Policy Forum on:

Regional "competence centres"
and European knowledge and innovation networks:
an international comparison of innovation cluster policies

Rome, September 19-20, 2007

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Report on aims and policy conclusions

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The Policy Forum of the IKINET project has been held on September 19-20, 2007 at the Department for Public Administration of the Presidency of the Council of Ministers, Palazzo Vidoni, Corso Vittorio Emanuele 116, Rome. The Policy Forum has been organised by the Department of Economics and Institutions of the University of Rome "Tor Vergata" and it has been promoted by the Italian Minister for Innovation in Public Administration, Ministry of Economic Development, Ministry of Research and the Italian National Economic and Social Council. Almost 50 experts from many competence centres, regional administrations, Italian and foreign national agencies and public institutions and of the European Commission have participated within three sessions devoted to the discussion of:
Theme 1: How to promote international accessibility and cooperation between competence centres
Theme 2: How to promote creativity and new innovative projects and companies
Theme 3. How to promote an effective governance of networks of competence centres

1. The role of innovation in European competitiveness

1) The internationalization of markets and of production processes indicates that innovation and new knowledge are the key factors of **international competitiveness for the European firms and regions**. They lead to economic and employment growth, but also to international division of labour, agglomeration and exclusion phenomena. In fact, the major factor of growth disparities between countries is the gap in technology and knowledge.

2) In the long term, the real factors of international competitiveness are neither taxes and corporate profits nor labour flexibility and labour costs, but rather **productivity changes, innovation capabilities, knowledge and know-how**. Innovation is not only the key factor of competitiveness and success of the existing firms, but also the factor explaining the survival or

crisis of firms or the factor leading to the creation of new firms. There are different factors of innovation, such as finance and entrepreneurship capabilities, but **the role of knowledge, technological and organizational capabilities and know-how** is becoming crucial.

3) Innovation requires **flexible forms of cooperation** between many different private and public, regional and international actors, such as large firms, SMEs suppliers, knowledge intensive services, higher education and research institutions, financial intermediaries, public administration and many other partners such as professional association and media. Innovation requires the **combination of different competencies** within a process of collective learning, as firms are forced to cooperate to increase and diversify their knowledge base.

4) While innovation policies mainly focus on the development of high technologies and R&D investments, **European industry is still dominated by medium and medium-high-technology industries**. These industries, however, are under ongoing pressure to integrate knowledge from new high technology and scientific segments and to obtain competitive knowledge advantages in global markets.

5) Moreover, **technology spreads across industries** and the development of new productions requires the innovative combination of different types of technologies characterising different sectors, while the new knowledge indicates an higher level of fungibility. The increasing relevance of integrative technologies – connecting medium and high-technology knowledge in industrial products – means also a need to **connect "synthetic" or traditional engineering and problem-solving knowledge with "analytical" or science-driven knowledge and with "symbolic" or creative knowledge**. Traditional boundaries between pure and basic and applied research can no longer hold. Consequently, cooperation between different actors and organizations is needed to connect the different forms and contents of knowledge.

6) **Medium tech sectors** are characterized by **many specialized small firms**, but also large firms or medium size firms are important in these sectors, such as in the case of the aeronautic, automobile and machinery productions. The fast growth of emerging countries create important opportunities for the **exports and growth** of these sectors, but these sectors need to fast and regularly **innovate and improve quality** of their products, in order to insure international competitiveness and to **avoid the de-location of productions** from the European regions and countries.

7) A complex interaction is needed between **regional and national or European innovation policies**. Various new sectors (such as aerospace, environment, energy, finance, major international infrastructures, etc.) seem to require **a more intensive national or European coordination** and the initiatives to be taken at the regional level should be stimulated and orientated within the framework of national and also European networks. However, **the spatial dimension of innovation** is also increasingly clear and that has lead to adopt policy schemes, which focus on the **regional clusters**. These programs are highly similar in the various countries, while having different names, such as national networks of clusters, poles de competitivitè, competence centres, centres of expertise or technological districts.

2. The characteristics of the "competence centres" policy

8) The challenge of increasing international competition calls for **a new industrial policy** supporting **large projects realized within national thematic networks** and building on the existing strengths and innovative capacities of the various regions.

