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PROJECT FULL TITLE: Facilitate Industry and Research in Europe

Guidelines for clusters: How to Stimulate and Improve Innovation Pull-through

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1 EXECUTIVE SUMMARY

Regarding the EC in the broadest sense, clusters can be defined as regional concentrations of specialized companies and institutions connected through multiple linkages. However, other definitions are used as well, depending on the context and purpose of the discussion. In particular, it seems to be important to clearly distinguish between clusters, cluster policies and cluster initiatives. Whereas clusters are a real economic phenomenon that can be economically measured, cluster policies are more an expression of political commitment to support existing clusters or the emergence of new clusters. Cluster initiatives are practical actions to strengthen cluster development, which can, but must not necessarily be, based on a formulated cluster policy

The OECD defines clusters as a geographic concentration of firms, higher education and research institutions, and other public and private entities which favours collaboration on complementary economic activities.

Formal definitions of clusters may vary, but many experts agree with economic expert and Harvard professor, Michael Porter's¹ definition that a cluster is defined as a geographic concentration of inter-connected companies and institutions working in a common industry.

In addition, clusters encompass an array of collaborating and competing services and providers that create a specialized infrastructure, which supports the cluster's industry. Finally, clusters draw upon a shared talent pool of specialized skilled labor.

According to the Clusters Policies White-book, the clustering is generally defined as a process of firms and other actors co-locating within a concentrated geographical area, cooperating around a certain functional niche, and establishing close linkages and working alliances to improve their collective competitiveness. The concept is related to, but goes beyond, that of agglomeration or co-location of related activities.

Whereas co-location may be associated with favourable external effects that are not intended but rather incidental (Mishan²), joint strategies and actions motivated by the anticipation of mutual benefits are greatly important in clustering. Until recently, the process was nevertheless viewed as exogenously determined, that is, from the viewpoint of a policymaker, a member of an industry or a resident in a region or a nation; you were lucky if you had it, or were part of it.

The cooperation between clusters and research organizations should be part of the strategic approach of each – university, member companies and cluster (further also region and industry). These guidelines

¹ PORTER, Michael E. CLUSTERS of INNOVATION: Regional Foundations of U.S. Competitiveness. October 2001. *Monitor Group on the FRONTIER Council on Competitiveness*. SBN 1-889866-23-7

² MISHAN EJ. Cost-benefit analysis: and informal introduction, London: Allen & Unwin, 1971.



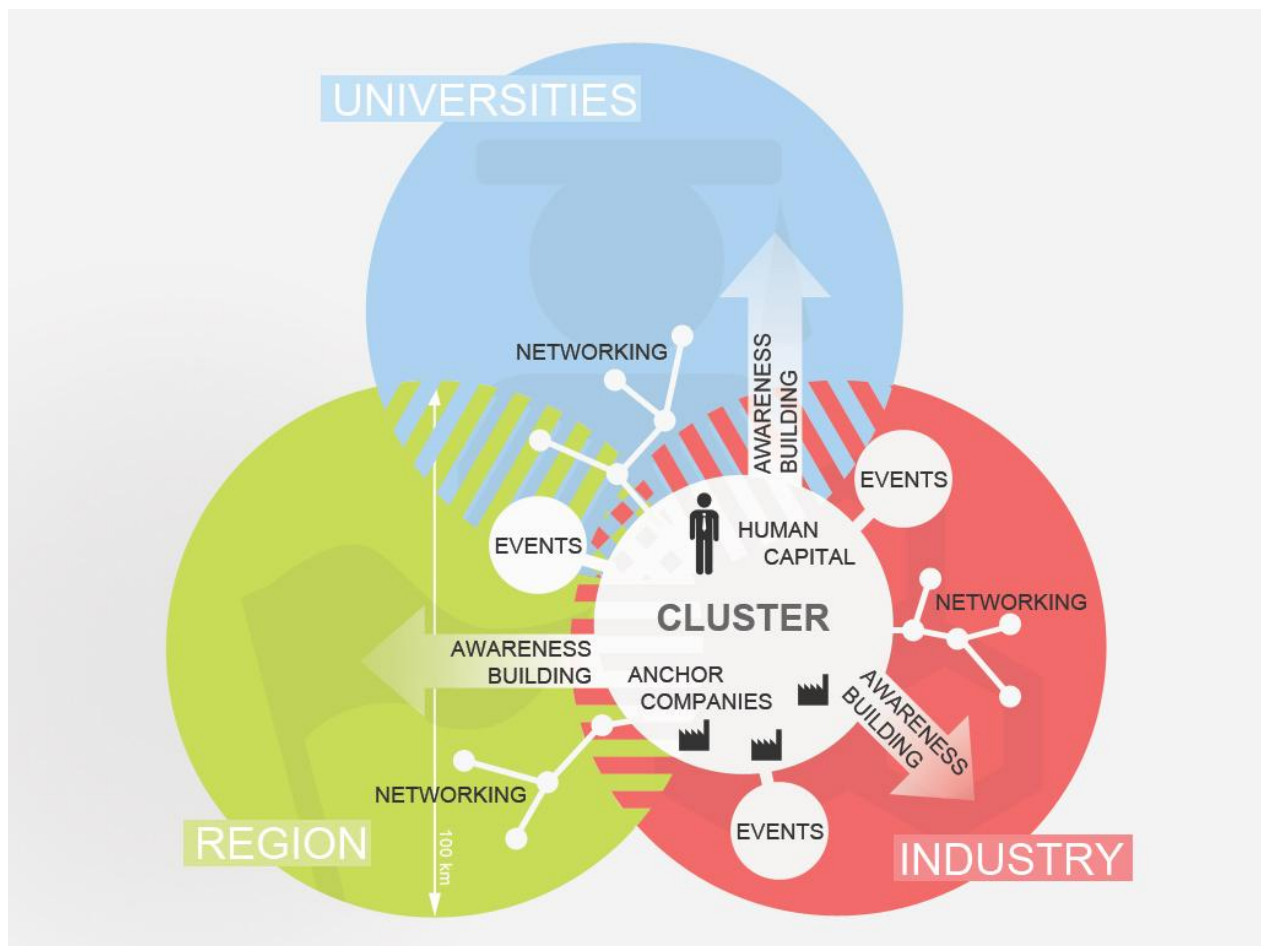
give directions to clusters on how to stimulate and improve innovation pull-through. These guidelines highlight the Enablers which need to be fulfilled, the most common barriers and the success stories. There are also recommendations, for founding clusters.

