

European Cluster Observatory

Case Study

Framework conditions to support emerging industries in the area of healthcare

From treatment to prevention and wellness

This report was written by Jelena Angelis, Elina Griniece and Kincső Izsak (Technopolis Group). Katrin Männik (Technopolis Group) supported the study with conducting interviews. Although the work has been carried out under the guidance of European Commission officials, the views expressed in this document do not necessarily represent the opinion of the European Commission.

Technopolis Group
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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 a 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

Emerging healthcare industries develop within a diverse range of clusters...

The results of the study indicate that cluster initiatives with a wide focus can provide a platform for emerging healthcare industries such as *medical devices, ICT and biopharmaceuticals* but also less associated industries like *textile manufacturing, aeronautics and embedded systems, forest-based industries, creative and cultural industries, and education*.

Cluster initiatives nurture several emerging healthcare niches at the same time...

The majority of surveyed cluster organisations and their cluster members tend to focus on 2-3 emerging healthcare niches simultaneously. For example, cluster organisations that indicate e-Health as one of their focus areas are also frequently active in personalised medicine and preventive healthcare and wellness.

Young entrepreneurs who can rely on collaboration platforms and access to more experienced mentors are driving emerging healthcare industries...

The survey and interviewees indicated that it is not research and business linkages that drive emerging healthcare industries (e.g. it is less usual that researchers set up a company in this area), but rather it is young entrepreneurs with the help of experienced mentors' collaborative communities that unlock new business development.

Attitudes within the public healthcare sector matter...

One important hindering factor of healthcare industries can be that healthcare providers remain too risk-averse or healthcare institutions that are not willing to take on board new solutions and experiment with new business models within the sector. This is sometimes seen the most significant barrier – even more so than fostering entrepreneurship in companies. In other words, it is not sufficient spending public money on entrepreneurship programmes in general, if entrepreneurial attitudes and openness are not addressed within healthcare institutions themselves.

Organisational capability of enterprises to drive cross-sectoral activities has not yet been sufficiently addressed...

Emerging healthcare industries need people with management, technical and creative capabilities who understand the business models and modes of operation of various sectors and take appropriate decisions for the development of cross-sectoral innovative business activity. The need for cross-disciplinary skills in healthcare businesses is well known, but up to know the issue has not been adequately addressed.

Customer readiness to adopt and use novel solutions is a key to scale up emerging healthcare ventures...

Existing market demand and prospects for future market growth are the primary considerations for entrepreneurial activity. The new emerging healthcare industries are very much user-driven and societal acceptance of the devised solutions determines the course of new developments in healthcare industries. Demonstrating feasibility and proof of concept is therefore even more critical than research and development and should form an integrated part of any supported project.

Building pathways to internationalise healthcare businesses...

The level of internationalisation and access to global markets has been singled out as one of the most decisive factors. However, often the reality is that regional actors keep on focusing on the local market and do not think about international opportunities. In many countries one difficulty is that healthcare

businesses do not have a clear path to step out in foreign markets. Building up concrete international chains should be thus better addressed by policy-makers.

Pre-seed funding and public funding for RDI are considered important, but new types of financing such as crowd-funding schemes seem to be more complex to use...

The availability of public funding for research, development and innovation (RDI) is perceived as more important by a larger share of survey respondents participating in the study than investment in RDI by the private sector. Pre-seed funding has been singled out as of outmost importance. It is also noteworthy that the availability of crowd funding is seen of less importance than other sources of funding. This may reflect that even if the topic is up-and-coming, in reality regional stakeholders do not rely on this type of funding to foster emerging healthcare industries.

Funding distribution in many countries is still channelled through a linear model...

Cross-sectoral projects, programmes or start-ups etc are more difficult to understand compared to the ones, which fit one sector. It also requires a more collaborative approach in designing and implementing national programmes that span across several areas and players within the research and innovation system. As an outcome, the activities supported by such funding are also more linear rather than cross-sectoral.

Enterprises in secondary healthcare markets face difficulties to qualify for RDI funding support...

The secondary healthcare market for preventive healthcare and wellness comprises a vast range of sectors of consumer products and services that integrate health benefits but to a varying degree of “scientificity”. The wellness sector in particular tends to employ “softer” aspects such as nature, water and sound for introducing new products and services. Hence, these companies face persistent difficulties to apply for public funding for RDI projects and would rather need another approach where service innovation is addressed.

The system of grants can also distort market needs and hinder the scaling up of emerging healthcare industries...

Despite the importance of public funding schemes, the system of grants can also distort market needs. Therefore, it is not conducive to stimulate the development of emerging healthcare industry clusters in the long-term. Even if the current system of grants offers opportunities for new developments, it actually creates a short-term, unrealistic demand for projects that only live as long as there is public funding available. Since there is often no business concept behind such publicly funded RDI projects, the opportunity to put on the market a viable product or service is often missed. There are many organisations that live on these public grants but do not connect to the real market needs.

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 *healthcare and related industries*. In this report clusters are understood as being “geographic concentrations of inter-connected 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 *healthcare and related industries* 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?
- What are the drivers that can scale up initial entrepreneurial activity into a dynamic cluster of industries?
- How can regional and cluster policy support the creation of a favourable business ecosystem and how it can stimulate the necessary cross-sectoral linkages?

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, a survey was launched among cluster management organisations across the 28 EU Member States and the EU Associated Countries. The cluster organisation survey was open from 24 March - 13 April 2015. In total 87 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 an initial desk research on framework conditions that can be more relevant in the area of healthcare industries.

In parallel a selected number (8) of in-depth interviews were conducted with cluster representatives. See Annex 2 for the full list of interviewees. Further desk research was carried out to supplement and validate the insights drawn from the survey and interviews.

The selection of the interviewees was based on the cluster focus areas striving to maintain also a broad geographical balance. The selected cluster focus areas comprised E-health, preventive

healthcare and wellness and nutritional healthcare. These areas have been selected due to the fact that they encompass diverse structural needs for undertaking innovation and entrepreneurial activities (e.g. R&D investment intensity, proximity to healthcare providers, etc) and therefore also showcase distinct framework conditions for promoting the emergence of new cross-sectoral industries. Additional factors for selection is the fact that up-to-date areas such as preventive healthcare and wellness, and nutritional healthcare have not received lot of policy attention, while there are good indications of the substantial sectoral growth potential.

1. Cross-sectoral collaboration in the area of healthcare

This first chapter presents the focus of the study. It provides a brief overview about the existing healthcare business ecosystem and gives insight into how its boundaries are being shaped.

1.1 The evolving healthcare ecosystem

The healthcare sector represents an important share of social and economic activities in the European Union. About 10% (ranging from 5 to 11%) of GDP is spent on healthcare and more than 15 million people are employed in the sector in Europe (iNOVAHEALTH, 2012). Rapid advances in healthcare have improved the quality of lives and life expectancy in Europe; however, the current demographic tendency of an ageing population poses an important challenge to the existing model of healthcare provision. The elderly population brings an additional burden to healthcare budgets as the ratio of pensioners to people of working age by 2050 is estimated to reach 1:2 (ibid). Also, the increasing prevalence of chronic diseases and ‘old habits die hard’ phenomena in lifestyle patterns (i.e. obesity, smoking and alcohol consumption) puts at risk the sustainability of the current system which is characterised by a relentless demand for access to care at a lower cost. If Member States do not make important efficiency gains, the European healthcare expenditure could increase by one third in 2060 (EC, 2013) outstripping economic growth.

The challenge of healthcare system reform also brings about great opportunities. Finding better and more efficient ways of delivering and organising health services also promotes advancement in science and technology development and stimulates innovative entrepreneurship. Therefore, instead of a great cost, healthcare can also mean significant growth prospects for Europe. Innovation is paramount, but new knowledge and technical opportunities alone will not be sufficient in bringing the necessary transformation. It will require profound organisational innovation, new cooperation patterns and behavioural change among the involved stakeholders, as well as novel notions about what “health” and “care” might mean in the future. The changing modes of healthcare organisation and delivery on various levels give rise to a new healthcare paradigm, namely:

- From hospital-centric to patient-centric system;
- From standard treatments to increasingly personalised diagnosis and cure;
- From treatment of acute and chronic diseases to preventive healthcare and wellness.

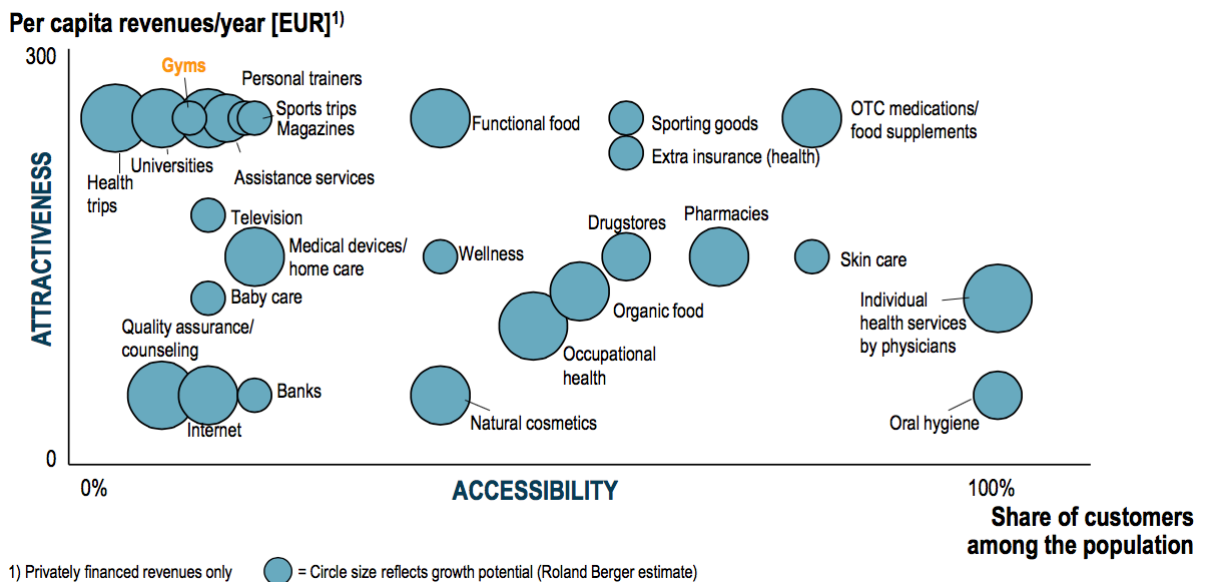
These substantial changes in the healthcare sector call for a convergence across industries to cater for changing system requirements, customer demands and expectations. Life sciences, medical devices and pharmaceutical industries have traditionally constituted a strong base for employment creation, economic growth and innovation in the area of healthcare. With the new healthcare paradigm more and more new types of industries are entering the ecosystem leading to new cross-sectoral collaborations. Traditional industries are being forced to adapt their business models to the changing future realities.

The rise of information and communication technologies and telecommunication has had a transformational impact across everyday life and industry, including healthcare. New ICT-enabled solutions are altering the ways healthcare data can be gathered, stored, transmitted and analysed. Through telemonitoring options care can increasingly be delivered also outside the hospital setting. Digitally empowered citizens using personal computing, apps, virtual communities and social networks are becoming more informed and more demanding healthcare customers. Similarly, other convergence technologies such as biotechnology and nanotechnology have also underpinned new developments.

