district
DEVELOPING INDUSTRIAL STRATEGIES THROUGH INNOVATIVE CLUSTERS AND TECHNOLOGIES

INTERREG IIIC SUD

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The DISTRICT Regional Framework Operation At Work:

Innovation Pathways and Knowledge Economy

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Foreword

Claudio Martini - President of Tuscany Region

Ever since its creation, the European Union Cohesion Policy has aimed to promote economic and social cohesion throughout the territory of Europe. To the present day, regions are still unequally armed to face globalisation and the new impacts of the global market. Their gaps in development are evident - a clear diagnosis thereof is provided by the recently released 4th Report on Cohesion.

Moreover, the opening up of the European market at the global scale is bringing in more competition, more restructuring and more competitive relocation of productive activities. New growth and opportunities are inevitably accompanied by new economic, social and territorial cleavages. This means that inequalities are likely to increase, as globalisation bears the seeds of heightened territorial inequality resulting by the enhanced competition. Therefore, cohesion policy should on one side aim at rebalancing the reciprocal position of european regions in the internal market but also - at the same time - try to improve the overall position of the european economy in front of the single global market.

Given the above challenges, the start of the new political framework for the European Union in 2007 has been accompanied by an increasing attention to the Lisbon Strategy and its innovation related objectives. The 2010 deadline is fast approaching and results aren't quite satisfactory so far. Therefore, some seven years after the launch of the Lisbon strategy, the new regional policy for 2007-2013 is at last taking into account the extremely urgent need to boost European competitiveness, particularly by encouraging innovation, entrepreneurship and the growth of the knowledge economy.

While communicating its renewed focus on the Lisbon agenda the Commission has affirmed that "one of the key factors enhancing the added value and effectiveness of cohesion policy is the quality of the partnership between all stakeholders, including those at regional and local level, in the preparation and implementation of cohesion policy programmes."[1].

This statement points to the fact that great potential for growth and innovation lies in the exchange between actors at the local scale but also between regions at the european scale. Lagging areas hold the potential to provide energy and dynamism to the european market – just consider the significantly higher growth rates of the recently admitted members states.

By the same stroke the Commission also stresses that "the reform of cohesion policy has provided for greater decentralisation of responsibilities to local and regional partners. By pooling local and regional knowledge, expertise and resources as well by designing integrated, tailor-made local and regional strategies, cohesion policy can obtain a better focus on investments with the highest impact on growth and jobs."[2].

So, one key feature of cohesion policy is the ability to mobilise all the political levels around shared European goals. One such goal is to try to maintain high standards of living by strengthening the european competitiveness and focusing investments in high added-value sectors. This requires improved training and education, a greater involvement of regional partners in programming, and an intensive co-operation between key stakeholders and among regions, in order to ensure concentration of resources on the growth and jobs priorities.
The re-affirmed importance of innovation and research in the new regional policy indicates that regions and cities are expected to provide significant contributions to the modernisation of economy and the achievement of the Lisbon objectives in the enlarged Europe. In front of the global challenges that face all regions, the european economy can only globally position itself as either competitive or not. The increasing global competition, the changes in demography, the increasing costs of energy and the global climate change – all call for an integrated response by the ensemble of the european actors.

Programmes like the former INTERREG and the current Objective 3 try to foster approaches to innovation that can be shared across borders, among regions and cities. Local and regional economic, social and political players are networked and mobilised by such initiatives – they can then throw a glance beyond their borders. By exchanging experiences and ideas with each other, regions can learn most effective practices and policies from all over europe, and thereby become themselves more efficient and effective in their decision-making procedures.