9) National and regional **competence centres** are designed to stimulate cooperation in research and technological development **in strategic important production fields** between companies, academia, the public sector and other organisations involved in promoting innovation, overcoming the gap between **pre-competitive technological research and practical industrial application**.

10) The **Policy Forum** on competence centres in Europe organized by the European VI FP project: IKINET - International Knowledge and Innovation Networks , aims to discuss **the role of competence centres in innovation and industrial policies** at the European, national and regional level. It also aims to promote international learning and benchmarking and **the launch of programmes for the creation of networks of competence centres** in countries and regions, which do not have them. In particular, it aims to investigate how competence centres can promote the international competitiveness of SME and these latter can become looked in international networks of innovation and knowledge.

11) The idea of the cluster policies and competence centres in various European countries is based on the following **characteristics of competence centres**:

- are part of a **national or regional network** created by a national or regional public program, which has defined a competitive mechanism for the selection of the various proposals of competence centres and an national or regional agency for the steering of the overall network of competence centres,
- have a **regional focus** but act on an **international scale**,
- concentrate on a specific **thematic production field**,
- are capable of **generating innovations** with a particularly high value-added potential,
- cover many links in the value chain and **connect multiple sectors of industry** and scientific disciplines,
- establish an outstanding communication and **co-operation platform** by promoting **public-private partnership** and existing networks between large and small firms and other regional actors, in close cooperation with universities and research, educational and vocational centres,
- aim to implement a **common strategy** of innovation and economic development for a specific **territorial cluster** or **regional innovation system**,
- represent **an innovative and operational mode of "governance"** or a "soft infrastructure", that aims to develop synergies around **specific collective innovation projects** oriented toward one or more **well focused markets**,
- allow to reach a critical mass, in order to develop **international visibility** in an industrial and/or technological perspective and to increase the attractiveness of a cluster with respect to international competitors.

Examples of national programmes on clusters policy/competence centres/ poles de competitivitè/centres of expertise are the following:
France: www.competitivite.gouv.fr/
Finland: www.oske.net/in_english/programme/objectives/ and www.tekes.fi/eng/
Austria: www.ffg.at and www.ffg.at/content.php?cid=341

10) "**Centres of Competence" are different from research "Centres of Excellence",** which mostly belong to larger research institutions and focus on well defined fields of advanced pre-competitive research, often in tight cooperation of specific industries, with the aim to raise the quality of research and to improve its international visibility and reputation. However, Centres of Competence, which **concentrate on innovative industrial projects**, may clearly contribute to the enlargement of the technological and general information base, required for cultural and social development, while specifically focusing on the competitiveness of a national and regional industrial and innovation system.

11) "**Centres of Competence" are different from the traditional "Technological Centres",** which have been created by local and regional institutions and aim to provide rather routine technological and business services to individual SMEs within territorial clusters, as Centres of Competence aim to the **design and management of large joint projects with several firms** and other partners for the development of new innovative productions for the **industrial diversification of a cluster**.

The IKINET project: aims and main findings

The IKINET project aims to identify the **key barriers in knowledge creation and innovation networks** not only within regional clusters but also **at the interregional and international level** within Europe, with particular reference to the relationships between the most developed regions and the less favoured regions in South Europe and in the EU candidate countries.

The IKINET project has focused its analysis on **the process of innovation in medium tech sectors** which represent the largest share in the European industry and have different characteristics than high tech sectors. Technology in these sectors is characterized by an high complexity, as products are made by an high number of heterogeneous physical components requiring specific knowledge.

The IKINET project aims to propose policy options and specific technology transfer measures, which may enhance the **integration within the "European Research/Knowledge Area"** not only of higher education and research institutions but also **of small and medium sized firms (SMEs)** specialised in traditional sectors through stable and flexible networks, enhancing their Europe-wide competitiveness. It also aims to an extension to existing policy schemes, which usually focus on very advanced technologies with high growth potential, but also with limited employment impact.

