding the crucial elements of framework conditions conducive to the development of clusters in emerging industries will also support better implementation of regional smart specialisation strategies.

The study was designed using the following approach: first, extensive desk research was conducted which comprised technological and business trends, cross-sectoral linkages and relevant framework conditions in the area of digital-based services. Based on this research, a survey was launched among cluster management organisations across the 28 EU Member States and the EU Associated Coun-

tries. The cluster organisation survey was open from 2nd August – 10th September 2015. In total, 46 valid survey responses were received (including partial answers). The survey questionnaire was designed following the conceptual model of the Regional Ecosystem Scoreboard and was based on the initial desk research on framework conditions. In addition, three in-depth interviews were conducted with selected cluster representatives to validate the results and get further insights into the sectoral logics of digital-based services (see Annex 2 for the list of interviewees).

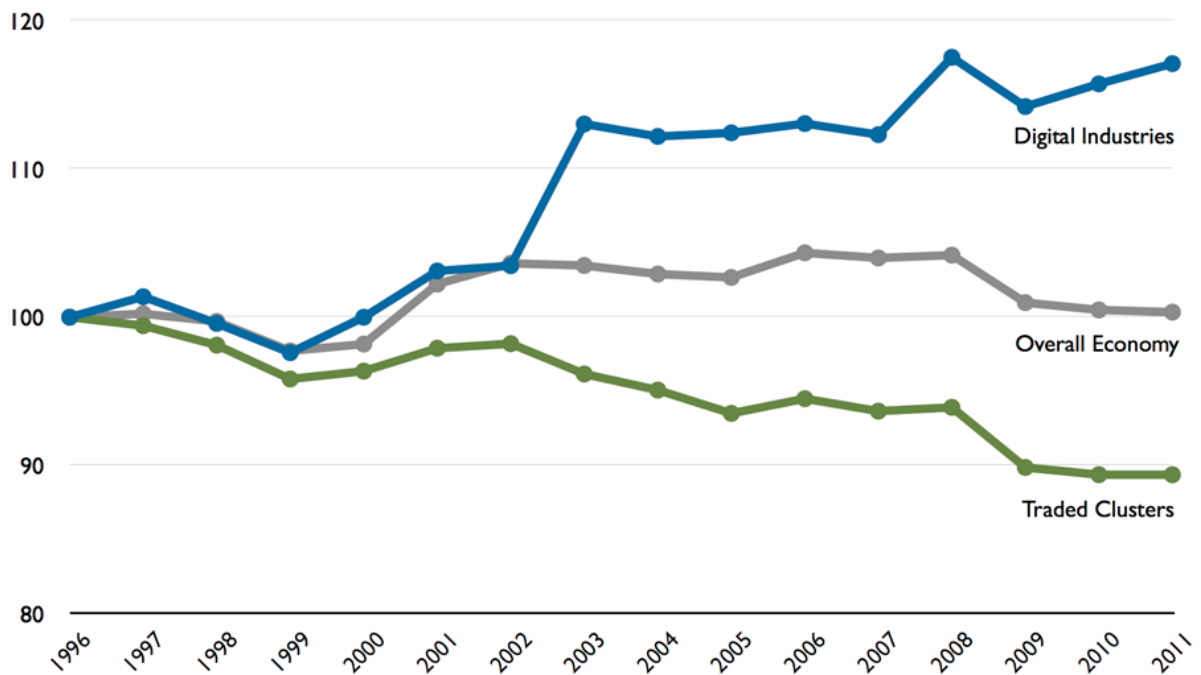
1. Digital-based Services as Emerging Cross-sectoral Collaboration Space

This first chapter outlines the subject of the study and provides a brief overview about the evolving ecosystem of digital-based services. Further, it gives insight into how the boundaries of this ecosystem are currently being shaped.

1.1 Emergence of Digital-based Services

Digital industries in general have grown very fast in recent years. Buzzwords like Smart Factory, Smart City or Internet of Things sum up the transformational influence the application of digital technologies in business and social life already has or is expected to gain. According to the European Cluster Panorama in 2011, the industry employed around 8.7 million people in Europe. Mostly, these were highly skilled workers. This is also reflected in a high productivity and wages which are far above the European average.

Figure 1: Evolution of Digital Industries (Employment in 1996 =100)



Source: Ketels/Protsiv, European Cluster Panorama 2014

Within digital industries, a shift from hardware to software can be observed, and within software from product to service. These observations reflect heterogeneous industry trends telling a ‘tale of two industries’ (ICD 2014).

- Digital services and products based on traditional business models and established technologies begin waning. This especially refers to the classical client/server model and stationary internet devices connected by Ethernet. Being initially designed for enterprises only, this model was 'downsized' for consumers and brought personal computers into most people's lives. While the market share of this traditional segment is still estimated at around 70%, its total volume is stagnating.
- In contrast, the majority of the current IT market growth is based on the four novel technologies: mobility, cloud, big data and social business. In 2014, activities based on these technologies accounted for a market share of around 30% and for nearly 100% of observed growth. Currently, we observe a stage which is defined by a sharp increase in innovation and value creation based on the four technologies. In the course of a continuous transformation of the economy, new technologies are beginning to extend this innovation platform (e. g. Internet of Things, Cognitive Systems).

Particularly, the technologies offer a platform for new innovative businesses and business models. Digitalisation in this sense does not only refer to an increased productivity in established business models, but opens opportunities for new ones. As a consequence, massive reconfigurations of value chains are under way. This holds true for both, the IT industry and other service sectors. Processes of intermediation and disintermediation will bring forward new actors and undermine former roles. The emergence of new digital-based services as well as the digital transformation of existing services will pose challenges and enable opportunities.

While concrete applications differ from sector to sector, the new technologies represent a common basis for the emergence of new digital-based services. The telecom sector is crucial in such a cloud- and mobile-dominated IT world. Wireless data is already the largest market segment in the telecom world in terms of worldwide spending and is still the fastest growing one. At the same time, price wars among the mobile data providers fuel the development of cloud and mobile based services.

1.2 New Technologies as Drivers of Service Digitalisation

Before illustrating how the transformational force of digitalisation changes established value chains in different service sectors, the main underlying technologies cloud, mobile, big data, and social business are briefly discussed as well as their stage of adoption and potential benefits.

Cloud

Cloud solutions are services delivered and consumed in real time of a network, in most cases the Internet. There are three main service categories:

- Software as a service (SaaS): applications and infrastructure software delivered as a service over a public cloud;
- Platform as a service (PaaS): functionality of application development and deployment;
- Infrastructure as a service (IaaS): delivering servers and/or storage in a cloud model.

Important key attributes of cloud services are an elastic resource scaling, ubiquitous network access, use of shared standard services and standard user interface technologies. A distinction can be made between public and private cloud services. Public cloud services are shared among unrelated enterprises and consumers. They are designed for a market. Private cloud services, however, are designed for a single enterprise. SaaS is currently the main driver of the public cloud market.

Various advantages act as drivers for the adoption of cloud services. They allow cost reductions and time to deploy novel technologies. It is possible to easily and flexibly scale the use of cloud services according to changing needs. They allow mobility while at the same time ensuring standardisation across locations. Finally, by overcoming IT skills issues, cloud services help companies to focus on their core capabilities. Thus, cloud services should not be regarded as a standalone phenomenon in the IT market. Furthermore, they have the potential to be a core ingredient of a larger transformation of many industries.

However, despite these potential benefits, the adoption of cloud services among European SME is still only moderate. Concerns about security and data protection have restricted the use of clouds the most so far (Digital Entrepreneurship Monitor 2013a).

Mobility

Mobility involves people, processes and technology. It refers to the phenomenon of an increasing usage of mobile solutions in business environments and by private customers. The wide spread of mobile connected devices - especially smartphones and tablets, but also increasingly wearables – builds the basis for a variety of mobile services. The download of apps grew by 61% in 2014. It is expected that in 2015 more than 3.5 million mobile applications will be available (IDC 2014).

Mobile services offer the obvious benefit of anytime and anywhere availability. Beyond, the quality of service can often be improved and a higher degree of personalisation offered (e.g. mobile commerce or mobile payment). So far the adoption of custom mobile applications by enterprises is quite low. Future growth is expected. Security concerns, challenges of interoperability and a lack of familiarity with available offerings are among the most important barriers for a wider adoption (Digital Entrepreneurship Monitor 2013b).

Big Data

Big Data refers to a sharp increase in the amount of data which can be collected, stored, managed and analysed. To handle the enormous amount of data it encompasses novel hardware and software solutions. Typically, Big Data is characterised by the “four Vs”:

- Volume: massive volume of data;
- Variety: breadth of data sources and formats;
- Velocity: speed at which information arrives, is analysed and delivered;
- Value: referring to both the cost of technology and the value derived from its use.

Thus, with Big Data technologies, it is possible to extract value from very large volumes of heterogeneous data very quickly. Rich media analytics become an important segment (video, audio, and image analytics). Also increasingly connected customers and consumers contribute to a data explosion. This enables companies to change the way they make decisions.

Big Data offers various business opportunities on the supply side (e.g. market analytics, remote monitoring, support for enhanced public services, etc.) as well as on the demand side (e.g. predictive modeling, supply management, dynamic pricing, etc.) in various sectors. However, there still exist serious barriers which reduce the speed of adoption. Issues of data security are again the strongest concern. Further, a lack of skills and resources hinders the widespread use of big data technologies so far (Digital Entrepreneurship Monitor 2013c).

