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Report on Cluster Alliances and Networking Between KIS-Enterprises and Clusters

EUROPE INNOVA
KIS-IP
ACHIEVE MORE

Anna Butzin
Judith Terstriep
Institute for Work and Technology
06.03.2009

Document Properties

Document No.:	ENTR/CIP/07/C/N04S00-6		
Document Title:	Good practice report on cluster alliances and networking between KIS-enterprises and clusters		
Work package:	WP6 – Access to Clusters		
Author(s)/editor(s):	Anna Butzin and Judith Terstriep		
Dissemination Level:		Nature:	O - Other
Status of Document:			
Version:			

Revision History

Revision	Date	Issued by	Description

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Abstract

The aim of this document is to outline access mechanisms to networking between clusters and among clusters and knowledge intensive services (KIS). It is structured into eight chapters. The first part (chapters 2-5 discusses clusters, the cluster lifecycle approach and cluster dynamics. Chapter 6 reflects some approaches of inter-cluster cooperation applied in European projects. Chapter 7 examines practiced incubator-cluster cooperation mechanisms. The report ends with the formulation of future requirements to strengthen incubator-cluster cooperation.

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1 Introduction

Political, academic and business actors of many European regions have joined forces to develop and stimulate the growth of clusters. During recent years structural policies and regional promotion schemes have been directed towards cluster-oriented regional development. It is assumed that dynamics, cooperation, competition, flows of knowledge and ideas within a cluster and between clusters and the outside environment stimulate an environment of innovation and competitiveness.

A geographic area (i.e. a region) and an industrial sector or a value chain are the delimited characteristics of clusters. Although the nature of interaction between companies is more important than the territorial confinement, it is difficult for companies from the «outside» to benefit from location-specific advantages. Against this background work package 6 «Access to Clusters» aims at facilitating access for KIS to related clusters by developing and validating practical mechanisms. For both, firms and venture capitalists it is beneficiary to have linkages to innovative environments like clusters: It allows firms and investors to cope with the increasing interdisciplinary nature at the core of today's technical change, to reduce the risks of investing in novelty, and to link innovation to the demand of markets.

It is the aim of this report to elaborate existing tools that promote both the cooperation among clusters and the cooperation among clusters and KIS. The report is structured as follows: Chapter two discusses the attributes, benefits and scopes of clusters and develops a cluster definition as a base for further elaborations. The chapters three and four are devoted to specific cluster dynamics. Whereas chapter three discusses the lifecycle approach of cluster development, chapter four focuses on the different dynamics from various cluster actors, including knowledge intensive services. It is argued in chapter five that the various dynamics of a cluster require tailored cooperation tools that especially take into account the cluster's and the firms' individual stage of development. A review of mechanisms aiming at fostering cluster to cluster cooperation is conducted in chapter six. The emphasis is put upon European projects that were supported within Europe In-

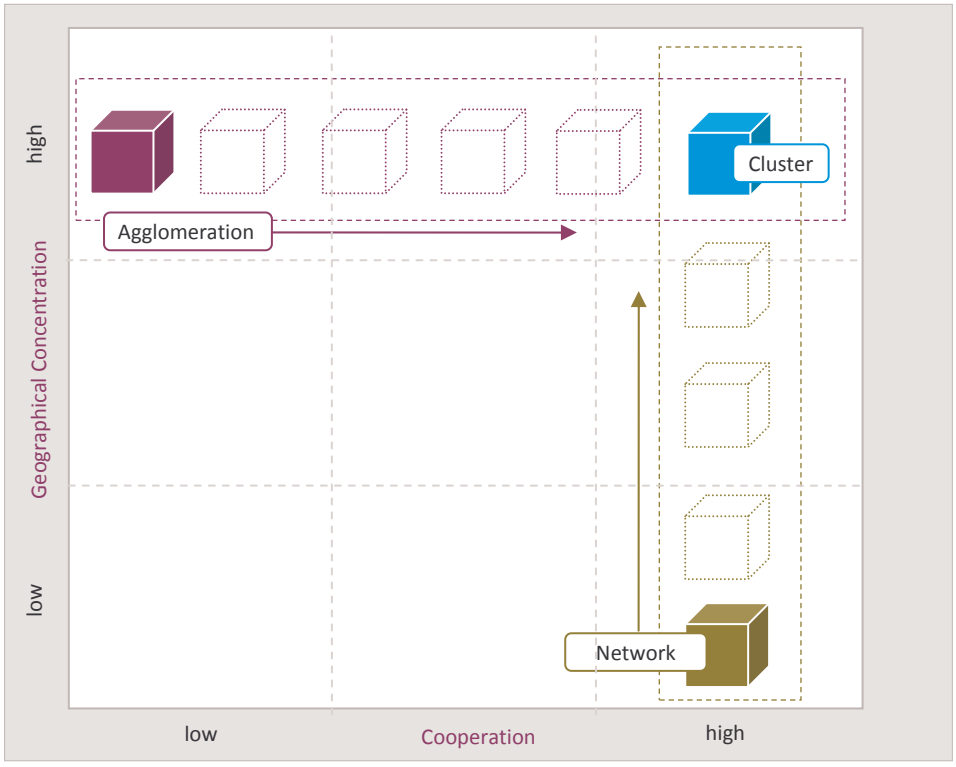
nova and Pro Inno Europe. However, special attention is paid to mechanisms aiming at establishing cooperation among incubators and clusters as two major contexts in which KIS-enterprises grow (KIS – knowledge intensive services). Therefore, a survey among the incubators participating in Achieve MORE was carried out. The report ends with the formulation of future requirements to strengthen incubator – cluster cooperation.

2 Approaching «Clusters»

For the purpose of ACHIEVE More it is important to distinguish between agglomerations, clusters and networks. Although all of the three have in common the characteristics «geographical/spatial concentration» and «cooperation», they have different conceptual backgrounds.

The concentration of an industry in geographic space is often referred to as «pure agglomeration». The key characteristic of industrial agglomerations is the spatial concentration (Gordon/MacCann 2000). Cooperation might take place – as is shown with the dotted cubes in figure 3 – but is not a decisive criterion. Benefits of agglomeration arise for example from the accumulation of human capital, productivity enhancements (i.e. economics of scale), reduction of transaction costs and spill-over effects. These benefits are known as external «agglomeration economies» (Marshall 1890).

Figure 1: Agglomerations, Networks & Clusters



Source: Terstriep 2008

By contrast, «networks» focus on social linkages that do not necessarily require spatial concentration. They can generally be defined as alliances of organisations and individuals with a common vision, and are characterised by stable relationships. As mentioned above, there is nothing inherently spatial about networks, although they might have spatial applications – as illustrated in figure 1 with the dotted green cubes. This is, because networks are to a large extent based on trust and face-to-face contacts. They are maintained through a combination of social history and ongoing collective action (Gordon/MacCann 2000). «Clusters» combine both dimensions, geographic concentration and cooperation, and are characterised by spatial proximity, linkages and socially embedded interactions (blue cube). Like agglomerations clusters are associated with *"[...] economic benefits which are potentially derived by co-locating firms from vertical linkages in the value chain and horizontal relationships, and the interaction with education, R&D and other organizations nearby"* (Fromhold-Eisebith/Eisebith 2004: 2).

As outlined in the final report of the expert group «Clusters and Networks» (EU 2003) *"Clusters are a nebulous concept"*. Due to its popularity the concept is used for a variety of different business structures: national, regional as well as cross-border clusters, clusters of competence, industrial or production systems and innovation systems. It is also used for different purposes: to increase the competitiveness of SMEs, support collective research, rationalise a whole industry, implement environment management systems etc. As Rosenfeld (1997) noted *"[…] there are as many definitions [of clusters] as there are types of organisations using the term"*.