Moreover, new configurations and business models have emerged among the healthcare industry, healthcare service providers, insurance companies and new system actors. Preventive care is encouraged by service providers; insurance companies have policies that include elements of healthcare which are preventive in nature (e.g. alternative approaches like acupuncture); community services aim at increasing prevention (e.g. nurses or midwives offering free consultations in community centres). Hospitals are gradually embracing opportunities brought about by innovations. Their model operation is moving from closed to open innovation – not only for adopting and diffusing innovation in hospitals but also for coming up with innovations within hospitals. This Open Innovation approach – following the pioneering work of Henry Chesbrough (2003) – is reliant on the entire healthcare community from discovery to delivery in the clinic and at home. Open Innovation is now often an approach in building public-private partnerships, for example, the Innovative Medicine Initiative in the EU or the NIH-funded National Centre for Advancing Translational Sciences in the USA. The newest development in healthcare innovation is Crowd Science as a way to improve the visibility of the needs of innovators and innovation seekers.

There are observations that the secondary healthcare market is becoming increasingly more important in Europe, mirroring the growing health awareness among the population. The secondary healthcare market comprises all privately financed healthcare services and customer goods with a focus on preventive healthcare and wellness (see Figure 1 on involved industries). For example, in Germany this market share is constantly growing at 5.5% per year (Roland Berger, 2011). Europe is also named as the wellness travel powerhouse. The research undertaken for the Global Wellness Tourism Congress points out that Europeans have taken a global lead in the number of wellness tourism trips taken annually. Moreover, 13 of the top 20 countries for domestic expenditure on wellness travel are in Europe (SRI International, 2013). These emerging trends point towards unleashed potential of more proactive and preventive healthcare paradigm in Europe focused on quality of life and well-being.

Figure 1: Analysis of the secondary healthcare markets constituent markets

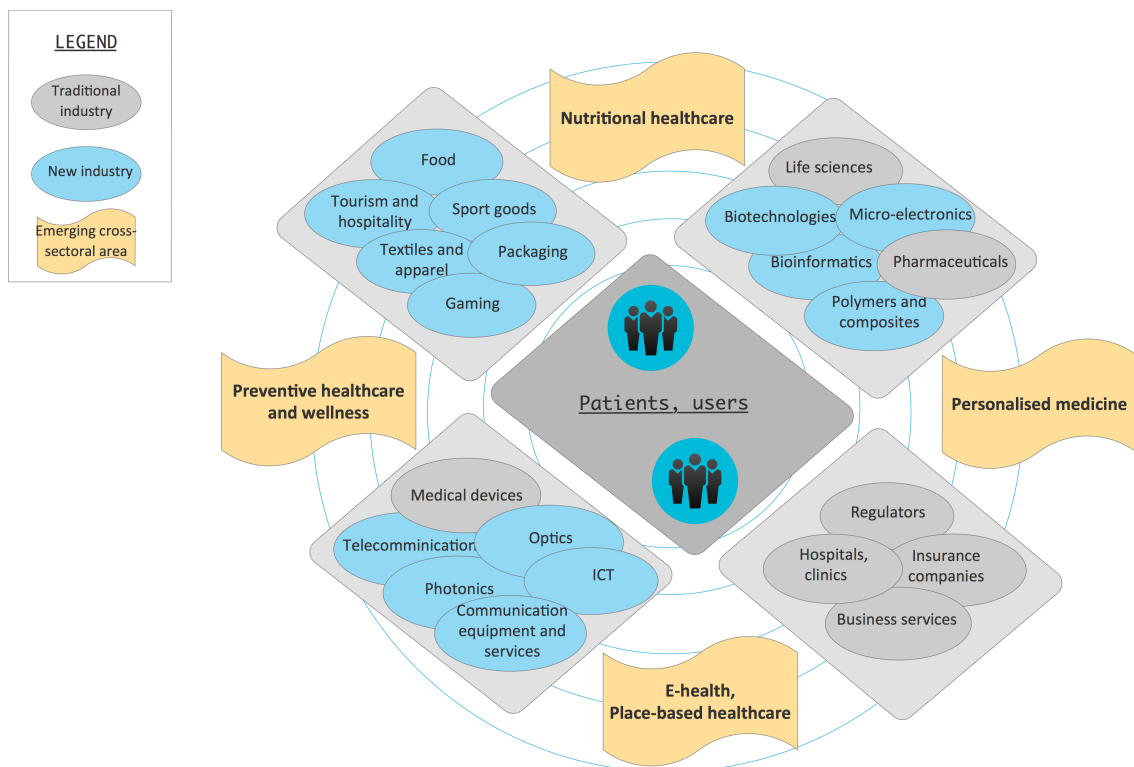


Source: Roland Berger Strategy Consultants (2011)

In summary, the broad areas for new business development and start-up activity within the healthcare ecosystem that can be specifically singled out are:

- **E-health:** the transfer of health resources and healthcare by means of ICT and telecommunication. E-Health includes among others such developments as electronic health records, e-prescriptions, healthcare information systems, telemedicine (or patient treatment at distance), m-Health (or application of healthcare solutions on mobile devices).
- **Place-based healthcare/ambient assisted living:** integration of more pluralistic models of care instead of the current hospital-centric model. The concept includes multiple service dimensions, for instance, care robots, telemonitoring of bodily functions, transmission of data to the hospital, security call systems, remote control of self-care and self-treatment. Equally the focus is put on the material and interior industry, welfare-tech, textiles, user-driven innovation, design processes and design concepts and biomimetics. The key part of the value creation lies not in separating these dimensions but in addressing them as one and developing usable solutions.
- **Personalised medicine:** often described as the right treatment for the right person at the right time. It reflects the increasing ability of pharmaceutical companies to match their products to the right patient using advanced methods and tools of modern science.
- **Nutritional healthcare:** pharmaceuticals and food are increasingly combined in order to use food for medical purposes. A new industry of probiotics, prebiotics, functional foods or rediscovered natural herbs is emerging that is producing these new substances with clinically enhanced properties.
- **Preventive healthcare and wellness:** encompasses a wide range of consumer products and services at the intersection with healthcare industries.

Figure 2: The evolving user-centric healthcare ecosystem



Source: Technopolis Group

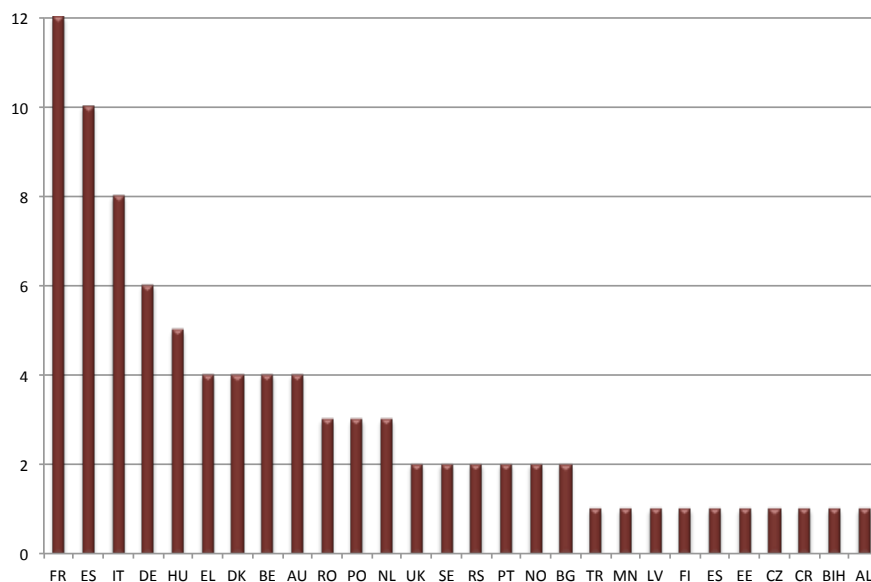
1.2 Characteristics of cluster initiatives driving emerging healthcare industries

As with other industries, the forces of cluster formation are in motion also within healthcare industries. Co-location and innovative collaboration among public and private healthcare institutions, pharmaceutical and medical devices companies, other related firms, insurance companies etc. happens in specific places in Europe even if healthcare is a topic for every economy. According to the European Cluster Panorama (2014) biopharmaceuticals and medical device clusters employ some of the most educated and productive employees in Europe and are connected to large and growing employment in local health care services. Regions across EU Member States are also active in launching cluster initiatives that are intended to stimulate cluster development in this area. The European Cluster Collaboration platform¹ has 79 cluster management organisations registered in the area of healthcare/medical devices in the European Union – most of them in Germany, UK, France or Spain.

In order to provide a snapshot of how healthcare industries evolve the authors relied on the information that cluster management organisations provided in an online survey about the ongoing changes within their clusters. One of the main roles of cluster organisations is to facilitate knowledge linkages between regional actors, which makes them a reliable source to reflect about the developments that the healthcare industry might take and also about the related industries these emerging niches “grow on”.

In terms of geographical representation, the online survey with cluster organisations captured a wide coverage of European regions. Nevertheless, 71% of respondents came from EU15 countries and only 18% from the EU13 and 16% from EU Associated Countries.

Figure 3: Geographical representation of responses to the online survey



Source: Technopolis Group

The geographical representation of the survey respondents cannot give exact insights about the hotspots of emerging healthcare industries as such but it can point somewhat to the interest in the topic across cluster initiatives in Europe. According to the results, cluster management organisations

¹ <http://www.clustercollaboration.eu/>

from France, Spain and Italy have expressed most often their clusters' engagement in these emerging industries. One has to keep in mind, however, that countries have different traditions in fostering cluster development in an organised way (for instance, younger or associated Member States have usually a shorter history), which might also explain a lower interest in the survey. Still, this cannot distort too much the survey results since there has been, for example, more interest from Romania than from the UK and more interest from Hungary than from the Netherlands.

The responses to the survey revealed the following insights:

Emerging healthcare industries develop within a diverse range of clusters

The results of the survey indicate that cluster initiatives with a focus on **medical devices, ICT and biopharmaceuticals** are among the most frequent platforms where new emerging healthcare industries are nurtured (see Figure 4). This may come as no surprise given the rapid developments in the area of E-health, personalised medicine and new ambient assisted living solutions.

Hospitality and tourism cluster initiatives are also increasingly integrating health and wellness related business directions. Close to 20% of survey respondents indicated their cluster companies undertake activities in this sector.

Agricultural sector and food-related cluster initiatives appear to associate themselves with emerging healthcare industries to a smaller degree (around 10% of respondent clusters). Functional food and nutraceuticals is highlighted as an important activity by this sample of respondents.

The cluster initiatives focusing on **textile manufacturing** (around 10% of respondents) are involved in preventive healthcare and wellness. The emerging business niches include, for example, smart materials for interior and healthcare applications, apparel or footwear.

Converging technologies such as **biotechnology** and **nanotechnology** are also occasionally mentioned as enabling focus areas for the development of new healthcare products and services. Equally the increasing potential for the application of **photonics and optics** in healthcare solutions is highlighted.