In order to be successful – as recently stressed by Commissioner Ms Danuta Hubner at the Regions for Economic Changes Annual Conference in Brussels last february – the exchange between regions should at least comply with three factors, that is:

• regions should work together, share experiences, and learn from them in order to benefit from the huge amount of available practices and expertises – in this way they can save time and resources while looking for the best solutions that must be tailored to the specific regional needs and contexts

• what is learned must be turned into action, so that exchange does not remain a theoretical exercise only – this means that shared practices must be adopted as concrete development measures by the regions

• all relevant actors must be mobilised according to the multi-level governance approach of the European regional policy – in this way high-level priorities can be more effectively and efficiently reconciled with local contexts

The present publication illustrates one such example of interregional cooperation that has developed along the abovementioned lines. The DISTRICT Regional Framework Operation – together with a number of other projects funded by the Structural Funds in the framework of regional development policies – has concretely tried to foster innovation, research and competitiveness of the partner regions. The project has brought together four partner regions from the four corners of Europe (Tuscany, West Midlands, Saxony and Vastra Gotaland) - regions that have shared their analysis and diagnosis of the economic prospects and accordingly formulated a joint way ahead. This was practically implemented through a number of interregional actions and networks – taking the form of interregional subprojects – that have contributed and fostered the innovation and knowledge-based development paradigms in these regions.

This - by no way exhaustive - description of the project's outcome aims to contribute to the capitalisation and dissemination of the results achieved by the DISTRICT Operation. It provides a resumé of good practices emerging from the subprojects as well as a section on ideas that we deem can stimulate reflection and discussion among regional and local actors and policy makers.

On the other hand, it is also an epitome of a three-years long experience that has involved and transformed four regions, some fifty local institutions and a significant number of people belonging to regional and local bodies. These people have learned to look, listen, talk and eventually better understand each other. They have shared their concerns and jointly imagined and designed their innovative pathways into the knowledge-driven economy. It is our and their hope that this collective experience can contribute to turning the challenge of globalization into a shared winning opportunity.

[1] COM(2007) 798 of 11 December 2007 "Member States and Regions delivering the Lisbon strategy for growth and jobs through EU cohesion policy, 2007-2013"

[2] Ibidem

A first account of a useful project ?

Massimo Bressan
DISTRICT RFO Project Manager

The idea of building the DISTRICT project was developed in 2004 with the aim of improving the regional innovation strategies of the four partner regions (Tuscany, West Midlands, Saxony and Western Sweden) through a close cooperation of their local actors. The partnership reflects an important charachteristic of the project, which is the diversity of each socio-economic context.The aim was to bring together regions which could represent an ideal continuum from manufacturing-based to knowledge-based regional economies.
Their local institutions, organisations and excellence poles in innovation and research are clear examples of policy interventions in this transition process. The challenge was to bring together various experiences and obtain relevant results in the three thematic component of the RFO (Clusters and business networks; SMEs innovation projects with Universities and Technology centers; Financial engineering, seed and venture capital, start up and spin off). The cooperation of universities, local administrations, business and research centers coming from different regions is exactly the most successful feature of this particular kind of European project, a so called, Regional Framework Operation (RFO) or Mini Programmes (in the current European structural funds programming period).

The involvement of the local partners started with a public call for proposal in March 2006. The call launched the invitation to submit proposals for the implementation of subprojects in the framework of the three thematic components. It was open to "Public and Public-equivalent Bodies" belonging to anyone of the four partner regions in order to organize interregional focused networks.The networks (subprojects) were requested to work on the following lines of actions:
• studies and methods to implement new policies aimed at enhancing research and technological innovation;
• new methods and approaches to increase cooperation between industrial SMEs and R&D institutes and develop industrial business networks and clusters;
• development of new tools for territorial management, foresight analysis, territorial analysis and planning;
• creation of networks to increase R&D and innovation transfer to support transition of mature SME systems to the knowledge economy;
• development and test of new methods to increase the number of innovative business ideas and products from Universities and R&D institutes.

The management of DISTRICT (central and regional secretariats) organized several meetings before the launch of the call. The potential partners partecipated in the meeting thereby learning the aims, tools and formal constraints of the subprojects. This practice has been particularly important – especially considering the short time available to the networks to operate, i.e. until the end of 2007 – and should possibly develop in the future into a two stage type of procedure: a preparatory or project building stage followed by an implementation stage.