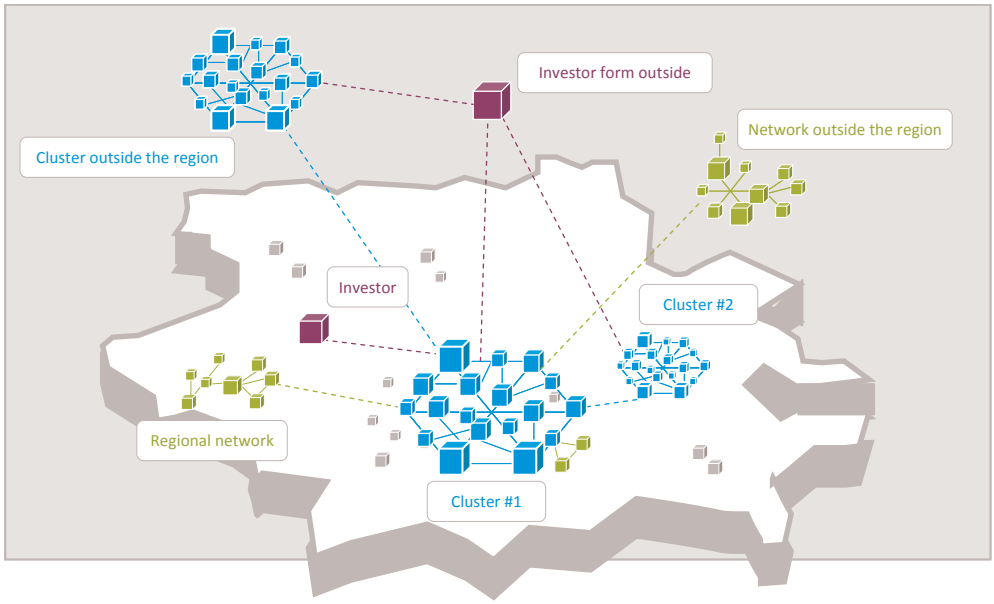
Even though a multitude of definitions exists, most share the idea of proximity, networking and specialisation. Therefore, the most widely used is probably Porter's definition (1998: 197):

> *"Clusters are geographically concentrated groups of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also co-operate."*

We understand «Clusters» as geographic agglomerations of interconnected companies and associated institutions linked by commonalities. These commonalities as well as an increased frequency and impact of interactions are ensured through the proximity (geographic and cultural) of firms and institutions. Firms in a cluster produce similar or related goods or services and are supported by a range of dedicated institutions located in spatial proximity. These are business associations or training and technical assistance providers. The primary goal of companies in a cluster is not cost-effectiveness and efficiency, but innovation and growth.

Clustering is similar to networking in the sense that ideally both are learning systems which help to socialise innovation-related knowledge and reduce uncertainty (Quandt/Pacheco 2000). Rather than being exclusive, cluster-based personal contacts and wider network linkages complement each other; a fact which underpins the ACHIEVE More project rational. As is illustrated below, the cluster members might be part of networks within and/or beyond the cluster, venture capitalists might be linked to various clusters (cp. figure 2).

Figure 2: Linkages between Firms, Clusters, Networks and Investors



Source: Terstriep 2008

3 Cluster Dynamics I: The Cluster Lifecycle

It is widely recognised that clusters are subject of a lifecycle that undergoes different stages of development (Menzel, Fornahl 2007; Bergman 2007). Although the cluster literature has yielded many different expressions for these stages[1], the common concern is to find accurate expressions that identify the various activities of a cluster over time. This chapter therefore refers to the most commonly applied lifecycle phases:

- In the *emergence phase* of a cluster it is difficult to detect the cluster at all. Firms are not yet specialised and apply a broad range of technologies. The generation of synergies through cooperation is almost impossible and growth rates remain average.
- The subsequent *growth phase* increases the visibility of a cluster. Firm growth and employment has reached above-average rates, new firms are founded through start-ups and spin-offs of established firms and other large corporates.
- The cluster has reached balance in the *self-sustaining phase.* There is neither remarkable growth nor significant decrease in the number of companies. Fluctuations are rather of 'cyclical nature' (Menzel, Fornahl 2007) and social networks have developed efficient routines to facilitate knowledge exchange.
- In the *stagnation phase* company numbers decrease significantly, because the technological potential and know-how are almost fully exploited. The cluster looses its attractiveness and start-ups as well as spin-offs tend to locate at more stimulant locations.

The lifecycle approach reflects not only quantitative developments, i.e. the number of companies and employees. It also reflects qualitative aspects such as knowledge dynamics, incumbent competencies, the institutional environment and type of firm entrants. Consequently, a cluster "*is not seen as a homogenous unity, but rather is described by the technological heterogeneity of its protagonists*" (Menzel, Fornahl 2007: 2). This implies a "resource based view" (Köhler, Otto

[1]For a summarising overview, please refer to Bergman (2007).

2006) that underpins clusters' strong dependence on company know-how and innovative actions.

A cluster lifecycle has similarities with the lifecycle of the industry it represents. However, to a certain extent the performance of clustered companies differs from non-clustered companies of the same industry. According to Audretsch and Feldman (1996) clustered companies outperform non-clustered companies in cluster growth phases, since they highly benefit from knowledge spill-overs. In contrast, non-clustered firms have more advantages over companies situated in a late cluster phase. They are not influenced by the dominant downward-trend that is likely to affect many clustered companies and are better able to change their market strategy.

This chapter elaborates further the different phases of a lifecycle. In concordance with the ACHIEVE More approach, the phases reflect activities that tend to appear in technology clusters. It is important to stress that the underlying trend of a phase never impacts all clustered firms in the same way. Some companies might benefit strongly from a certain phase while the growth of others remains moderate. This also depends on individual business models and a balanced mixture of cluster-internal and external relations.

3.1 Emerging Clusters

Firms in emerging clusters are highly heterogeneous. They are subject to different development paces, compose a scattered technological profile and are distributed over a wide geographical area. The weakly pronounced commonalities are a barrier to cooperation and knowledge exchange. Both the low degree of spatial concentration and the weak interrelations make it difficult to distinguish the cluster from overall industrial development (Menzel, Fornahl 2007). This is one reason why scientists still lack sufficient knowledge and evidence about why and how clusters emerge (Feldman et al. 2005).

It is nevertheless possible to formulate certain conditions that are likely to be present in emerging clusters. They are mainly derived from ex-post analyses in

stages when the cluster was visible already (cp. Feldman et al. 2005; Köhler, Otto 2006; Menzel, Fornahl 2007):

- Although only a few companies with quite heterogeneous profiles exist, they have a common understanding of the future technological orientation ("vision").
- They aim at exploiting market niches that are not occupied by established companies or open up entirely new market fields.
- Universities play a strong role in fostering the technological profiles of the companies. Some of the companies might even be university spin-offs with strong formal and informal linkages to the university.
- Horizontal and vertical interactions among the companies are less practiced.
- Apart from universities and companies, no other public or private actors play a role since they have not yet realised the cluster. Additionally, there is only little venture capital activity.
- Despite the embryonic stage of company interrelations, the mutual dependence of companies begins to form. This is the seedbed for successful subsequent phases and knowledge spill-over.
- The emerging entrepreneurial spirit needs to meet exogenous factors, such as a high market demand. Only the combination of the two will spur innovation.

Feldman et al. (2005) stress the role of entrepreneurs in cluster development and point out that "*many theoretical approaches of regional economic development ignore the importance of entrepreneurs as economic-change agents, able to create or attract the necessary resources and institutions to support their ventures, and able to draw on the rich historical and regional context in which they operate*" (p. 130). In terms of cluster development their finding comprises two important aspects:

Since successful incumbent entrepreneurs attract further entrepreneurs and (public) support institutions, they are an important driver that constantly enhances the cluster's attractiveness and its influence on the local environment. Secondly, entrepreneurs found their business at locations where they have access to relevant formal and informal networks. This usually is the region in which they were educated or had previous jobs.

Formal and informal networks in emerging clusters differ strongly from those in established clusters. As mentioned above, universities are an important player and contacts to other companies only become stronger and beneficiary over time. Therefore, cluster-pioneers encounter different problems than later start-ups since they cannot benefit from a networked knowledge base and are exposed to higher uncertainties. This is one reason why the emerging phase can finalise in two situations:

- A cluster does not form at all, because the survival rates of start-ups were not significant enough and a critical mass of companies was never reached.
- Companies overcome their vulnerable phase and successfully develop further.