Social Business

Social Business refers to making social connections and informal communication channels a substantial part of the companies' business. It adds value by allowing companies to shift from the traditional make/sell-model to a flexible sense/respond way. New actors are integrated into the company's value chain. The company especially gets closer to an increasingly empowered customer. Thus, social business involves new kinds of interaction and gathering of information to help companies making better business decision. New trends can be identified and responded to in a timely manner.

While so far the main reason for companies to use social business tools is to increase awareness about the organisation and its products, it is expected that customer communities will become an important component of companies' strategies in the near future. Thus, social business will change businesses. On the other hand, an increasing demand of social business tools offers various business opportunities on the supply side, for instance creating and leveraging communities of interest, social networked e-commerce or social marketing services (Digital Entrepreneurship Monitor 2013d).

1.3 Cross-sectoral Trends of Digitalisation in Service Industries

Due to the limited scope of this study and transformations which more or less take place in most kind of service sectors, it is not possible to give a complete overview about the emerging digital-based services ecosystem which, in addition to that, is constantly changing and moving its borders. Instead, examples from different service sectors are presented which illustrate how the availability and application of new digital technologies are leading to significant transformations within the sectors.

- **Know your audience: Big Data and Mobile transforming online advertising**

Online advertising is already an established channel of reaching potential customers. So far, this market has predominately followed traditional ways of selling packages of ads with the buyer having only limited knowledge about the actual audience of the ads. In contrast, real time bidding is an upcoming method to sell and buy digital-display advertising via automated auctions by using real time big data. This data refers to knowledge about the audience like age, gender or personal interests and links this information with the preferred audiences of the potential ad buyers. This is realized through a real time auction for the ad. Central to efficient real time bidding is the availability of knowledge about the audience. Hence, gathering cookie data is intrinsically important. As the potential audience is increasingly online via smartphones, tablets or other mobile devices like wearables, the location data is gaining in importance and adds additional value to the advert. Currently, the main market of real-time bidding is online advertising, but in perspective this mode has the potential to gain in importance also in other segments like television advertising as technical devices become more and more connected in the Internet of Things.

Further, mobile devices represent a new channel for advertising services. As in mobile advertising less space is available on the screen, traditional methods of advertising do not work well on most mobile devices. Native advertising addresses this issue and is one of the key trends in the field of advertising. Basically, this means that advertisements are seamlessly integrated into the native environment chosen by the consumers. Native advertising is especially common for social platforms like Facebook.

- **Digital technologies driving the share economy**

Sharing is everything, but new in the world of business. The first car sharing initiatives in Europe already started in the 70s and 80s of the 20th century. However, recently the internet and new digital technologies have provided the basis for the emergence of new sharing platforms. These platforms are special social businesses and address different kinds of products or services to be shared. Most important enablers are cloud platforms, mobile availability and real time big data analyses. Cloud computing technology lowers entry barriers by offering access to a flexible and scalable IT infrastructure. Requirements for the IT platform increase as the size of the platform grows. By using cloud technology, an operator of a sharing platform does not need to invest in IT infrastructure which is also possible to hire. The fierce competition among cloud providers leads to low prices of cloud-based IT infrastructure which further contributes to strengthen the share economy. The use of cloud technology also lowers the level of IT expertise which an operator needs to run its sharing platform. He can purchase easy access to a complex product.

Mobile devices combined with GPS positioning are additional drivers of the share economy: Spotting a nearby car sharing vehicle or finding the urgently needed toolkit within the neighbourhood. Smartphones, mobile internet and apps expand the possibilities of business models in the share economy. This, of course, depends on the extensive provision of mobile internet and Wi-Fi.

In the future, also big data analytics will become increasingly important in the share economy. For instance, in the case of car sharing, it might be beneficial to know the current traffic flow in the city and predict the demand for car sharing vehicles. Big Data can also help to better understand the demand side, and thus predictive analyses are expected to be the next step in the share economy.

- **Revamp supply chains: anticipatory logistics and automated warehouses**

Gathering and analysing data has always been a hot topic in logistical services. Advancements in information technologies enable logistical service companies to find new ways and reach a new level of intensity of adding value through making use of this data. Thus, logistics are a service sector which is already a tapped area of application for Big Data. Big Data is more and more used to increase efficiency in logistical processes. The growing ability to integrate data from various data sources lead to more integrated supply chains. Anticipatory logistics, forecasting the demand more precisely, is one important field. Big Data supports companies to better assess which goods where to deliver before they get the order. Higher efficiency is also addressed by the provision of real-time services. Gathering and processing data in real-time increases the capability of firms to flexibly adapt their services to changing customer demands and circumstances.

Real-time services and real-time routing is enhanced by new technologies which lead to autonomous logistics. This refers to transport technologies like unmanned aerial or self-driving vehicles. Technologies like radar, GPS or high-tech sensors enable an autonomous behaviour of the vehicle. It is expected that autonomous logistics will contribute to the development of new types of warehouses which are transformed into automated environments. Further, autonomous logistics have the potential to enhance the efficiency of existing logistical infrastructure or provide new logistical solutions for remote areas.

■ **Let me entertain you everywhere: Mobile video and music streaming**

As a consequence of digitalisation, entertainment industries are changing. Digital music distribution and video on demand services are fast growing markets. Digitalisation combined with the increasing distribution of stationary and mobile devices provide a permanent availability and access to digital offers.

The online video market is already huge. In 2014, YouTube revealed that half of all its video traffic originates from smartphones, tablets or other mobile devices which reflects that handheld devices are a fast growing category of entertainment displays. For marketers this means that using mobile videos is crucial. Social media has created new opportunities for mobile movie consumption. Already in 2011, Warner Bros. started digitally renting movies on Facebook for the first time. Studios now regard such platforms as promising destinations for video consumption. This further diversification of distribution channels is not only a challenge for the traditional television broadcasting industry and movie theatres, but also for pay on demand video services like Netflix.

Digital download of music is already established as a key revenue stream which accounts for the majority of digital revenues in the music industry. However, streaming services are getting an important part with growing shares of an increasingly diverse mix of music industry revenue streams. Globally, the industry derives 27% of its digital revenues from subscription and ad-supported streaming services, up from 14% in 2011 (IFPI 2014). In 2014, one of the leading global publishers, Kobald, announced that for the first time in Europe, streaming revenues from Spotify overtook those from iTunes. The overall share of publishing income from streaming activities accounted for around 10%. It is believed that the subscription model is leading to more payment for music by consumers, also shifting away from pirate services.

Beyond these examples digitalisation takes also place in a variety of other service sectors. For instance, smart grid is a crucial topic in the energy sector, established financial service providers are challenged by emerging fintech firms and new formats of e-learning gain in importance in the education sector. Another vibrant topic with regard to digital-based services is e-health. However, e-health services are not considered within the scope of this report as they are discussed in a separate case study on emerging industries within the healthcare sector.

2. Framework Conditions Supporting the Emergence of Digital-based Services

The digital transformation differs from sector to sector with regard to maturity and dynamics. However, a common characteristic is that transformations are not only based on a single new technology, but result from the interplay of different technologies. These get integrated in new and already existing business models. As transformations in different sectors are based on the same or similar technologies, the challenges are comparable. Sector specific characteristics still have to be considered, of course. So far, these challenges and framework conditions have especially been considered on a national or European level. Certain framework conditions can be critical for the evolution of regional innovation and entrepreneurial ecosystems, and they can either foster or hinder the emergence or transformation of digital-based services. This study shifts the focus to the cluster level and addresses the question as to how cluster initiatives and cluster policy can contribute to a favourable ecosystem for the cross- sectoral emerging industry of digital-based services.

The Regional Ecosystem Scoreboard – an initiative of the European Commission under the European Cluster Observatory – identified five dimensions of framework conditions that are critical for regional innovation and entrepreneurship. These are the quality of available knowledge basis and skills, access to finance, collaboration and internationalisation, entrepreneurial conditions, and demand conditions.

Following these five dimensions (complemented with relevant aspects of the regulatory framework), the online survey included questions to test which conditions are assessed as more prominent than others. The results of this survey are summarised in Section 2.1 and 2.2. The results of the online survey are interpreted against the backdrop of additional information which was gathered through the desk research and the interviews.

2.1 Characteristics of Participating Cluster Organisations

Digital-based services as cross-sectional business area

The sectors which are the main focus of the cluster organisations participating in the survey reflect the cross-sectional character of digital-based services (see Figure 2). 46% of the respondents regard information technologies as a main focus of their cluster. This in turn means that more than half of the respondents see the focus of their cluster outside the traditional IT sector.

Many of the clusters focus on different segments of creative industries namely “marketing, design and publishing” (29%), “video production and distribution” (22%), “music and sound recording” (10%), “performing arts” (10%) and “printing services” (2%).

Other important sectors are education, logistical services, communication and e-commerce. Energy, environmental services, financial services, automotive and tourism complete the list. The high share of clusters focussing on business services (44%) is quite surprising if we consider business services in a classical way as management consulting, accounting and similar services. However, it is likely that the category was misunderstood by several participants of the survey.

In total, the results of this question support the understanding of digital-based services as representing a broad variety of activities which emerge in different service sectors. Typically, the cluster organisations are focussing on several industries. Only two cluster organisations indicated that they were solely focussing on the information technology sector. This reflects the importance of the context of application of digital technologies and services.