The preparatory activities provided a solid background for a fast accomplishment of the formal requirements and by June 2006 the Steering Committee of DISTRICT was able to approve the list of the 11 funded networks (in less than three months from the start of the process). A total of 50 public bodies belonging to the four participating regions: 11 from Tuscany, 16 from West Midlands, 10 from Saxony, and 13 from Western Sweden (cfr. Tab. 1).

The available budget was 3,5 millions euro, while the request from the submitted proposals exceeded this figure by 2 millions euro. This resulted in a financial and technical review of several subprojects in order to be able to promote the most relevant networks. The main challenge for the networks was first of all the lack of time more than budget. DISTRICT has been one of the last projects funded in the

Interreg South zone. Being so close to the end of the former programming period (2000-2006), the subprojects activities have been compressed along a maximum period of 18 months.

Tab. 1 - The eleven funded networks within the DISTRICT - RFO and their partnerships

Subproject	Lead Partner	Lead Region	Thematic Component	Partners
InTechTex	Saxon Textile Research Institute (STFI)	Saxony - Germany	SMEs projects with Universities and Tech. centers	IFP Research AB, SE - Coventry City Council, UK - Sviluppo Italia Toscana S.C.p.A., IT (Tecnotessile) - Innovation Netzwerk Textil, DE
TechnologyMall	VEMAS	Saxony - Germany	SMEs projects with Universities and Tech. centers	Birmingham Chamber of Commerce and Industry, UK
INNOTRAD	University of Wolverhampton	West Midlands - UK	Cluster and Business Network	UCE Birmingham UK- Coventry City Council Clothing Centre UK - PIN s.c.r.l.IT
PICTURE	IRIS – Istituto di Ricerche e Interventi Sociali	Tuscany - Italy	Cluster and Business Network	University of Florence, IT- University of Birmingham, UK - URBAN SpA, IT
FORECO	Provincia di Pisa	Tuscany - Italy	Cluster and Business Network	Coventry University, UK - Espira GrowthCentre, - Sviluppo Italia Toscana, IT
SEARCH	CIP Professional Services	Vastra Gotaland - Sweden	Financial engineering, seed and venture capital, start up -spin off	Coventry University Enterprises, UK - PIN Scrl, IT - GUFI Research and Innovation services, SE - CIT Chalmers' Institute for commercial R&D, SE - SAXEED TU Chemnitz, DE
ETI-NET	RKW	Saxony - Germany	Cluster and Business Network	IMREG Dresden, DE - Birmingham Chamber of Commerce and Industry International Trade, UK - Coventry University Enterprises Ltd, UK
CLINIC	Black Country Chamber of Commerce	West Midlands - UK	Cluster and Business Network	PIN Scrl, IT – RKW, DE - Birmingham University, UK
RICE	Warwickshire County Council	West Midlands - UK	SMEs projects with Universities and Tech. centers	University of Warwick, UK - Sächsisches Textilforschungsinstitut, DE - Fraunhofer-Institut für Keramische Technologien und Systeme, DE – AGROVÄST Livsmedel AB, SE
STIM-SME	Espira Tillväxtcenter AB	Vastra Gotaland - Sweden	Financial engineering, seed and venture capital, start up -spin off	IVF Industriforskning och Utveckling AB, SE – Espira Inkubator AB, SE - CIEL Sweden AB, SE – Innovatum AB, SE - Gothia Science Park AB, SE - Coventry University Enterprise Ltd, UK – Consorzio Pisa Ricerche, IT - Technologie Centrum Chemnitz, DE
Serious Games	University of Skövde	Vastra Gotaland - Sweden	Cluster and Business Network	University of Coventry, UK

The cooperation among the four regions and the 39 participants involved in the project has promoted a consistent flow of informations and good practices, the joint development of methodologies and tools to plan and implement regional and local strategies, strategic planning and pilot projects, drafting measures to strengthen connections between SMEs and knowledge, promoting technology-linked institutions and services. The concern of the partner regions for their industrial background has been a focal point which supported the consensus on the operation's objectives and has helped in delivering valuable outcomes. The partners consider industry as a key element in their regional competitivity framework and even if some subprojects did not work in the most advanced areas of technology they all relate to existing industrial clusters and business networks.
A key strength of DISTRICT is the concrete nature of the policy challenges addressed by this project. [...] The adhesion of the regional partners with the fundamental mission of the project has been clear and strong[1].