3.2 Growing Clusters

Entrepreneurial activity, i.e. firm foundation, expansion and networking, becomes more evident in a growing cluster. The cluster still is comparatively small but has an innovative company stock with high growth rates. Further entrepreneurs are attracted by the stimulating environment and market entries and exits have a positive balance. Unlike earlier start-ups, start-ups entering a growing cluster have better access to available resources because social networks and information flows are more routinised. Additionally, they can compensate their lacking experience through partnering with other cluster members (Köhler, Otto 2006). Altogether, these “knowledge externalities” reduce uncertainties, R&D expenditures and commercialisation costs and sustainability affect business survival (Feldman et al. 2005).

Spin-offs too, play an important role in growing clusters. They are mostly founded by former employees of incumbent firms who aim at exploiting opportunities that the parent company for some reasons refused to exploit (either because the discovery is competence destroying or not in line with the dominant product range) or disagree with its organisational paradigm. It is likely that the discovery is close to the parent’s activities and stimulates partial competition between the spin-off and its parent (Dahl et al. 2003).

Due to former experiences, spin-offs have some advantages over start-ups in the foundation process. The founders are already embedded in social networks, possess knowledge about available competences of the cluster and can adopt successful routines of their former employer. Furthermore, it is assumed that they are both cognitively and technologically close to other cluster members. This allows the early realisation of synergy effects between companies (Menzel, Fornahl 2007).

Enhanced entrepreneurial activities in a growing cluster, in particular networking and partnering efforts, increase mutual learning. The awareness about the benefits of learning results in a steady adjustment of companies' knowledge bases towards each other (Menzel, Fornahl 2007). This is especially true for established companies who are aiming at strengthening their research cooperation and customer-supplier relationships. In spite of the benefits, the mutual adjustment of competences also bears the risk of loosing technological diversity.

The various cluster activities, i.e. networking and self-organisation as well as company growth and foundation, increase the cluster's overall "visibility" and draw two other groups of actors into the cluster: governmental and industry institutions who aim at supporting the cluster activities, and private organisations who offer (financial) services to the cluster companies.

Together, the various actors constitute a self-reinforcing system that fosters cluster growth.

3.3 Self-Sustaining Clusters

A self-sustaining cluster has reached maturity, underpinned by a "*well-functioning and rich innovative and entrepreneurial system*" (Feldman et al. 2005: 132). This is the starting point to attract further physical and human capital from public and private actors. Apart from public support services to facilitate ventures for example through the provision of infrastructure, private service companies grow. Altogether, the inter-connectedness of incumbent companies, public infrastructure (incl. educational facilities), spin-offs, start-ups and public and private services

create a self-sustaining system. Due to the improved opportunities of start-ups "*one sees the creation of regional public sector financing and grant-giving programmes. […] Additionally, venture capitalists relocate to the area or open branch offices, signifying that the region has succeeded in one of the factors the literature cites as characteristic of innovative clusters. […] The maturing cluster spurs policy changes as governments seek to attract and provide a flourishing environment for even more high-technology development*" (Feldman et al. 2005: 134).

New company foundations increase the cluster's vitality insofar, as they provide new impulses and increase the diversity of competences. In this context, spin-offs have better opportunities to give impulses quickly, because they are already embedded in existing networks (Menzel, Fornahl 2005; Köhler, Otto 2006).

As mentioned in the previous section, companies constantly move their knowledge bases towards each other to facilitate knowledge exchange and the exploitation of existing resources. This is a critical situation for the cluster, as Menzel and Fornahl (2005) point out: "*The strong similarity of the companies bears the danger of a negative lock-in as it decreases the probability of more radical innovations, which would lead to a wider development path and an increased ability of the cluster to adapt to changing external conditions. But a too large heterogeneity of the firms can also prevent an exploitation of synergies between the firms*." (p. 17).

In fact the adjustment of knowledge bases has increased competition towards the end of the maturity phase. It hinders start-up survival since there is more knowledge exploited than generated in the cluster (Köhler, Otto 2006). To prevent from the above mentioned risk it is crucially important for a cluster to have companies with access to "global pipelines" (Bathelt et al. 2004) or at least with linkages that go beyond the cluster boundaries. These can prevent companies from lock-in, because they provide different impulses to "refresh" knowledge bases and allow access to other networks.

3.4 Stagnating Phase

In terms of figures a stagnating cluster has decreasing firm foundations and job numbers and the above mentioned balance has turned negative. Weak firm foundation rates are a result of increased difficulties to successfully survive the early stage. Especially in early stages start-ups rely upon external knowledge provided by network/ business partners which now has become almost fully exploited and is without added-value for the start-up. The shrinking attractiveness of the cluster leads to different location decisions of companies. The resource pool of a cluster is narrowed down and not competitive anymore. Economically relevant knowledge and innovative ideas have become scarcer and even more valuable. As a result clusters become more exclusive and access is considerably hampered. The relationships of those who are network members are characterised by particular rivalry and the overall scope of collective learning has weakened. Further components of shrinking competences are job changes of talented personnel towards more inspiring environments and rationalisations in incumbent firms.

Due to these developments, the heterogeneity of a cluster cannot be sustained, and the environment that was once considered as fruitful has lost its relevance.

Additionally, cluster members tend to apply the routines that were successful in previous times. These are habits regarding e.g. organisational principles, the product range, technology, search mechanisms for new knowledge, market penetration strategies, well-known network partners, etc. They continue on a trajectory that is not appropriate anymore and that does not allow necessary changes. Therefore, it is likely that the cluster gradually loses the ability to carry out a radical change, e.g. new technologies and discoveries, towards new market fields. Instead it is subject to path dependency and cannot prevent from lock-in.

In some cases, clusters manage to initiate mechanisms that promote the reinforcement of their diversity. The precondition of a successful change of the current development path is an early awareness of the downward trend and appropriate measures that help to overcome it. A successful change leads to either a prolongation of the self-sustaining phase or to a new growth-cycle.

4 Cluster Dynamics II: Actors and Components

The previous chapter has outlined the important role of the cluster lifecycle in the overall cluster dynamics. It has also stressed the competences and dynamic effects contributed by different types of companies. Following this notion, this chapter takes a closer look at the impulses provided by different companies. As in the previous chapter, the focus is on firms working in high-technology environments. In order to elaborate cluster dynamics from the entrepreneurial perspective, it is necessary to distinguish between incumbent firms, start-ups, spin-offs and established firms that re-located into the cluster. With respect to ACHIEVE More concerns, a specific section is dedicated to dynamics generated by knowledge intensive business services and cluster cooperation.

4.1 Established Firms: Stabilising Factor and Impulse Generator

Incumbent firms have established stability concerning their internal knowledge stock and external relationships. They have a clear company profile that is well-known among the cluster members. Internal competencies were accumulated over time and constantly enriched by experiences. The organisational structure is efficient insofar, as different departments or functions have crystallised according to the requirements of the company's market field. The company is embedded in networks and sub-networks constituted by customers, suppliers, R&D alliances, financiers, industry associations, etc. and has stable external relationships. The external links have a local orientation to benefit from the cluster's "local buzz" and are ideally supplemented by national and global ("global pipelines").

Due to the inner and outer stability, incumbent firms are less vulnerable to local competition compared to younger firms. Nevertheless, they are exposed to general market trends that determine the overall performance. Routines developed by incumbent firms aim at balancing out the vulnerability, by ensuring the generation of pioneer-technologies, applications and products also in times of uncertainty.

Due to the sophisticated knowledge and competence stock, other firms consider it as advantageous to cooperate with incumbent firms. This holds especially true for younger firms who can greatly benefit from cooperation both, in terms of knowledge exchange and reputation. For both partners cooperation is less risky since the incumbent company has more experiences in cooperating with other firms. All these aspects facilitate an incumbent's access to new networks and knowledge (Koehler, Otto 2006).