Eight contractors are involved in the IKINET project: Università di Roma "Tor Vergata" (coordinator), University of Wales Cardiff, Ruhr-Forschungsinstitut für Innovations- und Strukturpolitik – Bochum, Instytut Badań Systemowych – Polska Akademia Nauk – Warszawa, Joanneum Research Forschungsgesellschaft – Graz, Institut National de la Recherche Agronomique – Paris, Universidad Autonoma de Madrid, Applica sprl – Bruxelles.

The following seven sectoral clusters have been chosen for the empirical analysis:

- Campania region (IT): Aeronautic cluster
- Wales region (UK): Aeronautic cluster
- Hamburg region (DE): Aeronautic cluster
- Slaskie region (PL): Mining Machinery cluster
- Steiermark region(AT): Automotive cluster
- Ile de France region (FR): Optics cluster
- Madrid region (ES): Aeronautic cluster

Innovation processes in SMEs and in medium technology sectors, **differently from large firms and high tech sectors**, are characterized by a greater importance of **informal and interactive learning processes** with respect to internal R&D activities. Innovation has a **gradual character** and consists mainly in improvement of existing products, services and processes. The process of innovation in medium tech sectors is driven by an **intensive interaction** between the suppliers and the customers, due to the **high specificity** of the need of the customers and the fact that products in the medium-tech sectors are made by **many specific components**. The **fragmentation of the production process** and the **high specialization** of the firms explains their **small size** and leads to a very strong interaction with the **external local environment**, made by an high diversity of private and public, local and non local actors.

The IKINET project has highlighted that the innovation process in medium tech sectors is different from the "linear" approach focusing on R&D expenditure and the rational process of optimization of individual firms, while it can be interpreted according to a "systemic" approach, focusing on knowledge creation, collective processes of interactive learning, iterative adaptation, implicit processes of automatic selection.

The sharing of information and the development of various forms of interaction between SMEs can be interpreted as a process of interactive learning and of gradual development of **"tacit" knowledge**. While codified knowledge could be interpreted as a stock or a resource, which can be transferred in the markets, tacit knowledge is linked to action and it **can be interpreted a complex set of capabilities**, which are localized or idiosyncratic and cannot easily be transferred.

In particular, tacit knowledge refers to **competencies** which explain both the **production capabilities** of the firm as also the **relational capabilities**, which facilitate the tight integration of a firm with other firms.

SMEs differently from large firms **should not be considered individually**, but represent a **regional complex system**, where the turnover, due to births and closures, the changes in the selection of partners are strong and there is an high interaction, due to the grouping of the various SMEs within larger industrial groups and to the existence of rather stable subcontracting arrangements between the various firms. **Clusters** do not correspond to the traditional local production systems or industrial districts and may have a rather different and evolving nature in the various regions. Clusters of SMEs often can not be defined within a limited local area and have a regional or even interregional reach, as the spread over contiguous regions separated by a rather long distance.

The IKINET projects has clarified why innovation and knowledge creation are local processes. Knowledge circulates within networks through formal and informal institutions. Explicit or codified knowledge may be exchanged on technology markets. Instead, **tacit knowledge requires allocation mechanisms which are different from the markets**, since it has an asymmetric character, it implies high risks and it requires reciprocal trust, identity and shared values leading to collaborations. Only specific organizations and institutions and not traditional markets are capable to insure those connections which allow the exchange and the tight interaction of tacit knowledge and competencies.

Knowledge flows are more important at the regional level while the supply chains of material flows are becoming international. The network relations – measured in various dimensions of interaction – reveal that the immaterial dimensions dominate the material ones. While the **firms do have extensive supplier relations**, these are relatively weak within the region and within the network. However, their **knowledge oriented relations are to a large degree regionally concentrated**. Supplier relations are more or less separated from knowledge intensive ones. There is **no automatic parallelism of interactions**.

The focus on regions allows to **adopt a long term perspective** and to incorporate new factors, which cross inter-sectoral divides at the local level, such as know-how, the transformation of tacit knowledge into codified knowledge, collective learning processes, the development of new competencies or skills of the people, the level of switching and adjustment costs in the process of change.

Social proximities are particularly important in those cluster structures, where conventional SMEs have only few international contacts and experiences in cooperation. Social events and fairs can help to overcome these barriers.