DISTRICT provides quite a few examples of the specific added value which an RFO can provide to regional innovation strategies. Each of the partner regions has a solid committment to innovation and research and a viable academic background. The public financial resources for each regional system of innovation come from different specific national schemes and from structural funds programmes. In any case it is not the budget which makes the difference, and not even the area of innovation and research where the network is focused. Where an RFO can make the difference – or simply turn useful - is the micro-approach to establish a frame of relationships between similar actors working in different regional innovation systems. Since a relevant part of technological innovation in industry comes from inter-sectoral cooperation - e.g. applying technology coming from one specific industrial sector to another - the network cooperation between technology transfer providers coming from regions with a solid manifacturing background is able to offer many possible examples and tools to approach concrete problems[2].

One example is provided by the InTechTex subproject which groups togheter some of the most important centers for technical textile in Saxony and Tuscany togheter with the Swedish Institute for Fibre and Polymer Research (IFP) and the English Coventry City Council (CCC). Textiles are increasing their market share in building and architectural applications, with new materials which bring lightness, strength and resilience as well as resistance to many factors such as deformation, creep, degradation by chemicals and pollutants in the air, rain or other construction materials. But the new areas of application for those materials are much wider.

A similar experience came from the Innotrad network, led by the University of Wolverhampton in West Midlands (UK). The objective of the project was to support traditional manifacturing industries in Tuscany and West Midlands in providing more knowledge and technology to their productions.

Another example of inter-sectoral and transregional network is TechnologyMall. Partners are: Vemas - the Mechanical Engineering Network of Saxony - and the Birmingham Chamber of Commerce and Industry. The idea of the subproject was to build a bridge which could contribute to shorten the distance between technology-developing research organisations and SMEs. It is a virtual innovation marketplace able to provide an easy-to-use tool for universities, research and development institutes, technology centres and high-tech companies to present their innovative products and developments to the market. Almost 500 companies, mostly SMEs, exhibit their profile on the TechnologyMall website (www.technologymall.eu). These companies also introduced more than 160 innovations and some 92 research

[1] Inno Scandinavia, DISTRICT RFO. Evaluation report, draft version, 2008 (soon available at: www.district-rfo.eu)

[2] A first narrative analysis of the results coming from the interregional networks is provided in the second Section of this report. For each network a brief description of a good practice emerging from the activities is described.

centres present their outline at the virtual fair. In fact, TechnologyMall helps SMEs to establish new networks and to market their latest innovative developments to new customers not only within DISTRICT regions but using also established historical links from Sachsen and West Midlands institutions to new markets like Russia and India.

STIM-SME (Stimulation and facilitation of new business creation from industrial SMEs) is another interesting example. The project developed methods and tools to identify high potential spin-out projects and to help these projects to develop into new business ventures including spin-outs, licensing, joint ventures and new products. The partners applied a diagnostic tool to validate possible ideas or products and selected 15-20 products. Among these 5 or 7 were qualified to be commercialized through an incubation process (using existing regional organisations). The spin-out manual (one of the outcomes of the subproject) is a concrete way to help companies and intermediary players to better manage the spin-out process. It also faces problems concerning financing, management, ownership, staffing, motivation and other complex issues.

Anyhow, even new networks – like these subprojects – can create contacts between regions which overcome formal project barriers. As it is shown in the article of Mats A. Lundqvist and Karen Williams Middleton[3], even a minor partner in the SEARCH subproject, like PIN (the University of Florence research unit operating in the city of Prato), was able to establish relevant connections between one local University spin-off and a local organisation, i.e. a small incubator promoted by the city of Florence (actually not a partner of the subproject). The tool which is the focus of the incubated spin-off is called SUSI ("Sensore di Umidità e Salinità Integrato"), that is, an "Integrated Sensor for Humidity and Salinity". It can measure the sub-superficial moisture content, and allows detecting the presence of soluble salts in a wall up to a depth of about 2 cm. The scientists - which have also patented their measuring device - have tested their technique on the "Paradise Wall" frescoes in the Santa Maria Maddalena de Pazzi chapel, painted by Giotto school, and the frescoes in the cloisters of St Antonino at the Convent of St. Marco, both in Florence. This test has helped the restoration process with reliable data. Many other ideas have been processed by the SEARCH subproject in different fields of application.

