

CLUSNET FINAL REPORT

**ORGANISING CLUSTERS FOR INNOVATION:
LESSONS FROM CITY REGIONS IN EUROPE**

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1. The CLUSNET project

Clusters have become a focal point of new policy initiatives in recent years in Europe. Mobilising the potential of clusters is now seen as central to regional, innovation and industry policy; at regional, national and EU levels. Clusters – regional groups of interconnected companies and associated institutions in particular industrial fields – are important because they allow companies to be more innovative than they would be in isolation. Thus, an enhanced understanding of cluster dynamics is key to improve regional growth strategies, innovation strategies and to transform industrial policy across Europe.

The CLUSNET project has been a three-year project (2009-2011) working towards three main objectives:

1. Improving the effectiveness of cluster support policies in larger European city-regions
2. Exchanging best practice from cluster cases across the city regions
3. Facilitating trans-national networks between cluster organisations and public officials working with cluster policy across partner cities

CLUSNET has been financed through the Interregional Cooperation Programme INTERREG IVC, financed by the European Union's Regional Development Fund, which has been set up to promote cooperation between Regions of Europe, and furthermore to share experience and good practice in the areas of innovation, the knowledge economy, the environment and risk prevention.

CLUSNET is based on a partnership consisting of the following cities:

Lyon (lead partner)
Barcelona
Budapest
Dortmund
Eindhoven
Gothenburg
Helsinki
Leipzig
Manchester
Munich

EUROCITIES and the Stockholm School of Economics (Center for Strategy and Competitiveness) have also been partners in the projects.

Cluster policy support has become an important element in economic development efforts of city-regions. However, the nature and impact of such efforts vary enormously, making it difficult for decision makers to find the right combination of tools that most effectively support cluster. City-regions are therefore searching for greater knowledge in this policy field. Hence, the objective of the CLUSNET project is to improve the effectiveness of cluster support policies in larger European city-regions.

Through the analysis of cluster programmes and organised clusters in the involved cities, the project has aimed to produce operational policy recommendations targeting each partner city on how to strengthen their efforts in cluster policy support. The project has also facilitated linkages between clusters from partner cities.

Since early 2009, the CLUSNET project has organised policy workshops in partner cities with the participation of numerous policy makers and clusters managers from all over Europe. During each workshop, in-depth policy analysis of existing cluster policies has been conducted with the objective to produce concrete suggestions for policy improvements. During CLUSNET workshops, networking activities and B2B meetings have furthermore been organised for cluster managers from partner cities in order to stimulate cross-border collaborations. In parallel, CLUSNET has enabled policy makers to participate in thematic in-site visits allowing them to engage in more direct, bilateral policy exchanges.

As a result of these activities, policy makers have gained an even better understanding of the complexity of successful cluster policy support, while at the same time gaining insight into the challenges facing European clusters today. As a platform for policy exchanges, CLUSNET has contributed to the design of even more effective clusters support policies in European cities. The lessons learned and policy recommendations born out of this work are to be found in this report. Together with the successful inter-cluster contacts generated by the CLUSNET project, these policy recommendations constitute the core result of three years of activities.

2. Innovation and clusters

Some firms are envied – they are innovative. Household names like Apple, Google, Toyota, Samsung and Twitter are listed among the most innovative firms in the world (Business Week top-100 Innovators). Innovative firms are both large and small, and innovative firms turn out a stream of new products, services, processes and smart business models. We argue that the common trait of innovative firms is not that they are staffed with particular people, or that their organisations are geared towards creativity and commercialisation. There is maybe some element of truth in this, but the important common denominator is that innovative firms tend to have their home base in particular environments – in dynamic clusters. It is obvious that there are more innovative clusters in the developed world, but when comparing rich countries, or even regions within advanced countries, they differ enormously in their overall capacity for innovation and in which areas of technology and business innovation occurs.

It is well understood that innovation is distinct from invention. Invention is the creation of something new, often with a technical meaning. Inventions can be patented. Innovation is also about new things; new products, production processes, services and novel business models. But this is only the first side of the coin. The other side is about bringing the new product or service into use and commercial value. The height of an innovation is not about how big the idea is, but how widely it is coming into use. For example, the introduction of e-mail became an enormous innovation, even if the technology was more mundane. So there are two sides to the coin; developing a new idea, product or service, and bringing it to the market. As we will see later, clusters are critical to the second half.

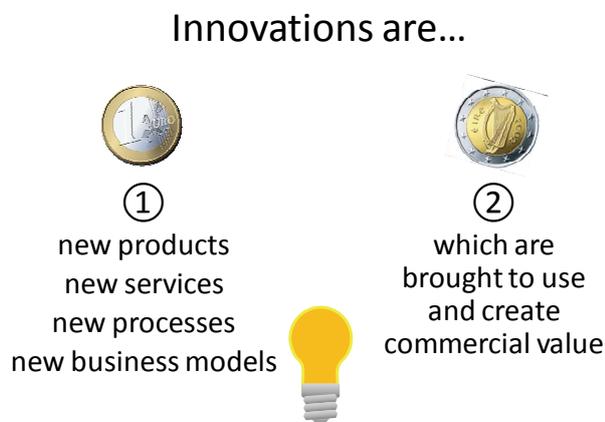


Figure 1. Two aspects of innovation

We can distinguish between two main sources of innovation: the scientific community and entrepreneurs or entrepreneurial firms, both large and small. The world of science and research generates new knowledge, ideas and concepts. Inventions and scientific discovery has led to numerous start-ups. In 1972 a Swedish professor at the Karolinska Institute in Stockholm, Lars Leksell, and his two sons, started up a company called Elekta around an

inventive idea of using gamma radiation to treat brain tumours. After 20 years of clinical trials, the so called “gamma knife” had been born and was brought to the marketplace. Medical technology, biotechnology and pharmaceutical firms emerge in close vicinity to leading universities in cities. Either they have been attracted to the location, or they were once a product of research transferred into commercial use as in the case of Elekta. When one of the world’s leading Pharmaceutical companies – Novartis – announced that they would move core operations from Switzerland to Cambridge, Massachusetts, it was an act of shifting the research home base from one regional context to another, from one cluster to another. As we will see in the next Chapter, connections between academia and business are crucial for innovation in many fields. Since city regions are home to universities and laboratories, we see an overrepresentation of innovation seeds from science in such regions.

Seeds of innovation

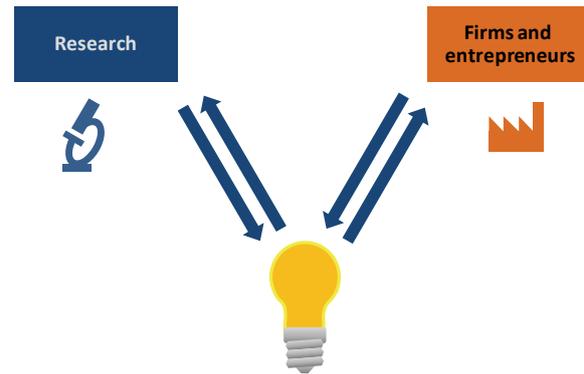


Figure 2. Two seeds of innovation

But there is another side to the seeds of innovation which is about acts of entrepreneurship. The classical Schumpeterian entrepreneur is a person that manages to develop new products and ideas that are brought to the market place, often with catastrophic consequences for established firms based on an old technology or business model. According to Schumpeter society develops through a process of creative destruction, where the novelty takes place at the detriment of established institutions and technologies. About a century ago the automobile entered the marketplace, which would fundamentally transform our society. In Sweden there were two young men, Assar Gabrielsson trained at the Stockholm School of Economics, and his friend Gustaf Larson, trained at the Royal Institute of Technology, working for the bearing company SKF. They had noticed the quickly growing industry, and in the early 1920s they agreed that they should start their own company, and take up production of cars. The small firm, set up in Gothenburg and named Volvo, developed within a cluster of manufacturers of engines (e.g. Pentaverken), gearboxes (e.g. Köpings Mekaniska Verkstad), bearings (e.g. SKF from which the company was spun off), metal casting (e.g. Bofors) and many other key technologies and industries. Innovations were brought in from the US and adapted to Swedish circumstances. The first car that came out of the assembly hall in 1927 was quite a modest product. However, Volvo later developed a long series of innovations, particularly related to safety and the environment.

Let us shift to another start up. On March 31, 2006 the Twitter Beta version was launched on Jack’s birthday. Three guys in Silicon Valley - Jack Dorsey, Biz Stone, and Evan Williams - were about to launch a new product that would take off at an enormous speed. Twitter would not just create a new business but also help Barack Obama into the White House. Biz and Evan had left Google a couple of years

Innovation

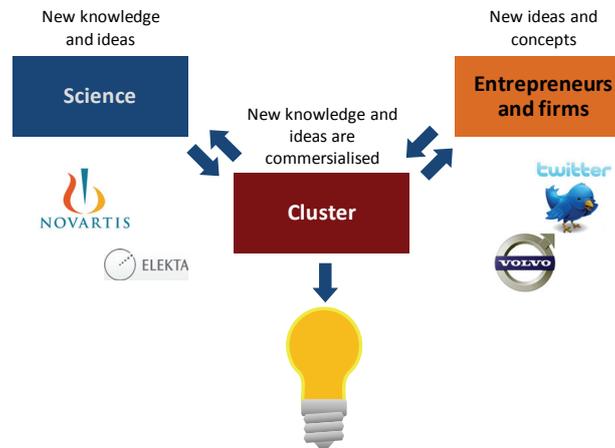


Figure 3. Innovation and clusters

earlier and had joined Jack at Odeo. After twisting the idea many times, the code was developed in a matter of weeks. Volvo and Twitter are two examples of innovations based on entrepreneurship, with little or no connection to the world of science. But both are important examples of new firm formation within clusters. And both Volvo and Twitter were in a sense not new ideas. The first Volvo car and the assembly line concept were a mere copy from the US, and the Twitter concept already existed in Finland, developed by the small firm Jaiko.

As we mentioned earlier, research is home to many innovations. But the fact that your city has a university does not guarantee a stream of innovations. Imagine that you fly over Geneva in Switzerland. You see the beautiful lake and infrastructure surrounding the city – and a magnificent alp landscape. If you lower yourself you will soon detect a university but also one of the most impressive research facilities in the world – CERN. CERN has more than 50 years of research in particle physics.

The Large Hadron Collider (LHC) was inaugurated in 2009, putting CERN as the number one site in the world. Five Nobel Prize laureates have their roots at CERN. Now, take you plane and fly over to California in the US. Again, we see a similar landscape and general infrastructure with roads and building, but as we enlarge the picture we will soon discover a university and the Stanford Linear Accelerator – SLAC. This is also an impressive research site, on par with CERN. Also SLAC boast five

Two Impressive Research Environments

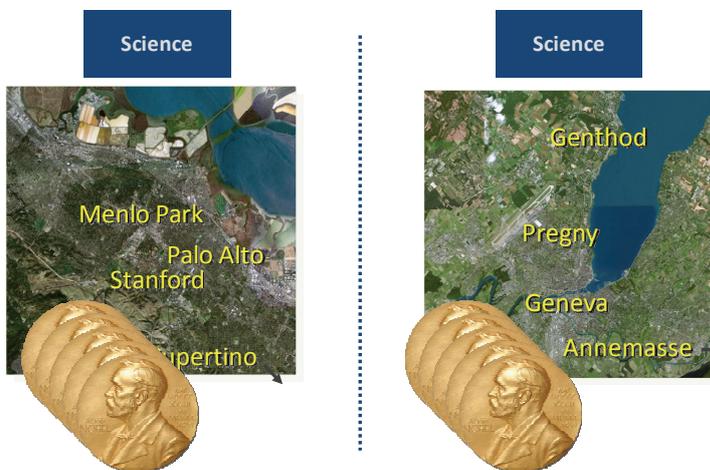


Figure 4. Two research environments: Stanford and Geneva

Nobel Prize laureates connected to the center.

Thus, we can conclude that in terms of potential spill-over, both sites offer great scope for innovation. But now we come to the big difference. Stanford campus and SLAC are in the midst of one of the most impressive clusters in the world – Silicon Valley – a cluster that produces large amounts of innovations, especially within IT and the Internet. Even the World Wide Web, once created at CERN by group of researchers that needed a digital communication network, was turned into a host of innovations in Silicon Valley. Stanford had begun to build bridges to industry already in the 1940s and 1950s, giving birth to the cluster, much different from Harvard and other leading universities in the US. Three, four decades later whole new industries and clusters emerged in what now had become “Silicon Valley”, a term coined in 1973. There is also a very prestigious university in Geneva, but the surroundings mostly host cows, meadows and beautiful Alps. So, when some 20 million dollars were invested in the start-up company Yelp in Silicon Valley, a couple of years ago, the same amount was paid to a famous painter to repaint the ceiling of the main hall of the U.N. headquarters in Geneva. Guess which investment has the largest chances of creating tomorrow’s jobs and firms?