Figure 2: Industry focus of responding cluster organisations as % of total number of respondents

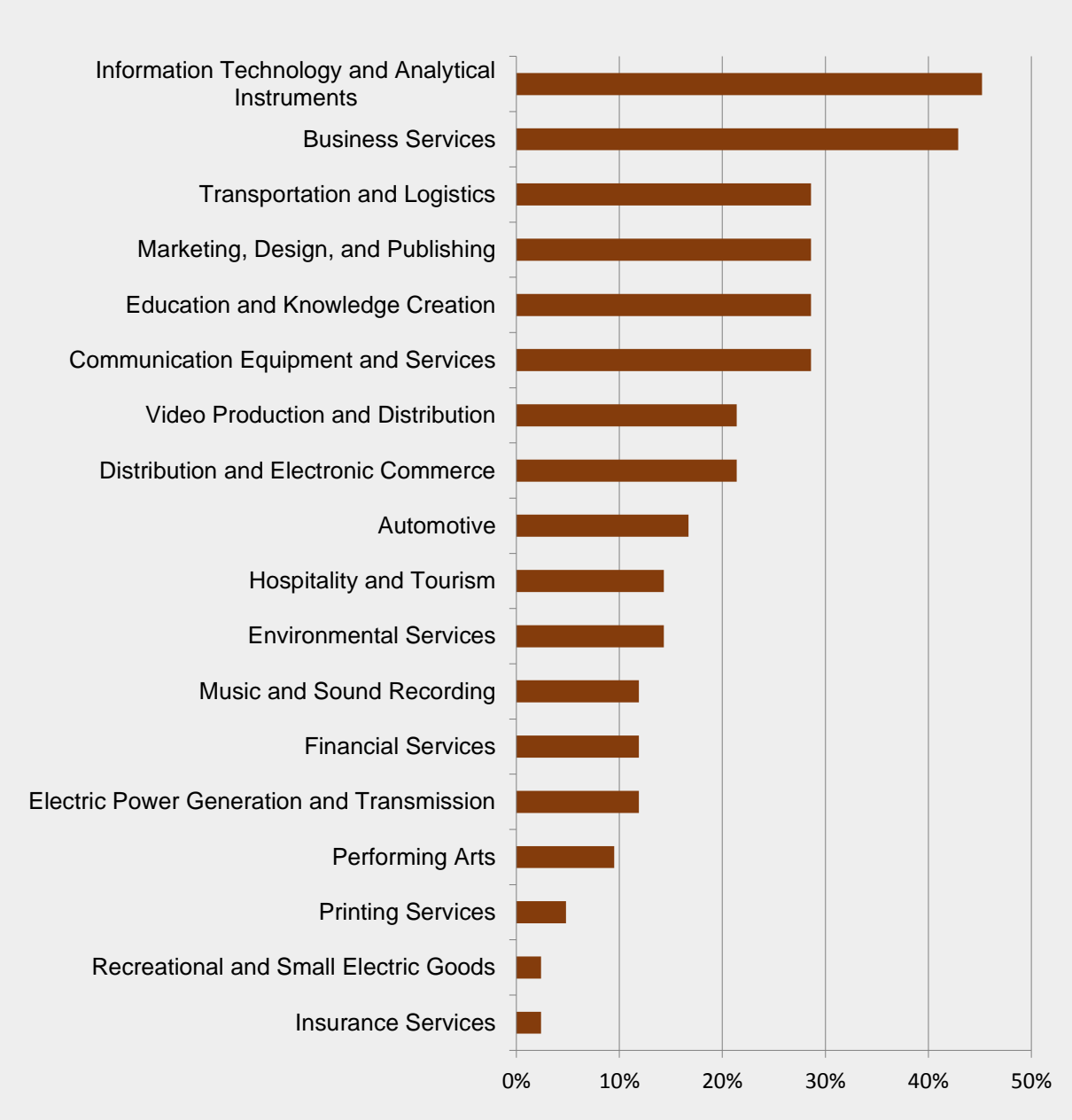
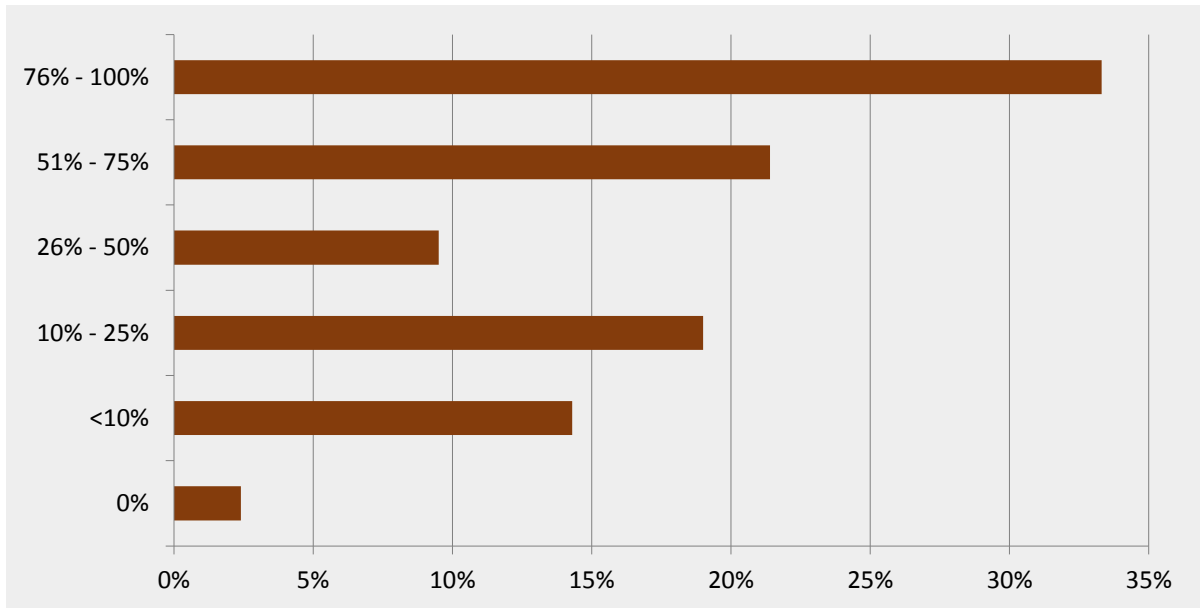
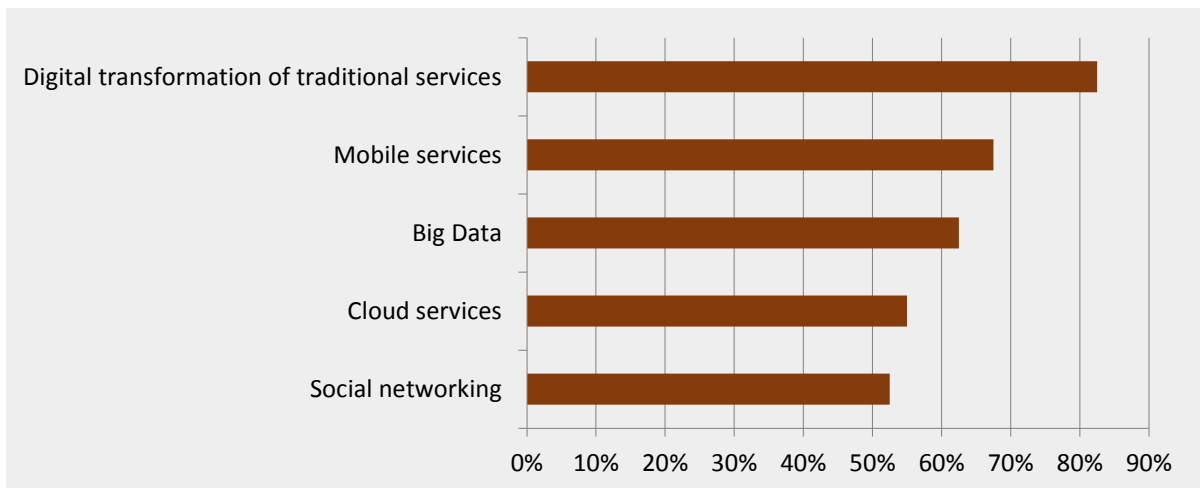


Figure 3: Percentage of cluster members engaged in digital-based services



Although only 46% of the clusters have a main focus on information technology, 64% of the cluster managers responded that at least 26% of their cluster members were engaged in digital-based services (Figure 3). Additional 20% stated that more than 10% of their members were engaged. This indicates that also beyond the participating IT clusters, the digitalisation of services is not a niche topic, but an important area of business activity. On the other hand, this reveals that most companies in non-IT clusters are still not engaged in digital-based services, illustrating a huge potential and challenge. Especially established SMEs struggle to digitally transform their processes and services.

Figure 4: Areas of digital-based services that responding cluster organisations are active in



Within the clusters, the digital transformation of traditional services is the main area of business activities. More than 80% of the responding clusters are active in this area. Usually, several of the enquired areas of digitalisation are important topics in the clusters with a special emphasis on mobile technologies. This supports the assumption that transformations in sectors and clusters are driven by the interplay of different innovative technologies.