2 ENABLERS AND BARRIERS

Six main Enablers have been identified that stimulate innovation pull-through and are discussed in Sections 2.1 to 2.6. They are:

- Anchor company
- Networking
- Human Capital
- Region cooperation
- Events (organizing/participating)
- Awareness building

The mutual relations between the Enablers can be seen as:



The main barriers³ to innovation pull through have been identified, such as:

- Low communication level on researchers' side
- Low communication level on industry side
- Low knowledge of customers' needs
- No marketing research prior to the R&D project
- R&D projects with unknown result/output
- Low R&D budget
- Low business knowledge of researchers
- Low knowledge about spin-off companies
- National thematic R&D projects support (with low business orientation)
- Regional thematic R&D projects support (with low business orientation)

The identification is based on desk research of different clusters case studies and also derived from the interviews with clusters managers.

2.1 Anchor Company

According to M. Porter's "Clusters of Innovation: regional foundation of US Competitiveness", 2001: *"Anchor companies are firms that play a large role in budding clusters by performing several functions... Anchor companies tend to organize other companies in a cluster for collective action such as collaborating with universities to build specialized research and training activities."*

Most successful clusters have at least one Anchor company. The Anchor company also brings the financial stability to the cluster. Very often, it is the Anchor company who is leading the cluster in the beginning of its life-cycle, or who brings the biggest potential of networking.

Later on, when a cluster could need different kind of sources due to actual activities, the Anchor company is highly appropriate. Sources such as specialist, pre-financing, unique know how and networking know how, etc.

2.2 Networking

"The unit of innovation has become the network, not simply the firm. To speed up the commercialization process, the walls that once separated public and private institutions, education and business, large and small firms must come down."⁴

³ Barriers in meaning region-university-industry collaboration to achieve innovation pull-through.

“...trust, willingness to share, and mutually beneficial exchange over time.⁵”

Cluster members are aware of the importance of connecting the company initiatives to the initiatives led by the universities and other research institutes, in order to bridge the innovation gap. Clusters usually put lot of effort into networking facilities and events, mostly between end users, suppliers, researches, government and main competitors, this means B2B, B2C and B2G⁶ networking.

Either the cluster or its members may initiate networking activity. It is also important to network not only in the industry, but cross-over into other fields, e.g. people from ICT sector network with people from energy or health sector. This can bring real value over time.

2.3 Human Capital

Availability of key human resources is very crucial, and also firstly the management of the cluster. It appears to the authors those characteristics which are important are:

- pioneering spirit
- openness to collaborate,
- establish associations,
- team work.