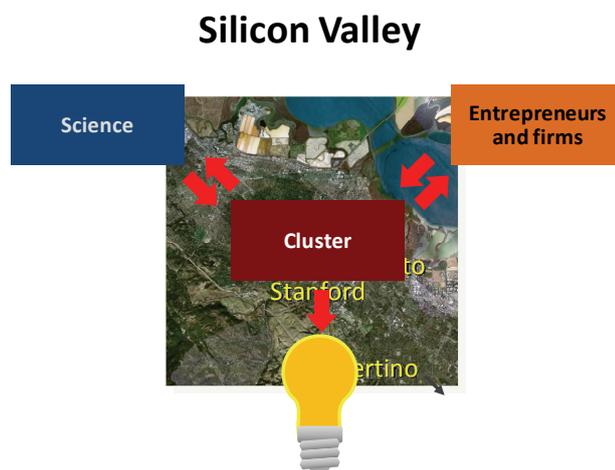
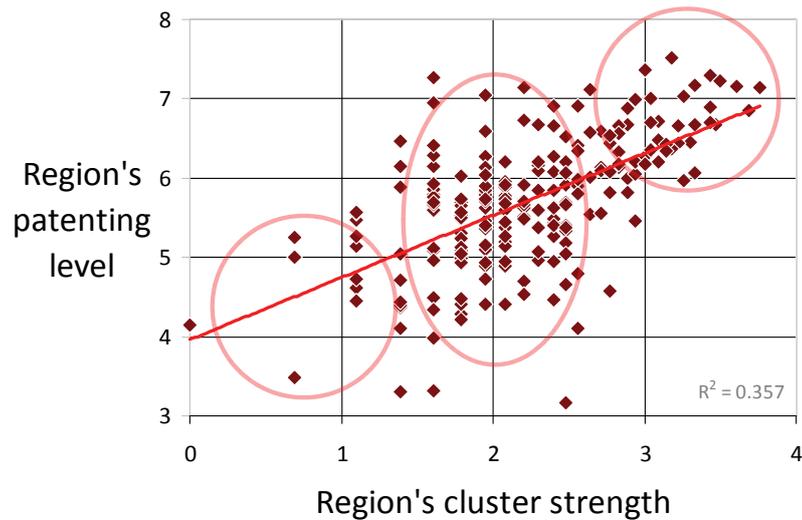


Figure 5. Silicon Valley and its cluster

So to conclude; the seeds for new products, services and business models can emerge in almost any place. It happens in university departments, inside large firms and it happens in small firms and among entrepreneurs. But a new idea or concept, however ingenious it is, doesn't make an innovation. Who will use it? For what purpose? And who is prepared to pay for it? The road from a new idea – ideation – to a commercially viable product or service is a long and winding one. The novelty needs fine tuning, business assumptions often have to be overthrown, and beta versions developed. The idea is twisted and turned as it meets users, and it is not uncommon that ideas find applications in fields which were not even on the map during ideation. The innovation must be put into use, and in the end there must be customers prepared to pay for it and prepared to switch from the current technology or concept. Clusters offer complementary skills, sophisticated users, access to education and research, and financial capital prepared to finance new

ventures. Clusters offer the soil where ideas are turned into successful commercial service and products; clusters offer a soil for innovation.

Let us compare the regions of Europe and look at the data. The more a region is focused on a few clusters, the more innovation output is produced, and the higher is the regional economic prosperity. In fact, there are no regions with a dispersed industrial structure (employment across a large range of sectors) that produce high levels of innovation, and vice versa, there are no regions with a high level of specialisation that produces low levels of innovation.



Each region's number of cluster stars (log) vs its number of patents (log), adjusting for country-level differences other than cluster strength.
Source: Data from The European Cluster Observatory

Figure 6. The relationship between a region's cluster strength and its patenting level

So what does that tell us? It tells us that innovation is not equally distributed across space within a relatively homogenous region such as Europe. If we would measure innovation inside nations we would find similar patterns; innovation is unevenly distributed within nations. In this report we will study nine city regions and contrast these environments. City regions vary in their capacity to innovate, but more importantly they breed innovations in different sectors. Some sectors such as Business services, IT, and Biotechnology we meet in almost every city, whereas Automotive and Telecommunications are only found in some. But, before we dig into the many aspects of regional conditions for innovation, we must get a better understanding of the innovation process itself. Innovation is a highly complex process that first involves many actors and individuals, and second, is a process that is enhanced through the diversity of involved agents and individuals, and also the proximity of these actors.

Gaps and bridges

Clusters can be particularly beneficial places for innovation to happen. To understand why, we must see the cluster as a collection of *agents of different kinds*. The most important type is the firm. It is firms that take innovations to markets and subject them to the test of competition. Another type is research organisations, for example research institutes, which produce new advanced knowledge. A third type is education organisations, such as schools and polytechnics. Universities are a special case, because they often play the double role of being both research institutions and education institutions. A fourth type is the capital providers, such as venture capitalist and banks, who provide the financial resources needed for the exploitation of inventions and new business models. And, fifth, government is a type of agent that makes policy decisions about public infrastructure investment, regulations, and many other factors that are important for innovations. This type includes many levels of government, from national to local, and a wide range of public agencies.

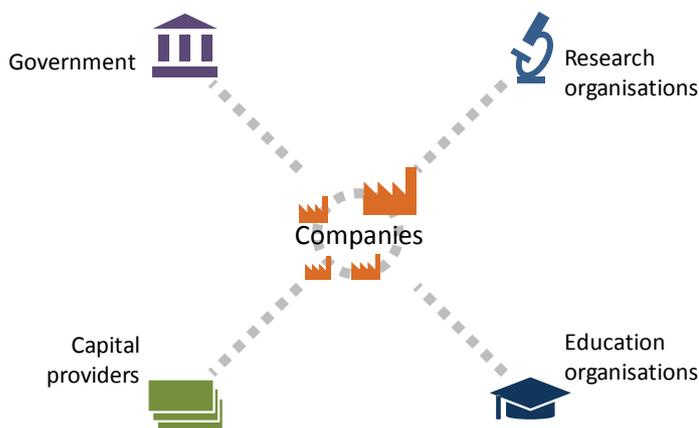


Figure 7. Five types of actors in a cluster

The reason clusters are relevant for innovation is that when there is a critical mass in a location of a sector or industry, the different agents can support each other. Through interaction within the cluster, they can provide conditions that are highly adapted to the needs of the firms. Universities set up research groups that produce cutting-edge knowledge in relevant fields and channel those findings to the firms in the cluster. Colleges offer specialised education programs and graduate students with skills particularly suited for working in the cluster. Capital providers become experts in the cluster's field, and can provide "smart money" by being better at assessing risks and opportunities in the cluster's business. Local government and public agencies learn to understand the needs of the firms, and make decisions that promote the cluster and removes obstacles to progress. In all these ways other agents support the firms and make it easier for them to be competitive and grow. Also, not least important, firms interact with other firms. Small firms interact with large firms, domestic firms interact with multinationals. They use each other as

buyers, as suppliers, as technology partners, as places to find trained staff, as sources of new ideas to imitate, or simply as an inspiration to aim higher and set more ambitious goals.

Figure 7 above is one way to illustrate all these interactions in a cluster. There are five different types of agents, and between them there are *paths* along which one agent can interact with another. One path, or perhaps rather one set of paths, runs between research organisations and firms, another between government and firms, and so on. In an ideal cluster these paths are busy with traffic. People move between actors, talk with others, bring news to others, discuss with others, change jobs, and tie the systems together in a thousand different ways. All this traffic helps make the cluster dynamic. Knowledge is spread and shared. Collaboration ensures that resources are used in the best possible way. Coordination aligns the interests and actions of different agents.

Figure 7 is a compelling picture. It shows the cluster in an ideal way, familiar from cluster literature. It is the kind of cluster everyone wants. Unfortunately, in reality most clusters don't look like this at all. In real clusters, communication between different kinds of agents is massively flawed. Small firms who believe they have something new exciting to offer, have a hard time even to be allowed to meet with the right people at a large enterprise. Large enterprises searching for a new supplier are more likely to look for an established international supplier than to go searching among innovative SMEs located right under their nose. Policy makers have only vague ideas about what business really needs. Researchers are more interested in academic publishing than commercialising their new findings or talking to business people. Schools formulate their curricula oblivious to what skills the industry is calling for. Entrepreneurs find it difficult to persuade banks to invest in new innovative businesses. Many business people would laugh at the idea to approach the local university to see if they have some new technology or skill they could develop jointly.

It is not difficult to understand that these connections will not just happen spontaneously. After all, the different types of actors have different roles to play in society. Universities are supposed to do research, not to serve R&D departments of companies. Policy makers have responsibilities that go far beyond serving companies with whatever they require. Education organisations have many other stakeholders than firms to oblige. And firms are in business to make a profit for themselves, not to provide altruistic support to each other. Even so, with some additional effort put into coordination and collaboration, large benefits could be reaped, which now remain neglected.

In other words, more often than not, clusters in real life do not live up to the potential that cluster theory grants them. Clusters possess tremendous potential, but in most cases, this potential remains largely untapped. At first, these immense missed opportunities may seem hard to accept. If the world is a place that is constantly moving towards an ideal equilibrium, a state of efficiently used resources, it seems unlikely that this kind of gross misalignments could endure. After all, why would clusters not make the best possible use of the potential they

enjoy? When all that is needed is a little interaction, why should these possible benefits remain untapped?

The answer is that this interaction between agents is not such an easy thing to do. If all it would take was a simple phone call from one person to another, then clusters would surely be a lot more dynamic. But in reality, there are thousands of reasons why that phone call never takes place. The policy maker doesn't pick up the phone, because she doesn't expect to hear any deeper insights from the industry of what they really need, only than the predictable call for lower taxes or trade protection. If the college teacher talks to the business world, it is about finding placement positions for the students, or arranging a recruitment fair, but certainly not to discuss the curriculum. The businessman has no idea what the researchers at the university are doing, he probably doesn't know their names and he certainly doesn't know under what departments they are organised. The researcher might want to see her latest discovery turned into a successful commercial innovation, but she knows that her career depends on publishing papers, and it will in no way be furthered by hobnobbing with business people; in fact, it will be hampered. And if, by chance, the businessman and researcher would meet and discuss each other's work, they would soon find that they speak different languages and have different mind sets, almost as if they were living in different worlds.

What this all means is that there are *obstacles* to interaction leading to gaps between the five sub-systems of the cluster. Obstacles make it difficult for actors to communicate with each other, to give each other information, to initiate collaboration, to pass on knowledge. Figure 8 below gives a list of such obstacles.

It is obstacles like these that prevent the research world to spread its new knowledge to the business world, and that stop policy makers from seeking advice from business people. Obstacles make traffic slow and awkward where it should be rapid and easy. Obstacles isolate systems when they should be connected. In short, obstacles create gaps where there should be paths. The picture of the cluster that we sketched above, with its wide paths and its intense traffic, is not a picture of a real life cluster. Real life clusters have obstacles as in Figure 9, much like the rivers and streams that a path has to cross.

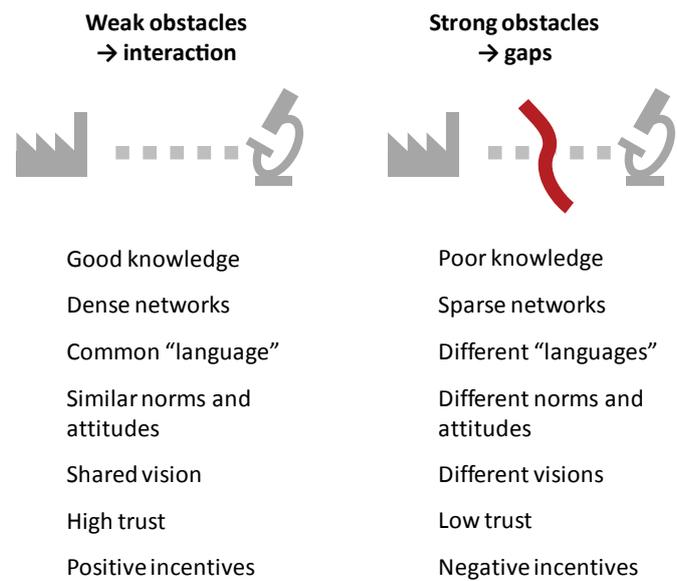


Figure 8. Different types obstacles that create gaps in a cluster

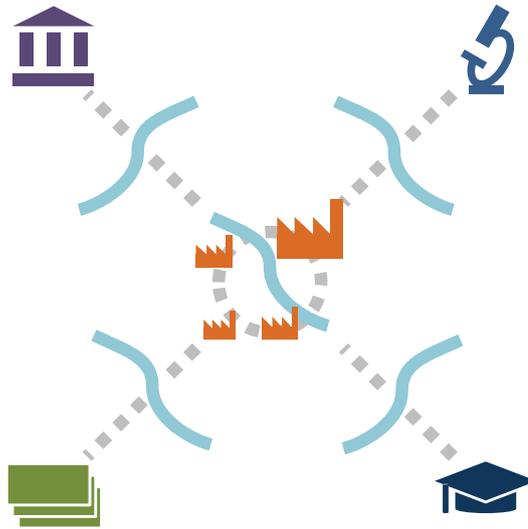


Figure 9. A cluster with gaps

This has great implications for innovation and competitiveness. It means that clusters despite their great potential for dynamic interaction between agents, often only exploits a small share of this potential. People do not make the most of the possibilities found around them, because they simply lack knowledge about what opportunity is nearby, they lack the networks to utilise it, they fail to initiate collaboration they would benefit from, and they fail to coordinate their actions with others.