Incumbent firms are a generator of jobs because of two aspects that are closely related to their innovative behaviour: Their growth caused by innovative products/services requires a constant recruitment of well-educated personnel. This will happen as long as the innovation can be integrated into the present product portfolio or if the management aims at penetrating markets that are new to the firm. The situation is different, if the innovation has the character of a by-product not in line with the product portfolio or the market strategy. In this case the innovation is not of any interest to the company, but might still be interesting for the employees who developed it. Therefore, non-integrable innovations occasionally cause the spin-off of new companies. In case of successful development these spin-offs generate further jobs but also cause "brain-drains" from the incumbent towards the spin-off (Keppler 2001). However, it is worth mentioning that large corporates also voluntarily launch spin-offs. Partly in order to penetrate new markets without carrying the risk – in case of failure – of their brand name associated to it.

In terms of competence based dynamics in clusters, incumbent firms generating spin-offs can be labelled as competence-diversifiers. It is assumed that the spin-off is regarding its product and cognitive behaviour close to the cluster's overall conception. It is a valuable addition to the cluster, as it adds competences and a new competitive element. A second aspect of why incumbents are competence-diversifiers is due to their "pulling forces" that attract other firms, e.g. suppliers, to the cluster.

Although these two types of companies, spin-offs and attracted companies diversify the cluster's structure, competences remain within a particular trajectory. The boundaries of the trajectory are pre-defined by the requirements of the incum-

bent companies and sharpen the cluster's profile. However, stable development paths may also lead to the confinement of the cluster's competences that eventually to lock-in effects (cp. the remarks on stagnating clusters in the previous chapter).

4.2 Spin-offs: Manageable Risk and High Profits?

Spin-offs evolve around a particular innovation that was developed in their parent firm, i.e. the incumbent. They play a comparatively important role for cluster dynamics insofar, as they anchor new technologies, products and competences. The degree of novelty of spin-offs' innovation is likely to be higher than the innovations developed in the parent company. Thus, there are opportunities to enter new sub-markets (Keppler 2001). Because of established relationships with existing networks, the process of getting known by other cluster members speeds up.

Spin-offs are usually founded by entrepreneurs who were formerly employed in leading positions in the parent company. They have a well-grounded overview of the current market situation and have gained positive (and negative) working experiences at the parent company. The combination of both aspects accelerates the establishment of efficient working routines inside the company. These routines are either similar to those applied in the parent company or differ from these in order to be tailored to the particular needs of the spin-off. Even in case of similar routines the spin-off can respond more quickly to market changes than the parent company. The reason for the greater flexibility is its smaller size and the early stage of customer and supplier relationships. Furthermore, spin-off entrepreneurs have sustained their position in social networks and access to the pool of the cluster's resources. Because of these advantages Keppler (2001) considers spin-offs as the business form which has longer survival rates and better performances compared to start-ups.

As spin-offs are founded by former employers of parent companies who are embedded in professional and private networks, the location of a spin-off tends to be in the same cluster. In a study on the Danish NorCom-Cluster it is underlined that

spin-offs account for the majority of the cluster's growth, because no other type of entry could achieve the same employment rates (Dahl et al. 2003).

Despite of high growth rates and established access to networks the process of recruiting knowledgeable personnel can be difficult for spin-offs. It is important for a spin-off to broaden the knowledge base by employing experienced workers who are not new to the industry (Dahl et al. 2003). Thereby spin-offs compete with incumbent firms which are able to offer a higher security regarding working spaces and reputation.

4.3 Start-ups

Helfat and Lieberman (2002) distinguish between three different types of cluster entrance: firms diversifying from related industries; parent ventures, i.e. spin-offs founded by experienced entrepreneurs and "de novo entrants", i.e. start-ups (cp. also Dahl, et al. 2003).

In contrast to spin-offs start-ups face greater barriers when attempting to access cluster networks. Their reach of social contacts and their success story are not yet sufficient to be recognised as an important actor. Additionally, the technological applications of start-ups are fragile and have not proofed long-term stability so far. In comparison to other companies, start-ups do not have much to bargain about, especially in terms of exchanging sensitive information. This is a serious disadvantage insofar, as start-ups - more than spin-offs - rely on external information channels to balance out their lack of experience.

Apart from the above mentioned problems start-ups still are an element of progress and renewal, since they implement latest technological developments and new expertise in niche segments. Thus, they contribute to clusters' specialisation process, enhance local competition and profile regional technological applications. It is these advantages that increase the interest of public and private funding institutions. Well-known technological profiles and the capability to commercialise emerging technologies is the major motivation of regional actors to fund early-stage ventures (Garnsey, Heffernan 2005). In contrast, private actors' moti-

vation is the opportunity to realise high profits by investing in technology start-ups.

Compared to other companies start-ups have the most efficient linkages to universities, as their founders usually come from academic fields. They are graduates or former employees of a university's research institutions and take along their social contacts. University networks represent a lot of fundamental technology know-how (basic research) and consider market knowledge to a lesser extent. Therefore, it can be assumed that start-ups who establish quick access to clusters – and thereby complement their network portfolio - have higher survival rates than start-ups who struggle to get access.

4.4 Relocated Companies

Relocated companies are companies that previously had a different location but moved into the cluster region because of advantages arising from proximity to other companies. They can be suppliers, clients or business partners of incumbent companies. Apart from proximity to their major business partners advantages also result from dense local networks, access to sector-specific know-how, and sometimes by way of pure presence within the clusters as a marketing effect.

But not only relocated companies benefit from their new location, they also provide benefits for other cluster companies and the cluster as a whole:

- They are experienced in their market field,
- Have a stable customer environment,
- Can provide access to complementary networks,
- Possess technological know-how,
- Can increase the cluster's reputation,
- And are a stabilising factor.

4.5 KIS

Both cluster external KIS and KIS-enterprises that are members of clusters are knowledge dynamising components in clusters. Their project based structure en-

ables them to temporarily provide external knowledge to the knowledge base of their client companies and to punctually accelerate knowledge dynamics. These attributes are crucially important in mature clusters to sustain clusters' success and to maintain an appropriate balance between knowledge diversity and a common knowledge base. Due to their strong degree of specialisation, KIS usually have a client structure reaching far beyond the boundaries of a cluster, because a sufficient amount of clients cannot be found in one cluster only. This also implies that their dependence on local networks is much weaker compared to other firms and that they face less risk to adjust too much to other companies' knowledge bases.

4.6 Cluster cooperation

Cluster cooperation too, is a fertiliser of clusters' knowledge bases and reputation. Apart from the opportunity to acquire new (international) business partners, advantages also arise on cluster management level e.g. through good-practice exchange and access to international networks (cp. the matchmaking events of NICE in chapter 6). Furthermore, the cluster managers can advance sectoral standardisation issues together and concentrate their lobbying activities. But also cross-clustering (cooperation among different cluster specialisations) has advantages in terms of getting access to lead customers, being close to relevant markets, etc.

5 Conclusion: Access to clusters with respect to its dynamics

The four stages of cluster development illustrate the different roles companies play in terms of cluster dynamics and the different developments cluster companies are subject to within a cluster lifecycle. These affect their openness and expectations from cooperation.