Access to sources of motivated contributors and pools of highly qualified personnel are essential to achieve sustainable clusters. Creation of key linkages with training and educational institutions, as well as firms that expect rapid or specialized skill-based development should be made at an early stage, especially in the case of dynamic and high growth clusters, to ensure a proper balance between supply and demand and to exploit research outputs.

2.4 Region cooperation

According to National Research Council Canada⁷, many believe that innovation is the product of strong assets (e.g. universities) dependent on funding from outside the region. They see little if any regional

⁴ Source: “Innovative regions: The importance of place and networks in the innovative economy,” Collaborative Economics (www.coecon.com), October 1999.

⁵ Source: “Innovative regions: The importance of place and networks in the innovative economy,” Collaborative Economics (www.coecon.com), October 1999.

⁶ B2B means relation between business and business, B2C means relation between business and consumers, B2G means relation between business and government.

⁷ POTWOROWSKI, J. ANDRE. CREATING AND GROWING TECHNOLOGY CLUSTERS: Observations and best Practices from NRC Managers engaged in the creation and development of technology based clusters. *National Research Council Canada*.

role... Encouraging new thinking about the cornerstones of regional innovation can lead to action on a regional basis – action to use both national and regional assets to promote a regional vision for innovation.

Including regions brings many new challenges, mostly the opportunities or sources of above mentioned Enablers. Cluster should cultivate attitudes toward collaboration and sharing of information among firms, universities, training centers, labor, institutions for collaboration, and government.

In terms of regional clusters the geographical foot-print seems to be more important than hitherto believed. In order to foster networking and collaboration travel distance, travel time and sharing of culture and ability to support informal gatherings all drive towards geographically limited cluster sizes. It would appear that travel time is the most common factor and that travelling up to about an hour is all that can be easily accommodated and this corresponds to cluster radii of about 60km to 100km, depending on infrastructure provision. The distance is based mostly on experience of clusters managers, but it may differ taking into account the traffic availability, density of population and industry in the region, the country region structure etc.

Not only the networking with people from different industries, but also cooperating with regional entities is highly important for clusters. On the other hand, clusters should stay open for collaboration with other clusters and regions at a further distance and be the mechanism for facilitating inter-regional cooperation.

2.5 Events (organizing/participating)

Events are very important for the clusters because the networking activities can be made in different meetings, but events brings the option also for wider audience/participants. Organizing and participating in different events encourages clusters members interaction and attracts the attention of other entities in the environment and in the market. There are many different events, which clusters can organize/participate in. They can be rather open ones or specific ones tailored to a specific community.

Open ones:

- thematic round tables, workshops, conferences, trade shows, exhibitions

Specific ones:

- Technology Executive Breakfast (TEB)
- Informal meetings
- The events are tailored to a specific community

Recommendations:

- Registration up to 120 attendees
- 60-100 participants

Participation at trade shows and exhibitions has also value for the cluster and for the industry cluster members. It can promote the cluster, build awareness about the industry, industry niche or cluster; and it can network easily and deepen the regional cooperation.

2.6 Awareness building

The awareness building should be one of goals of each cluster. It helps the cluster to find its right place on the market, and let others know, what it is doing, what is its focus and where it is going to. The awareness building can be achieved by two different approaches: creating its own support activities or participating in someone else's events.

Creating support activities:

- Clusters university⁸
- Innovation and knowledge platform
- Board for lobbying
- Issue magazine/newspaper/newsletter
- Provide industry knowledge⁹
- Briefing and roundtables with government representatives
- Seminars/workshops...

Participate at and cooperate with:

- Technology centers¹⁰
- Centers of excellence¹¹
- Technological research institutions
- Chamber of Commerce
- Regional institutions

⁸ Clusters University means founding own clusters educational programme/entity.

⁹ In case if these information are needed, e.g. from abroad entities, collaborators etc.

¹⁰ Technology centers are places where young companies can start. They typically provide cheap offices and services such as: how to write the business plan, training in marketing and support PR.