- + Knowledge failures
- + Network failures
- + Collaboration failures
- + Coordination failures
- = Innovation failures

This is where cluster organisations come into the picture. Cluster organisations are organisations that increase the competitiveness and growth of clusters by bringing different types of actors together. They connect business with academia, education with industry, large firms with small firms. They do this by providing activities and meeting places where common issues can be discussed and acted on jointly. They help the different agents overcome the obstacles and start talking to each other. In doing so, they get the traffic moving along the paths. One could say that what cluster organisations do is to *construct bridges* that allow the traffic in the cluster to flow.

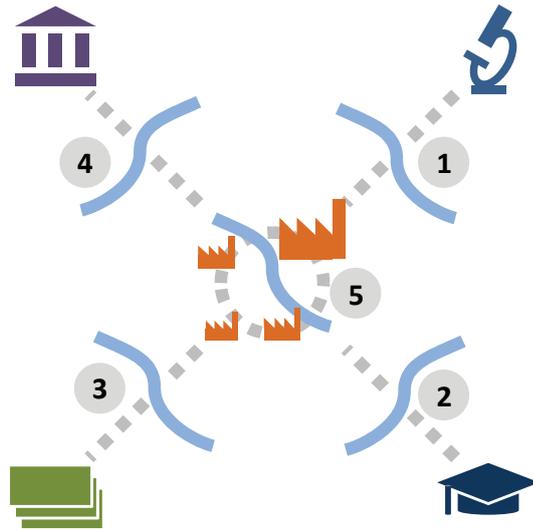


Figure 10. The five internal gaps within a cluster

There are five internal gaps, inside the cluster, shown in the figure above:

1. The research gap, limiting interaction between firms and research organisations
2. The education gap, limiting interaction between firms and education organisations
3. The capital gap, limiting interaction between firms and capital providers
4. The government gap, limiting interaction between firms and public bodies
5. The firm-to-firm gap, limiting interaction among firms

In addition, cluster organisations also help build bridges externally, outside the cluster. They are:

6. The cross-cluster gap, limiting connections between one cluster and another
7. The global market gap, limiting connections between a cluster and global markets

This model has emerged gradually from the case studies in the CLUSNET project. In the following section, we will describe each of the gaps, and give examples of how cluster organisations work in the city regions studied in the CLUSNET project.

3. The seven gaps of innovation

In this Chapter, we will have a closer look at the seven gaps of innovation. For each, there is first a vignette, an illustrative anonymised story based on actual cluster management cases. Next the various ways of bridging the gap observed in the CLUSNET project are described and commented on.

The Research Gap



Sara had just been appointed manager for external relations at her university. She was a bit unsure about her new role as gatekeeper. Should she stimulate external contacts at many different levels and departments within the university, or should she try to keep some control over the traffic. To improve linkages with the widget cluster she and people from the cluster organisation had agreed to run a conference highlighting some issues facing the industry. Martin, the manager of the cluster organisation had proposed that the university and the cluster organisation should both feature as inviting organisations. Sara on the other hand felt that the university should be sole responsible for such an invitation. Another issue was who should be invited. Sara had inherited a contact list for the widget cluster from the former manager. She felt that controlling this network was part of keeping her important position. In the end separate invitations were sent out from the university and the cluster organisation.

Back in the office Martin said to his colleague “we have a dedicated person at the university for external relations, but I feel that we do not develop trust and we don’t develop enough of collaboration”. A few days later Klaus, R&D manager in a company, approached Martin and presented a new idea for a new construction solution. It was clear that they should talk to a particular professor at the university. A number of meetings were held and at one point the professor proposed a more structured innovation project. Suddenly in the meeting the professor’s superior entered the room and got involved in the discussions. After about an hour he said that he was not willing to enter into any projects unless the company would sponsor a new professorship at his department. Klaus got up from his seat, said goodbye and left the room.

When Martin went to bed that night he was confused. On the one hand there was much talk at the university about interaction and collaboration with industry – they had an office for external relations and the university president always referred to industry collaboration in his speeches. On the other hand, in spite of speeches and meetings, very little true collaboration got off the ground. He also felt that he had problems understanding how the university organisation really worked. Some years later, when Martin reflected on the early years of building bridges between university research and industry, he realised that there was a huge difference between arranging meetings – even with top level people on both sides – and actually creating traffic and true collaboration across the two systems in the cluster. Not only were there people in academia who refused to collaborate at all, but there were also people who actively stopped traffic on the bridge. He had also experienced people in industry with the same attitudes. In one case a business manager admitted that he got involved in meetings to make sure collaboration did not take place as he felt that that could ruin his position in the company.

But the staff in the cluster organisation had not given up, and some years later they were pleased when a new PhD program and new professorships, both with strong linkages to the widget cluster, opened up. It was symbolic that after long discussions, a dedicated facility for cluster workshops and other collaborative activities opened up on university campus. New bridges were now being built and there was clearly more traffic and collaboration than before. Martin and his staff could tick off a couple of more to-do items on their big chart in the coffee room.

One type of bridge building Martin tried to achieve was between the business sector and the academic sector. We refer to this gap as the “research gap”, and it is probably the most researched of the seven innovation gaps. It is also the gap that has received the most policy attention over the past decades. For example, in the innovation system approach, a central field of innovation research, interaction between universities and other research organisations on one hand, and firms on the other hand is one of the key drivers behind innovation. And in European innovation policy, investment in research organisations has long been seen as the best way to promote higher levels of innovation.

The obstacles to interaction between business and academia can be particularly difficult to overcome. Incentive systems for university researchers are strong and often stacked against developing collaborations with business actors. Norms and languages in academia differ from those in the business sector, and administratively they operate with different timescales for budgets and work planning. In most countries, the gap between academia and business is wide, deep, and old.

An example from the CLUSNET project of strong bridge building to span the research gap can be seen in the Gothenburg region, Sweden. Gothenburg is a city region with a strong life science business sector as well as some large universities, notably Gothenburg University and Chalmers University of Technology. Gothenburg University has co-located its life science activities with the large Sahlgrenska Hospital under the name Sahlgrenska Academy. To help establish

links between these academic institutions and the local life science industry, a range of organisations have been set up. The Institute for Biomaterials and Cell Therapy (IBCT) is a “virtual research institute” located near Chalmers. It conducts joint research projects with participants from both the University and life science companies. There is also a combined incubator/business park/innovation centre called Sahlgrenska Science Park (SSP), co-located with Sahlgrenska Hospital and Sahlgrenska Academy. One of its main tasks is to help researchers with the development and financing of business ideas in the life science field. Both IBCT and SSP receive local/regional government funding, and public funding is also provided as verification support to innovative research ideas with a high potential for commercialisation.

In life science, there is a type of actor that generally does not occur in other cluster. It is the health care sector, which is often dominated by public health care providers. The health care providers are neither business actors, nor research actors, nor government actors. They play a special role, and share some characteristics with each of those groups. Like business actors, the health care sector are buyers of the products and services that the Life Science cluster produces. Like research actors, they contribute to knowledge creation and R&D processes. And like government actors, they can be influenced and directed by policy decisions. In the case of Gothenburg, a close collaboration with the region’s hospitals is considered a particular regional strength, giving the cluster an edge in clinical trials.

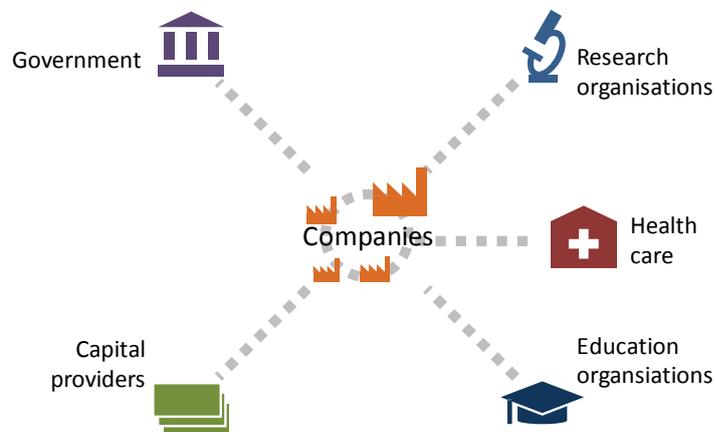


Figure 11. The actors in a life science cluster, including the health care sector

The research gap is particularly central in Life Science, a sector where innovation to an extremely high degree is derived from academic research. Life science clusters have usually quite advanced bridges in place, like Gothenburg. Leipzig is one such example, with BIO CITY Leipzig. It is a large incubator co-located with the Center for Biotechnology and Biomedicine (BBZ) of Leipzig University, with a focus on academic spin-offs and technology transfer. However, similar arrangements exist in other sectors, too. In the Manchester city region, Salford

University has plans to locate digital content labs, a game centre, and an incubator in the Media City UK development complex.

Gothenburg, Leipzig and Manchester represent somewhat different challenges for the research gap. In Gothenburg the bridge goes between a strong academic sector and a strong business sector. In Leipzig, the academic sector is well established with an ancient lineage, but the business sector is far more emerging in its nature. In Manchester, the business sector is huge but the academic sector plays a more modest role. This means that the task of connecting the academic research world with the business world is a very different task in those three clusters.

As seen in the examples above, the most common model is that public or university funding is used to establish an incubator or test bed/demonstrator or some other form of bridge from academia to business. However, the bridge can also be built in the opposite direction, from business to academia. Such an example can be found in Eindhoven, where Philips is a central firm in the microsystems cluster. Philips has established an R&D facility called MiPlaza (Microsystems Plaza), which is owned and operated by Philips, but which can be used by external parties including universities and research institutes. This is part of Philips open innovation strategy, which aims to deepen R&D collaboration between Philips and external parties.

Although bridging the research gap is considered a top priority in many cluster organisations, it is not a central aim in all clusters. In Dortmund, the academic tradition is shorter and the role of the universities in regional cluster policy is not as prominent as in the examples above. In Helsinki and Budapest, only limited efforts are spent on involving the universities in the clusters.

The Education Gap



Sam had just come out of a meeting with a municipality civil servant. Sam, a man in his mid-sixties, was the CEO of a large widgets firm. He was strongly engaged in the widgets cluster and was the chairman of the widget cluster organisation. The civil servant, Lin, was in charge of secondary education and was in the process of planning for a new technical education programme. During their meeting, Sam had argued that there ought to be a specialised widget programme.

Most of Sam's colleagues in the local widget industry did not share his view on this point, and meant that there was no need for industry to spend time on discussing matters like education with the municipality. Education, they argued, was a matter for the municipality to handle. Sam's colleague John had told him that "government and the city should do

their work such as building roads and arranging education, and it is up to industry to build widgets and make a profit.” Sam on the other hand was convinced that they could strengthen their regional cluster by pushing for a new specialised education.

The main problem Sam had discussed with Lin was that there was a level lacking in the education system between the high school level and the university level. Sam and others had noticed that many technical jobs were too advanced for students fresh out of school, but too simple for students with a Masters degree in Engineering. Widget firms would hire Master graduates, who would do the job for a short period, and as soon as they had gained some working experience, they would apply for more qualified jobs elsewhere.

Sam’s lobbying of Lin was successful. Not only did Lin produce a blueprint for a 1.5 year widget engineering programme, but she also made sure that the municipality got industry people involved in the planning. However, Sam’s vision for widget education went even further than this. Sam and the manager of the cluster organisation, Martin, had compiled a to-do- list of 100 points to carry out over the next few years. One of the points was the establishment of a whole new engineering school specialised in widgets.

The vision was to build a school that could attract students directly from high school, but also to attract people from industry, who had a few years of practical experience, for more formal training. This put high demands on the school to be attractive, both in the infrastructure and its curricula and teaching staff. The widget industry in general was not considered very exciting and modern, so making the school and industry attractive for young people was a challenge, but also necessary to remain competitive in the long run.