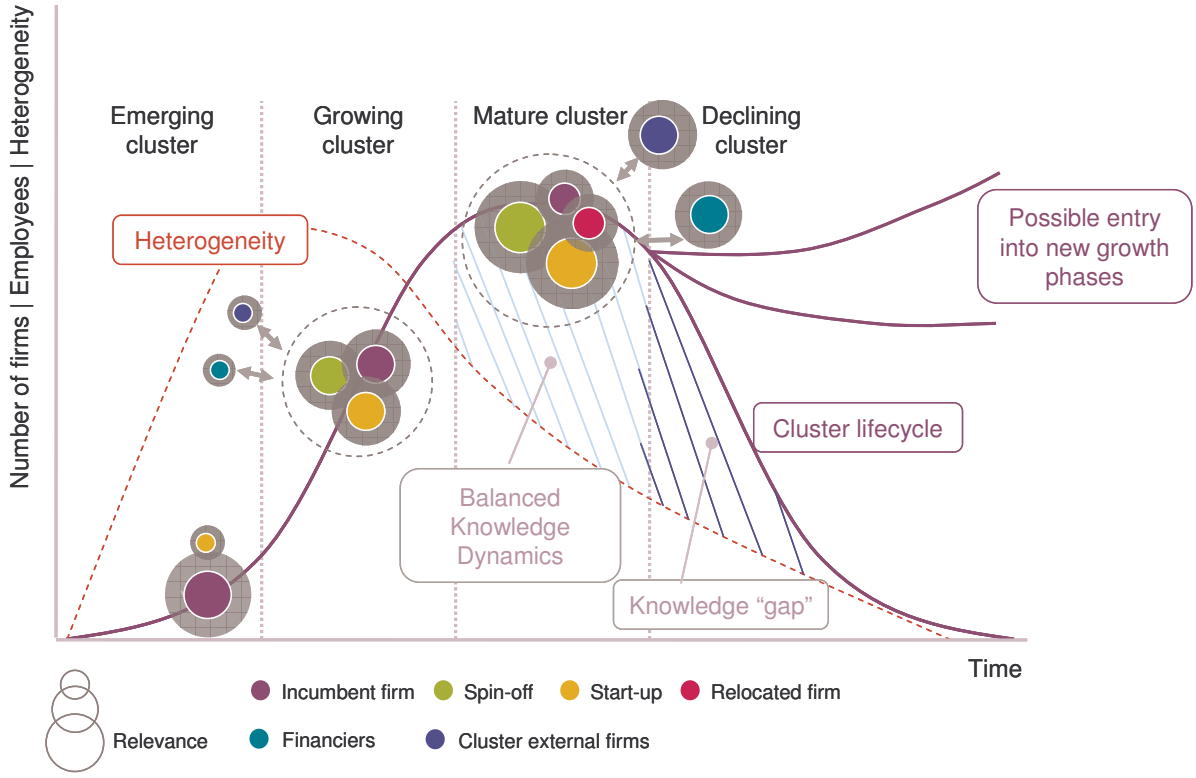
Figure 3 (next page) summarise possible zones of accession for KIS-enterprises with respect to the dynamics of a cluster (i.e. the cluster lifecycle and firms). The dashed red line indicates a clusters' heterogeneity which is clearly pronounced in early stages and becomes more homogeneous over time. In early developments the heterogeneity will complicate access to clusters or cluster companies as the cluster is neither visible nor known within the sector. Furthermore, many companies themselves are start-ups and it is unlikely that cooperation with other start-ups is their priority (as this cooperation always embodies risk and uncertainty).

Access to growing clusters is comparatively easier. The cluster recognises itself as a sectoral concentration and some companies already overcame their foundation phase. In order to grow and to stabilise their market position they need to cooperate with other firms. Cooperation can contain the launch of common research projects but might also have a service function that underpins/facilitates a firm's (daily) operations. In concordance with increased start-up and spin-out activities, access to finance gains in importance. For companies which aim at locating in a cluster this phase is considerably promising. Although access is not as easy as in a mature cluster, a relocated company can greatly benefit from the overall dynamics in a growing cluster.

From a theoretical point of view, access to mature clusters is most easy. Companies are willing to cooperate with other firms especially since they learned from experience that cooperation can be fruitful. Additionally, incumbent firms have a well-grounded market position and exactly know their needs, also in terms of cooperation. Regarding abstract dynamics of the overall lifecycle, it is crucial for clusters in this phase to establish cooperation with external KIS. Due to their

knowledge intensity KIS can provide additional knowledge impulses and dynamise a cluster's knowledge base which otherwise runs danger to slightly become more homogeneous. Clusters that manage to establish a sufficient amount of external linkages (national, international) will perform better and have a longer phase of maturity than others.

Figure 3: Cluster Dynamics and External Links



6 How to connect clusters: mechanisms applied in European projects

The chapter introduces cluster to cluster cooperation mechanisms that were applied in two projects. The NICE-project (Europe Innova) explicitly aimed at connecting ICT-clusters that were project members right from the beginning. Furthermore, good practice in cluster-management was exchanged among mature clusters and growing ones. The INNET-project (Pro Inno Europe) had a broader sectoral focus and aimed at enhancing cooperation between regional, national and European funding schemes. Three tools of INNET that promote cluster cooperation are introduced subsequently.

6.1 Experiences from the 6th Framework project NICE

Within the framework of the NICE-project funded as a Coordination Action by the European Commission under the 6th Framework Program several "matchmaking events" took place. Generally, NICE aimed at networking ICT Clusters in Europe and the matchmaking events were one mechanism to bring cooperation into concrete. The workshops should support SMEs' internationalisation by fostering cooperation among highly innovative and developing clusters. The clusters were formal members of the NICE project.

Past experiences with similar events in the clusters' regions have shown that a critical mass of entrepreneurial participants is crucial for a successful event. In order to attract interest, key challenges for SMEs in internationalisation processes were addressed:

- Marketing;
- Networking – networks are seen as a good starting point for getting in touch with potential partners;
- Partnerships and joint ventures;
- Selling ideas before selling products – before entering a foreign market with a concrete product or service it is important to sell the idea and the business concept behind the product or service in order to prepare the ground.

Business culture matters

Moreover, one had to keep in mind that business cultures vary a lot across Europe's regions, especially regarding internationalisation. For example, German companies spent a lot of money and time for market research, whereas Swiss companies kick off business right after they have a good business idea. Due to the small size of the national market, Finish firms have to act globally by nature.

Considering these aspects one had to come up with a highly attractive program, both in terms of content and social activities. Following this notion the workshop programs combined company/solution presentations, pre-arranged one-to-one meetings allowing qualified time with preferred partners, virtual matchmaking and site visits to highly attractive companies.

How to mobilise ICT SMEs companies?

To mobilise the required number of companies, different communication channels were used:

- Acquisition of interesting keynote speakers to enrich the program;
- Printing of the program which not only highlighted the workshop agenda but also the benefits for participants;
- Workshop announcements in the regional newspapers and via the partners' websites;
- Invitation letters to ICT companies, cluster managers and networks across Europe;
- Workshop announcements via Europe INNOVA portal and other networking platforms like openBC, XING;
- Personal talks to ICT companies.

To make the event most beneficial for the participating ICT companies in terms of matchmaking a web-based platform for posting company profiles and joint project ideas was set-up. In addition, participants had the opportunity to pre-arrange individual business meetings with selected potential partners and thus hold intensive business talks in an easy and efficient way.

Success story of NICE

The results achieved in paving the way for transnational collaboration of ICT SMEs are noteworthy. More than 50 pre-arranged entrepreneurial one-2-one meetings took place during five business matchmaking events and 15 businesses have been or are in process of joint business.

In summary, the experiences in NICE demonstrate that ICT SMEs opt to strengthen their innovative capabilities and to internationalise if they get the chance. However, companies' capabilities to successfully internationalise vary, and so does their culture and «risk-taking» behaviour. Most SMEs are aware of the need for innovation as key driver for their future competitiveness. They know that they depend, more than ever, on networks, formal and informal linkages in and beyond their home region to unfold their full innovation potential. However, this knowledge does not necessarily lead to an internationalisation strategy as core element of the business strategy. But the contrary, many SMEs remain focused on their national markets.

6.2 Tools developed within the INNET project

INNET, a project funded within the frame of Pro Inno Europe, aims at promoting cooperation between regional, national, and European funding schemes in order to facilitate the internationalisation of SMEs in technology clusters. Within INNET three major tools were developed to advance inter-cluster cooperation:

INNET Matching Tool

www.vdivde-it.de/innet/cluster-profile-db

INNET's objective is to support cluster managers in the process of searching for and finding new clusters to cooperate with. The web-based tool is divided into two main sections consisting of a Cluster Profile Database and a Search Profile Database.

The Cluster Profile Database comprises:

- General information about the cluster

- Cooperation objectives for the future
- Specific cluster characteristics
- Expertise and experience in the industrial activities

The Search Profile Database comprises:

- Cooperation sought in countries/regions
- Specific cooperation objectives of other clusters you are interested in
- Search for specific expertise and experience in industrial activities
- Search for cluster with specific characteristics
- Ideas of financing the cooperation

After a cluster manager has posted a query, a software-based matching process of search profiles and cluster profiles starts which is manually supported by INNET project partners.