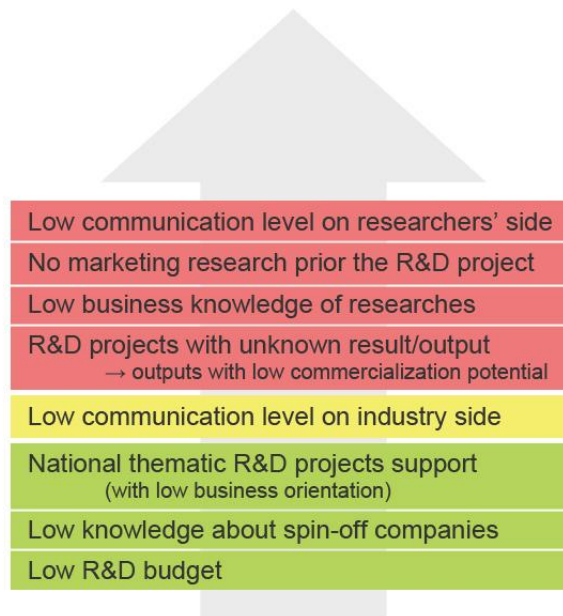
¹¹ Centers of excellence are typically publically funded or partially publically funded bodies that focus on research. They may be universities, Research and Technology Organisations (RTOs) and usually have highly skilled and specialized technical staff, e.g. Fraunhofer in Germany, or TNO in the Netherlands.

2.7 Barriers

Based on the desk research and interview with clusters managers¹², the main barriers¹³ to innovation pull-through have been identified, such as:

- Low communication level on researchers' side
- Low communication level on industry side
- Low knowledge of customers' needs
- No marketing research prior the R&D project
- R&D projects with unknown result/output
- Low R&D budget
- Low business knowledge of researches
- Low knowledge about spin-off companies
- National thematic R&D projects support (with low business orientation)
- Regional thematic R&D projects support (with low business orientation)

Based on research, the barriers have been divided depending on their importance.



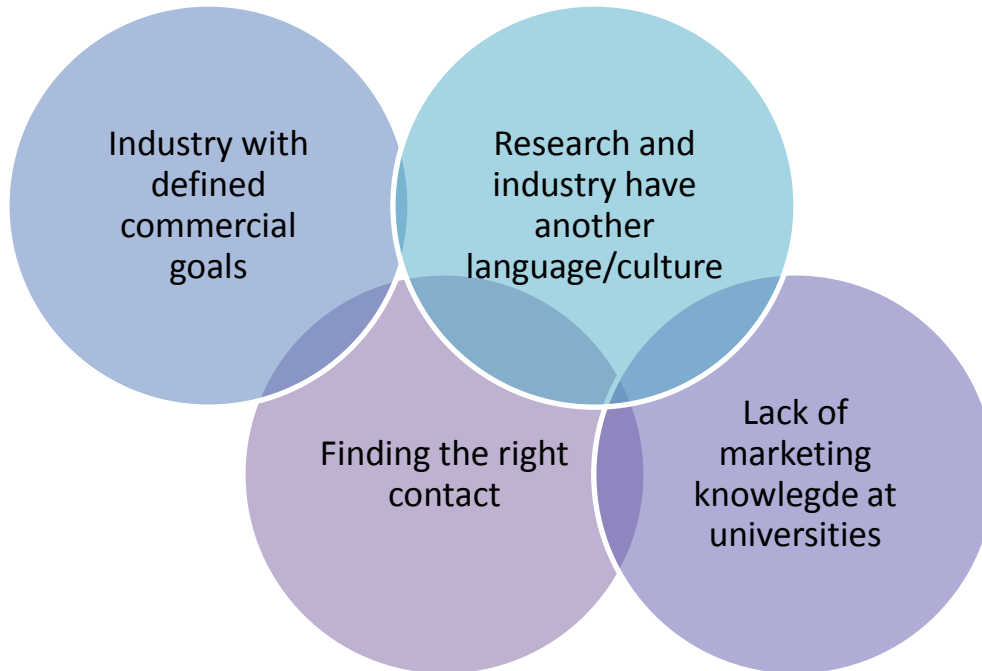
How to deal with these barriers is described in section 5.2 Open up for Business Oriented Research Opportunities.

¹² See the Appendix A – List of sources.

¹³ Barriers in meaning region-university-industry collaboration to achieve innovation pull-through.

2.8 Problems identified

Based on previous research, the 4 main problems inhibiting industry-research collaboration have been identified.