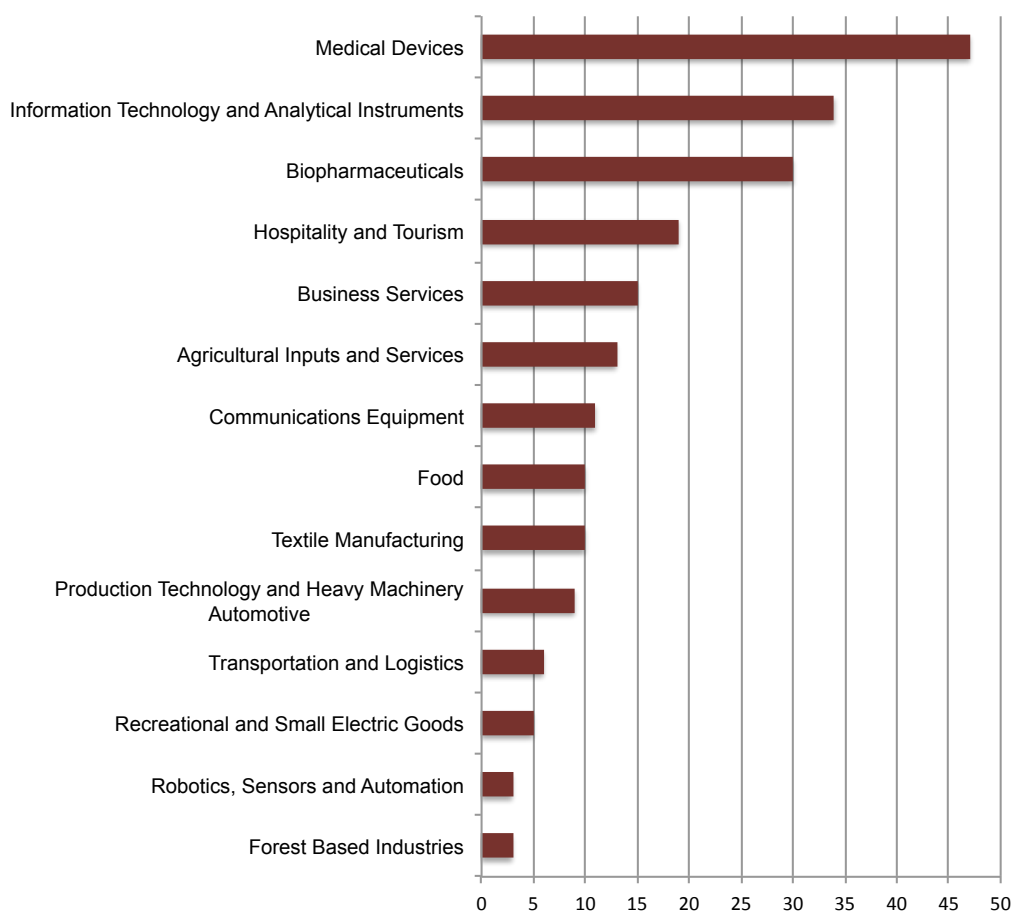
Furthermore, new cross-sectoral healthcare related industries are developing also on the base of cluster initiatives with a distant industrial focus. Examples mentioned by survey participants include even such sectors as **aeronautics and embedded systems, forest-based industries, creative and cultural industries, and education**.

Box 1. Aerospace Valley diversifying into healthcare

Aerospace Valley is a cluster initiative launched in 2005 with the objective to foster competitiveness of the French Midi-Pyrénées & Aquitaine regions' Aeronautics, Space, and Embedded Systems sectors on the national, European and international levels. Aerospace Valley was certified a "Worldwide Cluster". Today, health is considered an axis of diversification for the cluster, for instance by applying security and safety technologies or virtual reality solutions to connect medical equipment. Within the framework of the BEA project, Aerospace Valley and another cluster initiative called Cancer-Bio-Health from France have been cooperating to develop an innovative wristwatch that provides telecare services for the elderly.

Source: <http://www.aerospace-valley.com/>

Figure 4: Industry focus of survey respondent cluster organisations as % of the total number of respondents



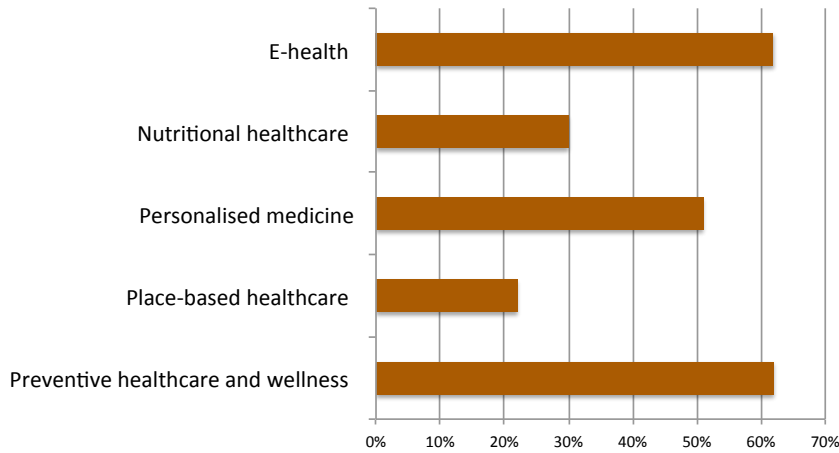
Source: Technopolis Group

Cluster initiatives nurture several emerging healthcare niches at the same time

Only 30% of the respondent cluster organisations indicate that their members focus only on one of the five emerging healthcare industries singled out by the survey (see Figure 4). One third of these specific respondents are focusing on preventive healthcare and wellness (mainly tourism and sport industry). The vast majority of respondent cluster organisations focus on 2-3 of the pre-defined areas by the survey.

Cluster organisations that indicate E-health as one of their focus areas (48 respondents) are also frequently active in personalised medicine and preventive healthcare and wellness. Cluster organisations focused on nutrition (23 respondents) also tend to comprise entrepreneurial activity in preventive healthcare and wellness. Place-based healthcare is highly integrated with other healthcare emerging industries in the cluster setting.

Figure 4: Emerging healthcare industries that respondent cluster organisations are active in

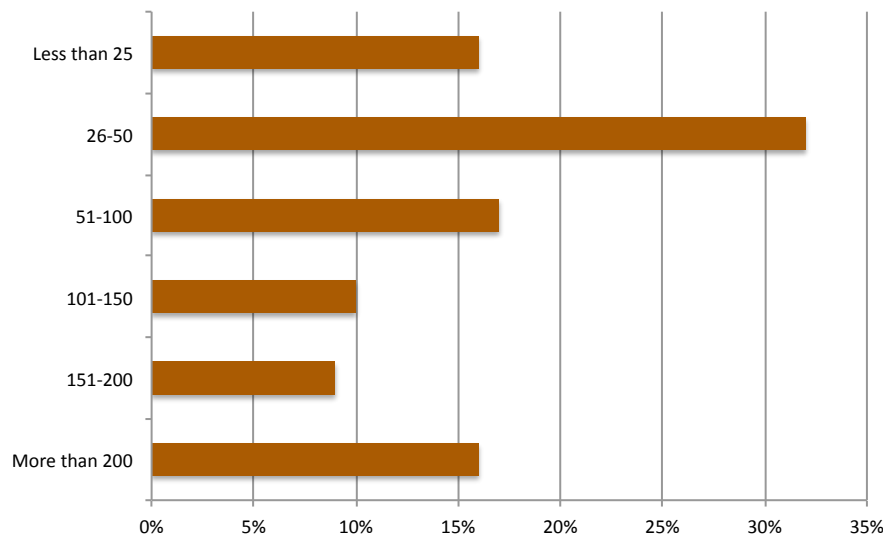


Source: Technopolis Group

Emerging healthcare activities represent a small share in current cluster initiatives

The majority of respondent cluster organisations (65%) represent small and middle-sized cluster initiatives making up to 100 member companies and related organisations. 16% of respondents are very large cluster organisations with more than 200 members and with a predominant focus on life sciences, biopharmaceuticals, ICT, medical devices and production technology.

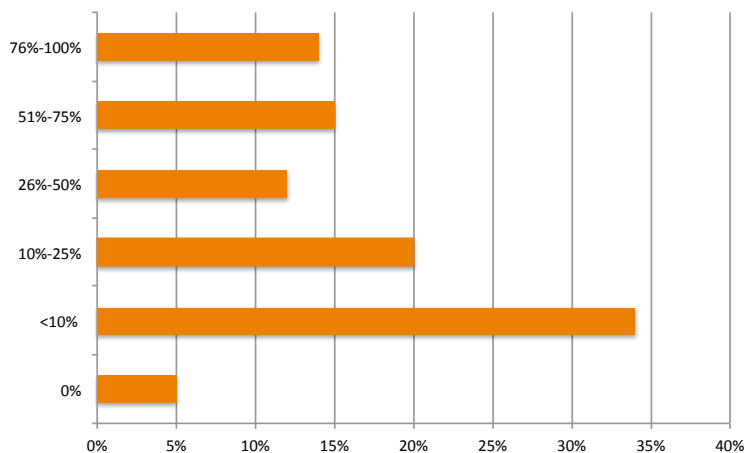
Figure 5: Number of cluster members in survey respondent cluster organisations



Source: Technopolis Group

Within the cluster organisations that responded to the survey, the share of those companies (all types of businesses) that are engaged in emerging healthcare activities is relatively small. In 34% of cases less than 10% of cluster member companies are engaged in activities related to emerging healthcare industries. This is due to the fact that diverse types of cluster organisations are involved in these activities as highlighted earlier. See Figure 6 for details.

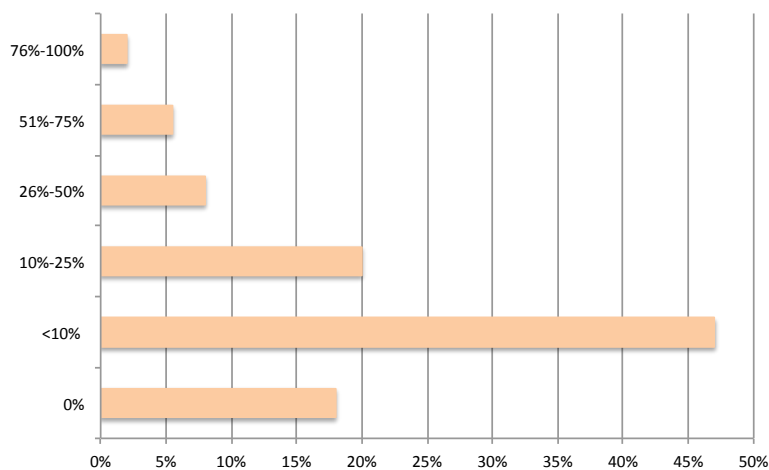
Figure 6: Percentage of cluster member companies engaged in emerging healthcare related industries



Source: Technopolis Group

Similarly, in terms of start-up activity almost half of the respondents again note that less than 10% of the start-ups within the cluster are entering emerging healthcare industries. Significant start-up activity in healthcare niche areas (51%-100%) can be found only in the case of 8% of the respondents. This indicates that those clusters whose member companies are highly focused on emerging healthcare industries (51%-100%) involve predominantly already mature companies.