Driving home from one of the many meetings, Sam had an idea. Why not put the new school just next to his old company? Locating it right in the middle of the widget cluster could be both of symbolical value and could enhance contacts between the school and the industry.

A few years later, Sam’s vision materialised. It was the opening day of the new school, CTK. Everybody who was anybody was there. People who normally did not visit industrial areas were now walking around in the heartland of this cluster, dressed up, carrying a glass of chilled white wine, and listening to proud inauguration speeches. CTK offered four programs; process engineering, plant design, widget machinery design, and dedicated IT solutions. It was still a public school but many cluster firms offered teaching assistance, software and other resources, making it a highly attractive school. And, right next to the school, there was a laboratory and test machinery which would later be bought by the cluster organisation, turned into an open test bed and a learning platform for the widget students at the school.

When Sam met his old buddies he noticed that their attitudes had changed. Tight contacts between industry and the education system had become a part of normal life.

Advanced regions tend to have similar education systems, ranging from basic to tertiary education. As we saw in the case above, there is room for specialisation, not only at the level of tertiary education but also at secondary education. Part of cluster dynamics is to increase specialisation on top of general education needs. Leading clusters are characterised by highly educated and highly specialised

human capital. Specialisation efforts can be driven by education institutions in splendid isolation or, as in our case, take place through a process of two-way interaction with the cluster.

Aligning education institutions with the needs of companies in the cluster is an important issue for many clusters. In some cases, the need for a qualified training of students is even an urgent problem for a cluster. Across Europe, cluster organisations frequently report that finding qualified students is a factor holding back growth in the cluster. Bridging the education gap is therefore a key objective in many cluster initiatives. It is typically done in two ways, which can be used each by itself or in combination. One way is to initiate contacts between cluster representatives and the educational organisations with the aim to discuss and improve the education offered. The aim could be to achieve some modest adjustment of the curriculum, or it could be more ambitious goals to establish whole new schools and programmes. The other way is to co-locate the education organisations with other cluster actors.

In Dortmund, training students for the emerging IT sector was considered an urgent matter. With the dramatic decline of the steel, coal and beer industries, quick growth in new sectors was needed, and IT was one sector targeted for development. A cluster mapping revealed that as many as 700 IT firms were located in the city, a concentration not noticed until then. To kick-start growth in the sector, a new IT study program was introduced which lasted only two years, faster than the traditionally three-year programs. This was a way to speed up the supply of the much-needed IT students in the region.

In Gothenburg, the life science cluster initiative identified a strategic gap in the training offered in the region. Although there was a wide range of business educations available, there was no training which was aimed specifically at entrepreneurs in the biotech sector. To promote entrepreneurship in the clusters, Göteborg International Bioscience Business School (GIBBS) was set up as a joint school between the Sahlgrenska Academy and Chalmers University of Technology, in close collaboration with the regional health care organisation and life science companies. GIBBS offers a master level programme where the students spend about half the time on developing real projects from the idea stage to a full scale business plan for application of hard financing. It is located in the city district that houses the core of the cluster.

Co-location of campuses with other cluster actors is a commonly used method for bridging the education gap. CLUSNET examples of this include the many universities that have established campuses in the 22@ cluster district in Barcelona, Salford University's recent opening of a campus for 1500 students in Media City UK in Manchester, and the education programmes offered in Brainport's automotive cluster (MBO Automotive Center and Automotive Center of Expertise, both located at the High Tech Automotive Campus in the city of Helmond, close to Eindhoven).

The Capital Gap



Martin had been out on one of his usual visits to one of the larger member firm. He had met with a group of senior managers to discuss a new training program. The reaction was similar to what Martin had experienced in other large firms; “we are not really interested in participating in publically funded programs”. He jumped into his car and drove off to another cluster member, Dronic Inc., a medium sized firm. After listening carefully, they were prepared to open the doors for a person from the cluster organisation to make a diagnostic check on training needs among factory workers. Resources had been secured from an EU funded skills program. About a year later, at a board meeting in the cluster organisation, Sandra, the manager for the training program reported back on the results. Productivity in the Dronic factory had increased by a stunning 30%! One board member reacted and said he could not believe it.

At the same time a private equity group from another city had become interested in finding buy-outs in the region. Martin and his staff had met several times with the firm to present investment opportunities in the regional widget cluster. After careful analysis the private equity group acquired three firms, including Dronic Inc, and merged them into one group. The owners of Dronic had been looking for exit opportunities and even considered closing down the factory. However, the 30% increase in productivity had put the plant back on black figures, and had made it an attractive take-over candidate.

Martin realised that by bridging the gap between industry and publically financed training, Sandra had secured a future for the firm. And, in addition, by bridging the gap between industry and private equity, they had facilitated a process of adding both new financial muscles and management to the cluster and a necessary restructuring of three mid-sized companies. When the acquisition was announced, Martin and Sandra took a long walk down to the city centre and enjoyed a magnificent dinner at his favourite restaurant “Four Kitchens”.

The bridging of industry and finance involves both public and private funding. The cluster organisation has brought public financing from EU, national and regional sources. The use of these resources vary, including training (as in the case above), grants to start-up firms, access to incubator services, and R&D resources for SMEs. In addition, the cluster organisation has been instrumental in attracting private equity to the region.

In comparison to other gaps, the capital gap is somewhat neglected in research. There is a substantial literature on venture capital, but it is largely separate from cluster research, and within cluster research, capital providers are often not treated as a separate type of actor, but merely as members of the business sector together with other cluster firms. Among cluster policy makers, access to capital has gained

increasing attention, but more so on European and national levels than at regional and local levels. Some cluster organisations have as their main task to support their members in applying for funding, from EU or national funds for regional development, but most cluster organisations do not engage in that kind of activities. Improving connections between cluster firms and venture capitalists is a rare activity among cluster organisations.

On a more general level, there are several CLUSNET examples of cluster initiatives that consider attraction of venture capital as a general goal and one of the long-term purposes. Manchester’s vision for Media City UK includes building a network with all kinds of actors, including capital providers: venture capital firms, technology providers, TV media, film media, web, mobile technologies, publishing, retail and other business services. Similarly, one of the focus areas for the Gothenburg life science cluster initiative is to “attract expertise and capital to the biomedical field within the region.”

In terms of concrete activities, Dortmund is a notable case. As the three main industries that had been the backbone of the city’s economy – coal, steel, and beer – declined, it was clear that new technology companies and SMEs would be essential for economic growth. However, the local banks had for a long period been used to dealing with large heavy-industry companies, and had very limited experience in new sectors and small clients. For that reason, the city development project organised round table meetings with selected sectors to establish contacts between them and the banks, and to improve the banks’ knowledge in the new sectors.

Such activities aimed at the private capital market are however not as frequent and prominent as those aimed at public financial sources, in particular EU funding. The

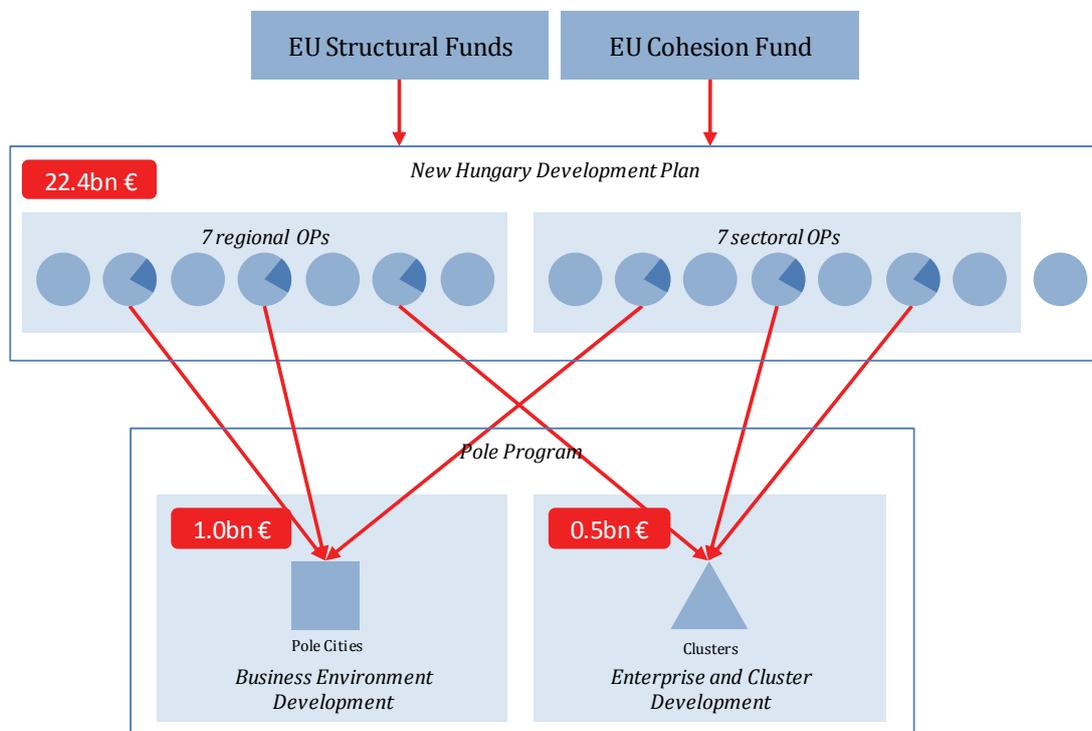


Figure 12. The flow of funding to the Hungarian poles and clusters

considerable resources available through EU's regional funds and framework programs have made access to EU funding a key priority for many cluster initiatives. The "New Hungary Development Plan", for example, was a centralised effort to channel EU Structural Funds and Cohesion funds, adding up to 22 billion EUR, and part of this, about 1.5 billion EUR, were channelled into the Pole program, with Business Environment Development projects and Enterprise and Cluster Development projects. The division of this EU funding was a central organising principle of the Pole program. (In April 2011, a new division called the Cluster Development Office was formed and took over the cluster-related tasks from the Pole Program Office.)

In comparison, access to private capital is more of a challenge in Hungary. In the case of the Mobility and Multimedia cluster in Budapest, there was an apparent lack of Venture Capital and Angel Capital. For one of the more successful start-ups, VC funding was instead provided from abroad, and the firm relocated to more dynamic cluster outside of Hungary.

In the Brainport Eindhoven region (NL) there is an example of how EU funding is channelled through private companies to other firms within the cluster. Both Philips and ASML have received support from the European Commission and the European Investment Bank within the framework of their joint Risk Sharing Financial Facility initiative. These provide near-equity loans at low interest are then further channelled from the companies to universities, research centres and SMEs. In this case, the funding does not go through regional public agencies or through a cluster organisation.

The Policy Gap



Bill was the R&D manager for a large company in the widget cluster. He had suddenly become aware of the fact the national authorities were changing some energy regulations that would have a direct negative impact on their profitability. He was now very concerned and called Martin at the cluster organisation. "Hello Martin! As you are well aware of they are about to decide on new energy regulations. We must talk to someone in the public sphere to give our version. Do you know anyone?" About a month later the two gentlemen together with a few other people met with some people at the Energy ministry to explain how the company has improved both energy efficiency and reduced emissions, but in a way that was not fully compatible with what the proposed legislation. This was the first time Bill and his colleagues had a meeting inside a Ministry. The public officials understood the issue and promised to talk to involved public agencies to see what could

be done to reach the new energy and environmental targets but avoid legislative and implementation mistakes.

A while later Bill had a meeting with his boss who was surprised to hear that they had been able to create such a fruitful dialogue directly with public officials. Bill replied – “I think this proves that the membership fee we pay to the cluster organisation is well worth its price.” As it turned out Bill was later appointed Chairman of the Board of the cluster organisation.

A cluster organisation can play a very instrumental role in bridging the gap between public authorities and business. In this case the cluster organisation had arranged meetings and carried out investigations to enhance the dialogue in the region regarding both infrastructure and energy. For example, unclear responsibilities regarding failed services in the energy field were discussed between public and different private actors, and proposed solutions led to regulations within four to five years. The cluster organisation has also helped in bringing both national and international public officials and policy actors to the region to promote the cluster.

Establishing better links between the business sector and the government sector is challenging for many reasons. Local and regional government, on the one hand, need to support economic development and provide the best possible framework condition for firms to operate in. On the other hand they cannot engage in distortive or preferential support for an individual company. Cluster organisations can be of great help in providing forms for a useful and productive dialog between business and government. They can provide a wide contact surface and help develop action plans that serve whole systems of companies, industries and sectors.

Connection between business and government is often built into the governance structure of cluster organisations, in particular for those that apply a “triple helix” perspective on economic development. In the triple helix model, three types of actors are involved: government, academia and business. GöteborgBio, the cluster organisation for life science in the Gothenburg region (SE) is one example of a triple helix constellation. Its principals are a pharma company, a medical equipment company, a biotech company, the local business development agency, the regional business development agency, the national foreign-aid agency, a national innovation support fund, and two local universities. Each of these is represented on the board and active in different projects within the cluster organisation.