Surprisingly, the most relevant problem is to find the right contact; in both directions, from universities to industry, and from industry to universities. Mostly the companies are more successful at finding the contact at the universities, but university researchers face real difficulties in finding the right person in the industry, which will be willing to share the research and knowledge. This is because industry and universities have a different language and the mechanisms don't exist; one is therefore forced to consider the understanding of the other (i.e. the culture) in order to find people with whom to work. This is something that will remain, but can be minimized. Networking, events regionally can help to reduce this gap. The communication between companies and academia is difficult mainly due to the difference in outlook, timescales and motivations. Academia has the luxury of focusing on the medium to long term; it is rewarded by publication records and funded on 3 to 5 year timescales or longer. Industry frequently focusses on the near to medium term and does not want to publicize its work until, a product has been produced. The industry has defined goals, deadlines, all of this directed to sales. More-over the companies do not want to invest time, money and knowledge into research and outputs with low level of Return on Investment (ROI), or into non affordable technologies and products. Nevertheless research organisations and industry can mutually benefit from the exchange of people, even for short, targeted

periods. Our interviews with industry¹⁴ indicate that access to competent but different perspectives provides a major benefit arising from interactions between research institutions and industry.

Clusters that possess the majority of the Enablers tend to markedly decrease the probability of facing these problems.

¹⁴ As part for the FIRE project a number of ADS members were interviewed between January and May 2013 and their views recorded under the Chatham House Rule.

3 DISCUSSION AND CONCLUSIONS

3.1 Step 1 – Providing the Enablers

Identifying the Enablers is the first step. There are some recommendations how clusters can fulfil them.

1) Anchor Company

- a) Find an Anchor company and attract it into the cluster (if not already established)
- b) Sustain and develop the very good relations with the Anchor company management to attract it to be an active member of cluster

2) Networking

- a) Create events to allow members to regularly meet new people
- b) Support known contacts (also using different communication platforms, e.g. LinkedIn, Twitter)
- c) Presumably focus on particular types of networking that help industry and universities work together

3) Human Capital

- a) Employ the key person with characteristics such as:
 - i) Pioneering spirit
 - ii) Openness to collaborate
 - iii) Establish associations
 - iv) Team work

4) Regional cooperation

- a) Collaborate with the regional institutions
 - i) Inform them about the cluster's activities
 - ii) Actively participate at regional institutions' activities
 - iii) Find some mutually beneficial projects and work together

5) Events (Organizing/Participating)

- a) Organise own events and participate at other ones
- b) Aim to organise cluster the events on a regular basis
- c) Support the events (using different ways of PR)
 - i) Open ones: thematic round tables, workshops, conferences, trade shows, exhibitions
 - ii) Specific ones: Technology Executive Breakfast (TEB), informal meetings, events are tailored to a specific community

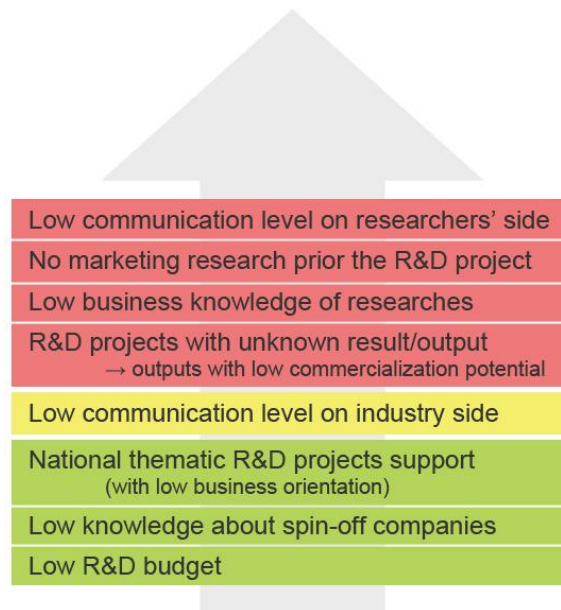
6) Awareness building

- a) Make the awareness building one of the cluster's important goals
- b) Realize the support activities on regular basis
- c) To build the awareness well, find collaborative partner for the awareness building activities, in and out of the region

- d) Identify all the possible events/activities suitable for the awareness building and participate there
 - i) Support activities: Cluster long-life University¹⁵, Innovation and knowledge platform, Board for lobbying, Issue magazine/newspaper/newsletter, and Search the industry, Briefing and roundtables with the government representatives, Seminars/workshops...
 - ii) Participate at and cooperate with: Technology centres, Centres of excellence, Technological research institutions, Chamber of commerce, Regional institutions

3.2 Step 2 – Open up for Business Oriented Research Opportunities

Continuing to supply the Enablers provides a basis for supporting the stimulation of innovation pull-through. Also there are some barriers clusters can face, such as:



Breaking the barriers will help the cluster to open up for business oriented research opportunities.