Since interactive learning is the key process in knowledge creation and the access to tacit knowledge is crucial in SMEs and medium-tech sectors, **networks are an appropriate form of organization**, which facilitates the interaction and the flows of information and knowledge. Within networks nodes and links are constrained by the existence of spatial distance. Networks may have different characteristics. In particular, **clusters should evolve toward the form of 'Strategy networks'**, which are based on intended relationships and cooperative agreements between firms and other organisations. They imply forms of central coordination, the creation of procedures for the exchange of information, the codification of individual tacit knowledge and the investment in the creation of collective codified knowledge.

The linkages between SMEs in the process of interactive learning within a cluster are often informal, rather chaotic and time-consuming. Based on an original methodology called **"Territorial Knowledge Management",** which provides a innovative and comprehensive and operative approach in promoting innovation in regional networks, the IKINET project developed methods to investigate and generate knowledge networks. Territorial Knowledge Management aims to consolidate the linkages between regional actors and to facilitate the flows of tacit and codified knowledge, by enhancing **six factors or dimensions**: stimulus to innovate, accessibility, receptivity, local identity, creativity and governance capabilities. This approach is highly flexible and can be adapted to the various European clusters.

Major factors of weakness in **medium tech sectors** are 1) a low international accessibility 2) the lack of creativity and of promoting product innovation rather than only process innovation 3) the lack of formal instruments of governance of knowledge relations, rather than automatic spill-over of technologies and informal cooperation. On the other hand, **high tech sectors** indicate other key problems, such as 1) a low local embeddedness of firms, 2) the difficult combination of R&D and analytical knowledge with creativity and symbolic knowledge, 3) the need to avoid the concentration in large firms and to promote spin offs and participation of other partners in decision making. The **low tech sectors** are characterized by various weakness, such as 1) a too low international accessibility, 2) the lack of receptivity and of qualified skills, 3) the lack of identity and fragmentation in decision making.

The multiplication of players and layers of negotiation – international, national, and local – demands a different model of government, called "**multilevel governance**", based on organisational structures of interaction and partnership. In particular, Research, Technology, Development and Innovation Policy (RTDI) is a field of concurrent legislation between various levels of government, and tighter **vertical cooperation should be complemented with an increasing specialization** according to the subsidiarity principle.

The speed of information flows and of decision making processes and a **faster adoption of innovation** is tightly related to the **stability of the organizational forms** and it depends on the existence of a well developed institutional system A rather diversified **typology of institutions** play a leading role in defining a long term strategy of innovation of SMEs within the different regions. Institutions and other forms of "social capital" play the role of immaterial infrastructures which organize the knowledge flows between SMEs within the clusters. Institutional solutions to overcome lack of resources by SMEs are regionally specific and influenced by long-term historical and cultural heritage within the region.

Medium size firms have developed vertical flows of tacit knowledge in their respective supply chain, but they need to be supported in order to **develop horizontal linkages** between different technologies and sectors, by participating to regional "**centres of competence**" focused on **new fields of production**, which may be related to traditional specializations in the various regions, with the participation of firms and research institutions having complementary competencies. **Productive diversification** is not only beneficial for small and medium firms but it can also be very positive for the large firm since it can rely on collaborating partners in more than a single sector, but always within the industry.

Regional, national and European institutions are required in order to promote **international forms of cooperation between SMEs,** both at the regional and national level. In fact, the development of international relations requires **a more stable framework**, than the market mechanisms or even multinational companies and private forms of bottom-up international cooperation may be capable to provide. The creation of **European networks of "centres of competence"** may look as a promising solution to the above obstacles.

The **international extension of knowledge networks** of SMEs call for the identification of common objectives and projects with external partners, while maintaining a strong local identity. It is necessary to find ways in order to combine regional public assistance with firm **collaboration in projects that go beyond their own territory**.

Barriers of SMEs to international clusters can be rooted in different problems. For more conventional SMEs, **general deficits of contacts** and experiences are particularly relevant, while for more advanced SMEs **commercialisation strategies and institutional security** are more relevant. Accordingly, **different organizations can act as gatekeepers** to secure necessary openness of cluster structures in these cases. For any public support, not the type or structure of gatekeeper should be decisive but the **actual impact on integrating SMEs**.