Brainport Development (NL), another CLUSNET example, has a triple helix approach at the core of its strategy. Though operating in a region traditionally dominated by a single firm, Philips, getting all sectors of society involved in economic development has now been a key guiding principle for many years. Delivering the vice-president of the Brainport Foundation, Philips is still taking up its part of responsibility, but others – from the business sector, academia as well as from public authority side – do so as well.

Some city regions follow a mixed approach. In Helsinki, the Forum Virium Helsinki is owned by the City of Helsinki, and engages local companies but not universities. At the same time, Culminatium Innovation is operated by the Helsinki City Region including Helsinki and neighbouring municipalities, with a full triple helix model. Culminatium is an umbrella for nine national centres of expertise.

The Firm-to-firm Gap



Sven, CEO at large foreign-owned widgets company, was disenchanted. After long discussions, corporate headquarters had decided not to approve the resources he had requested to develop a new patent his company had developed into a commercial product. He found it hard to accept that the patent would remain unused. He decided to bring up the issue with Martin. “Do you think there is anyone in our region that has the competencies to turn our invention into a testable product?” After some consideration Martin proposed that they should talk to a small firm, Turnab, who indeed turned out to be interested. Already in the first meeting, between Turnab, the widget company and Martin, it was decided that Turnab should look for some public SME innovation funding. Initial funding was secured and the project got off the ground.

Although the project progressed, Martin noted how difficult it was to move the project forward with one very small and one very large partner. There were frequent big brother-little brother conflicts slowing the work down. Just to write a contract regulating IPR and other issues, in case the prototype would turn out to be a success, took over a year. Martin realised he would need to create a climate of equal partnership in the project, and convince Sven to accept that ownership of the product would belong to another firm. Even more upsetting, Sven would have to accept that he would help create a product that Turnab at a later point could sell to competing firms. Turnab, too, had to change because of the project. Turnab had been a pure sub-supplier who simply produced components specified by their buyers. Now they would become a firm with a product of their own, one that they would control and market themselves. Furthermore, they had to learn how to work in an innovation project involving people and organisations they had never talked to before, and handle a project that was as big as their previous annual turnover. This was clearly outside their comfort zone.

Still, the project proceeded and after some time Turnab presented a prototype which was put to the test at the big firm. The target was to achieve 60% energy savings, but the tests showed that the prototype delivered up to 80% energy savings. Sven was pleased that they would be first in the market with this improved machinery, and Turnab saw a great potential in developing this new market niche.

One morning on the way to his office, Martin got a call from the manager at Turnab. He got straight to the point. "Please add us to your list of members in your cluster organisation. How much is the fee?"

In this example the cluster organisation could act as a bridge between a large firm and an SME, and initiate an innovation project that turned an invention into a successful commercial product. The bridge was widened through monthly breakfast meetings hosted by SMEs in the cluster, where they could market their skills and competencies to others. Other activities involved round-table discussions and other organised meeting fora that opened up for business-to-business connections. Clearly, such discussions were often of a confidential nature, and once the connection had been made, the cluster organisation had played its bridge building role and was not involved in the continued business process. However, in some cases, such as the Turnab case, staff from the cluster organisation was also instrumental in setting up and carrying out the project.

If connections between firms on the one hand and other actors on the other hand are complicated, firm-to-firm interaction is no less problematic. Innovation in cluster thrives when competencies and resources can be combined and re-combined locally, but too often firms are not making the most of the possibilities that other local firms have to offer. Helping firms interact with one another is therefore one of the purposes cluster organisations often have.

A frequent way of stimulating firm-to-firm interaction is co-location. By bringing companies into the same district in a city, the likelihood of new business connections increases, if only because people are more likely to meet each other by coincidence. This goes well together with city district development plans. In many cities, particular districts have been developed to attract firms in one or several clusters. Not least is this a popular model when re-developing disused industry sites. In Dortmund, a large abandoned steel mill area (200 hectares) is being transformed in the Phoenix development project, which includes not only residential areas but also a business district meant to attract companies in micro/nano technology, production technology and other high-tech or cultural industries. Similarly, the 22@ urban regeneration project in Barcelona has reshaped an old industrial district (also 200 hectares) into a location for five modern clusters: medical technologies, media, energy, ICT, and Design.

In Dortmund and Barcelona, the public sector was leading the development project. In Manchester, however, the private property development company Peel Group owns and develops the location for Media City UK. Similarly, in Eindhoven it is Philips who owns and operates the High Tech Campus, which houses more than 90 companies. They have taken a radical measure to make people meet across firms. In the contract terms of locating to the Campus, it is not allowed to have an in-house restaurant. This way, lunch traffic is diverted towards the common campus restaurant.

For Media City UK and many other cluster initiatives, one challenge is to promote interaction between large firms and small firms. BBC is the "anchor firm" in the

cluster and it is relocating to Salford Quays, where Media City UK is being developed. However, many of the SME in the sector are located in neighbouring Manchester, and will not benefit from close co-location with the large players. Creating a joint cluster for both these locations was therefore one of the recommendations by the CLUSNET team.

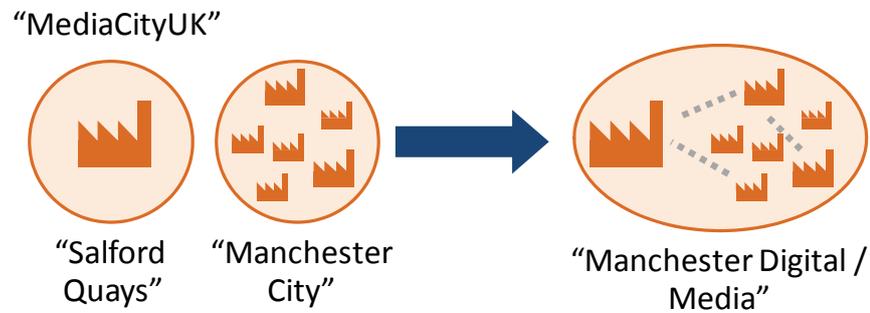


Figure 13. Media in the Manchester city region – one cluster or two?

Cluster organisations do not rely on close co-location only to promote firm-to-firm contacts. Regular networking meetings are a very frequent activity. In Lyon, the cluster initiatives, or poles, investigated do not have a prominent urban development component. Coordination between companies is not based on co-location, but on cooperation in joint R&D projects, which get co-financing from the pole programme. The initial focus has been primarily on large firms, and they have not appeared to be very interested in more collaboration with SMEs. This entails a risk of slowing down the process towards truly dynamic clusters, and not involving highly innovative SMEs. One suggested approach, suggested by the CLUSNET team, was to initiate two types of activities: some directed at large firms and some that are more attractive for SMEs. Then, when both groups are engaged in the project, each by its own set of activities, they can be brought together to pursue common goals and promote firm-to-firm contacts.

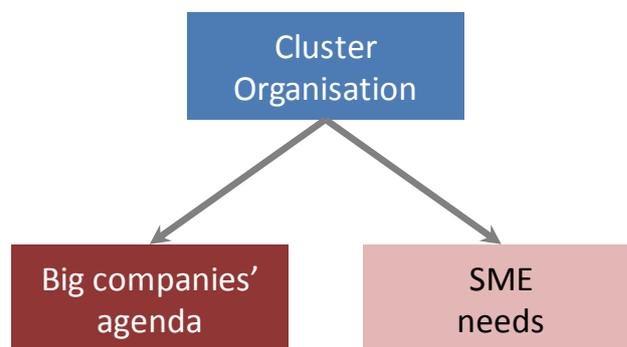
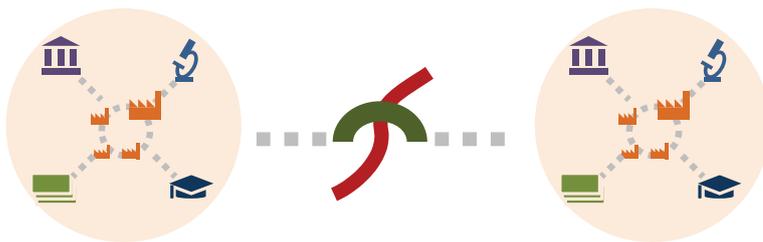


Figure 14. Two different target groups for a cluster organisation

Similarly, the Mobility and Multimedia Cluster in Budapest was formed with one of the main aims being to bring a large number of SMEs, and also larger multinational enterprises, within the mobility and multimedia field in the Budapest region (Central Hungary) together for cooperation on certain issues. The cluster also involves the Budapest University of Technology and Economics and six other academic institutions. When visited by the CLUSNET team, about 60 firms were members of the cluster, three quarters of which were SMEs.

The Cluster-to-cluster Gap



Martin and Sara shared a taxi to the Widget Breakfast meeting. This morning WIT Inc was in charge of running the meeting. As usual some 15-20 people attended. Jim and Alice, two IT consultants at WIT presented some of their new concepts, and made particular reference to the widget cluster. As it happened the widget cluster organisation had decided that all breakfast meetings should involve both people from the widget and the regional IT cluster.

About a month later Martin participated in another breakfast meeting. This time it was hosted by a start-up. The company had some 10 employees and was a spin-off from an established local IT company. The idea behind the spin-off had emerged as a couple of consultants had developed a custom-made application for one of the leading companies in the widget cluster. Jim and Alice presented a rosy future of the company and often returned to the new dynamism that had emerged in the widget cluster. Jim was convinced that by adding more sophisticated IT solutions the widget cluster would remain competitive in world markets.

On the way home to the city centre of Arntown Sara remarked that she had been contacted by a couple of consultants who were interested in presenting an idea for new services that could be of interest to the larger firms in the widget cluster. Martin turned on the local radio news – “today it has been announced that WIT Inc will move all of their widget consulting business from Bigtown into Arntown and integrate it into the existing Arntown unit”. That was great news for both the cluster and the widget cluster organisation.

In regions where there are several strong clusters, cluster policy is often geared towards developing not only the individual clusters, but also connections between clusters. Clusters in Design (as in the CLUSNET case of Barcelona) or ICT, which

provide competencies and knowledge that can be applied across many sectors, are frequently considered as key targets for such cluster-to-cluster collaboration, but other more unexpected combinations are also pursued.

Cluster organisations that belong to the same programme are obvious candidates for such cross-clustering efforts. In Lyon, for example, three of the five official poles were active in technology fields that had relevance for cleantech: Lyon Bio, Axelera (chemicals and environment), and Lyon Urban Trucks and Bus. Over time, different approaches to cleantech had been applied. Initially, the poles acted separately with no cleantech coordination. In the next stage, Grand Lyon implemented a cleantech strategy, where cleantech was a common theme for the poles to collaborate around. However, as separate entities each with its separate funding that was not contingent on cross-cluster cooperation, this collaboration did not come easily. When a call for proposals for a new cleantech pole was launched in 2009, Grand Lyon decided to propose novel model, in which the pole would have some of the existing poles as its founding members, not companies.