Surprisingly, based on desk research and interviews with clusters managers¹⁶, it appears that access to finance is not the main barrier to stimulating innovation pull-through. University spin-off companies, which often develop products/services brought from the academic field, have problems in other areas. The main difficulty is that innovations, specifically technical ones in the area of trustworthy ICT, are often difficult to position in the market. This is the second most important barrier identified above. It may be

¹⁵ Clusters may set up their own educational entity.

¹⁶ See Appendix A – List of Sources.

the result of very little market research having been undertaken prior to commencing an R&D project and to the very limited business knowledge often possessed by the researchers. This is exacerbated by the fact that the spin-offs are often young companies with young people who have a very low level of practical market knowledge and experience. Sometimes they are missing a strategic partner with the market understanding.

The low communication level on the industry side differs by the volume of the company. Some companies prefer to keep R&D in-house, some (particularly SMEs) are interested in connecting to universities or research institutes that can help them but struggle to find the right contacts. Large companies are usually well connected with researchers in relevant fields.

Of the barriers identified in Section 2.7, the four main ones, which are logically connected, are below:

- Low communication level on researchers' side
- No marketing research prior to the R&D project
- Low business knowledge of researchers – industry mainly market oriented
- R&D projects with unknown result/output → outputs with low commercialization potential

Researchers are usually keen to find companies to work with but find it hard to connect to companies that are interested in their work. The reason why is the low business knowledge of researchers on one hand and project outputs with low commercialization potential on the other. The truth is that R&D staff in companies and R&D institutions usually collaborate well if they have common goals on which to collaborate.

The R&D project, the R&D Institutions are normally encouraged by funding bodies to take account of the potential impact of their work on markets when planning their projects, but there is often low market knowledge in universities.

However, clusters usually make the marketing research by themselves. Marketing research prior to the R&D projects, which are market oriented, should be a key issue, in order to know if the project will have a good commercial result

It appears to be much easier for companies to identify and articulate their goals than for researchers to understand them. It would appear that the low business knowledge of researchers may be hard to change quickly and would require constant input from changing market conditions can be a time-consuming distraction for them. (Notable exceptions exist and demonstrate excellent practice in gaining industrial input, mutual participation and guidance¹⁷.) In contrast companies often rapidly adapt to changing market conditions and technology opportunities as their survival depends on doing so. Clusters are perfect entities that should help to minimize the low business level of the researchers by the internships and interim projects of students (future researchers) in their members' companies. The

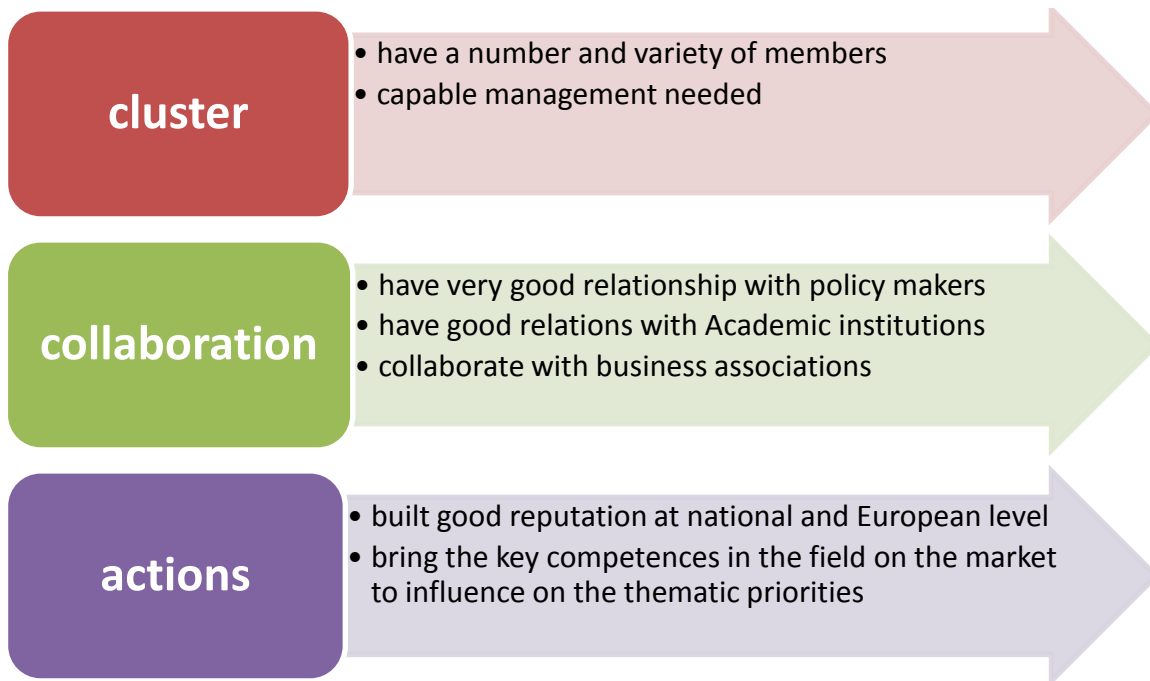
¹⁷ E.g. the 'Membership Model' at CSIT, Queens University, Belfast. <http://www.csit.qub.ac.uk/>