Figure 7: Percentage of cluster members that are start-ups (or spin-offs) entering healthcare related emerging industries



Source: Technopolis Group

Healthcare becoming more flexible and data-driven in the future

Overall, the survey respondents are convinced that healthcare is poised to become more personalised, more ICT and data driven, more empowering and flexible in the future. Besides the five identified emerging healthcare industries, more specifically the respondents highlighted the following growth areas:

- **Artificial intelligence and virtual/augmented reality:** computer-generated input such as sound, video, graphics and GPS data will provide augmented live view of a real-world environment. Artificial intelligence will drive the next-generation health analytics.
- **Cloud-based health information systems and big data:** cloud-based service models make it possible to deliver and receive care anywhere. The amount of information gathered from the patient self-monitoring devices is increasing and providing tremendous value for health data analytics.
- **Convergence technologies:** new possibilities provided by biotechnology, nanotechnology, mechatronics and photonics will be taken up by the health sector leading to a vast range of new services and products.
- **Health education and alternative medicine:** increasing pressure to cope with "civilisation" diseases raises the demand for services and products in the area of alternative medicine (e.g. Ayurveda).
- **m-Health:** the number of medical mobile applications has been increasing over the years raising a need for evidence base on what mobile apps can be realistically integrated in the clinical settings.
- **Nutraceuticals:** the demand for products derived from food sources with extra health benefits in addition to the basic nutritional products is expected to rise.
- **Sensors and biosensors:** it is possible to swallow digital devices and tiny sensors for gathering and storing data, transmitting body temperature, heart and respiration rate to an external device.
- **Sport industry:** the significance of sport products and services as core means for ensuring healthy and active living for the population is recognised.
- **Tissue engineering and 3D tissue printing:** more and more objects can be printed with 3D printers and the biotechnology industry is keeping an eye on the potential of this opportunity. Printing living tissues, then cells or drugs might not be far from the future reality.
- **Wearable devices:** there is increasing clinical evidence of the value of continuous physiological data in managing chronic diseases and monitoring patients after hospitalisation. As a result, a growing number of medical devices are wearable.
- **Modular healthcare buildings:** modular healthcare facilities have the advantage that they can be used for a multitude of purposes, are fast to build and are smart in arranging better hospital care. This provides opportunities for a number of firms to develop new technical and design solutions for healthcare buildings.

Figure 8 summarises the views of survey respondents about the thematic areas that they believe will ensure their cluster company growth in the foreseeable future.

2. Critical framework conditions supporting emerging healthcare industries

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 specific industries.

Healthcare innovations offer today a rich pool of business opportunities, from big data to new prevention services; however, not all regions are able to profit from these opportunities. Regions that can build up strong healthcare industry clusters will be the ones with the right framework conditions in place.

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 dimensions (complemented with regulations that can be specifically important for healthcare industries), the online survey included questions to test which conditions are more prominent than others. The results of this survey that refer to emerging industries within the healthcare ecosystem in general are summarised in Section 2.1. It must however be acknowledged that certain sub-areas such as E-health, prevention and wellness industries can exhibit different success factors that are discussed in more detail in the subsequent Sections 2.2 and 2.3.

2.1 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 for healthcare industries. The survey also included options for framework conditions that can be contrasted and tested about which plays a more prominent role.

1. Entrepreneurial conditions

The survey outcome shows that **trust between actors in the healthcare sector and businesses** is the most acute factor when it comes to the entrepreneurial conditions of emerging healthcare industries. 54% of respondents mark it as of “Great importance” and 34% as of “Quite some importance”. It is not a surprise as such that trust and entrepreneurship is a leading stumbling block for healthcare innovation. As Professor Michael Porter commented in one of his works: *“Competition as it has been historically structured in most healthcare systems around the world has not really been aligned with value. What it takes to be successful for a provider is not tightly connected to what it takes to be successful for the patient.”* (Forum on Healthcare

Box 2: Fostering entrepreneurship in healthcare institutions – Medical Valley Bavaria

As some of the survey respondents flagged, one issue is that although businesses have the necessary technological background they often do not understand the challenges of the healthcare sector or are less aware about the related regularity aspects. A solution to this could be for instance to involve pro-active doctors into the advisory board of companies. Medical Valley in Bavaria plans to address this problem by setting up an ‘industry-clinic’ incubator in hospitals, which would allow not just fostering an entrepreneurial culture in healthcare institutions but also generating physicians’ feedback on new technological developments and ideas.

<http://www.medical-valley-emn.de/>

Innovation). Players in the emerging healthcare industries can speak very different languages and pursue different goals, which in the end manifests itself in a low level of trust.

Although entrepreneurship is often seen as prerequisite for any emerging business activity, the survey responses also highlight that an important framework condition is not just entrepreneurship and entrepreneurial culture in general, but the **entrepreneurial attitudes within the healthcare sector**. An important factor hindering the further development of healthcare industries is the traditional mindset of healthcare providers who often remain too risk-averse, having a preference to follow traditional paths. Also, there are not enough courageous healthcare institutions who are willing to apply new solutions and experiment with new business models within the healthcare sector. One has to recognise that there are risks involved in changing traditional healthcare practices and this is why programmes that can clearly identify and mitigate these risks would be important.

Figure 9: Most important entrepreneurial conditions



Source: Technopolis Group

In addition to the prompted framework conditions indicated in the survey some respondents also noted further issues such as the willingness of spin-offs to take on board experienced entrepreneurs that can drive the business more strategically.

As the survey responses show it is not the lack of innovative ideas but the uptake of innovation is the weakest link. This partially comes from a different set of values and objectives which healthcare providers and healthcare innovators are working towards.

2. Knowledge basis and skills

Organisational capability of enterprises to drive cross-sectoral business and innovation activities is the most prominent factor when it comes to human capital prerequisites. 48% of respondents marked it as “Great importance” and 31% “Quite some importance”. This relates to the need for people with management and leadership capabilities who can understand the business models and modes of operation of various sectors and take appropriate decisions for the development of cross-sectoral innovative business activity. The cross-sectoral aspect is a real challenge. For instance in order to launch a new healthcare data platform, one needs the understanding of healthdata, insuring security, connecting to mobile phones, create mobile apps, creating connected objects, understanding of wellness and prevention what can work out, understanding the needs of patients. This clearly requires an orchestrated alignment among many actors.

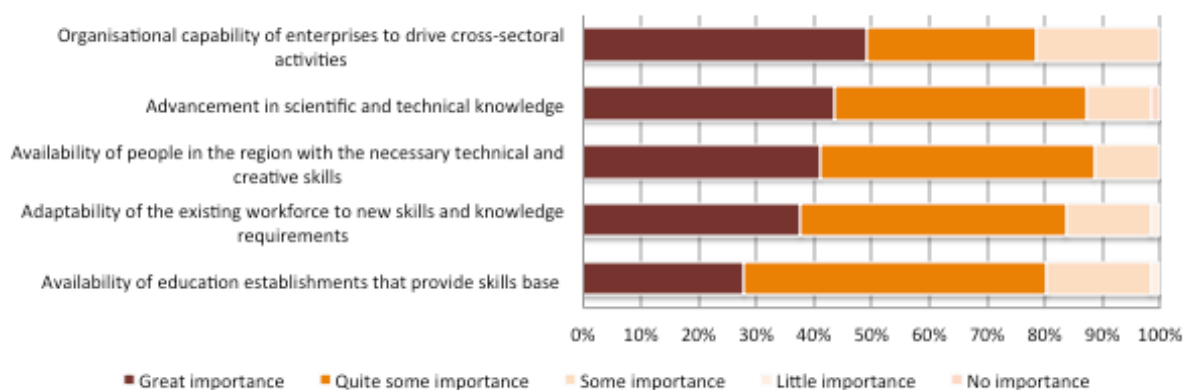
The need for cross-disciplinary skills in healthcare businesses is something that has been well known for a while. Nevertheless, the survey responses show that this issue has not yet been adequately ad-

dressed despite being a critical factor for business development in healthcare. A major problem that was flagged in the survey is a lack of medical knowledge and skills of IT specialists who should develop new healthcare applications, and vice versa a lack of IT skills in medical professions. This competence gap between healthcare providers, companies and other related institutions could cause missed opportunities that should be addressed.

Advancements in scientific and technical knowledge are also recognised as a key factor (respectively 88% and 89% regard it as either of “Great importance” or “Quite some importance”) and this is a common response across any sub-areas such as personalised medicine, prevention and wellness or nutritional healthcare etc. The knowledge basis has been often pointed out as the most important requirement that can kick off emerging activities in the area of healthcare in the regions, although this is not seen as a sufficient condition to scale up the new niches on higher industrial levels.

The adaptability of the existing workforce to new skills and knowledge requirements is regarded slightly less important than the availability of skills, although also flagged as a dominant factor by most of the respondents. The survey responses suggest that the availability of education establishments that provide the necessary skills base is seen as an important but not a crucial factor.

Figure 10: Most important skills and human capital conditions



Source: Technopolis Group

3. Collaboration and internationalisation

Collaboration platforms among companies, healthcare professionals and R&D actors are singled out as a very important driver. 83% of respondents mark it as of “Great importance” or “Quite some importance”. The survey respondents indicated that the key bottleneck for new cross-sectoral innovations in healthcare is mainly due to the lack of embeddedness of enterprises in the healthcare sector and barriers in communication between suppliers, users and practitioners. Collaboration platforms can provide an arena for cross-sectoral exchange and are indispensable for wide-scale innovative developments.

One should not underestimate the impeding factor of vested interests and people’s rigidity to change. Many business ideas fail because of these reasons and many emerging industrial activity cannot grow to a higher level because the ‘system’ as it functions acts as a barrier rather than a stimulator. To solve this issue, there is a need for more platforms, interactions between local authorities, national authorities, big businesses and local SMEs.

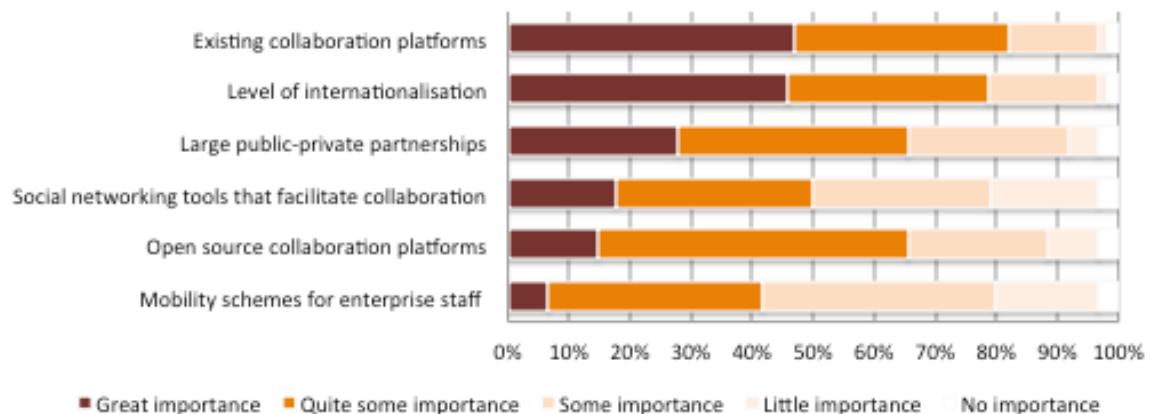
One might think that knowledge linkages between research and businesses are the ones that count, but the survey indicates that this is not the driving force behind emerging healthcare industries. It is

less usual for researchers set up a company in this area, but **young entrepreneurs with the help of experienced mentors** are behind unlocking new business development.