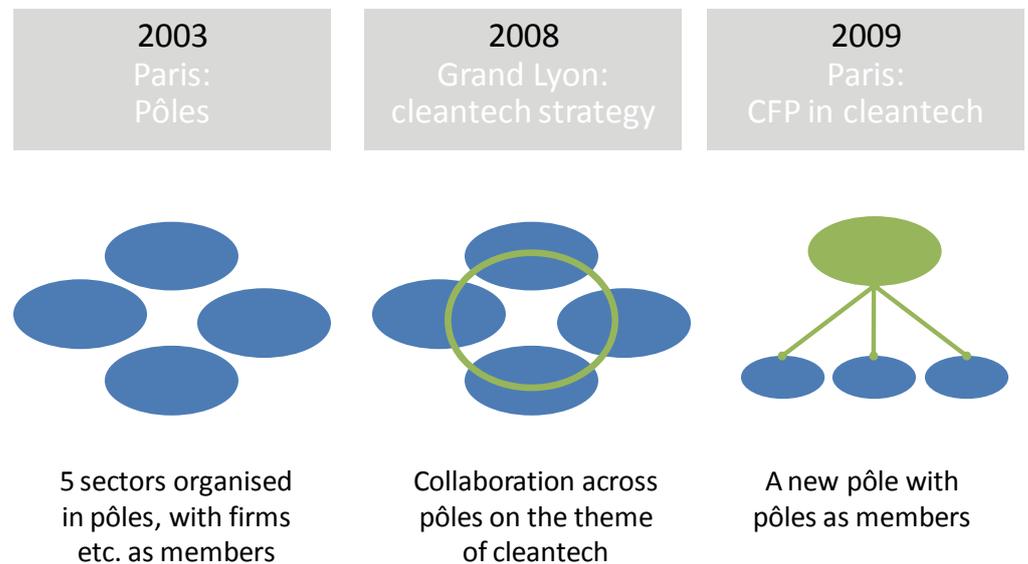


Figure 15. Different approaches to cleantech cross-clustering in Lyon

In Dortmund, cross-clustering was one of four strategic themes selected for the period 2008-2018. Key markets were identified (simulation, mobility, energy, resources), and for each of these it was identified what each the eight main clusters could contribute.

cluster \ market	Simulation	Mobility	Energy	Resource
bio	pharmacy studies	lab on a chip	biogas, biomass	industrial biotechnology
business services	business models	business models e-mobility	energy contracting	efficiency consulting
creative	serious games	mobile apps	sustainability awareness raising	green marketing
health	medical imaging	ambient assisted living	hospital engineering	hospital engineering
it	CAD	mobile apps	smart grids	rapid prototyping
logistics	supply chain simulation	e-mobility	green logistics	RFID-control
micro	micro sensors	RFID-transponder	energy harvesting	new surfaces
production	production process simulation	mobile maintenance	intelligent production building	new materials

Current status of implementation

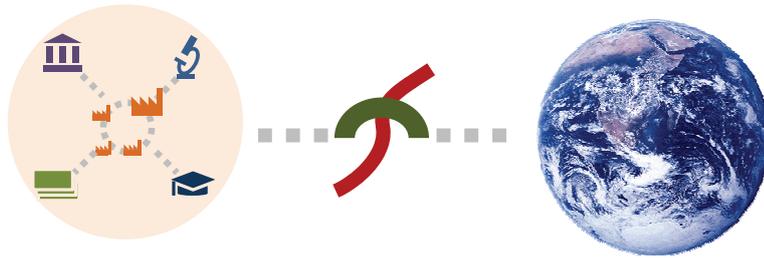
none	proposed	potential	actual
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Table 1. Possibilities for cross-clustering identified in Dortmund

In cross-cluster collaboration, as in firm-to-firm collaboration, co-location can be used as a tool. An organisation such as 22@ in Barcelona can play a pivotal role in creating cross-cluster dynamics and raise the attractiveness of the business district.

As mentioned earlier, cross-clustering is a natural option when there are several cluster organisations running in parallel under the same funding program. However, when cluster organisations belong to different programs and have different funding sources, city regions tend to be considerably less likely to try to connect them to each other. Administrative barriers and organisational myopia seems to be a powerful obstacle to overcome.

The Global Market Gap



Another delegation from China was on its way to Arntown. The widget cluster organisation had arranged an impressive program including visits to companies, meetings with top regional and local policymakers and public officials, and a visit to the university. After three full days Martin was exhausted, but also pleased with all the positive feed-back he had received. Just a few years earlier the only business contacts between Arntown and the vast market in China was limited to a few large local multinational firms. One of the companies in the widget cluster, Stemson Inc, with more than a decade of experience of doing business in China, had in fact been instrumental in setting up the first contacts. The cluster organisation had helped in the process of involving more actors in the cluster, including both the university and the public sphere. After a few years the local chamber of commerce had begun with training sessions for doing business in China and offered translation and interpretation services.

A year later, Martin and three others from the widget cluster sat on a flight to Beijing. They were a bit excited but also pleased that they would meet a top public official, Mr Wu. Mr Wu was in charge of a range of industries across China, including the widget sector. This would open up many important doors, which in turn would lay the foundation for more exchange trips and in the end more business, not the least for SMEs in the widget cluster. It was also a step in the process of finding a dynamic “sister region” to Arntown in China.

A return visit came after only six months. Martin was pleased to inform the guests that one of the cluster companies producing high quality components had set up office in China and they were doing good business. In the afternoon, the delegation went over to Stemson Inc for a visit. As usual the CEO talked about the company, the long relations they had with Chinese customers, but he also talked a length about the widget cluster and its enhanced dynamism. The Chinese seemed to be excited, understanding exactly the importance of improving the home cluster with its many linked actors in business, research and education. Mr Li remarked to his boss – “did you notice that the cluster organisation offer promotion materials in Chinese” – his boss nodded back.

International contacts are both about promoting exports and internationalisation, not the least among SMEs. But it is also about putting the cluster onto the world map and enhancing its attractiveness. Attraction involved people (students, entrepreneurs etc.), technology and inward direct investments. In the case above, competing firms to Stemson Inc have established smaller research units in the region to get access to highly specialised competencies, local research and education facilities. At first this has been a sensitive issue for the cluster organisation. However, by using public funding it has been argued that this type of attraction is to the benefit for all in the long run. In another case a

foreign multinational firm acquired a specialised supplier in the Arntown widget cluster. The CEO from world headquarters later explained that it was not only the firm as such that was of interest but also establishing a position inside the dynamic Arntown widget cluster. After a short while the company decided to shift production from a European location into Arntown to improve its overall competitiveness.

The global gap is the final and perhaps most complex of the seven innovation gaps. One side of it is a global market reach. A competitive cluster cannot operate in isolation from global markets. Global competition is the touchstone of innovativeness, and it provides the cluster with essential signals about market preferences, new technologies, new business models, and so on. Another side of it, equally important, is the inflow of talent, resources and investment to the cluster. A competitive cluster needs to be not only attractive but also visible.

Cluster organisations frequently engage in bridging all these aspects of the global gap. Where individual firms rarely share their international contacts, a cluster organisation can make those connections available to many. It can help small firms reach markets otherwise only accessible to large firms, and it can enhance visibility by branding the region and the cluster.

The branding of a region or a cluster, the CLUSNET case studies showed, is not an easy task. From the City region's perspective, it can make sense to brand a small district, while from the global perspective often only the whole city region is visible. The Manchester case illustrates how difficult these choices are: should the accurate location name of the cluster, "Salford", be used? Or the more well known "Manchester"? Or the more ambitious name "MediaCityUK", with its reference to the country but not to the city?

Here, cluster programs with a strong top-down component, such as in the case of the Lyon poles, seem to have an advantage. Efforts to coordinate branding appear successful, and the Lyon brand stands out clearly.

Apart from branding, investment and talent attraction activities are employed by many cluster organisations, but often it is done in a way that is not-cluster specific. A striking example of the cluster-specific approach is found in Dortmund, where there is no investment attraction agency. Instead, an agency in Berlin was contracted to perform a highly targeted recruitment process. Potential companies in three selected sectors are identified using a specific set of criteria, contacted by email and phone, and invited to visit the Phoenix West business location.

More common is the method to utilise existing networks, and relying on general promotion. Using existing firms (and other organisations) and their networks is one way to bring new firms in. The Lyon "Ambassador Network" is one example of this, where Lyon firms were encouraged to tell the "story of Lyon" within their existing business networks. Lyon also invests in general promotion of the city, for example the slogan "Only Lyon", which was marketed actively across several channels. Manchester also does general promotion of the city. One strategy is employed by all agencies that market Manchester as a location, for example the

MIDAS science part. However, at one point they have also engaged in attraction of a specific key company, when Bank of America was targeted to locate in Manchester as a key component in the financial sector.

For Southeast Netherlands, the Brainport brand is promoted globally through the Brainport International Community (BIC), which builds international networks and attracts international talent to the region, and also provides a “welcome service” for those who arrive in the region.

4. Reflections on cluster organisations

Projects and services

A cluster organisation conducts activities in two different ways: projects and services.

Projects have a limited duration in time and usually a specific target, such as the development of a prototype. They engage a particular subset of participants, and are often lead by a representative of one of the participants. Most of the work in projects is performed by the participants.

Services, in contrast, are usually on-going activities with no particular end point. They are typically offered to all participants and managed by the cluster organisation's own staff. Together, the services offered form a base of support that we can call the *platform*.

Innovation and other core activities in a cluster organisation are usually conducted as projects:

- Innovation projects, joint R&D projects
- Technical standards development
- Specialised training
- Export services: trade fair participations, export missions

Many other activities are usually offered as platform services in most cluster organisations:

- General networking events: regular breakfast- or lunch meetings, monthly gatherings
- Thematic workshops
- Intelligence: market intelligence, technical trends
- Lobbying of relevant public bodies
- Talent attraction and recruiting
- Business assistance to cluster firms; preparation of standard contracts
- Branding of the cluster

- FDI attraction: information to firms interested in investing in the cluster
- Information: maintaining membership list, mapping of firms and their specialities
- Communication: newsletters, press releases, website, promotion material
- Evaluation: analysis and reporting of the state of the cluster
- Administration: membership handling, annual general meetings

Two organisational models

As mentioned, the core innovation activities are usually performed as projects. There are two fundamentally different ways that a cluster organisation can handle those projects. Either they are seen as *internal* to the cluster organisation, as activities carried out within the cluster organisation itself as part of the organisation’s main tasks. Or, alternatively, they are seen as *external* to the cluster organisation, as independent activities only partially associated with the cluster organisation itself. As we shall see, a cluster organisation’s choice between these two models has a large impact on how it operates.

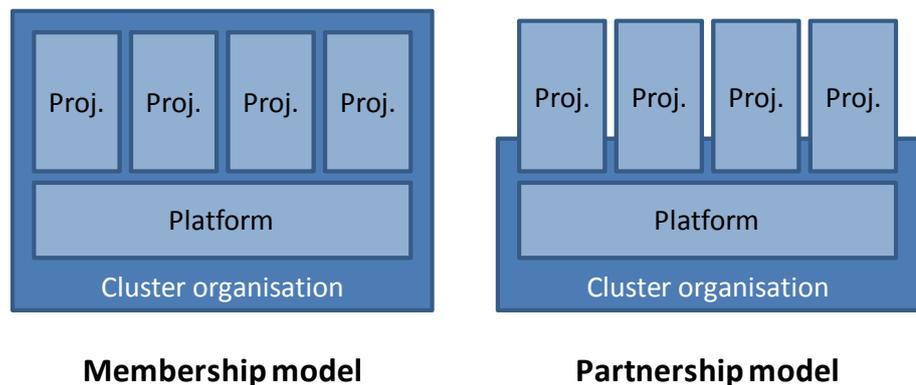


Figure 16. Two models for cluster organisations

The first model can be called the *membership model*. In this case, projects are *internal* to the organisation. Projects are only open to members of the cluster organisation, and membership in the organisation is strictly regulated: one is either “in” or “out”. The cluster organisation itself is the “home” of all this project activity, and becomes the central actor, making a clear distinction between insiders and outsiders. The cluster organisation is led by a cluster manager, who acts as a “captain”, driving the organisation forward according to a strategic plan. The manager and other staff of the cluster organisation are highly accountable for the success of the projects.

The second model can be called the *partnership model*. Projects in this model are conducted *outside* of the organisation. They engage varying partners, making the

group of project participants open and permeable. With its supporting role, the cluster organisation itself becomes less important, and the focus is more on the projects. This model requires a different kind of leadership, where the leader is seen more as a process manager acting like a “broker” bringing new partners together. Since the projects are external and partly outside the reach of the cluster organisation, the organisation is guided by a fairly general agenda. There is less at stake for the cluster organisation’s staff, since the success of the individual projects is seen as external to the organisation.

Table 2 below summarises the differences between the two models.

	Membership model	Partnership model
Projects	Internal to the cluster organisation	External to the cluster organisation
Focus	The cluster organisation	The projects
Participants	Closed, members only	Open, partners recruited
Leadership	Cluster manager	Process leader; facilitator
Strategy	Strategic plan	Strategic agenda
Staff accountability	High stakes	Lower stakes

Table 2. Characteristics of the two organisational models

In reality, many cluster organisations do not entirely match all the characteristics of just one model. There exists, of course, hybrids between the two models. Nevertheless, most cluster organisations align clearly with one of the two models.

“We currently have 50 members, and that is a suitable number. For the time being we don’t foresee allowing any new members to join, unless of course some of our current members decide to leave the Pole”. This quote by a cluster manager of a pole organisation is one illustration of the closed nature of the membership model.

In contrast, Triple Steelix is a typical partnership organisation. It is a cluster organisation for the steel cluster in North Mid-Sweden. They view the firms (and organisations) in the cluster as belonging to one of four categories. The outer group constitutes every firm in the sector, and they are seen as “potentials”. Inside these is a group of firms that are reached by the newsletter and other information activities of Triple Steelix. About 700 firms are on the cluster organisation’s mailing list, and are referred to as “Steelix Club”. The next circle contains the about 150 firms that actively participate in the other platform activities arranged by Triple Steelix. For example, they attend the networking meetings and seminars. Finally, the inner circle constitutes those 30-50 firms that are currently involved in one of the innovation projects that Triple Steelix initiate. Those are called “partners”, not members. Triple Steelix encourages firms to enter and leave these circles. For example, a firm can be an activity participant for a while, then become a project partner during a period, and then step down and just be an information recipient for a while, until it becomes a project partner yet again.