[3] Cfr. First Section, "Ideas": Mats A. Lundqvist and Karen Williams Middleton, Interregional university-linked innovation - the potentials for Europe.

Innovation is not only a matter of research and business but clearly touches also other areas of public interest, such as education and training, the labour market, and urban planning for cities which have developed rapidly when manifacturing was leading the development and growth of population. The delocalisation process left european cities with a lot of no-more productive spaces waiting to be re-invented and available for citizens. The PICTURE network partnership supported the Prato City Council in Tuscany – Prato being the most important italian textile district - by developing proposals for projects and activities related to the physical transformation of the city, the promotion of innovative clusters within the production process, the implementation of social policies and, finally, logistics and mobility issues. The project aimed at supporting the local government in the experimentation of shared forms of analysis and planning, and in developing proposals of intervention and was successfully received by the City Council itself.

These are some examples and much more useful information is provided inside the two Sections of this report. The first one, called "Ideas – Linking Policies to Innovation", includes some studies which have been promoted either by the working groups activated in some of the networks or by experts which have been contributing to some of our activities.

In the paper provided by Mats A. Lundqvist and Karen Williams Middleton of the Chalmers University of Technology in Gothenburg the authors deal with a complex issue for European regions. Starting from the experience developed through the activities of the SEARCH subproject and other parallel policy cases which have been supported by regional actors in the Västra Götaland Region, they discuss how interregional innovation networks might be able to create a greater capacity for European actors (Universities and SMEs) to readily access global markets for new innovations.

Lisa De Propris, of the University of Birmingham's Business School, presents a paper on the challenges which European manufacturing clusters have to face in order to adjust their competitiveness in the changing framework conditions. The author reflects on the experience of the PICTURE subproject (with a focus on West Midlands) and proposes possible trajectories to move clusters to more knowledge intensive activities.

Alexander Eickelpasch, of the DIW - German Institute for Economic Research in Berlin, introduces an interesting analysis of the German InnoRegio policy scheme: a programme for the promotion of regional innovative networks in less favoured regions. The paper addresses crucial issues for anybody dealing with public policies: Do these programmes bring about the results which they are designed for? Can regional innovative networks be promoted? Do they ease and/or speed up the innovation process in companies?

Marco Bellandi and Annalisa Caloffi, of the Department of Economics - University of Florence, present a paper on the idea of Regional Innovation System approach which has charachterised the innovation policies designed and implemented by the EU and by the European regions in the last ten years. The authors based their analysis on a set of innovative projects funded by the Tuscany regional government during the period 2000-2006 and present interesting observations on the different composition of the networks of innovators.

The second section, called: "DISTRICT subprojects. Innovative cases and stories embedded in European Regions", contains summaries of case studies of good practices from the eleven DISTRICT subprojects. The focus on concrete cases which is reflected in this report has been the main concern of our management approach. The central and regional secretariats have always been working side by side with the regional authorities which run the ERDF programmes and the interregional network was also a way of testing, integrating and improving each regional innovation policy approach. We sincerily hope that our results might be helpful to a wider arena and remind all the readers to check the DISTRICT website for more documents, tools and information.

SECTION 01

Ideas – Linking Policies to Innovation

A Framework for the Analysis of Cluster Trajectories

Lisa De Propris
The Birmingham
Business School Team

Summary

The objective of this document is to explore the possible adjustment trajectories of manufacturing clusters towards a knowledge and post-knowledge economy.

The forces of globalisation that are impacting on European manufacturing regions are posing a threat to existing paradigms of competences and routines; whilst offering an opportunity to integrate new knowledge and learning. Globalisation in this context includes four aspects:
• The cross-border extension of production networking through sub-contracting, processing trade and foreign investment;
• The mobility of human capital and therefore skills;
• The transfer and sharing of knowledge, competences and innovation across localities, regions and countries;
The exchange of goods and services across international markets.