A policy of the knowledge economy based on the "governance" or "dynamic coordination" approach implies the use of **different policy instruments** with respect to those usually adopted in traditional innovation policies, such as:

- public R&D
- public subsidied to private R&D
- public demand of innovative products and services
- IPR in order to insure a monopoly power to innovators

New instruments of innovation policies are those which aim to steer the knowledge networks and to:

- create new **nodes** in the knowledge networks, such as the enhancement of innovative spin-offs from firms, the recognition of universities as a new actor in innovation networks, the promotion of diversity and attraction of new actors,
- create missing **links** by defining new procedures in the relationships between the local actors.
- promote **international links** in order to avoid regional closure and lock-in effects,
- invest in **human resources**, education and life long learning, in order to increase receptivity to new knowledge,
- promote alignment and **identity building** by defining joint long term projects and a joint strategy.
- accommodate the **switching costs or adjustment costs** implied by major changes in order to increase the flexibility of sectoral clusters and SMEs and accelerate the time of changes.
- design and adopt new regulations, which may defend weak and dispersed interests and determine the conditions in order to **aggregate scattered needs and demand** and to create new markets for innovative products and services.

3. The role of competence centres and cluster policy in European innovation policy

12) Competence centres and a focus on knowledge links indicate **the need for a new framework for innovation policies** at the regional, national and European level.

13) Competence centres allow to exploit the **factors of competitiveness of the European economy** with respect to the many and large emerging economies. These factors are related to:

- the **high diversification of industrial productions** within the various industrial clusters allowing the creation of new productions as combination of traditional specializations,
- the **emergence of new needs**, which often have a collective nature, by consumers and citizens and the creation of **new markets**,
- a high **qualified labour force**.

14) Competence centres are **a new instrument of innovation policy** and the experience of some countries where they have been created in the last few years should be extended to many other European **countries, which still lack an explicit national program** for the creation and management of **a national network of competence centres**.

15) Competence centres should combine a **strategic approach** focusing on the **central decision** on selected **R&D projects** with a **decentralised approach** aiming to the creation of **wide and flexible networks for interactive learning and knowledge sharing.** Competence centres should be characterised by:

- intersectoral integrative approach,
- transparent governance structure,
- openness and mid-term perspective.

16) Competence centres should not only focus on **financing pre-competitive and competitive R&D** and on **promoting technology transfers** to individual firms, but they should also aim to **promote knowledge creation, network building, knowledge exchange, interactive learning, the development of labour competencies and the creativity capabilities of the clusters in the design of new projects**. Competence centres should work as **knowledge intermediary** and not only act as an intermediary, which foster social and institutional proximity.

17) While high tech sectors are based on "analytical" or science based knowledge, **medium tech sectors** are based on **"synthetic" or engineering knowledge** and on **"symbolic" or creative knowledge** and they require **different types of innovation policies**. While in the case of "analytical" knowledge national financing may be adequate, in the case of "synthetic" knowledge and of "symbolic" knowledge **the need to promote regional relations is very important**. In particular, innovation in medium tech sectors is facilitated by **horizontal relations** within territorial clusters and these may be **accelerated by the competence centres**.

18) Competence centres should not only focus on **the needs of individual companies** or on the **strengthening of the vertical supply chains.** They should also **adopt a territorial perspective,** i.e. dealing with **horizontal relations** between the different sectors, and an **institutional perspective,** i.e. promoting new forms of **multilevel governance**.

19) Competence centres are crucial in order to **reduce the "switching costs"** to innovation and to **accelerate the speed** of the process of adoption of innovation, thus **avoiding the risk of a lock-in effect** in territorial clusters and **promoting an horizontal and vertical diversification of the traditional productions** in these clusters.

20) Knowledge **clusters are no longer organized along the boundaries of sectors**, as the knowledge and technology can be used in **different product segments**. The diversity of final products even raise incentives for cooperation, as direct rivalry between the partners can be excluded. Consequently, any support of knowledge clusters **should not be concentrated on single sectors but on broad platforms**.

21) Competence centres contribute to **develop a new vision** and a **long-term strategy** and should increase the **awareness of needed changes** in the clusters, thus **increasing the stimulus to innovate** by firms and other actors in the clusters.