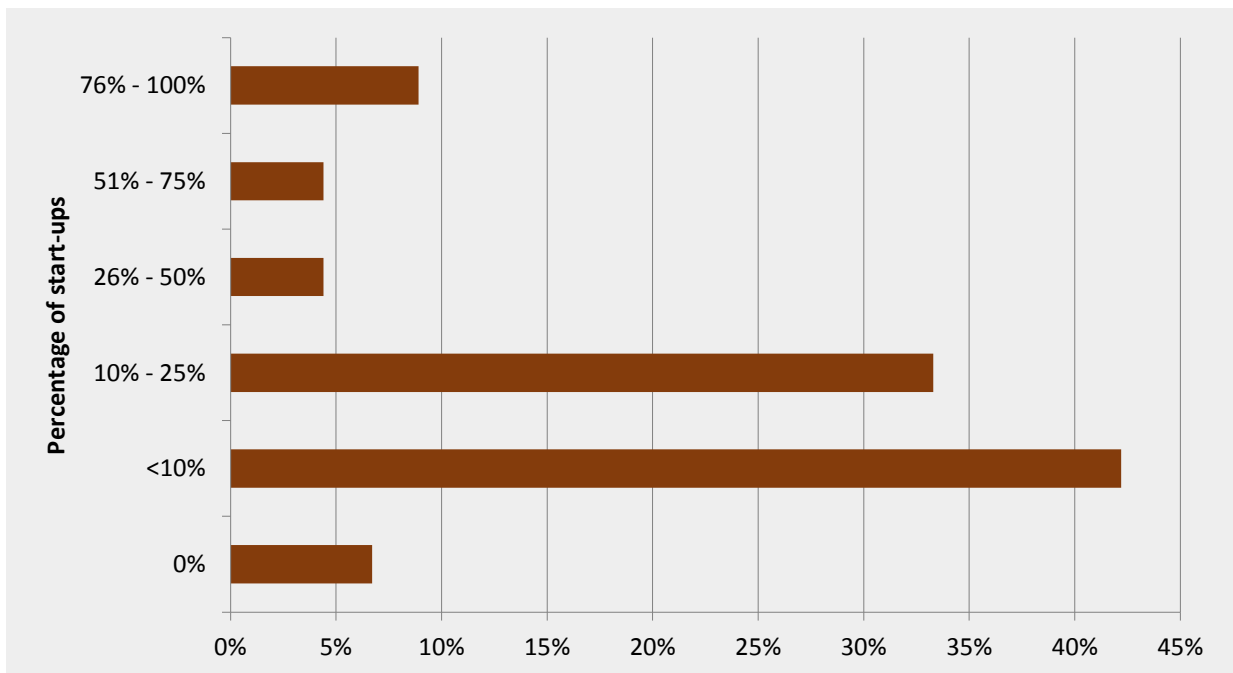
As important future topics and drivers are especially mentioned the Internet of Things (IoT) and Smart Cities by the participating clusters. Again, both topics are rather cross-sectional. IoT relates to highly connected technical devices, equipped with sensors, which communicate with each other and assist their users inconspicuously. The huge amount of data which is produced and gathered this way offers bright opportunities for digital-based service providers. Correspondingly, cities try to get smarter by implementing new digital technologies and provide public services more efficiently. As this concerns most aspects of everyday life, Smart City is a real cross-sectional topic offering opportunities for various types of digital-based services.

Start-ups as part of the digital economy

The role of start-ups is discussed very prominently in the context of digital industries. However, it is worth keeping in mind that despite their importance for innovation and growth, only a minority of companies engaging in digital-based services indeed are start-ups. In more than half of the clusters less than 10% are start-ups. In 30% of the clusters, start-ups account for 10% to 25% of all cluster members which are active in digital-based services. In 18% of the clusters, the share is even higher. Thus, with regard to framework conditions, start-ups are an important target group, but by far not the only one.

As elaborated further in the following sections within the right framework conditions, start-ups may contribute significantly to innovation in clusters even beyond the scope of their own firm boundaries.

Figure 5: Percentage of the cluster members active in digital-based services that are start-ups



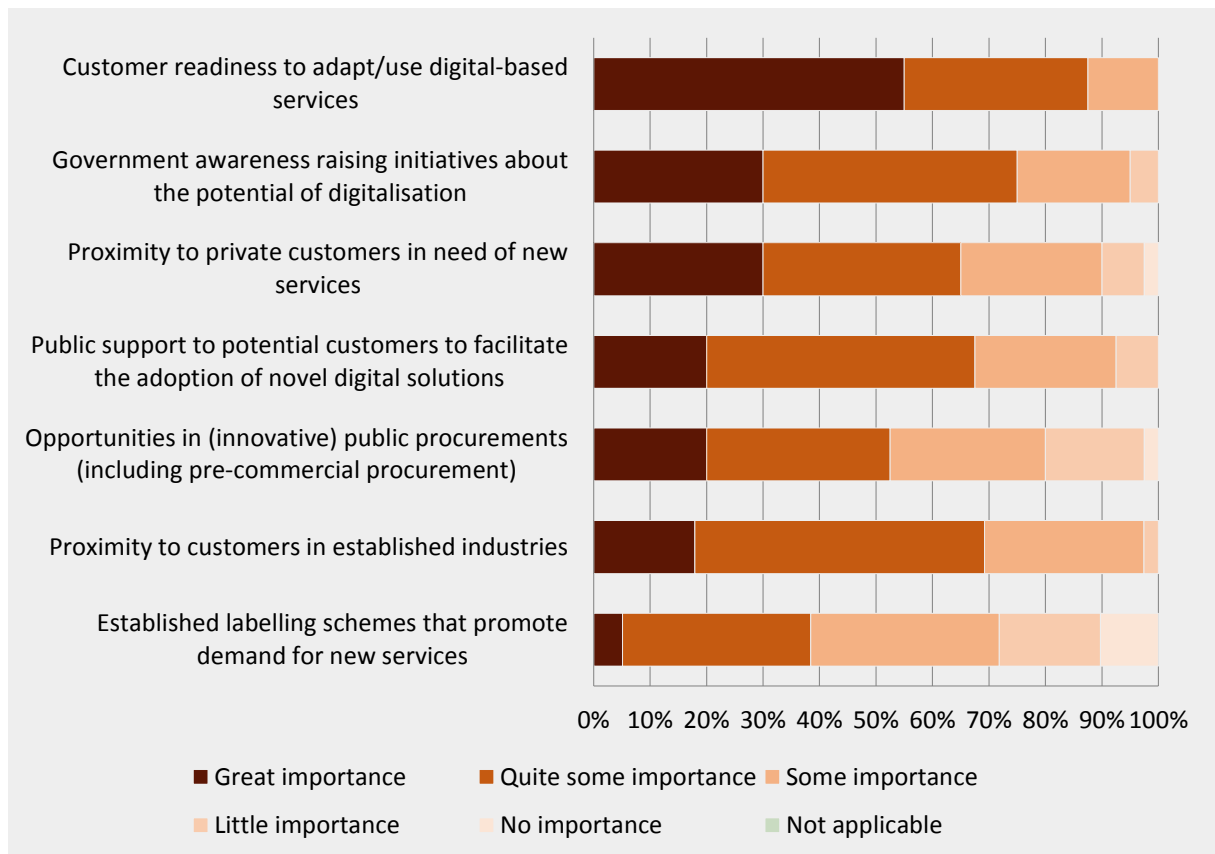
2.2 Framework Conditions as Perceived by Cluster Organisations

This section summarises those framework conditions that have been awarded the greatest weight by the survey respondents. Although all categories of framework conditions are usually important, there are some that can be singled out as more relevant. The results of the online survey are interpreted and explained by using in-depth information which was gathered through desk research and the interviews.

Market transformation and demand conditions

The analysed dimension of framework conditions addresses the transformation of the market of digital-based services and readiness of potential customers to adopt novel digital solutions and integrate them into their processes and business models.

Figure 6: Factors fostering digital-based services related to demand conditions



This **customer readiness** is regarded as the most crucial element of this dimension of framework conditions. More than half of the respondents mark this condition as of “great importance” and a further third as quite important. This correlates to the finding of desk research that although the digitalisation of the economy is considered as one of the most important trends, especially in the political sphere, the actual adoption rate of new information technologies in Europe is relatively low. This holds especially true for the smaller SMEs (Digital Entrepreneurship Monitor 2014). As SMEs which embrace digital technologies tend to grow faster, this leaves a large economic potential still underexploited (Strategic Policy Forum on Digital Entrepreneurship 2014). One reason is that the benefits of new digital services are not always obvious and known to the potential customers - especially if already

functioning structures already exist. This lack of information and transparency offers a leverage point for cluster initiatives to support their cluster members. This holds true for both: cluster initiatives focusing on supply and cluster initiatives focussing on user industries.