INNET Cluster Exchange Platform
www.proinno-europe.eu/admin/uploaded_documents/INNET_Newsletter_3.pdf

INNET launched an Exchange Platform Workshop for cluster managers. The platform focussed on issues of innovation and transnational cooperation and was tailored to sector specific needs (e.g. biomedicals and food processing). One component considered as valuable by the participants were individual meetings among cluster managers.

Innovation Express
www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=71&parentID=55#

Innovation Express is an open call for proposals to foster trans-national cooperation between European Technology Clusters. It is financed by the national/regional innovation agencies and authorities involved in the INNET project. Its major objective is to support activities such as dissemination and promotion as well as technological and innovation advice in the context of technology transfer (i.e. benchmarking activities and in-depth knowledge of other clusters).

7 Existing Mechanisms of Incubator-Cluster cooperation

The objective of this chapter is to summarise our findings from a survey of the various existing mechanisms that facilitate access for KIS-enterprises to clusters. To foster the connection of the two is worthwhile insofar, as clusters provide an environment for innovative and dynamic companies that could be promising research and business partners for KIS. The survey was carried out among the incubators that are Achieve MORE project partners and shall shed light on specific "cluster access mechanisms". The latter is of considerable importance, because these tools particularly aim at establishing contact between start-ups and cluster companies. As discussed in chapter 4 the social contacts within clusters can be of great value for young companies in order to access to knowledge and experience.

Before starting with the detailed analysis a short notice is made on what is meant by "cluster access mechanisms". Access to clusters can be established on multiple ways, can have different degrees and different purposes. The ways on which incubators and companies can enter clusters are for example through networking events and information sessions organised by the cluster management. These events usually provide insights into clusters' activities and market focus, but not necessarily access to companies. In this case, the access to a cluster remains on a superficial level. If a company has business contacts to a cluster member or participates in a project with several cluster members, it is likely that it has access to "local buzz" and the clusters knowledge base. Both approaches fulfil particular aims: While general information sessions are appropriate to get an idea of the cluster's major competences, the linking with new business partners will certainly require a deeper penetration of the cluster's structure.

7.1 Survey among the Achieve MORE incubators

7.1.1 Questionnaire

To carry out the survey among the incubators which participate in Achieve MORE a questionnaire containing seven questions divided into two sections was devel-

oped. The first section (four questions) aimed at generally assessing whether the incubator has contacts to other (national) clusters and at concretising the purpose of cooperation. In detail, the questions were formulated as follows:

Question 1: Does your incubator cooperate with any cluster managers or companies that are members of clusters?
Explanation: It was important to clarify what is meant by 'cooperation with clusters', i.e. the cooperation with the cluster managers or cluster members.

Question 2: If yes, how was the cooperation established?
Explanation: The major interest was to learn more about the character of relationships between incubator organisations and clusters: are they formal or informal, what was the motivation to establish the relationship, etc…

Question 3: Does your incubator provide specific support to organise linkages with clusters in earlier and later development stages of companies?
Explanation: We assessed how detailed/ professionalized the cooperation was. The underlying assumption was that incubator companies have different needs and expectations according to their stage of development, also when they cooperate with clusters. Concretely, we wanted to know whether the incubator was able to offer cluster access tools that are tailored to the company's development stage.

Question 4: What are the perceived benefits of cooperating with clusters?
Explanation: The aspect of mutual benefits relates to clarifying the issue of synergies between clusters and incubators.

The questionnaire's second section (three questions) aimed at assessing whether incubators and clusters also cooperate in terms of business foundation. (In contrast to tools which are applied when a company has entered the acceleration phase.)

Question 5: Does your incubator cooperate with cluster managers or cluster members to complement your support services? Do they vary in different development stages of a company?

Explanation: In contrast to question 3 this question was formulated to assess whether clusters are able to enhance the foundation tools/ services developed by incubators.

Question 6: Does your incubator provide services only for start-ups from specific sectors or does it have a broader profile?
Explanation: We assume that incubators have easier access to clusters when they have a well-developed sectoral profile that is in line with the clusters' sectoral focuses.

Question 7: How could the incubator/cluster cooperation be improved in terms of business foundation?
Explanation: With this question it was aimed to grasp the incubator organisations' view concerning the formulation of future requirements of tools that aim at connecting KIS and clusters.

7.1.2 Feedback from the incubators

Previous to the evaluation of the questionnaires it needs to be stressed that feedback was quite weak (12 questionnaires returned out of 27). However, as the survey's aim was to get an idea of applied cooperation tools, it is not a decisive precondition to have a broad variety of returned questionnaires (although this would have certainly added value to the survey). Furthermore, the received comments were very valuable and it is worthwhile to discuss them in greater detail.

Cooperation among incubators and clusters (questions 1 and 2)
Cooperation among the two actors is widely established: All of the incubator organisations who returned the questionnaires are cooperating with one or several clusters that is/are located within the national boundaries. The aim of cooperating with clusters can be generally labelled as the generation of synergies in fostering company growth. However, although every cooperation pursues similar aims, modes of cooperation take various forms in practice. They have different channels and topics.

The major channels through which cooperation with clusters takes place are projects, networks, formal membership, cluster management and personal relationships. The first four channels are usually based on contractual agreements. Formal membership and presence in the same networks were mentioned as the most frequent interaction channels followed by cluster management and common projects. In some cases incubator organisations were at the same time responsible for the management of a cluster or were actively involved in the cluster management's set up. In other cases the situation was vice versa and cluster organisations were stakeholders of incubators. Common projects were mainly funded by regional or national governments and took place on an infrequent basis. In one case informal contacts between the incubator organisation and a cluster were the decisive reason for cooperating with each other.

Apart from the formal or informal background it is possible to group the cooperation's thematic focuses into four categories (overlapping possible):

- Sponsoring, e.g. incubator and cluster organisations jointly sponsor business idea competitions;
- common events, e.g. breakfasts for cluster and incubator companies and more technically oriented events;
- specialised functions, e.g. a cluster management utilises the incubator's know-how on business foundation;
- linking incubated companies with cluster members.

The first three categories are necessary activities to maintain social contacts. They lay ground for successfully linking start-ups with cluster companies. These linkages are not established per se, it is rather decided on a case by case basis whether contact between an incubated company and a cluster company are considered as beneficiary. This depends on the incubated company's stage of development and on its individual profile (in terms of sector, market, customers, etc.).

Incubators' specific support to facilitate their companies' access to clusters (question 3)

In this question we asked whether the incubator holds ready specific tools to facilitate a company's access to a cluster that are tailored to the individual development stage. In our view early access to clusters is important for start-ups, at

least by way of information sessions or similar events. This may lay ground for later business/ research partnerships. However, it seems that both incubator organisations and start-ups consider the fostering of linkages to clusters as more important in later phases (e.g. during acceleration). One explanation might be that the benefits of cooperating with cluster organisations/members increase the better profiled the start-up is.

Accordingly, the incubators did not mention specific tools connecting incubator companies with cluster companies that additionally take into consideration the incubator company's stage of development. Nevertheless, some incubators have had start-ups that now are formal cluster members.

Benefits of cooperation (question 4).

The main argument for establishing contacts to clusters is their complementary know-how. Whereas incubators are specialised on the provision of support services and consultation regarding business foundation ('micro-level'), cluster managers and members provide access to sector specific information, e.g. technology inputs, market-knowledge ('sector-level'). The lack of knowledge in incubators regarding sectoral/market specifics might be a result of their broad profile which allows start-ups from various sectors to locate in the incubator (cp. issue VI).

In one questionnaire it was differentiated between benefits for incubator managers and incubated companies. Accordingly, the cluster is an appropriate frame for incubator managers to promote their companies' competences and to get sector-specific information. For incubated companies the cluster is a good benchmark to better understand the company's position in the local/regional industry.