Interestingly, **open source collaboration platforms** hold importance (53%) but are currently not considered to be a key driver. Nevertheless this might change in the long term as some of the respondents also noted. As desk research on the developments in healthcare innovation market indicates, open source collaborative platforms and public-private partnerships might overtake in importance from other collaboration platforms and internationalisation as such over time. Crowd-sourcing and open access databases already exist and address several technological issues such as 3D printed bio-materials or developing artificial intelligence to support medical decisions. This should be kept in mind in developing relevant policy agendas as well as cluster management activities.

The level of **internationalisation** and **access to global markets** have been also marked as decisive factors with 45% of the respondents indicating it as of “Great importance” and 34% of “Quite some importance”. Nevertheless what often happens in certain regions is that companies usually focus on the local market and do not think in international terms. Healthcare businesses do not have a path that they could follow in order to step out to foreign markets. There are good examples of this: for instance the rapid expansion of life science industries in Denmark was made possible largely due to international connectedness, acquiring intellectual property rights from the US and adopting a favourable attitude to foreign specialists (Vinnova, 2008).

Figure 11: Most important knowledge linkages



Source: Technopolis Group

Mobility schemes are not seen as critical by the survey respondents, which might reflect that such schemes are less effective in the long term than established collaboration platforms.

Box 3: The role of Aalto University student association in fuelling entrepreneurial mindset in Finland

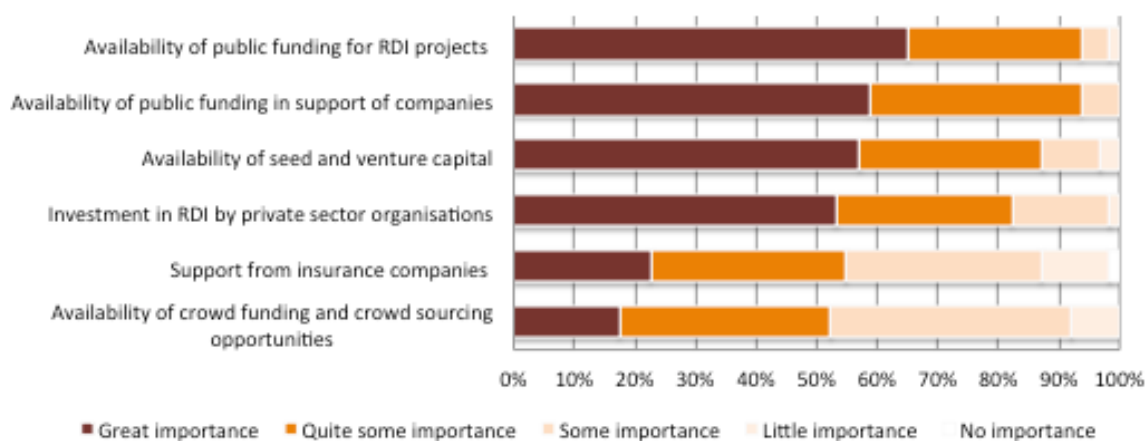
Today Finland is internationally known for its vibrant start-up culture. Yet only a decade or even five years ago this cultural phenomenon was not evident. It is only over the last couple of years that Finland has become a true frontrunner in this aspect. The country hosts an annual start-up event *Slush* that gathers start-ups, technology talent, international investors, executives and media for a two-day gathering. The success of the event has been stunning. *Slush* has grown from a meeting of 300 people in 2009 to the largest start-up event in Europe – planning to convene around 15,000 people in 2015. The start-up culture development has been a truly bottom-up process driven by a common societal realisation that Finland needs the next growth stage after Nokia’s global decline. In this respect Aalto University student association has played an enormous role in changing the mindset in the country. Entrepreneurially oriented extra-curricular activities have promoted the creation of many student start-ups and availability of experienced entrepreneurs as mentors have helped the companies to mature.

4. Access to finance

The survey respondents considered all sources (both public and private) of funding of great importance with a much higher share compared to other framework dimensions. The **availability of public funding for research, development and innovation** is perceived as more important by a larger share of respondents than investment in RDI by the private sector. This is interesting to see although one could have expected the emerging industries related to healthcare such as prevention, wellness or E-health projects need more investment in design or new business models than R&D.

It is also interesting that the availability of **crowd funding²** is seen as **less important** than other sources of funding. This might reflect that even if the topic is fashionable, in reality it is still new to people, more complicated to implement, and hence regional stakeholders do not rely on this type of funding to foster emerging healthcare industries.

Figure 12: Most important sources of finance



Source: Technopolis Group

An important underlying factor explaining the current weaknesses in cross-sectoral collaboration can be the intervention logic of existing funding schemes in many countries. As a rule of thumb **funding distribution in many countries is still channelled through a linear model** (even if with the implementation of smart specialisation strategies this might change in the future). Cross-sectoral projects, programmes or start-ups are more difficult to understand compared to the ones that fit one sector. It also requires a more collaborative approach in designing and implementing national programmes that span across several areas and players within the research and innovation system. As an outcome, the activi-

Box 4: Crowdfunding healthcare start-ups

Health Tech Hatch is a site launched in 2012 in the US to crowdfund specifically health start-ups. The objective was both to help health start-ups crowdfund and beta test their products with patients and physicians. Nevertheless, crowdfunding turned out to be more complicated since the amounts are usually too small and the funders do not see enough return on their investments.

Crowdfunding healthcare ventures in Europe is less popular. Although several general crowdfunding sites exist across EU countries, it is still an emerging source of financing.

Source: <https://gigaom.com/2013/06/05/crowdfunding-in-healthcare/>

² Crowdfunding is “the collective effort of individuals who network, usually via the internet, to pool their money to support efforts initiated by other people or organisations”. Oxford English Dictionary

ties supported by such funding are also more linear rather than cross-sectoral. As a result, enterprises find it harder to drive cross-sectoral activities, combine teams with technical and creative skills, and available knowledge does not capture the cross-sectoral nuances.

A second issue that some of the survey respondents from younger Member States highlighted is that sometimes the **system of grants can distort market needs**. Therefore it is often not conducive to stimulate the development of emerging healthcare industry clusters in the long term. Even if the current system of grants offers opportunities for new developments, it actually creates a short-term and unrealistic demand for projects that only live as long as there is public funding available. Since there is often no business concept behind such publicly funded RDI projects, the opportunity to put on the market a viable product or service is often missed. There are many organisations that survive on these public grants but do not connect to the real market needs.

5. Demand conditions

Customer readiness to adopt and use novel solutions has been singled out as the factor with the greatest importance by most of the survey respondents (see Figure). 42% of respondents mark this framework condition as of “Great importance” and 33% as of “Quite some importance”. Existing market demand and prospects for future market growth are the key considerations for entrepreneurial activity. The new emerging healthcare industries are user-driven; societal acceptance of the devised solutions determines the course of the new developments. Nevertheless proximity to healthcare providers that can be the basis for developing new healthcare products or services are seen more important than proximity to private customers – which again leads to the conclusion that embracing a mindset change within public healthcare institutions is a critical factor in unlocking the potential in emerging healthcare industries and scaling them up to a higher level of growth path.

Opportunities for innovative public procurement have been outlined as highly important by 38% of respondents and 32% give it quite some importance. Public procurement and especially innovative public procurement plays an important role in healthcare innovation. Nevertheless in order to convince public procurers to adopt new healthcare applications, there is a need for more **comprehensive empirical evidence** for their social and economic benefits, even if sometimes this evidence is limited and difficult to obtain at the start. Evidence is less well developed than the availability of technologies to facilitate it (Carrera and Dalton, 2013).

Nordic Innovation in 2011 started a programme “Innovation in the Health Sector through Public Procurement and Regulation” (run until 2015). One of the key aims of this programme is to “develop the supplier industry through closer contact with the public buyers”. The programme also acknowledges that procuring across borders can create a larger home market.

Public procurement rules, established labelling schemes and proximity to public and private customers are recognised as having quite some importance, but not being decisive. In addition to the listed framework conditions it has been underlined that for market uptake there is a necessity to introduce advanced products in combination with low cost.

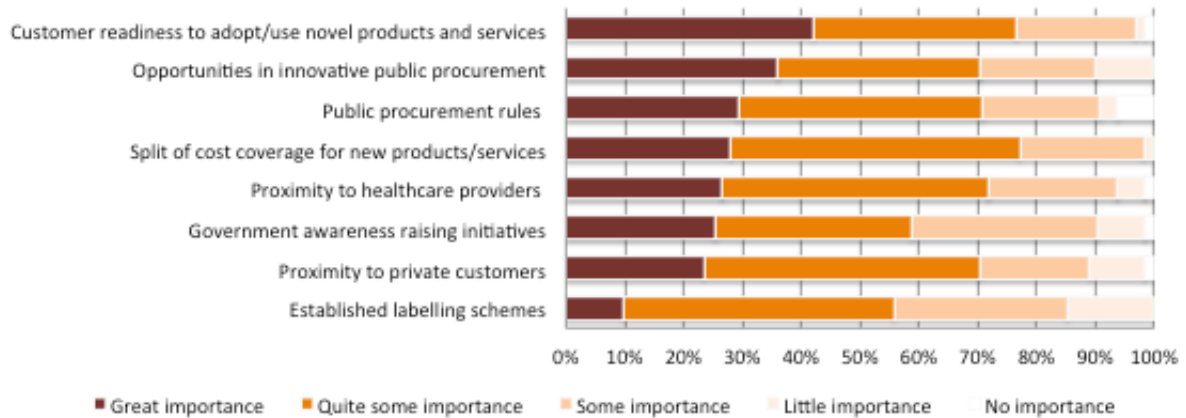
Interestingly government awareness raising initiatives were rated as less important although cus-

Box 5: Demand for healthy food in Debrecen, Hungary

The main goal of the Innovative Food Cluster organisation located in Debrecen, in Hungary is to foster the development, manufacturing and distribution of innovative activities in the area of functional food. The cluster members aim at creating jointly a highly attractive and market-driven platform of agri-biotech professionals, businesses and customers. One of the members, the i-Bolt <http://www.i-bolt.hu/> is for example selling healthy, functional food. They link their activities to large cultural centres or university campuses with the objective of stimulating healthier lifestyles. A key aspect that is seen as critical in unlocking the potential in this emerging cluster is including businesses and start-ups in thinking in the new business model. Research and innovation projects are less effective if there is no reality check and a creative thinking behind these ideas on how to turn them into viable business models.

customer readiness to adopt novel products ranks the highest. This can be also interpreted as the current government raising initiatives being seen as less effective. Nevertheless to address customer readiness some kind of awareness raising programmes and campaigns might be necessary.