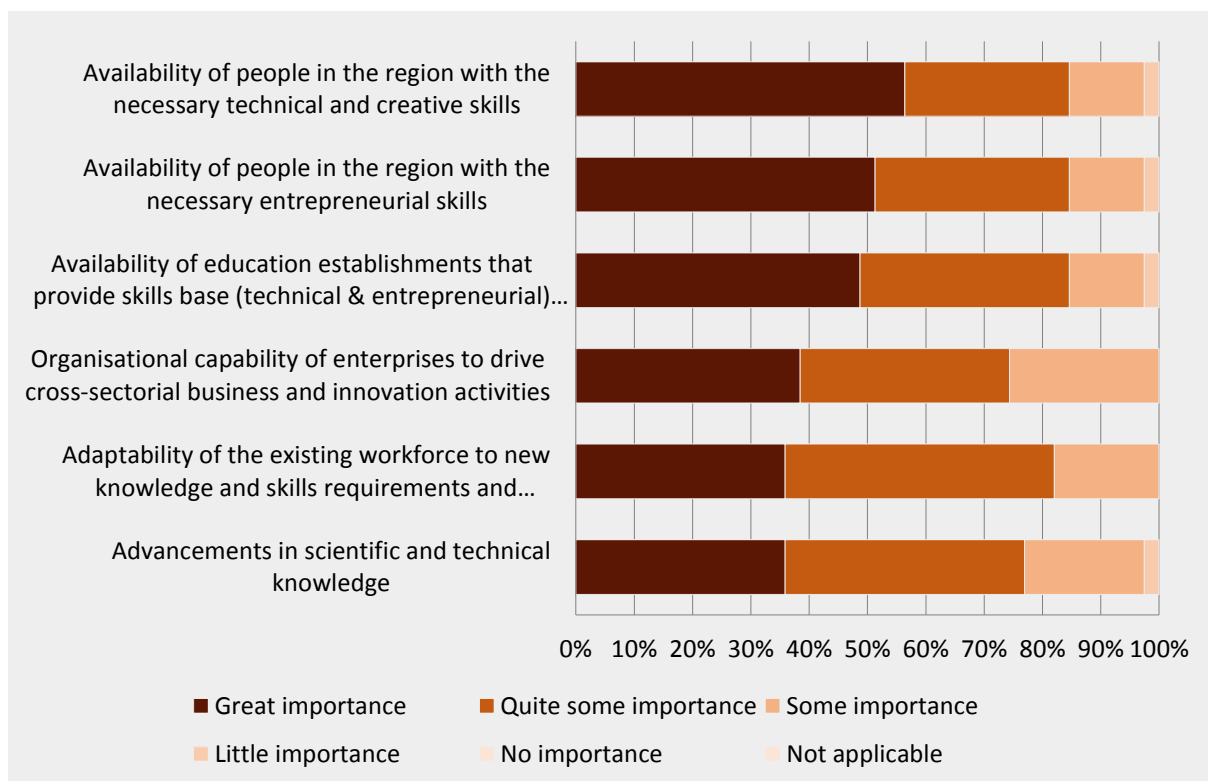
The importance of the readiness of the demand side is especially interesting against the backdrop that so far, the majority of policy initiatives target the supply side (Digital Entrepreneurship Monitor 2014). Accordingly, 75% of the respondents assess government initiatives to raise **awareness** about the potentials of digital-based services as important. In addition, 68% mark the existence of **public support to potential customers** for the adoption of novel digital solutions as important. Policy support of this type also takes place, but mostly only on a moderate level and with limited success as the low adoption rates indicate.

The **proximity to customers** in traditional industries and to private customers is also assessed as quite important by the responding cluster managers. Digital services like software work in a specific application context. To precisely know the problem and the added value of the service is crucial. In particular, for larger companies, it is important to understand the big shifts in their customer industries and to develop solutions for emerging problems at an early stage. Proximity to customers also facilitates to bridge the competence gap with regard to digital technologies which can hinder communication and efficient problem solving.

Knowledge and skills

Generally, the respondents of the online survey very much emphasise the importance of the availability of knowledge, skills and the respective educational establishment in the region.

Figure 7: Factors fostering digital-based services related to knowledge and skills



The availability of qualified workers with **technical skills** is assessed as the most important factor. This need for technical skills is quite obvious with regard to IT-based services. However, this does not necessarily mean that there is a general lack of people with the necessary technical skills in the region. But it indicates that regions with a large and technically skilled workforce have better preconditions to digitally transform their service economy successfully than regions which lack these competences.

The availability of **entrepreneurial skills** is assessed as nearly equally important as the availability of technical skills. This reflects that establishing innovative services and conquering new markets is not only about developing a working technical solution. Particularly in emerging industries, it is crucial to understand the new evolving markets which the developed digital-based service is aiming at. In addition to the need that a potential customer has to be ready to adopt an innovative digital-based service (see section 2.2.1), it is equally important that providers of digital-based services know their market and are capable of communicating the added value of their service within this market. With the availability of skills being the most important factors of this dimension, it is not surprising that **educational establishments** which provide the respective skills base are regarded as nearly equally important.

Further, with regard to skills, it is necessary to differentiate between providers of digital-based technologies and users which integrate these technologies into their services. While providers heavily rely on profound IT skills, users of specific services and technologies usually need only selective skills. In a company which uses a specific technology, an IT specialist is not necessarily needed to successfully implement and profit from digital innovation. Rather, a specialist from the respective sector with supplement IT competences often is the better choice.

Hence, advanced vocational training is an important topic with regard to the development of digital-based services as an industry. IT specialists need more competences with regard to entrepreneurial and management skills, while users need to be qualified for the application of innovative digital-based services. As a consequence, the digitalisation of the economy advances training of employees and gains in importance in more and more professions.

Knowledge transfer

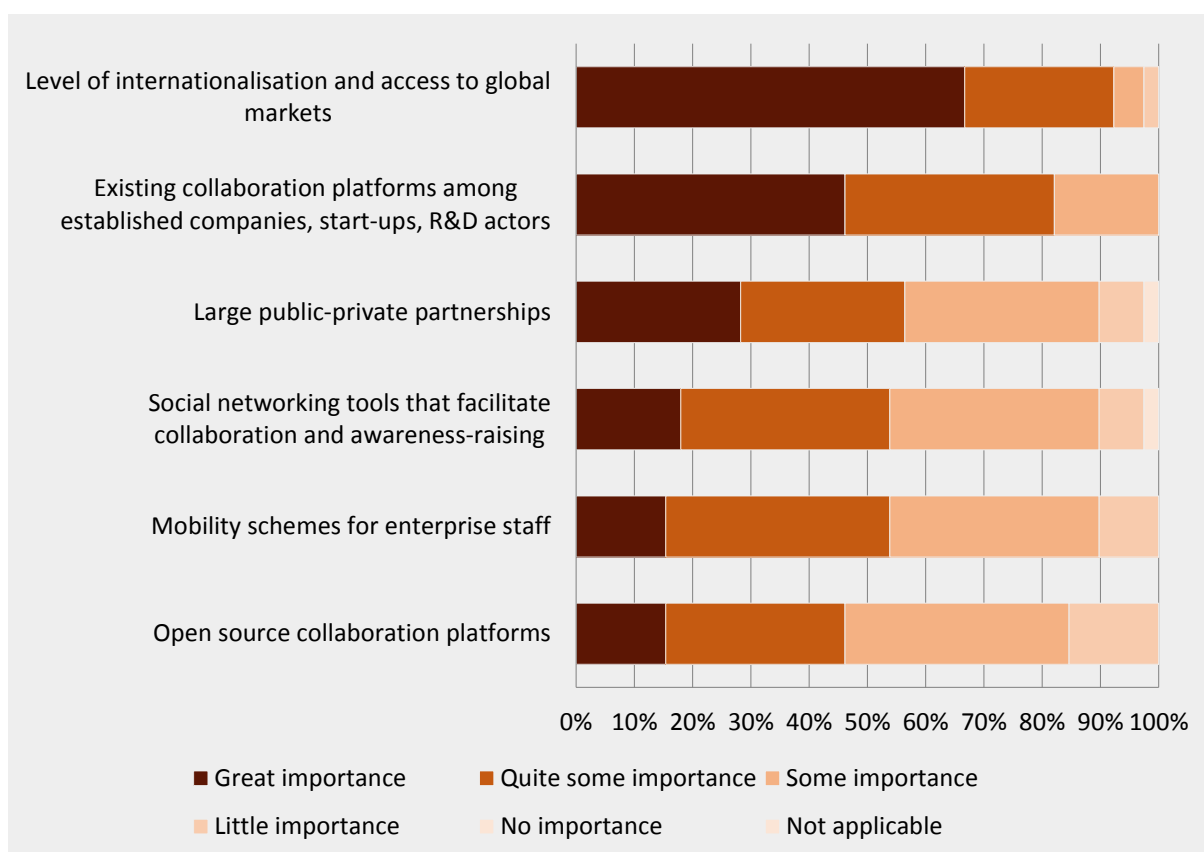
Within the dimension of knowledge transfers, the factors show a wide range regarding the assessment of their importance. The factor 'level of **internationalisation** and access to global markets' stands out. Two third of the responding cluster organisations mark this factor as of 'great importance'. Traditionally, services tend to focus on regional or national markets. Their spatial transfer is very sensitive to cultural and administrative distance. As a consequence, beyond the activities of few global service providers, most service sectors are far less internationalised than most manufacturing sectors. However, the high importance of the level of internationalisation reflects a defining characteristic of digital-based services and products. The more digital a service is, the less effort is necessary for scaling up or implementing the service in a new business environment. This offers a huge potential for fast growth and early international activities. Though, such a successful transfer of an established service should not be taken for granted as many failed examples show.

Collaboration platforms bringing together established companies, start-ups and research institutions are assessed as the second important knowledge transfer factor. Within the emerging industry of digital-based services, such collaboration is vital for the development and spread of new digital services. Joint projects of large companies and research institutions give fresh impetus to the cluster and the transformation of business models in established companies. Also both sides profit from the cooperation of established companies and start-ups. Start-ups gain access to potential customers, well-financed partners and sometimes even business know-how, while established companies profit from

innovative approaches and ideas developed by the start-ups. The more intensively such exchange takes place, the higher the potential for the development of digital-based services within a region.

It is worth noting that only medium importance is assigned to digital-based networking tools ('social networking tools' & 'open source platforms'). Even within very IT faced sectors traditional ways of co-operating and communicating seem to prevail.