problem on the other side is that the companies focus mostly on profit or turnover. This means they pay attention to such products/services/projects which will bring the highest Return on Investment (ROI) in the earliest possible time. Also the companies are careful about projects with non-affordable output for the market.

One, often intractable problem, is the sometimes incompatible objectives of industry and universities. Good research may well be long-term and builds knowledge and is often measured by good publications in the peer-reviewed academic press. Industry on the other hand needs market differentiators and commercially exploitable intellectual property (IP) in the near to medium term. Good research may or may not be exploitable. If it is exploitable, it is also worth recognizing that industry may have to invest much more than the cost of the early-stage research to bring a commercial implementation to market.

3.3 Step 3 – Grow and Develop

After providing the Enablers and being aware of potential barriers, the cluster also needs to continue to evolve to thrive. There are some of recommendations, from other successful clusters¹⁸, on how to grow and develop the cluster.



¹⁸ See Appendix A – List of Sources.

Be aware of

- **WORKING GROUPS**

- If you are not sure about the work to be done in a working group, do not establish them.

Common problems are:

- Lack of interest or time of potential participants
- Limited participation
- Difficult to attract again with something new in the group¹⁹
- Short life of the working group

- **FOCUS**

- There are two extremes – too wide range and too narrow
- Avoid the confusion with the project theme focus, make your goal (focus) easy to understand
- Too wide a range of interest can lead to conflict of interest
- Too narrow a range of interest can miss out project opportunities
- Cluster should regularly follow the global industry trends

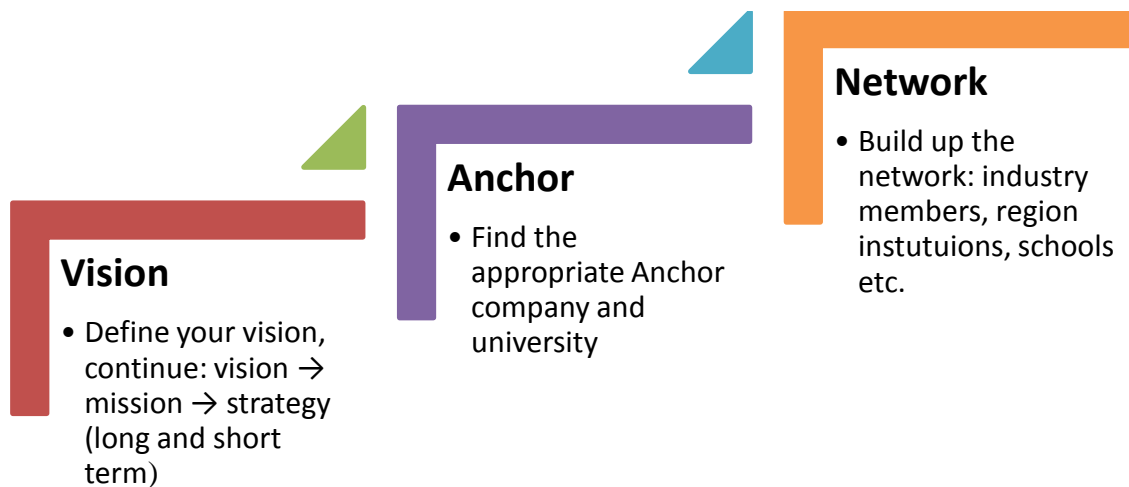
- **RISK**

- High risk research can have small chance to succeed
- Low risk brings higher chance to have partners and succeed, but usually low Return of Investment, so it is difficult to get companies involved
- Low risk vs. high risk can be minimized by open discussion before the research agenda is decided

¹⁹ Understand: in limited continuity of participants and also in lack of regular new ideas.

3.4 Founding cluster recommendation

In founding a new cluster the first aspect is the need. It can be need for the research, need for the marketing/networking, need for wider collaboration, getting stronger in business etc. The core of the cluster should always be in industry, because there is real demand. In this case we mean “business cluster” (see the definition of business cluster in the introduction part).