Figure 13: Most important demand conditions



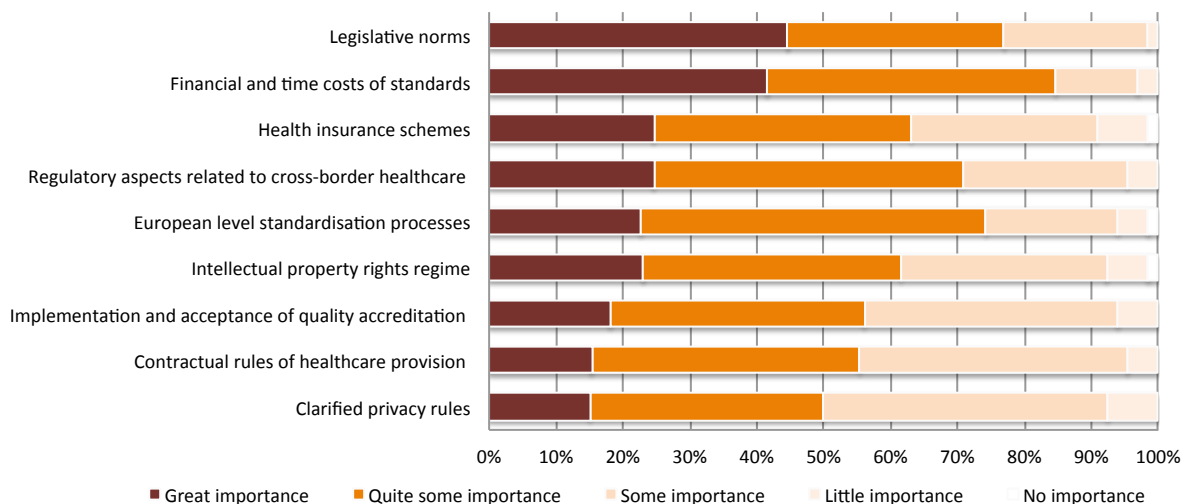
Source: Technopolis Group

6. Regulations

Legislative norms and **financial and time costs of standards** appear to be the most prevalent concerns: 45% and 42%, respectively, of respondents mark them as of “Great importance”. IPR plays greater importance for personalised medicine and E-health, less so for other fields.

European level standardisation and **regulatory aspects related to cross-border healthcare** are singled out as having quite some importance, despite the fact that they are not key drivers. The role of standards and legislative issues as incentives or rather barriers is debatable, but survey respondents indicated that they tend to be critical when it comes to reassigning capital for developing new innovative products.

Figure 14: Most important regulatory conditions



The question of regulation prevails in this category of framework conditions as it is present and applies in several sectors. The ICT sector is regulated with specific acts and standards that are sector specific as well as indirect ones regulating social behaviour and norms in general (such as personal data protection acts). The healthcare sector is well regulated both at EU level and by national legal acts as well as a number of standards. Regulation, standards and norms will stay as important framework conditions and most likely will gradually move onto the policymaking arena in the future. They can be much more influential in stimulating innovation activities in the economy than, for example, public procurement, but they are much more complex in their nature (for example, the design and implementation of regulations need time). They also need coordination between different ministries - which is much more difficult to implement - and their impacts are much less understood (Romanainen et al., 2014).

Last but not least **national healthcare reforms** that are ongoing in several EU Member States and changes initiated by national policy-makers gives a decisive framework for enabling or hindering the upscaling of emerging healthcare industries. As interviewees highlighted it is also important to align healthcare reforms with industrial strategies being developed in the area of life sciences, personalised medicine or other related industrial niches.

2.2 Framework conditions specific for e-Health

e-health is a perfect example of a convergence between several sectors in introducing new innovations and new economic and growth opportunities to the market. e-Health refers to tools and services using ICT that can improve prevention, diagnosis, treatment, monitoring and management of diseases. As such it brings, or has a potential to bring, huge benefits to the entire community meeting “the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers”.³ It also creates many business opportunities for companies working in various sectors but which by linking can bring e-Health solutions, e.g. information and data sharing, electronic health records, telemedicine services, portable monitoring devices, software for use in operating theatres, robotised survey, etc. Use of information and communication technologies in healthcare is probably the most important recent revolution in healthcare. It has been discussed globally since the 1990s but it has not yet been used as much as it was hoped for. There are various reasons behind this: insufficient or fragmented funding, set up and governance of healthcare services, resistance to change existing models of care, complex political environment (which require to make a stand on some politically sensitive questions), costs and complexities in implementing e-Health solutions, and insufficient evidence into the benefits of some solutions – to name just a few.

The survey and interviews conducted for this study and complemented with further desk research revealed several factors that are critical (or can be a key barrier) in fostering e-Health businesses and scaling up emerging firm activities into more concentrated and connected clusters.

Critical framework conditions:

- **Market**
- **New business models**
- **Pre-seed funding**

Key barriers:

- **Security and data protection**
- **Lack of interdisciplinary and management competences**
- **Cost of market entry**

³ http://ec.europa.eu/health/ehealth/policy/index_en.htm

Market and demand are critical factors – more so than the technology itself

The market entrance barriers in introducing e-Health solutions are relatively high and the public sector can play an important role, which is well understood. Despite the fact that the sector is highly regulated, the public sector can bring and create new e-Health business opportunities through procuring needed healthcare solutions. However, in reality this is not always what happens and there is often not or very weak link between public healthcare procurements and start-up businesses. This is something that is currently less exploited although it could be an important driving force.

Some users are not technically conversant to understand and use e-Health solutions. If there is no uptake of an innovation / new product on the market, it will be difficult to grow companies in that field. This relates to the employees of the healthcare sector – who will be using these solutions, the public sector – which will be implementing, operating and maintaining a national e-Health system, and patients. People need to be comfortable with the classifications used, data management, health and IT language and terminologies. For example, the elderly population who are not as technically savvy will be resistant to use e-Health solutions. Access to the Internet has the potential to improve the lives of these people and has the potential to reduce costs to the national healthcare system. Other groups of the population in danger of exclusion include, for example, rural and remote communities and social welfare recipients.

Another important issue related to the uptake of new innovation is the costs associated with its use. If healthcare providers and especially patients are taken the burden and the immediate financial consequences of the use of expensive technologies, it can slow down the uptake. Insurance and reimbursement procedures need to address this issue.

New business models and commercialisation strategies in e-Health matter

Open Innovation and crowd science are the new models present in the field. Hospitals are encouraged not only to adopt and diffuse innovation but also to come up with new innovations. Once the idea is clear, the help comes strongly from a number of accelerators working in the healthcare area in Europe.

Box 6: Platforms encouraging commercialisation as well as funding – UK and Europe

Healthbox in the UK – apart from creating a platform for seed and early-stage businesses to test and validate their businesses – also has a proprietary evaluation and commercialisation process aimed at the large healthcare organisations interested in identifying and advancing their internal innovations. Even if a company was not interested in e-Health in the past, it is possible to spark its interest in this area by creating opportunities.

Source: <http://www.healthbox.com>

The EU FP6 funded FICHe (Future Internet Challenge e-Health) accelerator programme targeted all European SMEs and start-ups interested in developing new applications in e-Health using FIWARE technology and are assisting 80 SMEs through mentoring, training, technical support, a real live field lab and financial support. The attractiveness of FIWARE is based on its cloud-based infrastructure for the creation and delivery of Future Internet applications and services. It is public and royalty-free, offering an attractive proposition to SMEs and start-ups both as a commercialisation model as well as a solution of pre-seed funding.

Source: <http://www.f6s.com> and <http://www.fiware.org>

Funding at pre-seed and seed stages are still seen as crucial

Usually venture capital funding is abundant but pre-seed and seed money is still seen as a key issue (as stressed by the interviewees). For young companies developing e-Health opportunities this is especially critical as the solutions brought by these businesses can offer huge benefits to different players in the healthcare system and can make the system more efficient or cost-effective. It is an issue that the maturity of businesses in this field is not sufficient to get funding given that emerging companies act in a seed phase. Visibility of the e-Health start-ups and acknowledgment of their solutions can serve as a springboard to rising necessary funding.

Box 7: Creating visibility in e-Health, Spain and EU

The e-Health Competition is one of the initiatives that offer such visibility. Running for the fourth year, this competition is targeting EU SMEs in e-Health and m-Health. Started as a sector initiative, it was first organised by TICBioMed (an e-Health cluster from the region of Murcia, Spain) and eVIA as unofficial competition in 2011 targeting only Spanish SMEs. The initiative was welcomed by the European Commission, which became its sponsor. This year's competition is also organised by TICBioMed with the endorsement of the Health and Wellbeing Unit of the European Commission. Although not a funding platform as such (the 1st and 2nd prizes give only €1,000 and €500), this Competition creates marketing opportunities for awarded (and indeed participated) SMEs to attract customers, partners and external capital. For example, winners will get an entry to the next hackathon organised by HealthStartup (www.healthstartup.eu), entrance ticket to MEDICA Brokerage event and an opportunity to present itself at Med-e-Tel 2016 (an event of the International Society for Telemedicine & eHealth). All these activities create an opportunity for SMEs to strengthen their business case and get access and increase their chances of getting funding from other competitions and programmes (including the Horizon 2020 SME Instrument), business angels and other early-stage funding opportunities as well as venture capitalists.

Source: www.ehealthcompetition.eu and <http://www.ticbiomed.org/>

A lack of optimisation within healthcare processes is a barrier that impedes innovation in e-Health on a number of levels

To start with, improving the healthcare processes, i.e. optimisation of medical processes, can in turn lead to more commercial opportunities. When the data are spread across several pools it makes it more difficult and more time consuming to ensure that the data can be used. Once the data are in one public pool, they can generate huge benefit and ideas for new innovative business solutions.

The next barrier to be overcome is the incompatibility of various IT operational systems. Very separate IT worlds exist in the hospitals and clinics of various countries. Even within the same country it is still an issue, e.g. one IT application system is used in hospitals and another used in ambulances, which makes data transfer almost impossible.

Even when these operational and technical issues are tackled, the question of data protection and security comes into play. e-Health generally deals with highly sensitive data. This issue becomes even bigger when a new opportunity crosses borders. The EU's Data Protection Directive (which declared privacy a human right) presented a data management challenge. On the one hand, the patient data presents an invaluable source of information, which can lead to new e-Health solutions, but on the other hand, the data hold lots of private confidential information which needs to be protected. The Big Data protection and security question is on the agenda in many sectoral discussions (not only healthcare) and as its importance is growing it is likely to come to one or another solution suitable to the sector development.

Complementary skills are crucial for e-Health

The area of e-Health requires merging the skills of several disciplines such as IT, healthcare services, medicine, etc.. One major problem is that IT specialists do not always have knowledge and skills in medicine, and vice versa. It is also more difficult to find medical doctors interested in entrepreneurial opportunities than IT specialists interested in applying their solutions in another field (for example, medicine). Companies and investors often employ or engage doctors to help with the adoption of a new technology or solution. This is done in order to understand the healthcare needs in a given country, e.g. only prescribing medicine after a face-to-face meeting. On a more technical side, there is also a shortage of health informaticians, and training and recruitment of such professionals is still difficult.