Figure 8: Factors fostering digital-based services related to knowledge transfer



Access to finance

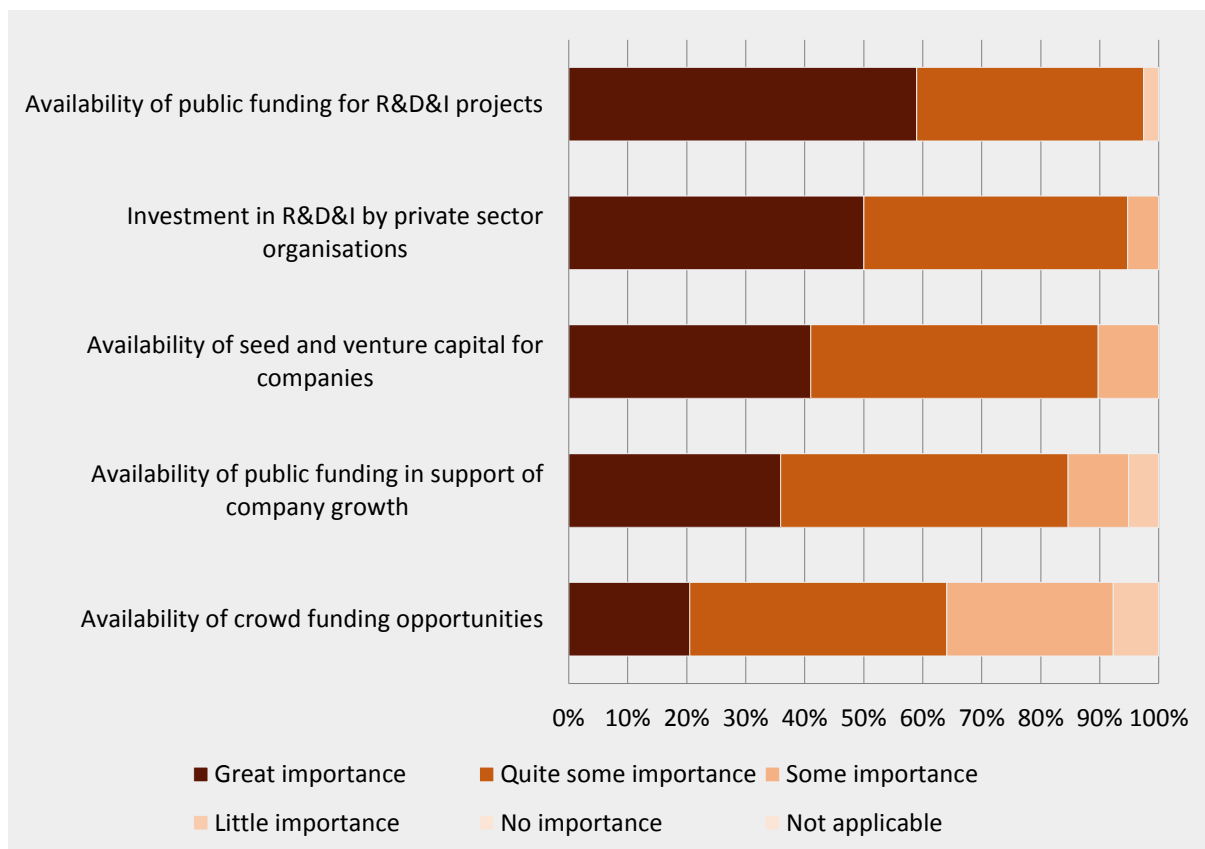
Access to venture capital and funding as well as public and private investments in research, development and innovation activities are all rated as highly important factors for the development of the digital-based service industry. This factor is absolutely crucial for small companies which have not started to generate constant revenues.

Regarding **seed and venture** capital in Europe, the level of investments is still quite low compared to the USA. However, the access to venture capital and funding is not only a question of availability of funding programmes and the existence of investors. Start-ups also have to be ready to receive funding and capital. A lot of start-ups fail because they are not properly prepared for presenting their service to an investor or funding agency. Coaching can enable them to give a clear answer to the question of the added value of their service to potential investors.

Availability of public funding for research projects is regarded as the most important factor of this dimension. Large companies have the need to search for innovative technologies to further develop their business activities and adapt them to the digital transformation of the economy. Smaller companies often do not possess the necessary funds to conduct intensive research without public support.

As an IT-based finance instrument, **crowd sourcing** opportunities are rated as having lower importance than the other factors. However, around two third of the responding cluster organisations mark this factor as having ‘great importance’ or ‘quite some importance’. For a financing instrument which only exists for several years now, this could be regarded as a quite high value.

Figure 9: Factors fostering digital-based services related to access to finance



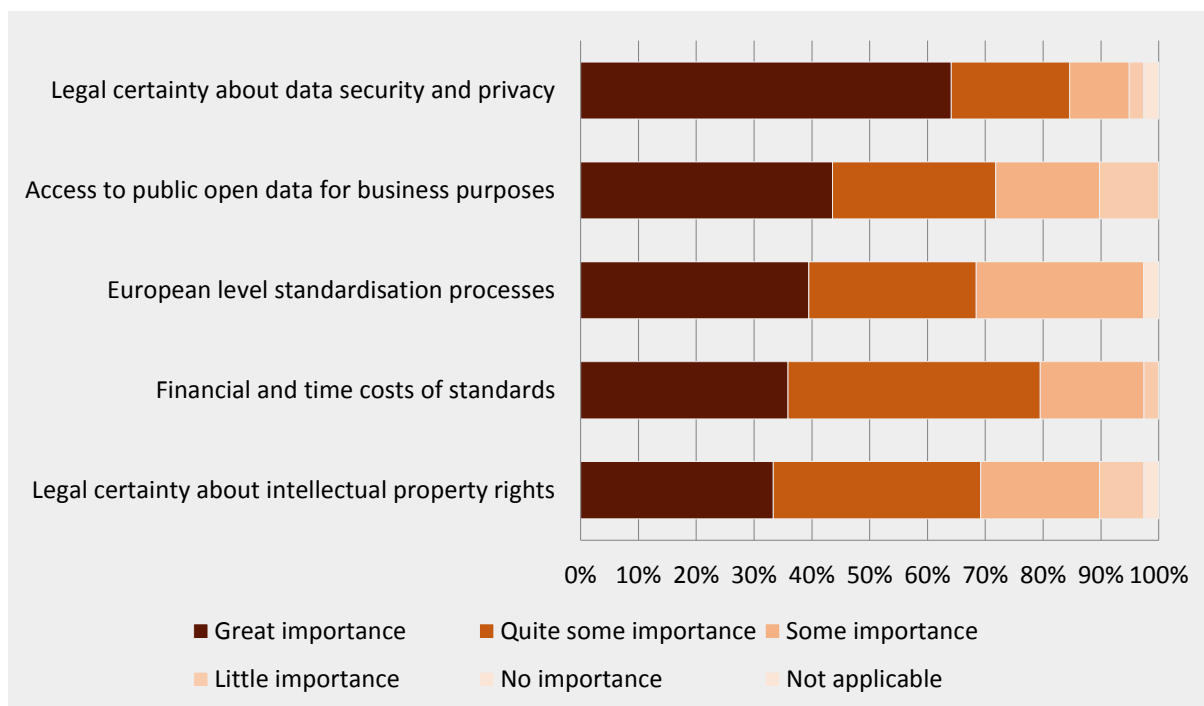
Regulatory framework

Also in the area of digital-based services, the regulatory framework has great importance. With data being considered as the new oil of the digital economy, it is not surprising that **clear rules about data security and privacy** are assessed as most important factor of this dimension. In the case of digital-based services, policy faces the challenge of setting rules for an emerging and constantly changing business sector. This can lead to the absence of clear and reliable rules on how to handle data and can create uncertainty about the sustainability of business models based on the analysis of data.

The public sector collects and possesses a huge amount of data. The commercial exploitation of this data would be a big business opportunity for digital-based service providers. Hence, the topic of **public open data** is considered as quite important among the responding cluster organisations. Potential fields of application are diverse and include healthcare, energy or the transport sector. Using this data offers opportunities for more efficient public services as well as opportunities for businesses and start-ups. The discussion of how to make public open data accessible is closely connected to the question as to how standards of data security and privacy can be complied to.

Standardisation is particularly a question of interoperability of services. So far, lacking standards hinder the possibilities of integrating new services into existing systems. Missing standards also hinder the benefit of clouds as isolated applications make it difficult to change the cloud provider, for instance.

Figure 10: Factors fostering digital-based services related to the regulatory framework