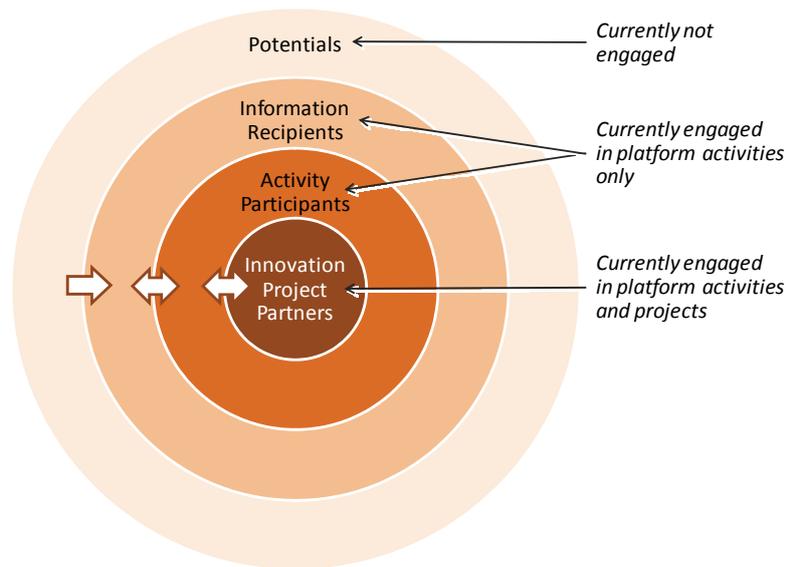


Figure 17. Four categories of actors in a partnership model cluster organisation. (Source: Triple Steelix)

“We encourage firms to move in and out of our projects. We want circulation, not just the same firms as partners all the time” says Maria Engholm, the Triple Steelix process leader.

Funding logics

Each of the two models is associated with its own funding logic. In the membership model, the bulk of the funding is directed to the cluster organisation itself, and is then split between platform and project activities within the cluster organisation’s own budget. In addition, each project may have some additional funding through various co-funding arrangements, but most of the project funding comes from the cluster organisation.

In the partnership model, the cluster organisation receives a basic funding to cover platform activities and maybe also to use as seed funding for projects. The main source of funding for the projects, however, comes from external sources. A key role for the cluster organisation is therefore to identify and bring together suitable partners for projects and help them apply for external funding. The two funding logics are illustrated in the figure below.

In the partnership model, a small investment in the platform and project seed funding can attract large amounts of external funds. A key performance indicator for cluster organisations following the partnership model can be the ratio between cluster organisation funding (“investment”) and the resulting external project funding (“return”). For example, Øresund IT, a cluster organisation for the IT

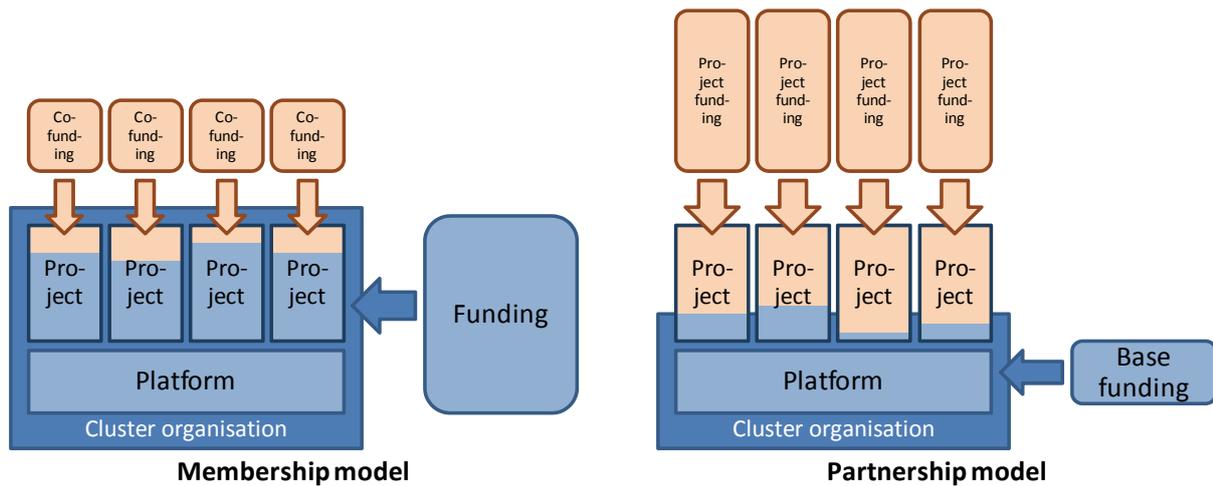


Figure 18. Funding principles for the two organisational models

sector in the Danish-Swedish Øresund region, used this ratio as key performance measure.

Most cluster organisations face the problem of how to survive after the initial funding runs out. The solution is normally to shift gradually from public to private financing. As the basic public funding is ramped down, membership fees and consultancy fees are used to make up for the loss. The membership model is particularly sensitive to loss of public funding, since project financing is such a central part of the organisation's *raison d'être*.

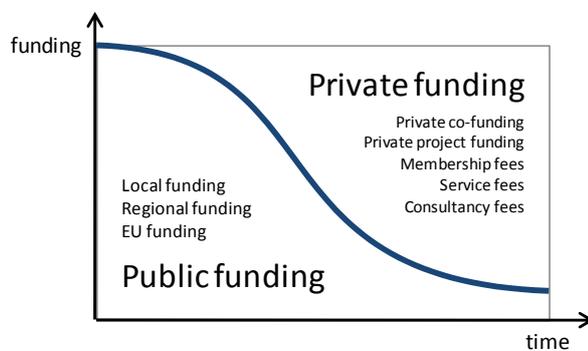


Figure 19. Evolution of funding for a cluster organisation over time

Dependence on a single source of funding can be a weakness of a cluster organisation. An indicator of this sensitivity is the largest source's share of total funding. The higher this share is, the more dependent on its main funding source is the organisation. Organisations with multiple sources of roughly equal size are less susceptible to changes in the funding situation.

Governance

The membership model and the partnership model also differ in terms of governance.

Cluster organisations that follow the *membership* model are, by definition, membership organisations, and as such they are owned and controlled by their own members. Members typically elect a board, to which the cluster manager reports.

In the *partnership* model, the cluster organisation is owned by one or several parent organisations, which are usually key local or regional stakeholders. Typical examples of such owners are: a regional development agency; a consortium of a city municipality and an industry organisation; a holding company owned by the municipality. The owner or owners contribute not only funding but also provides resources, manpower and other types of support, and often an organisational “script” or blueprint to follow. Through its ownership, the owner or owners confer reputation and status to the cluster organisation.

How much the reputation and status conferred by the owners is worth can depend greatly on the situation: being member of one programme can give a cluster organisation visibility in one context but no visibility in another. For example, a region might promote the cluster organisations it has initiated while ignoring those funded by a national agency, and vice versa. Also, being part of a well-established programme affords a cluster organisation international recognition. Being classified as a “pôle de compétitivité” or a “Kompetenznetze” can be an advantage for a cluster organisation seeking international cooperation partners.

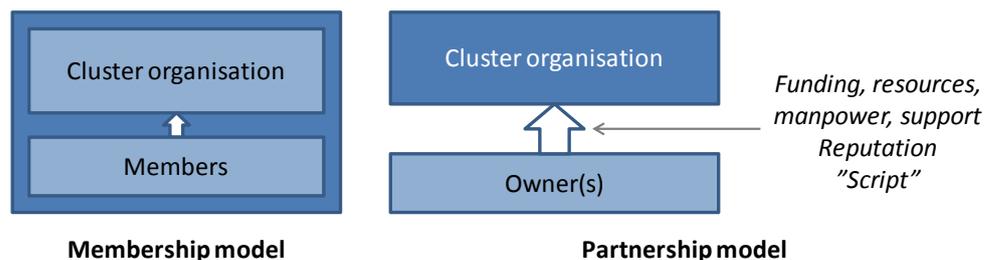


Figure 20. Governance of the two organisational models

5. Cluster policy for city regions

Within the area of clusters, the role of government is to stimulate innovation and enhancing the competitiveness of cluster firms. Both active fiscal policy and regulatory changes play important roles. Some measures are geared towards the more general macro and micro business environments, whereas others are more targeted towards individual clusters. The concept of a “cluster policy” is gaining ground. Thus, cluster policy can be interpreted in two ways; fiscal and regulatory policies which will impact clusters in more general terms, i.e. policies for clusters, or more specific as cluster policies targeting particular clusters. Both types of policies play a role in the construction of clusters.

Policy to Enhance Competitiveness of Clusters

Almost all policy areas are in some way or the other linked to clusters dynamics. Below, in Table 3 we have listed a range of traditional policy areas that are closely intertwined with clusters, even though the underlying rationale is much broader, such as improving the state of a city.

Policy area	Implication for clusters
Science and innovation	Science-driven clusters are sensitive to investments in science and technology development
Competition	Rivalry is one of the key ingredients of dynamic clusters
Trade	Linkages to world markets is of fundamental importance to improve cluster dynamics, both inflows and outflows
Market integration	Creating one level playing field within Europe, where resources can flow more freely, some clusters will gain more resources whereas others will decline, thus promoting stronger clusters
Regional	Clusters can gain from regional programs, e.g. promoting infrastructure or training, and it pushes regional decision makers to specialise their regional economy
Social policy	Access to superior public services enhance attractiveness of clusters bringing in new resources, such as new skilled people and companies
Urban planning	Making space available for cluster growth (e.g. urban regeneration)
Infrastructure	Increasing the functional region and enhancing city attractiveness

Table 3. Policy areas and their implications for clusters

If we take a closer look at regional policies, they interact with other territorial levels, ranging from states/sub-national regions through nations and international organisations, notably the EU.



Figure 21. Interaction of Policy Levels

Some regions have deep historical roots in Europe, whereas others are being formed right now. In our experience, many larger cities in Europe have formed or are about to form larger city regions, involving adjacent municipalities. City regions create larger functional regions within commuter distance. Furthermore, city regions have by now become powerful players in Europe, and many of them

strive to build functional regions with a population of at least 1 to 2 million. Several of the CLUSNET team cities have this ambition.

As we saw in the case of Manchester, the regional level (North West Development Agency) has recently given way to the city region within the field of economic development policy. Policy levels compete for policy space, and programmes are often overlapping. We now see EU cluster programmes, national cluster programmes and city cluster programmes run in parallel across Europe. Smart cities try to make use of all these instruments within their territories. And furthermore, smart cities coordinate different policy tools to reinforce strong clusters. We saw this in the case of Barcelona where design policy, entrepreneurship policy and urban regeneration policy interacted in the case of the Design cluster.

City regions have access to an array of organisational entities involved in economic development (Figure 22 below). In addition to policymaking bodies formulating laws and regulations, we see a range of city public agencies, often in the form of non-profit incorporated entities (e.g. Business Region Gothenburg, Barcelona Activa). Some run more general programmes, as in the case of city branding and entrepreneurship promotion, whereas others are more cluster-specific. We also see a tendency of organising cluster umbrella organisations (e.g. 22@, Pheonix Dortmund). This can stimulate cross-clustering innovation (gap 6). An organisation such as 22@ can hopefully play a pivotal role in creating cross-cluster dynamics and raise the attractiveness of the business district. The co-location of five clusters is a good starting point for this.

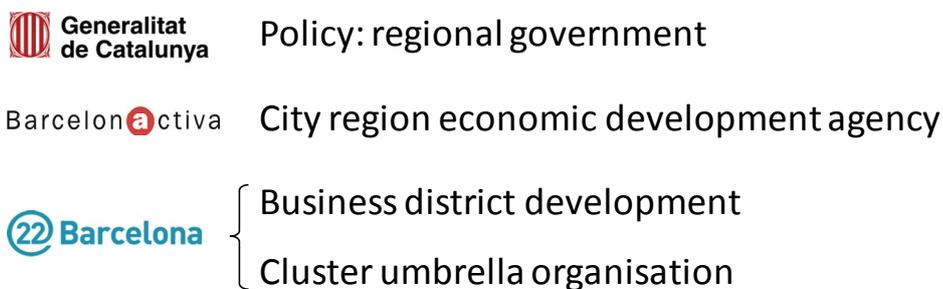


Figure 22. Example of three levels of economic development agencies within a region

A key challenge for city regions is to bring all these policy areas into a synergetic whole. Part of this work is to handle the balance between bottom-up initiatives, and emergence of new brands and sub-brands, with a top-down overall strategy to build an attractive and visible city. Globalisation has increased mobility of all types of resources, and thus it is even more important to distinguish the city brand in a world of competing brands. Top-down policy and planning of both hard infrastructure and soft infrastructure must meet bottom-up initiatives by individual entrepreneurs, firms, universities and other agents.