The market is relatively closed and somewhat limited locally

Due to differences in healthcare provision and regulations, e-Health at the moment is more a local (at its best, national) market rather than European. Thinking locally makes sense when addressing the needs of the local community being served by a given e-Health solution. Nevertheless, the potential for larger development is in applying new innovation in numerous locations. This, however, becomes tricky as application of opportunities is coordinated by the public sector. As has already been discussed in earlier parts of this report, procurement of new technologies and solutions to the national healthcare system is often very complex; standards and regulations are often not clear enough for companies or not supportive enough of the new technology / solution; issues of security and privacy in using healthcare information create a barrier. Since regulation and legislation often lag behind technology, privacy is generally addressed in reactive rather than proactive terms and in many cases impedes the development of innovation.

2.3 Framework conditions specific for prevention and wellness

As described in section 1.1 the preventive healthcare and wellness sector comprises diverse industries that provide consumer goods and services for preventive, curative and rehabilitative care. The sector can be best characterised as a continuum of businesses ranging from treating disease to a multidimensional and holistic approach that focuses on complete physical, mental, social wellbeing and disease prevention. The constituent markets of the sector encompass, among others, medical devices and wearables, fitness and sports, health tourism, medical hotels, SPAs and massage facilities, alternative medicine and therapies, health focused media, occupational health solutions and other consumer products and services. The key characteristic of preventive healthcare and wellness is the fact that the sector is heavily consumer driven, as people voluntarily become the users of these products and services. The digitally enabled and health conscious consumers are creating demand for innovative products and novel types of service delivery incentivising new cross-sectoral collaborations among established industries.

The survey and interviews conducted for this study and complemented with further desk research revealed several factors that are critical (or can be a key barrier) in fostering prevention and wellness and scaling up emerging firm activities into more concentrated and connected clusters.

Critical framework conditions:

- **Paradigm change in society**
- **Concentration of complementary skill-sets**
- **Supporting access of start-ups to larger companies**

Key barriers:

- **Heterogeneity of national healthcare regulatory requirements**
- **Eligibility difficulties to apply for R&D funding support**
- **Closed business mentalities in traditional wellness sectors**

Societal awareness of the importance of preventive healthcare and lifestyle changes is key to the creation of market demand

The rising healthcare costs and unsustainability of the current healthcare system increase the economic importance of preventive healthcare measures and lifestyle changes. Growing awareness that prevention lowers healthcare costs and increases productivity and wellbeing gradually changes the cornerstone of the healthcare paradigm. Market outlook studies and also interviewees clearly indicate that there is a great deal of untapped potential for the growth of the sector in Europe despite that fact that a lot of activity has been already undertaken. Unsaturated market opportunities and positive prospects for the growth of future market demand are the main incentives for encouraging entrepreneurial activity and innovation in this area.

Concentration of the rights skills at the right time play a decisive role

Innovative solutions and business ideas in prevention and wellness sector require the concentration of diverse complimentary skills not only across sectors, e.g. life sciences, medical research, ICT, but also within broader sectoral areas. For example, in wearable technology business model hard science knowledge in building devices and sensors need to be complemented by design thinking and under-

standing of ICT service delivery. These are very different backgrounds and skill sets that need to come together. The critical mass of necessary skills concentration usually stem from exploiting existing industrial strengths or taking advantage of declining industries.

In Finland, for example, the fact that Nokia laid off thousands of people with technical skills and experience in mobile technology development coupled with a rising number of entrepreneurially minded young people led to an increased start-up activity and clustering of young companies focused on mobile applications for preventive healthcare and wellbeing. An important supporting factor to this clustering was the fact that there were physical premises at Open Innovation House in Espoo where start-up teams in the prototyping phase and still thinking about their business model could meet and exchange. This concentration of complementary skills and identification of the unsaturated market niche led to a rapid expansion of the cluster. If in 2013 the first cluster member meeting convened only some 15 companies, than within only two years this number has grown tenfold.

Support to start-up access to larger companies is critical for the success of innovative entrepreneurship

According to the CEO of Reckitt Benckiser, a multinational consumer goods company, consumer health is one the most fragmented markets in the world (www.reuters.com, 11 September 2013). It is only a matter of time until fragmentation leads to new consolidations. Business research reveals that in consumer health market the gap between high performing companies and others is widening. Leading companies are swiftly adapting to customer needs through acquisitions and alliances that reshape their portfolios (Accenture, 2013). With multiple industries converging and transforming the consumer health market, new companies have to be particularly agile to bring about new collaborations to maintain relevance of their business idea.

In this dynamic and evolving business environment start-up and SME access to large companies is crucial as it can prove very difficult for highly innovative small companies to upscale their business idea without the involvement of larger players that hold more developed product and service portfolios. Platforms and arenas that enable the exposure of start-up business models to bigger market players are critical for speeding up innovative entrepreneurship.

Box 8: EIT KICs as vehicles for start-up exposure to larger companies

The concept of the knowledge and innovation communities (KICs) of the European Institute of Innovation and Technology as large collaborative, trans-European and thematic public-private partnerships hold great potential for fostering innovative start-up growth. KICs serve as geographically dispersed theme-driven innovation platforms bringing together various types of public and private actors of the innovation system and allowing serendipitous encounters. One of the KICs – EIT ICT Labs – that has defined also a separate innovation action line for health and wellbeing proved to be highly instrumental in helping small Finnish start-ups in wearable technologies to open the doors and raise the interest of large multinational companies such as Philips.

Source: <http://eit.europa.eu/activities/innovation-communities> and <http://www.eitictlabs.eu/>

Heterogeneity of national healthcare regulatory requirements pose barriers for market entry

Preventive healthcare and wellness industries lie at the intersection of a state-regulated healthcare system and consumer driven market. There are very diverse market structures, incentives and regulations in place across different countries and various actors in the healthcare system may play different roles, making it difficult for young companies to navigate through the national set-up.

In countries where regulatory environments have more scrupulous oversight on preventive healthcare products and services the market entry can become thorny. An important factor that companies have to encounter is the requirement for medical certification to prove the claimed health outcomes of a product or service. For example, wearable devices are rapidly emerging applications intended for daily use under increasingly diverse situations, e.g. from fitness apps to insulin intake reminder devices. To date no single set of standards exists that would evaluate all types of emerging wearable devices. For those wearables used as medical devices more accuracy and consistency in the performance is required, thus also stricter certification rules prevail. Companies engaging in this market niche have to understand in detail the national regulatory requirements, as well as time-scale for applicable certification procedures. These kinds of uncertainties significantly increase the complexities and challenges in upscaling entrepreneurial activities in the emerging healthcare industries.

Enterprises in wellness sector face difficulties to qualify for R&D funding support

Public support to R&D projects is one of the main mechanisms how companies are stimulated to engage in innovation. The secondary healthcare market for preventive healthcare and wellness comprises a vast range of sectors of consumer products and services that integrate health benefits but to a varying degree of “scientificity”. The wellness sector in particular tends to employ “softer” aspects such as nature, water and sound for introducing new products and services. For example, classical tourism and wellness sectors are increasingly integrating new types of massage therapies, spa and sauna offerings, body and soul concepts and nutritional products in their services incentivising business opportunities for local wellness oriented SMEs. Yet such types of innovative output are difficult to compare and measure the same way as, for example, innovation in the area of medical technologies. The experience from the long-standing wellness cluster in the Austrian region of Tyrol suggest that cluster companies have been facing persistent difficulties to apply for public funding for RDI projects as the proposed initiatives were not considered sufficiently research driven.

Closed business mentalities in traditional wellness sectors hamper cooperation for innovation

Hospitality and tourism are traditionally strong sectors that increasingly integrate preventive healthcare and wellness offerings. As outlined in section 1.1. Europe is at the frontline for the frequency of wellness travels. This signifies the rising demand and rising supply for such services as wellness spas, health cruises, fitness offerings and mind-body-soul retreats. There are many opportunities to bring about more innovative solutions creating, for example, cross-links with energy and construction sectors for more energy efficiency solutions, mobile and IT technologies for one-stop-shop services and bringing more lifestyle and wellness products within the existing business models. Clusters provide a platform for fostering such cross-sectoral collaborations, yet as interviewees point out that is not always easy. The tourism and hospitality sector is traditionally characterised by closed business mentalities as all innovative products and services can be quickly copied by the competitors. For this reason new collaborations are forged slowly and in a rather isolated manner.

3. Policy recommendations

The policy recommendations presented in this chapter outline those areas of intervention that national and regional policy-makers and cluster organisations should consider in order to create more favourable conditions for emerging healthcare industries.

Healthcare is a complex system to tackle but will have to be addressed in order to stimulate more innovation

The first set of recommendations relates to the healthcare system – whether on the European level as a whole or within each individual country.

First, changing or adjusting **procurement practices within healthcare** is paramount for the success of the introduction and uptake of new healthcare ideas and development of new businesses as a result of this uptake.

- An issue of linking suppliers of innovation healthcare solutions with buyers in public sectors within one country or cross-border needs to be addressed first. For example, policy-makers should seek to motivate healthcare organisations to be at the forefront of healthcare innovations by acting as good first customers that buy, try out and give feedback on new inventions.
- SMEs (with their new healthcare innovations) can be offered simplified procedures or additional encouragement to become suppliers to the public healthcare organisations. For example, when a public sector healthcare organisation assesses and decides on which new product / solution to include on their list, SMEs from which ideas have received acknowledgement or recognition of experts in the field should receive extra points during this evaluation process. Recognition here could be support from business angels and venture capitalists that have an established record in supporting healthcare businesses – or European level funding from Horizon 2020 or similar instruments.
- Legal frameworks for public procurement need to be further harmonised on the European level in order to encourage cross-regional uptake of healthcare innovation. While this requires complex and time-consuming efforts, certain steps can already be made. For example, cluster organisations in different countries can act as a first point of entry to the national healthcare system. They can offer SMEs a guide and explanation on how public procurement in healthcare works in a particular country, what is the easiest way to get access to the national healthcare system and what triggers interest for new innovations in healthcare. This requires for a cluster to have ongoing discussions and connections with players in the national healthcare system.

Second, existing **jurisdictional barriers to cooperation** (particularly when there are conflicting regulations between different countries) need to be addressed. Here, for example, cross-national working groups on the implementation of standards or harmonisation of the regulations can be convened under the leadership of the European Commission.

Third, the system should allow sufficient **freedom for creativity and serendipity** to flourish and bring interesting new developments. Policy support measures can be development to support this. For example, some of the measures can continue to target cross-sectoral cooperation by pulling companies from different sectors together and by encouraging them to cooperate. Other measures and incentives can look into physical co-location of different profile companies, for example, bringing healthcare and space technologies companies under one roof and creating physical opportunities to work together

(perhaps, even sharing some equipment); or establishing a business incubator at a hospital, thus creating a physical link to the healthcare environment.