In the beginning the vision is very important. The environment and industry analysis should be done to see the need for the cluster. The potential members should already be working together. A balance between Vision and pragmatism needs to be established at the start. It is very appropriate while building to be: in the right place at the right time – and do the right things. The right place is predominantly governed by the market niches occupied by industry and complemented by their geographical location in serving their chosen markets. Assuming that an Anchor company acts as the focus for the cluster, it is very important that it will be interested in potential research needs of the whole cluster and the ability of other members to supply it, i.e. to act as a broker between the two. Strong networking should include the researchers (e.g. from one or more universities or RTOs) from the beginning. Researchers and innovators are a vital part of the cluster and strong links to this community, especially universities and RTOs, are vital. Mutual engagement between industry and research communities can both assist in the shaping and in the exploitation of commercially attractive research and contribute to the development of a balanced research agenda, meeting the short, medium and long term needs of the participants.

4 Appendix A – List of sources

This research is based on 3 different groups of sources:

1. **Project Partners**
2. **Desk Research**
3. **Other clusters managers**
4. **Other sources**

These groups can be more precisely characterized such as:

1. **Project Partners**

All project partners, the leaders or decision makers inside the project partners.

Those project partners are:

- ADS (Great Britain)
- AMETIC (Spain)
- CYBERNETICA (Estonia)
- IFIS (Germany)
- LSEC (Belgium)
- NSMC (Czech Republic)

For more information about the partners please go to: <http://www.trustworthyictonfire.com/>.

2. **Desk Research**

Desk Research was made as a first step of the research. The information was searched mainly in the ICT industry. Unfortunately, there were no many studies concerning the clusters in ICT covering the relevant topic of how to stimulate and improve the innovation pull-through. Due to this fact, the other industries and branches were also taken into account. The most inspiring papers were from these clusters:

- Construction EU clusters
- Financial Service Cluster, Hong Kong
- Digital Media and Creative Industries, Scotland and UK
- Salmon Industry Cluster, Chile
- Biotech Cluster, Montreal
- e-business cluster, New Brunswick

3. Other clusters managers

Besides the project partners, there are also other ICT clusters. Skype interviews were also made with the managers of these clusters:

- Slovenian ICT cluster (Slovenia)
- Virtual Dimension Center (Germany)
- Softwarezentrum Böblingen/Sindelfingen (Germany)
- ICT Cluster (Poland)
- ITEKO (Czech Republic)

4. Other sources

Other important players apart from the clusters were also relevant. There were many interviews made with managers and decision makers of clusters members companies but also with regional entities, whose point of view is also very important, such as:

- Masaryk University
- Czech Chamber of Commerce, national and regional level
- Czech National Clusters Association
- South Moravian Innovation Center
- Czech ICT Alliance
- Czech Association for IT Services

5 Appendix B – Other sources recommendation

5.1 Recommendations from e-business Cluster

“Develop the research agenda with key stakeholders/leaders – e.g. Municipal governments – the most visible leaders, and ensure that they are all on the same page.

Build a collaborative model of R&D – challenge the universities to leverage their capacity, on their own campuses.

Build a “facilitator organization”, which cuts across all players. In Halifax, we created a separate entity, a Life Sciences Development Organization, with multiple sources of funding. They had a methodology and an action plan. Most communities do not have a longer-term vision of where they want to go.

Develop a decision-making model, a collaborative model, where you consult before you invest.”

Source: POTWOROWSKI, J. ANDRE. CREATING AND GROWING TECHNOLOGY CLUSTERS: Observations and best Practices from NRC Managers engaged in the creation and development of technology based clusters. *National Research Council Canada.*

5.2 Porters recommendations for universities

- Recognize the important role of universities in regional economic development.
 - Take the lead on, and participate in, regional and cluster development efforts.
 - Create and support technology transfer offices.
 - Work with firms and venture capital to streamline the technology transfer process.
 - Benchmark the commercialization of university-created intellectual property using measures that promote efficient dissemination of knowledge.
- Actively participate in cluster development efforts.
 - Align university curricula and research to meet the needs of local clusters.
 - Create cluster-specific institutions to support collaboration between academia and industry clusters.
 - Work with local industry to create areas of excellence within universities that differentiate the university and complement local industry strengths.
 - Integrate research and training efforts with the needs of local industry.
 - Participate in the recruitment of companies.
- Support company start-up efforts by professors and students through mentorship, entrepreneurial education, and financing

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