Targeted Cluster Policy

Cluster policy is a more active policy promoting particular clusters within a city region. The financing of such programs can emanate from EU level (e.g. structural funds), national level, and regional and local levels. Throughout this report we have seen a number of examples of city-regional cluster programs.

A key tool in a cluster program is to promote cluster organisations. Such programs – how cluster organisations are financed, governed and so on – vary a lot across our nine studied cities. However, it should be said that it is not a matter of enormous resources; rather it is about “coffee money” – getting the right people, with the right mindset and competencies, at the right time together, and it is about “seed funding” for collaborative innovation projects. Successful cluster organisations are thus often small and nimble organisations playing a middle man role between the different types of actors in a cluster. To build bridges and create lasting traffic takes a lot of entrepreneurial effort on behalf of the cluster manager and other staff of cluster organisations (remember the cluster manager Martin in Chapter 2). Only in Europe, there are now over 1,400 cluster organisations listed (see www.clusterobservatory.eu), active across all sectors and regions.

The core activities of cluster organisations should be to bridge the seven innovation gaps and build a cluster identity. It is both about constructing bridges across the gaps, but it is also about creating traffic on those bridges. Such traffic involves organising meetings, seminars and other gatherings to stimulate exchange of ideas, and the setting up of joint innovation projects of all kinds. Such work takes a long time, and the cluster organisation should build a “neutral” platform to work from. As long as a cluster organisation has a clear public status, a clear academic status, or a clear business status, it will face difficulties building bridges with intense traffic. Mixed financing, board representation and so on build legitimacy as a neutral actor.

As we have seen through numerous examples in this report, there are many forces working against true collaboration and interaction across actors on the cluster stage. These forces are both institutional (values, norms, etc.) but also carried by certain individuals. In the vignettes about Martin and the widget cluster, we saw several examples of how collaboration processes are hampered by the actions of key people in the cluster. When this happens openly and clearly, at least the cluster manager knows where the problem is. It is more problematic when the process is hampered by people who appear to be helping collaboration, not stopping it. Cluster managers will probably recognise some of these situations in one form or another. A Bridge Keeper is someone who is appointed to coordinate collaboration, but in fact becomes a bottle neck. The Resourceless Supporter is genuinely trying to help, but does in fact not have the power or resources to bring the process forward as expected. The Braker is more insidious, in that she/he appears to be a supporter, but is actually pursuing a hidden agenda, and is actively or passively obstructing the process. Sometimes, the process is de-railed as someone at a higher level in an organisation suddenly steps in and changes the prerequisites for the



The Bridge Keeper	The Resourceless Supporter	The Braker	The Reluctant Boss
Is in charge of organising collaboration, but maintains control to a degree that it actually prevents collaboration	Is enthusiastically supporting collaboration in principle, but does in practice lack the necessary resources	Appears to promote collaboration, but is in fact covertly obstructing the process to pursue a different agenda	Interferes in the collaboration process by revoking mandates and resources for collaboration

Figure 23. Four types of behaviours that can hinder collaboration

collaboration: the Reluctant Boss. Behaviours like this occur in any organisation, and are in no way specific to cluster bridge building. But because of the complex nature of cluster collaboration, they may be more difficult to spot. With skilful cluster management, however, problems like these can be identified and circumvented.

Regional cluster policy is being promoted at the EU level through a range of initiatives and programmes. We propose that cluster policies should, in line with the European Cluster Memorandum (can be downloaded at the European Cluster Observatory, www.clusterobservatory.eu), be targeted towards:

- 1) Inspire cluster programmes in member states and regions as a central part of regional and innovation policy
- 2) Continue building capacity for fact-based cluster policies and evaluation
- 3) Support to transnational cluster networks and benchmarking across regions of Europe
- 4) Cluster manager training
- 5) Policy learning for regional development with a focus on innovation and clusters

We propose that such policy initiatives should be integrated into the next phase of European Structural Funds, where city regions must play a prominent role.

A three-level model of cluster policy

The concepts we have presented in this report can be summarised in a single three-level model illustrated in Figure 24. The top level is the *cluster level*, where we find all the different types of actors. For a city region, this level is useful for mapping the cluster. How many firms does the region have in the selected sector? What universities are relevant for the cluster? Which schools and capital providers are related to the cluster? Which local/regional government agencies have an impact on the cluster?

The second level is the *interaction level*. This is where we find the bridges, the various organisations and actions that span the gaps and tie the cluster together. They can be cluster organisations, incubators, regional investment attraction agencies, chambers of commerce or many other types or organisations. For a city region, this level of the model is useful when surveying which organisations are involved in supporting the cluster, and to identify gaps that are overlooked and unattended.

The third level, the *collaboration level*, is where actual contacts between actors take place. This is where we find the people who participate in the collaboration activities in the cluster. It is this level that determines whether or not the resources and efforts spent on supporting the cluster will result in increased dynamics in the cluster, improved innovation, and ultimately enhanced competitiveness. For a city region, observing this level gives an indication of how well a cluster initiative is working. Are people meeting? Do they communicate and collaborate with each other? Are they actively involved or passive observers? In short, is there traffic on the bridges?

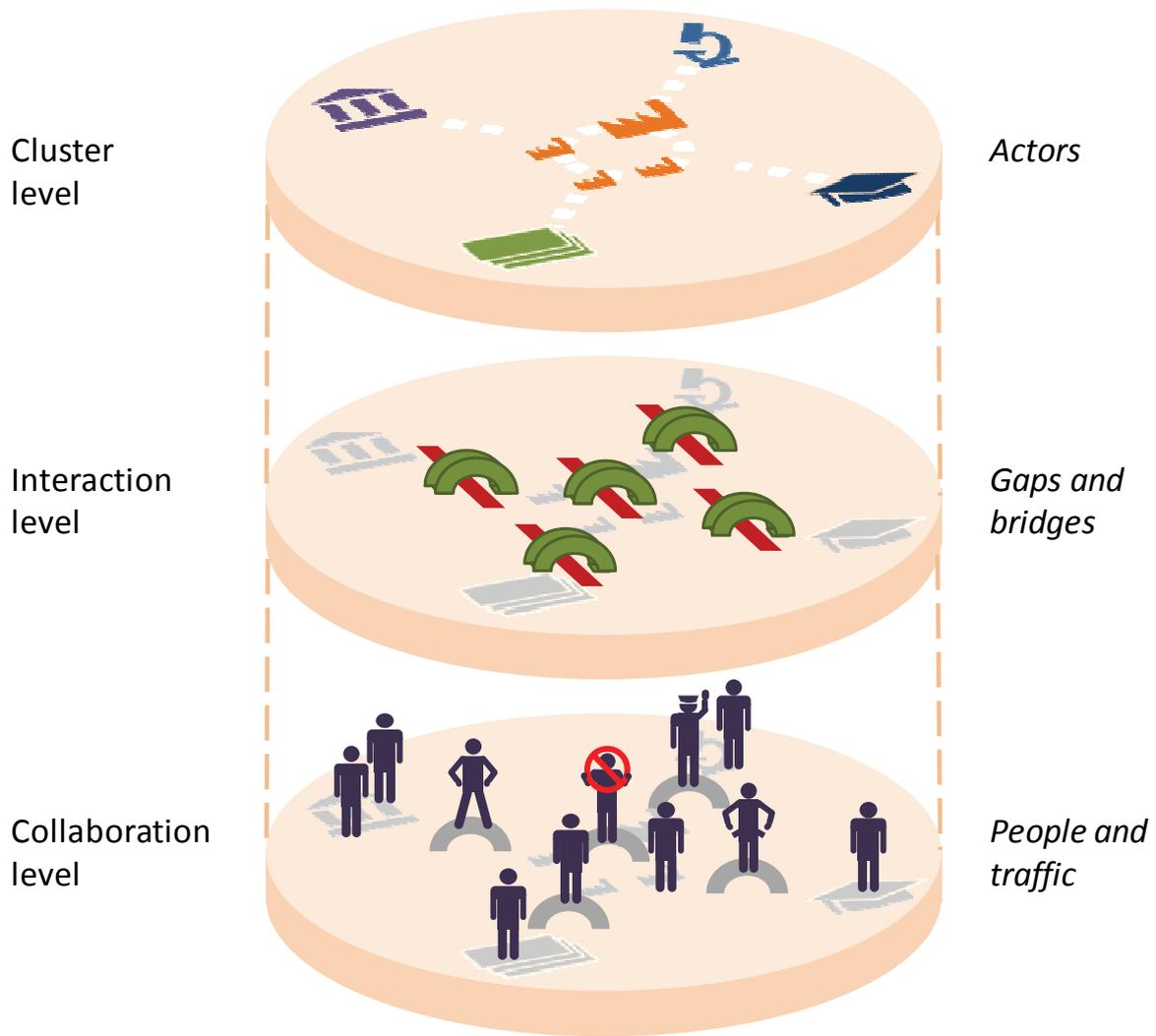


Figure 24. A three-level model of cluster policy

A Final Word

In this report we have offered a fresh perspective on city regions, economic development, innovation and clusters. In Chapter 2 we outlined the seven gaps that create obstacles for innovation, i.e. the creation of new products, processes, services and business models that enter into use and create commercial value. Clusters as we have shown are particularly important for the second half of the equation. Cluster dynamics is partly a natural process, but also a matter of construction by all actors on the cluster scene. Cities have access to a range of instruments that can be used to bridge those innovation gaps, and can build identities around clusters. Many models are tried out and we have observed many good examples in the CLUSNET cities.

To offer some advice, here are five pieces of advice for bridge builders:

- Begin with the low-hanging fruit. Start building trust in the cluster by identifying some task where there is agreement that action is needed. In our example case, the cluster manager Martin started off with an education-related project, not because it was the most important task but because there was general consensus that this was an issue that ought to be addressed.
- Building cluster identity is an unending task. Making actors think about themselves as part of a cluster takes continued encouragement, and needs to be repeated over and over as times goes, new priorities appear and new people get involved. Martin had a list of 100 to-do-items, and could tick them off one by one as work progressed, but building the idea that “we are the widget cluster” remained on the list.
- It is about people and traffic. Setting up organisations, institutions, and networks is necessary to build bridges, but a bridge without traffic is of no use. Activities are needed to maintain the bridge and keep it from being disused or even destroyed. Martin made a point of revisiting earlier projects to make sure they didn’t run out of steam.
- Benchmark yourself. Comparing yourself to others is not just a good way to evaluate how you are doing. It is also a great way to learn new things. The CLUSNET project has been a good example of this. Martin was eager keep learning by participating in EU benchmarking exercises, both with other widget clusters in Europe, and with clusters in entirely different sectors.
- Bridge building is easiest from a neutral position. Bridge building from one side only risks hitting a wall on the other side of the gap. Cluster organisations that are seen to be clearly public sector-run, or purely belonging to the academic sphere, or being all-business, will find it difficult to engage all types of actors in the cluster. The cluster organisation Martin joined was a public agency, but after a few years he insisted that it be converted to a neutral non-profit organisation and moved the office out of the city hall.

So, honestly, when you think about your own city what do you see in terms of policies and programmes related to clusters? Institutional thickness or empty slots? In the Table 4 below we show two hypothetical cities. Which of them does *your* city look like?

City A	The Research Gap	The Education Gap	The Capital Gap	The Policy Gap	The Firm-to-Firm gap	The Cluster-to-Cluster Gap	The Global Market Gap
Network Gathering					✓		
Innovation Projects					✓		
Website					✓		✓

City B	The Research Gap	The Education Gap	The Capital Gap	The Policy Gap	The Firm-to-Firm gap	The Cluster-to-Cluster Gap	The Global Market Gap
The Incubator	✓						
Network Gathering	✓	✓	✓	✓	✓		
Innovation Projects	✓				✓		
Training Programs		✓					
Trade Shows					✓		✓
Office on Campus	✓	✓					
Market Intelligence							✓
Quality Program					✓		
Export Promotion					✓		✓
Technical Standards					✓		
Cross-clustering						✓	
Investor Days			✓				
Talent Attraction							✓

Table 4. Two hypothetical cities with different bridge building programmes

And if you are a cluster leader, how much like Martin are you? If you can see areas for improvement, we hope that this report has given you new inspiration to help in the construction process of creating more attractive and dynamic city clusters.

Grand Lyon	www.grandlyon.com
Barcelona Activa	www.barcelonactiva.cat
Budapest	www.budapest.hu
Dortmund	www.dortmund.de
Brainport Eindhoven	www.brainport.nl
Business Region Göteborg	www.businessregiongoteborg.com
City of Helsinki	www.hel.fi
City of Leipzig	www.leipzig.de
Manchester Enterprises Ltd	neweconomymanchester.com
Munich	www.muenchen.de
EUROCITIES	www.eurocities.eu
Stockholm School of Economics, Center for Strategy and Competitiveness	www.hhs.se/csc