Emerging sectors require new skills and conditions

The second set of recommendations relates to the factors related to the nature of the emergent industries in healthcare.

First, **skills development and capabilities building related to the emerging industries** need to be brought onto the European, regional and national agendas.

- Bringing up a generation of healthcare managers – who understand both the healthcare system (i.e. hospitals from within and the needs of healthcare professionals or patients) and another sector, for example, ICT – is crucial for the future growth within the emerging healthcare sector. This way it will not only close the existing gap in needed skills but will also show current students opportunities in having cross-sectoral knowledge.
- As many emerging opportunities in healthcare are related to the use and application of ICT, there is a need for promotion of education, training and national planning capacity in information systems and technologies.
- A gap in provision of training in certain areas, for example, health informatics and other cross-disciplinary subject areas need to be addressed. Education curricula for such subjects should be available across Europe.
- Finally, a regional (and perhaps, later European) network and a rotational system of emerging healthcare mentors / advisors (who have successfully developed a new product and grew their business in the area) can be started. At the same time, regional or national authorities can set up a programme through which start-ups can apply for a grant with the help of which they can 'buy' support from a mentor / advisor from that network.

Second, although funding availability is not a new area as such when it comes to the development of new business opportunities, **funding of cross-sectoral collaborations at all stages** (i.e. pre-seed, seed and later stages) is important for the emerging industries in healthcare. Several elements are crucial here, namely:

- On a national level, it is recommended to move from more linear (sector focused funding streams) to interdisciplinary funding. This requires various sectoral ministries working more closely together – a step which is not always possible to implement.
- Tax incentives for investment activities (which exist in many countries for business angels) can be revised to introduce specific conditions on tax incentives for investments into emerging healthcare businesses, and in this way stimulate a supply of funding. Special tax incentives can be introduced in relation to crowd-funding as well.
- It is important to maintain continuity of funding, as innovations in emerging industries require more time for uptake and momentum building.

Third, speeding up the adoption of novel solutions depends on the presence of factors such as **incentives**.

- Governments play a role by setting up goals for better health, better nutrition, and though policy mechanisms can somewhat shape the direction of a new sector. The vision that that e-Health, preventive healthcare, food for health will be very important in the future is a decisive factor to drive businesses in the niche areas. Policy-makers at all levels (including the Euro-

pean Commission, national and regional governments as well as sectoral ministries) should clearly communicate these directions.

- In developing relevant policy agendas and cluster management activities crowd-sourcing and open access database (which already exist) need to be kept in mind.
- National policy-makers should establish mechanisms to create or secure markets for new technologies, thereby reducing the risks involved in R&D and improving the chances of a satisfactory return on investment in ICT for the private healthcare sector.
- Greater incentives are needed for healthcare providers to help companies understand the needs within the healthcare system. The establishment of company incubation facilities within large teaching hospitals would help the setting up and growth of healthcare focused SMEs (in addition to also creating opportunities for creativity and serendipity as discussed in an earlier recommendation).

Emerging sectors need to be understood

The final set of recommendations relates to an understanding of emerging sectors in healthcare, as each new development needs time to be taken up and accepted.

First, it is important to continue creating fruitful ground for new emerging healthcare innovations to develop by **stimulating public demand**.

- The new emerging healthcare industries are user-driven, thus societal acceptance of the devised solutions determines the course of the new developments. To achieve the change in societal attitudes, awareness raising programmes and campaigns, spreading interesting examples, creating role models may be necessary.
- Cluster organisations can develop a proactive way of offering and 'selling' emerging healthcare ideas / companies within their cluster to large companies, healthcare providers and other potential 'buyers'.

Second, **coordination and collaboration between regional/local agencies and state authorities** in the topics of emerging healthcare innovations needs to be put in place and maintained. Targeted collaborative platforms and interactions between the local authorities, national authorities, big businesses and local SMEs should be set up either on the basis of already existing collaboration platforms or from scratch in the regions where such platform do not exist. This will build a solid basis for good promotion of new concepts, thus contributing to the understanding and uptake of innovations.

Third, for new innovations to be understood better, **platforms and environments for piloting potential innovation** can be promoted further. Initiatives like Living Labs offering a user-centred, open-innovation ecosystem integrating research and innovation processes within the society is a concept that needs to be applied more for the testing of emerging healthcare innovations.

Multi-actor cooperation will be required to take all these various recommendations forward involving public sector (both on the European and national levels), sector organisations (including cluster organisations), higher education and research sector, financial services, entrepreneurial support organisations and other actors.

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Annex 1: Survey questionnaire

Section 1: Introduction

The European Cluster Observatory is a single access point for statistical information, analysis and mapping of clusters and cluster policy in Europe. 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.

Technopolis Group as the member of the European Cluster Observatory consortium is preparing a **case study on factors that can influence the development of emerging industries in the area of healthcare**. Emerging industries include, for instance:

- E-Health
- Nutritional healthcare
- Personalised medicine
- Place-based healthcare
- Preventive healthcare and wellness

Within this task we are undertaking a **survey among cluster organisations** across the 28 EU Member States and the EU Associated Countries. The aim of this survey is twofold: 1) to identify cross-sectoral collaborations in healthcare related areas that European clusters engage in; 2) to determine those cluster-specific framework conditions that foster cross-sectoral innovation and entrepreneurship in emerging industries related to healthcare.

If your cluster organisation is currently engaged in any of the emerging industries related to healthcare or is planning to do so in the future, we would be very grateful if you filled out this survey by **13th April 2015**. The survey will take no more than 20 minutes of your time. If your cluster organisation is not involved in any activities with respect to emerging healthcare related industries, please disregard this survey.

All answers and comments will be treated as strictly confidential and non-attributable. The survey results will be reported in aggregate and anonymous form. Your answers will be saved only when you click on the "Done" button at the end of the survey. If you have any questions or comments about the survey please do not hesitate to [contact us](#).

We thank you very much in advance for your contribution to the study!

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*:
3. Region where your cluster organisation is based (if applicable):
4. Your name*:
5. Your position:

Section 3: Overview of the cluster focus and characteristics

6. Please select in which emerging industry companies in the cluster that you represent are active in*: *(no restriction to the number of options)*
 - E-Health
 - Nutritional healthcare
 - Personalised medicine
 - Place-based healthcare
 - Preventive healthcare and wellness
 - Other: please specify
7. Please select which cluster category is the main focus of the cluster that you represent? *(no restriction to the number of options)*
 - Agricultural Inputs and Services
 - Apparel
 - Biopharmaceuticals
 - Business Services
 - Communications Equipment and Services
 - Downstream Chemical Products
 - Financial Services
 - Fishing and Fishing Products
 - Footwear
 - Hospitality and Tourism
 - Information Technology and Analytical Instruments
 - Insurance Services
 - Lighting and Electrical Equipment Appliances
 - Marketing, Design, and Publishing
 - Medical Devices
 - Music and Sound Recording
 - Performing Arts
 - Printing Services
 - Production Technology and Heavy Machinery Automotive
 - Recreational and Small Electric Goods
 - Textile Manufacturing

- Transportation and Logistics
- Upstream Chemical Products
- Video Production and Distribution

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

8. In what year was your cluster organisation created?

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

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

10. What percentage of the cluster members are companies engaged in the emerging healthcare related industries you identified?

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

Please provide comments, if any:

11. What percentage of the cluster members are start-ups (or spin-offs) entering healthcare related emerging industry(ies) you identified in question 6?

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

Please provide comments, if any:

12. What has been the main driving force behind the creation of the cluster?

- Spontaneous cluster: genesis is based on a spontaneous agglomeration of key enabling factors without direct commitment of public actors
- Policy-driven clusters: formation is a consequence of active efforts and policies of governmental agencies aimed at cluster development
- Hybrid clusters: where the features of both of the above types are observed

Please provide comments, if any:

13. Please indicate what best represents the geographical scope of the members of your cluster:

- Regional
- National
- European
- Worldwide

14. In your view, what emerging business areas related to healthcare can drive the future development of your cluster?

Section 4: Identification of framework conditions

15. Please list the top three incentives that, in your opinion, promote entrepreneurship and innovation in the emerging healthcare related industries:

16. Please list three the most important barriers for clustering and accelerating business activities in the emerging healthcare related industries:

17. Please rate the degree of importance of the cluster-specific factors listed below that can foster business creation, entrepreneurship and innovation in emerging healthcare related industries.

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 im- portance	Quite some im- portance	Some im- portance	Little im- portance	No im- portance	Not appli- cable
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"/>
Public procurement rules in healthcare	<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 products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Government awareness raising initiatives about life style changes for healthy living	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proximity to healthcare providers in need of new products/services	<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 products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer readiness to adopt/use novel health related products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Split of cost coverage for new products/services between healthcare system and patients/consumers	<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 emerging healthcare related industries:

18. Regulatory factors

	Degree of importance to fostering entrepreneurship and innovation in the area of prevention and wellness					
	Great importance	Quite some importance	Some importance	Little importance	No importance	Not applicable
Intellectual property rights regime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legislative norms	<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"/>
Clarified privacy rules	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Implementation and acceptance of quality accreditations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractual rules of healthcare provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Regulatory aspects related to cross-border healthcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health insurance schemes	<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 emerging healthcare related industries:

19. 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 healthcare 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 healthcare sector actors and private businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost of entering into an emerging sector of business activity	<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 (including big data 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 entrepreneurship factors have been important in fostering business development and innovation in emerging healthcare related industries:

20. 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 education establishments that provide skills base for the emerging industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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 emerging healthcare related industries:

21. Knowledge transfer factors

	Degree of importance to fostering entrepreneurship and innovation in the area of prevention and wellness					
	Great importance	Quite some importance	Some importance	Little importance	No importance	Not applicable
Existing collaboration platforms among companies, healthcare professionals, 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 (e.g. Innocentive)	<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 emerging healthcare related industries:

22. 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/innovation/internationalisation	<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 and crowd sourcing opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support from insurance companies	<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 emerging healthcare related industries:

Section 5: Recommendations for cluster policy makers

23. In your view, what can national/regional policy makers do to support the clustering of innovative and growth oriented companies and promote the development of emerging industries in the area of healthcare?

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 and offer new opportunities in healthcare industries.

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

Thank you for you participation!

Annex 2: List of interviewees

- Gonzalez Jorge – Managing Director of TICBioMed, Spain
- Heroufousse Francois - Director of the Food Competitiveness Pole Wagralim, Belgium
- Rab Mate - Director of DTMP Science and Technology Park of Debrecen
- Ranzi Robert – Program Manager at Cluster Wellness Tyrol, Austria
- Tärnov Külle – Manager of Health Tech Cluster, Estonia
- Törner Lotta – CEO of the Skane Food Innovation Network, Sweden
- Trinkwalter Jörg - Member of the Executive Board and Director of Cluster Marketing & Development at Medical Valley EMN, Germany
- Turpeinen Marko - Director of EIT ICT Labs Helsinki co-location centre, representing Health SPA cluster, Finland
- Katharina Robohm - Bureau Alsace Europe

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

<http://ec.europa.eu/enterprise/initiatives/cluster/observatory/>

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