In sum, networking and knowledge exchange are considered as the major benefits of incubator – cluster cooperation. Whereas 'networking' remains unspecified in the respondent's comments, the notion of knowledge exchange clearly refers to the complementary know-how of clusters. It is complementary insofar, as clusters are closer to relevant markets and technological progress than incubator organisations. Networking and knowledge exchange are then followed by the notion of common (innovation) projects as a third considerable benefit. Further benefits were:

- marketing of the incubator's activities and companies within the cluster,
- pooling of best practice of the cluster management and the incubator organisation,
- a shorten time to market,
- proximity to leading companies,
- financial support.

Do clusters complement incubators' support services? Do they vary in different business foundation phases (question 5)?

The returned comments indicate a 'division of work' between incubators and clusters: Incubators provide the entire range of services that foster business growth in early development phases. Clusters are of greater relevance when companies want to expand and stabilise their market relations. This 'division of work' has no clear-cut boundaries and is characterised by tendencies. Therefore, it seems that clusters' complementary contributions are of greater effectiveness in later business foundation phases. It seems that they do not have the competences to support incubators in the aspect of service-provision for founders (apart from financial and to some extent mentoring issues).

Furthermore it was stressed in some comments that not every incubated company benefits from cluster contacts and that this very much dependents on the individual business model. Therefore, some incubators have developed dedicated tools to assess which types of contacts are promising.

The incubators' profiles (question 6)

Most of the incubators have a broader profile insofar, as they host different kinds of technological oriented companies. Two incubators provide services for ICT start-ups only.

Improvement of cooperation between incubators and clusters in terms of business foundation (question 7)

The comments and suggestions with respect to the issue of improving cooperation between incubators and clusters were quite specific:

- To link incubated companies with internationally strong clusters in order to improve access to international markets and to join bigger companies in R&D projects.
- Existing companies could provide more and better incentives to motivate the creation of new companies. They could organise social events for people who have business ideas.
- Marketing of incubator services to the cluster members, sectoral workshops with cluster members and start-ups.
- Cluster members could participate in the incubators' committees by which companies are selected.
- Better funding mechanisms.
- To improve matchmaking activities between founders and existing companies.
- A better visibility of cluster activities would facilitate the access to relevant information.

7.1.3 Multiple access to clusters: tools applied in the incubators

The aim of this survey was to elaborate the mechanisms incubators and incubated companies apply to connect to clusters and cluster-members and to find out whether the mechanisms take into account the clusters' specific dynamics. Judging from the survey and the topic's weak presence in other European projects, it seems to be insufficiently developed so far. A fact which limits on the one hand the scope of mechanisms to be introduced in this report, but on the other is a great opportunity for the Achieve MORE partnership to further this issue in order to develop a unique selling point. Therefore, this sub-chapter focuses on cluster access mechanisms that are already applied and on mechanisms whose application looks promising.

According to the survey's results it is important to distinguish between access mechanisms for *incubator organisations* and for *incubated companies*. Although both follow the same goal of business growth, the paths to achieve such vary as regards functions and competences. Whereas incubator organisations provide a frame for business growth (counselling, service, provision of office space and equipment, marketing), incubated companies need to profile their market position, acquire first clients and further develop their business idea. These two func-

tions require different access mechanisms to clusters. In the subsequent sections the focus is on those which are relevant for *incubator organisations*.

The reasons and motivations for incubator organisation to link-up to clusters are manifold. Underpinning the effectiveness of the above mentioned frame is one of the major purposes. Advantages arise due to the main cluster characteristics, namely the sector-specific concentration of companies and other actors as well as strong networking activities. Therefore, clusters provide a lot of valuable insights for incubator organisations for the benefit of incubated companies. These are the following:

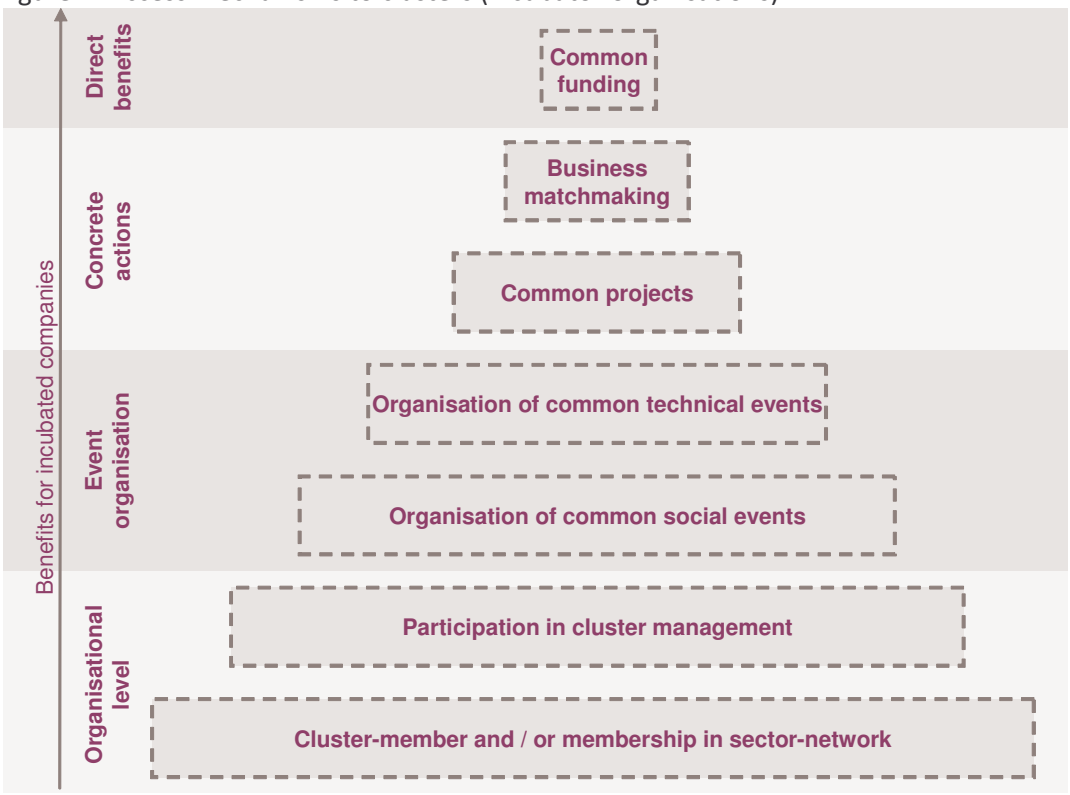
- Access to sector-specific knowledge (trends, technologies, tendencies, applications, etc.);
- Access to market knowledge (which technologies / applications are marketable or are likely to meet market expectations?, who are the market-leaders?, where are potential lead-users for the incubated companies?);
- Many addressees for marketing activities;
- Access to potential business partners of incubated companies.

According to the survey, incubator organisations seldom have a sector specific profile. To have contact to all relevant sectoral contexts, they are often linked to several clusters located in the same region. The crucial access mechanism mentioned by the respondents of the survey was networking on various levels in diverse formats. Most efficient in terms of information sourcing are the two formal means “membership in a cluster” and “membership in sectoral-networks” in which cluster organisations / companies are members, too. These two are the baseline for any other access mechanism.

Figure 4 summarises incubators’ access mechanisms to clusters according to the degree of cluster penetration. The latter correlates with the benefits perceived for incubated companies. Altogether, the practiced incubator-cluster cooperation mechanisms constitute four “action-fields” containing one or several mechanisms: On an organisational level incubator organisations establish access by being a cluster-member or by participating in cluster management. This ideally is the seedbed for common event organisation that introduces young companies, con-

crete actions such as the launch of common projects as well as matchmaking activities, and common funding activities.