22) Competence centres also represent **a stimulus to the international openness** and competitiveness of the regional clusters. As firms are increasingly integrated in international production networks, **also competence centres have to build international networks.** Competence centres may create that **institutional framework made by trust, reciprocal commitment and well designed governance**, which allow the SMEs of distant regions to collaborate in joint projects, where **exchange of tacit knowledge** can not be protected through intellectual property rights.

23) **Gatekeepers are particularly important for lagging regions**, as in these regions necessary density of partners might not be given to form clusters, but single partners might use contacts to regional gatekeepers to find access to clusters in other regions.

24) Competence centres may be **organized as a public-private-partnership**, where the regional government acts as a **coordinator** and with a consortium of private actors or the regional business promotion agency acting as **supporting and managing institution**.

25) Competence centres aim to free **the innovation and entrepreneurial potential** of a cluster or region innovation system and to **activate new actors**, since innovation depends on the contribution of many partners and **small and medium size firms** may take innovative choices to be followed later by large firms. **Openness to new actors** within the various clusters is a decisive prerequisite for sustainability, in order to **avoid path-dependencies and lock-in effects** or the emergence of an elitist club made by few large and small firms isolated from the rest of the cluster.

26) However, industry-based, innovation-oriented models of cooperation usually focuses on **a small number of key companies and research institutions**, on the base of a **particular overarching theme**. They are highly flexible instruments and provide short and medium-term solutions to **project related research and development problems**. On the contrary, the **transfer of scientific knowledge to SMEs** requires a long term effort for strengthening the multi-dimensioned and multi-institutional regional knowledge infrastructure and for increasing the receptivity of firms through job qualifications and further training and education.

27) Competence centres promote a **new role of universities in life long training programs** together with professional associations and also in **promoting creativity and entrepreneurship** by **joining firms in innovation projects** and in the creation of new firms.

28) Innovation policies should devise different instruments for **specific target groups**. Moreover, the subject matter of innovation and technology policy is highly heterogeneous in scope, and is made up of a **variety of policy fields**, **diverse institutions and numerous agents**. Thus, any potential solutions will require **highly complex strategies of intervention**.

29) A key problem in regional policy is the need to identify **regional fields of competence** and to target **relevant areas of new technology**. The following three fields of competence can be identified as candidate for cluster policies according to their stage of development: a) **developed fields of competence** well connected with the current specializations of the regional economy, b) **developing fields,** where strength in the supply by research institutions does not correspond to the actual demand by the regional firms, c) **emerging fields** in an early stage of research undertaken, which are in need of policy support for future development.

30) Competence centres should not only **implement "ex post" projects,** which have already been approved by national institutions. They should also play a crucial role in **identifying many large and small new projects through an exploration activity** of the emerging needs in existing and new markets and by **creating a coalition of regional and also international partners** needed to solve the problems.

31) The development of knowledge clusters **requires time to build up internal codes and reputation**. Public support via projects sometime only leads to short-term structures, which run into risk of losing the engagement of partners after the end of external funding. However, pure long-term public funding would destroy incentives of the private partners to look for efficiency. Thus, **public-private partnerships and collaboration with private financial intermediaries to fund cluster structures** together with public funding for more long-term strategic and joint goods could be a suitable way out of existing deficits in funding.

32) Organizations operating in clusters are **providers of new services** which, over the short-term, are to be developed with the help of initial start-up funding, but which over the longer term should not be supported by government financing. This **in-built need for self-financing** makes it necessary for clusters to focus on developing services which generate clear operational benefits for companies in a short space of time. While clusters thus support the development of new, company-related service structures, the prevailing financial considerations mean that **short-term operational benefits** are pushed to the fore, and long-term, **strategic concerns** tend to recede into the **background**.

33) Thus, it seems appropriate to define **more precisely** the tasks expected of clusters and to identify **three distinct fields of activity**:

- supporting **core cluster themes** with public funding by devising long-term programs lasting several years, as clusters can take on functions related more closely to the public sphere,
- integrating policies for clusters with a **variety of policy fields,** due to the multidimensional nature of innovation policies,
- understanding clusters as **providers of specific company-relevant services** at normal market rates.