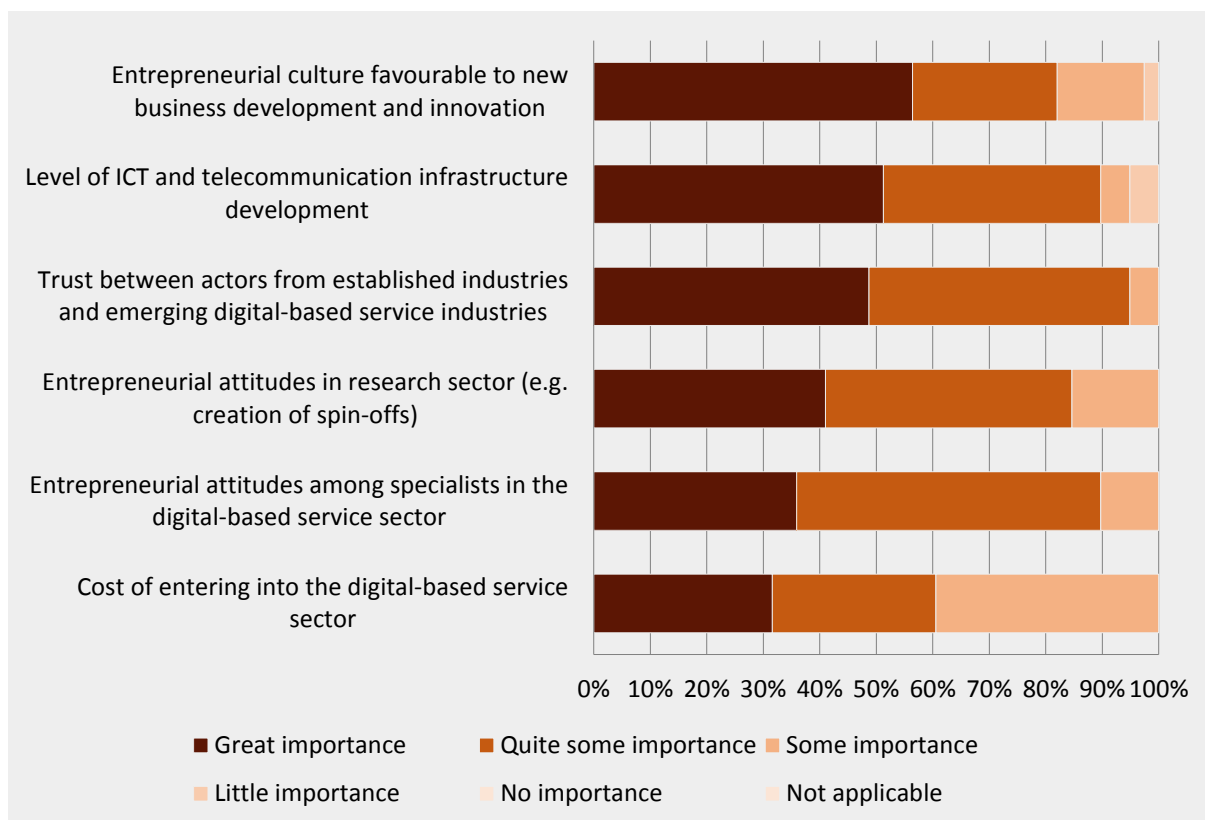
Entrepreneurship

An **entrepreneurial culture** is regarded as very beneficial for the development of the digital-based service sector. This involves risk-taking companies which are curious about new opportunities and motivated founders following regional role models. Despite its importance, such a culture is difficult to establish and it takes a long way building it. Cluster organisations can contribute to such a culture, but also depend on other actors to conduct supplementing activities.

An appropriate ICT and telecommunication **infrastructure** is an important condition fostering digital-based services. 51% of the responding cluster managers mark this factor as having ‘great importance’. Especially mobile and cloud technologies depend on a sufficient level of infrastructure development. This holds true for both, providers and users of respective services. Regions with such infrastructure will struggle to successfully transform their economy in the era of digitalisation.

The third factor which around half of the respondents mark as having ‘great importance’ is the **level of trust** between actors from traditional industries and the emerging digital-based service industries. Developing this trust is important as sometimes, a mentality gap between young start-up firms from the IT sector and more traditional established firms from other sectors hinder efficient communication and collaboration. Building trust helps to bridge this gap and to enable more fruitful cooperation and business relations.

Figure 11: Factors fostering digital-based services related to entrepreneurship



Main drivers and barriers

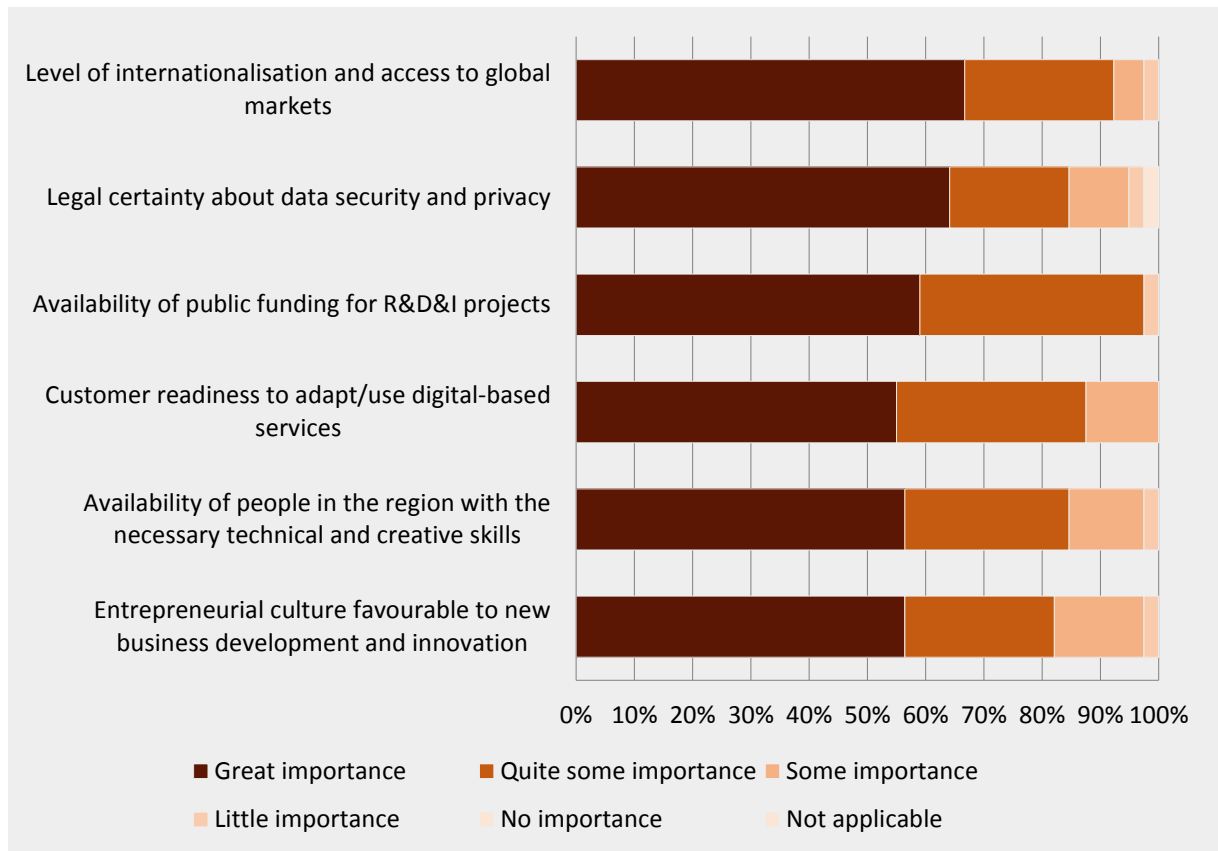
The results reveal that there is no single dimension of framework conditions which really stands out in terms of importance. Figure 12 depicts the six factors which were assessed as having the highest importance. All six factors belong to different dimensions:

- Level of internationalisation and access to global markets;
- Legal certainty about data security and privacy;
- Availability of public funding for R&D&I projects;
- Customer readiness to adapt/use digital-based services;
- Availability of people in the region with the necessary technical and creative skills;
- Entrepreneurial culture favourable to new business development and innovation.

The participating cluster organisations were also asked to name the three most important incentives that promote innovation and entrepreneurship in digital-based services. These answers affirm the result of Figure 12 with a special focus on the cross-sectoral characters of digital-based services, the importance of skills and further education, public funding of research activities and the role of individual entrepreneurs.

Further, in the free text answers the cluster managers emphasise the importance of networking tools to bring together established companies from different sectors, research institutions and start-ups. This also reflects their perspective on digital-based services as an emerging industry and as evolving network.

Figure 12: Most important factors based on online survey



The most important barriers which were perceived and named by the responding cluster organisations are related to:

- Lack of sufficient public funding
- Lack of entrepreneurial culture
- Lack of required skills

In other words, the most important barriers are the absence of the most important favourable framework conditions. In addition, some respondents moan about a lack of public support and political willingness to foster digital-based services.

3. Policy Recommendations

As an emerging industry, the business ecosystem of digital-based services is just evolving. It is continuously shaping its borders and linkages. The 'rules of the game' are not definitely set and the roles of the different actors are not finally defined. Existing structures within traditional sectors are challenged by new innovative players. As sectoral structures, value chains and required skills change, also the need for specific framework conditions to support the emerging dynamics arises. As outlined in chapter three, the required framework conditions do not differ fundamentally from those of traditional industries. Generally, the same dimensions of framework conditions should be considered. However, the results indicate that the focus within and among these dimensions should be different to provide targeted support for innovation and entrepreneurship in digital-based services.

The policy recommendations presented in this chapter focus on those areas of intervention that cluster policy and cluster organisations should consider with regard to creating more favourable conditions for the emerging digital-based service sector.

Increase efficiency of cluster policy support for emerging industries

So far, most cluster policies in Europe have followed sectoral logics. This focus is beginning to change in the course of regional smart specialisation processes. Like other cross-sectoral topics, digitalisation gains in importance in regional policy programmes and cluster strategies. However, digitalisation often is considered more as an add-on than as a cross-cutting trend which transforms the whole economy. Hence, the first set of recommendations relates to the dimension of cluster programmes and policy design to increase the efficiency of cluster policy support to emerging industries.

- Programmes and funds should explicitly address challenges and opportunities of digitalisation. Where this is not the case, a re-focus is recommended. Concretely, cross-sectoral collaboration and the linkage of value chains should be encouraged. This should not be limited to the obvious target group of information technology companies and clusters. As a **cross-sectional phenomenon, the digitalisation of services** should be addressed as such also by cluster policy design. As digitalisation of the economy is also a topic of European and most national policies, the alignment with those policies should be secured to benefit from potential synergies. Cluster initiatives should act as partners and experts in the course of the policy design process.
- The majority of policies which target at the support of digital industries focus on the supply side, namely the IT sector. However, it is expected that up to 75% of the benefits from digital transformation will be felt by traditional industries. To exploit this potential, a **holistic policy approach** addressing both, supply side and the users is recommended.
- Digital transformation changes existing and produces new businesses at high speed. The needs of these businesses differ from traditional sectors and, in addition, change continuously. To better address the needs of an emerging digital-based service sector **increasing the understanding of policy-makers and administration** would be beneficial. Bringing together policy-makers, public administration and companies from the digital service sector on a regular basis could help to build the necessary digital competences.
- Regional cluster policies could comprise the targeted use of regional **public open data**. Based on regional competences, selected data could be made available for commercial use in pilot projects. On this basis, regions could gather experiences with open data provision and the potentials of open data could be exploited at regional level.