Figure 4: Access mechanisms to clusters (incubator organisations)



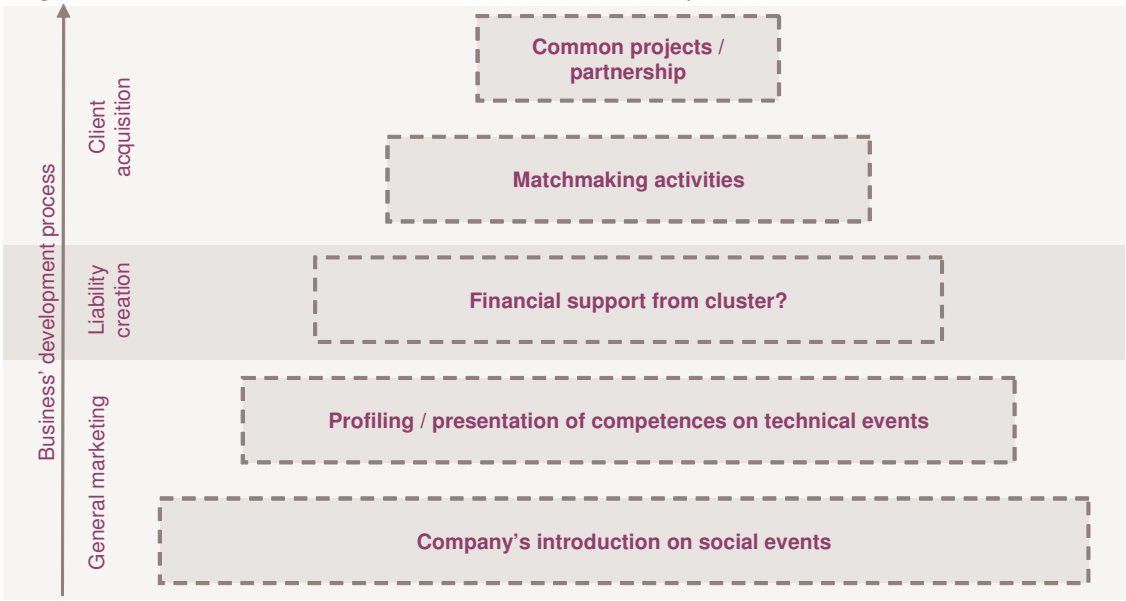
Incubated companies' linkages to clusters aim at establishing business contacts to acquire new clients or business partners. Although companies do not benefit from linkages to clusters per se, there are some general advantages arising from these:

- Access to sector-specific and market knowledge which complements their science-driven / technological know-how.
- Connecting to clusters means connecting to a plethora of potential business partners.
- Cluster-companies are a good benchmark for incubated companies in terms of business models and competition.

The initiation of linkages can start in early business foundation phases where the focus lies on a more general presentation / introduction of the new firm. The new

company is announced in order to popularise its name, applied technologies and competences. In case the cluster has dedicated finance tools, applying for financial support might be an option for the start-up. This will create liabilities and strengthen the linkages between start-ups and clusters. Once product development has become concrete, i.e. the company is in search for first customers, access mechanisms focus on matchmaking between incubated and cluster companies. In this respect, the activities of earlier foundation phases might function as a "door-opener", since the company is already known (cp. figure 5).

Figure 5: Access mechanisms to clusters (incubated companies)



The connection between incubator organisations and clusters is promising. However, tangible tools to strengthen cooperation remain in an embryonic stage and require further development in order to achieve best practice. The subsequent chapter will draw upon this issue.

8 Future requirements to strengthen incubator-cluster cooperation

The report's major objective was to depict mechanisms for incubator-cluster cooperation as means to support KIS-venture growth. Incubators and clusters were chosen as the study's background because of two reasons: Firstly, they belong to the core actors within the framework of Achieve More. Secondly, many incubators support KIS-ventures and thus, are "by nature" close to their needs. In turn, clusters provide a vital environment allowing access to many potential business partners for KIS.

Before formulating future requirements to strengthen incubator-cluster cooperation, reference is given to three guiding points in this study. These are:

- Cluster dynamics
- KIS-venture dynamics
- Synergies between incubators and clusters.

Chapter 5 reflected upon cluster knowledge dynamics and underlined the role of KIS's linkages to clusters. Especially in the maturity phase, KIS and other external firms can supply new knowledge, thereby accelerate clusters' dynamics and sustain its growth. Furthermore, cluster companies know from experience the potential benefits of cooperating. But not only a cluster's lifecycle requires consideration when connecting KIS and clusters. KIS-ventures too, undergo several development stages during business foundation that affect cooperation, as a KIS which was founded quite recently has not much to offer to other business partners. Finally, synergies between incubators and clusters as well as their "division of knowledge" are central to build upon the players' interests.

In the survey among the incubators the following themes were outlined to improve incubator-cluster cooperation:

- Linkage of incubated companies with internationally strong clusters in order to improve access to international markets and to join bigger companies in R&D projects.
- Fertilising stronger interweave between incubators and clusters due to common committees, common development of incentives to found businesses, and common events.
- Common funding initiatives.

The aspects underline the possible synergies between incubators and clusters. They arise through the complementary knowledge caused by the different positions in the "knowledge generation process": Incubator companies reside within the stage of knowledge exploration and examination, i.e. their product is under development. Clusters too, explore and examine knowledge, but their major activities are knowledge exploitation, i.e. companies grow because their products met market demand. Although having different positions in the knowledge generation process, incubator and cluster organisations are united by the common goal of business growth. The mutual interest of cooperation lies on the one hand in paving the way for business growth after the acceleration phase (incubators). On the other, clusters' motivation is to maintain the constant flow of knowledge to sustain knowledge dynamics from external sources.

Accordingly, we identified "areas of cooperation" which in ideal case lead to increased synergies but need to be strengthened in future:

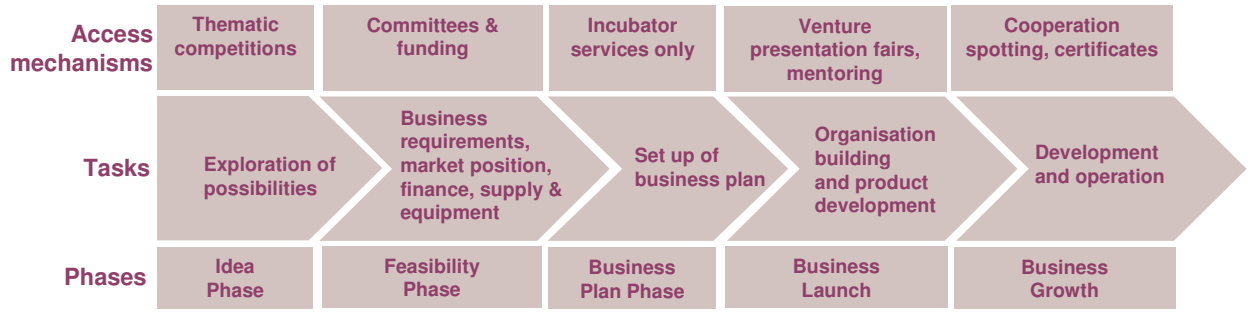
- *Thematic idea competitions*
- *Seed-financing*
- *Start-up support mechanisms.*

To achieve maximum impact, the areas of cooperation need to be tailored to start-ups' dynamics (cp. figure 6). As mentioned earlier, a well-grounded penetration of a cluster / cluster companies is considerably unlikely for a very young business (cp. figure 5). However, commonly issued *thematic idea competitions* are supporting or even accelerating the exploration of opportunities for potential entrepreneurs. Cooperation remains on organisational level between cluster and incubator management but with increased liabilities and issues at stake. Further-

more, interests of incubators and clusters are safeguarded: To excite thematic and well-profiled start-up activity generates new "customers" for incubator organisations and complements clusters' competence profiles (for example e-security, RFID).

Mutual *participation in committees* or even the set-up of *common committees* increases transparency and maintains high-quality information flows on management level. Additionally, it raises interests to set up common *finance support tools and funding schemes* which are beneficiary for entrepreneurs who are in the process of founding a business. To stabilise business launch, incubators and clusters need to put further effort into the organisation of events that allow start-ups to present themselves, e.g. *venture presentation fairs*. *Mentoring programmes*, e.g. "business angels", between incubated and more experienced cluster-companies or individual members too, stabilise business launch through knowledge transfer. During the phase of business growth it is crucial to acquire business partners and (lead-)customers. *Intensified matchmaking* activities and further *cooperation spotting* will support start-ups. To proof start-ups' cooperation-competences, well-known incumbent companies which are/were business partners of start-ups could issue *cooperation-certificates*.

Figure 6: Multi-level Access Mechanisms



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