Linking service-providers and user industries

The readiness of user industries for the adoption of digital services and technologies is a key factor for further growth of digital-based services. So far, adoption rates among European companies are still relatively low. Often the knowledge of available services and the related added value is limited in SMEs of user industries. The following recommendations target at increasing this readiness by linking technology providers and user industries more efficiently.

- Central to success of novel digital services in traditional industries is the **clear communication of the added value** of the new service. In a first step, challenges and undergoing shifts in user industries need to be understood. In a second step, opportunities for the application of existing digital-based services of cluster members should be identified. This requires a very good knowledge of the cluster members and the services they offer as well as profound knowledge of the new field of application. The knowledge flow should be bi-directional. Needs of current and potential user industries should be communicated into the cluster by the cluster management. On the other hand, potential fields of application for service types of cluster members could be worked up for selected user industries.
- One mean for enabling such a knowledge flow and matching service providers and users are targeted **cross-cluster collaboration** activities. Involving cluster organisations from two sectors can enhance trust and openness among the participating cluster members.
- Added value of novel digital-services and technologies can superbly be communicated through **successful lead users**. These users need to be identified and encouraged to share their experiences. To avoid a competitive situation between lead user and followers, it is recommended to acquire lead users from comparable, but not the same industry as the followers. In this case, learning how to efficiently integrate new digital services into the business model takes place between different industries.

Building cross-sectoral skills in IT and user industries

To put it bluntly: in the future, data will be collected on everything. Companies need to learn how to deal with these data and especially how to extract value. They face the huge challenge to build the necessary capabilities and attract specialists with technical and entrepreneurial skills. Cluster policy and cluster initiatives can take a supporting and coordinating role in this respect.

- Cluster initiatives should contribute to **transparency regarding regional educational establishments** which offer specialised expertise through trainings. On the other hand, they should collect and communicate needs of their cluster members and try to push the establishment of respective training courses. This holds especially true for the **required technical skills in user industries**.
- Universities should be encouraged to integrate courses for **entrepreneurial and business skills** into the academic education of IT experts. Such courses could be complemented with events that feature successful founders who share their experiences with the students.
- Digital trends in traditional service sectors also change the required **skills for cluster management** teams. Hence, digital competences should be built up in the respective cluster organisations.

Reinforcing entrepreneurial cluster dynamics

Characteristic for emerging industries in general and digital-based services in particular is the important role entrepreneurship plays in the development of regional clusters. Cluster initiatives can contribute to create an entrepreneurial culture and foster entrepreneurship in digital-based services by delivering targeted services to their cluster members. These services should take up existing entrepreneurial dynamics and re-inforce them. Relevant services might include:

- Communication creating a positive perception of founders, for instance through presenting successful regional founders as role models. Main target groups are young professionals and students.
- Support potential founders and start-ups through establishing a mentoring system which offers access to various competences and experiences.
- Implementing formats that specifically link start-ups and established companies.
- Facilitate the access to finance through coaching potential candidates with regard to managerial and communicational skills.

Influencing national and European sector policies

The dimension of regulation and industry standards is usually not within the scope of influence of regional cluster policy-makers and cluster managements. However, this dimension is a very important part of the ecosystem and overall framework.

In addition, regulation and standards are an area of high complexity. Particularly prominent are the issues of data security and privacy. But also questions of liability are key issues, especially if digital-based services are related to sensible areas like transport, finance or healthcare. Who is liable in the nearly unavoidable case of malfunctions? And as the digital-based service sector constantly evolves, also the requirements for regulation change. To cope with this challenge, a more adaptive regulation could help to reduce the gap between upcoming needs to regulate and respective rules coming into effect.

In particular, strong and well recognised cluster initiatives should try to influence policy-making even beyond the area of cluster policy. National and international cross-cluster cooperation could enforce the weight of respective contributions.

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Annex 1: Survey Questionnaire

Section 2: General information

Please enter your details in the fields below:

1. Name of your cluster organisation:
2. Country where your cluster organisation is based:

Section 3: Overview of the cluster focus and characteristics

3. Please select in which areas of digital-based services companies in the cluster that you represent are active in*: *(no restriction to the number of options)*

- Mobile services
- Cloud services
- Big data
- Social networking
- Digital transformation of traditional services
- Other: please specify

4. Please select which cluster category is the main focus of the cluster that you represent? *(no restriction to the number of options)*

- Automotive
- Business Services
- Communications Equipment and Services
- Distribution and Electronic Commerce
- Education and Knowledge Creation
- Electric Power Generation and Transmission
- Environmental Services
- Financial Services
- Hospitality and Tourism
- Information Technology and Analytical Instruments
- Insurance Services
- Marketing, Design, and Publishing
- Music and Sound Recording
- Performing Arts
- Printing Services
- Recreational and Small Electric Goods
- Transportation and Logistics
- Video Production and Distribution

Please specify the field, if necessary, or add field(s), if not listed above:

5. In what year was your cluster organisation created?

6. Please indicate the number of members in your cluster:

- Less than 25
- 26 – 50
- 51 – 100
- 101 – 150
- 151 – 200
- More than 200

7. What percentage of the cluster members are companies engaged in the areas of digital-based services you identified?

- 0%
- <10%
- 10% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Please provide comments, if any:

8. What percentage of the cluster members active in digital-based services are start-ups (or spin-offs)?

- 0%
- <10%
- 10% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Please provide comments, if any:

9. In your view, what emerging business areas related to digital-based services can drive the future development of your cluster?

Section 4: Identification of framework conditions

17. Please rate the degree of importance of the cluster-specific factors listed below that can foster business creation, entrepreneurship and innovation in digital-based services.

Note in the comment fields below if you think there are other industry-specific aspects that are important to recognise.

Market transformation factors

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Proximity to customers in established industries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Proximity to private customers in need of new services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Customer readiness to adopt/use digital-based services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Opportunities in (innovative) public procurements (including pre-commercial procurement) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Established labelling schemes that promote demand for new services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Government awareness raising initiatives about the potential of digitalisation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Public support to potential customers to facilitate the adoption of novel digital solutions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other market transformation factors have been important in fostering entrepreneurship and innovation in digital-based services:

Regulatory factors

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Legal certainty about intellectual property rights | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Legal certainty about data security and privacy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Financial and time costs of standards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| European level standardisation processes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Access to public open data for business purposes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other regulatory factors have been important in fostering entrepreneurship and innovation in digital-based services:

Entrepreneurship factors

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|--|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Entrepreneurial culture favourable to new business development and innovation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Entrepreneurial attitudes among specialists in the digital-based service sector | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Entrepreneurial attitudes in research sector (e.g. creation of spin-offs) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Trust between actors from established industries and emerging digital-based service industries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cost of entering into the digital-based service sector | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Level of ICT and telecommunication infrastructure development | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other entrepreneurship factors have been important in fostering business development and innovation in digital-based services:

Factors related to knowledge and skills base

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Advancements in scientific and technical knowledge | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of people in the region with the necessary technical and creative skills | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of people in the region with the necessary entrepreneurial skills | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of education establishments that provide skills base (technical & entrepreneurial) for the emerging industry | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Adaptability of the existing workforce to new knowledge and skills requirements and interdisciplinary competences | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Organisational capability of enterprises to drive cross-sectorial business and innovation activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other knowledge and skills factors have been important in fostering entrepreneurship and innovation in digital-based services:

Knowledge transfer factors

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Existing collaboration platforms among established companies, start-ups, R&D actors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Large public-private partnerships | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Open source collaboration platforms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Social networking tools that facilitate collaboration and awareness-raising | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Level of internationalisation and access to global markets | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Mobility schemes for enterprise staff | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other knowledge transfer factors have been important in fostering entrepreneurship and innovation in digital-based services:

Factors related to access to finance

| | Degree of importance to fostering entrepreneurship and innovation | | | | | |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Great importance | Quite some importance | Some importance | Little importance | No importance | Not applicable |
| Availability of seed and venture capital for companies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of public funding in support of company growth | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of public funding for R&D&I projects | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Investment in R&D&I by private sector organisations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Availability of crowd funding opportunities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other factors (please specify in the comment field below) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please comment what other financial factors have been important in fostering entrepreneurship and innovation in digital-based services:

10. Please list the top three incentives that, in your opinion, promote entrepreneurship and innovation in digital-based services:

11. Please list three the most important barriers for clustering and accelerating business activities in digital-based services:

Section 6: Business case examples

In the scope of this case study we are collecting interesting examples of business cases of new emerging start-ups and industry transformations that disrupt the traditional value chains.

24. Please indicate if you are willing to share information on successful business cases from the experience of your cluster and agree that this information may be included in the case study:

- Yes, I would like to share information on successful business cases
- No, I do not want to share such information

Conditional to question 24:

25. Please briefly describe the company(ies) example(s)

26. Would you agree to be contacted for further details on the company example(s)?

Yes

No

Conditional to question 20:

21. Please provide your contact details:

Email address:

Phone number:

Thank you for your participation!

Annex 2: List of Interviewees

- Anne Torunn Hvideberg, DIGIN, Norway
- Christoph Runde, Virtual Dimension Center Fellbach, Germany
- Patrick Cocquet, Cap Digital, France

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

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



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