Possible trajectories for clusters to upgrade to knowledge intensive activities are as follows:
1.Securing new market segments: narrow, niche market for high value added, high design, and highly creative goods and services (e.g. jewellery, clothing, leather, glass).
2.Diversification, novel application to high-tech sectors (e.g. ceramics in engines and aerospace, car components shift from auto to medical devices). This implies a shift of core activities up the supply chain and specialise where possible competitive advantage (e.g. textile machinery).
3.Re-positioning in the global value chain. This third trajectory is interrelated to the opportunity of firms to open up to new sectors or new market segments, and the positioning of their production activity in the global supply chain.
Such trajectories to move clusters to more knowledge intensive activities can be pursued by focusing on specific objectives: design and R&D; education, and the wider cultural context.

Possible tools to achieve the above objectives are: firm networking (very broadly understood), planning (in the sense of the organisation of the social and economic space especially in the urban context) and issues related to policy-making and policy governance.

The main recommendations are re-combination of embeddedness and openness, re-combination of hard and soft technology and re-organisation of the socio-economic-institutional-urban system.

The objective of this document is to explore the possible adjustment trajectories of manufacturing clusters towards a knowledge and post-knowledge economy.

1. Context

The forces of globalisation that are impacting on local economies are both posing a threat to the existing paradigm of competences and routines; and offering an opportunity to integrate new knowledge and learning. Globalisation in this context includes four aspects:

1.The cross-border extension of production networking through sub-contracting, processing trade and foreign investment;
2.The mobility of human capital and therefore skills;
3.The transfer and sharing of knowledge, competences and innovation across localities, regions and countries;
4.The exchange of goods and services across international markets.

All the above are particularly impacting on those European regions that have historically been specialised in manufacturing industries. Such competitive advantage has been eroded as labour intensive activities are moving to lower cost locations and, at the same time, domestic markets are flooded by cheap imports. Two have been the major effects of these trends: on the one hand, firms have tended to shift or relocate certain activities away from so-called traditional manufacturing regions in search of cost reductions, and on the other hand, firms have been urged to upgrade their competences towards more knowledge-intensive activities. This raises key issues regarding what trajectories traditional manufacturing clusters can follow to remould their competitive advantage and maintain a sustainable growth.

In general terms, the macroeconomic influences and constraints are affecting international trade, as well as the international mobility of labour, services and goods.

We are assuming that in the UK case this has gone on for longer: the industrialisation process started in this country 100 years before continental Europe; the exchange rate has been a problem for the competitiveness of British export; policy support towards manufacturing industry has been active only since 1997. The result is that the process of 'manufacturing hollowing out' in the UK is more severe.

From this context, we identify possible cluster trajectories by drawing upon the experiences in industries and clusters in the Midlands.

Such industries will include:

• The position of the car industry in the West Midlands into the European and global auto value chain (network);
• The move away from mass manufacturing into design-intensive product niches, such as in the high-value added clusters, such as jewellery, textile, glass, furniture. Another example of this would be the furniture industry in Forli' (Italy), where innovation over the past 10 years has focused on changing market segments, in particular focusing on medium-to-high income segment of consumers, therefore also utilising some strategies around organisational innovation, for example organising online sales through the internet and modifying and improving the materials used for production.
• The attempt for some clusters to diversify in new sectors by providing very innovative and specialised products/components (an example is specialised glass for aerospace and aeroplane manufacturing, for runways light or chemical laboratories)

A key issue is to consider the analysis of cluster trajectories not simply in the context of a closed local system, but rather considering the position of that industry in the global supply chain context. So the possibility, for instance, of focusing in particular on one of the activities being undertaken in the industry and using that to supply the entire global industry, which is the idea related to local systems providing an anchoring role to its firms 'floating' in more globalised input and output markets and learning environments.

2. Trajectories

Possible trajectories for clusters to upgrade to knowledge intensive activities are as follows:

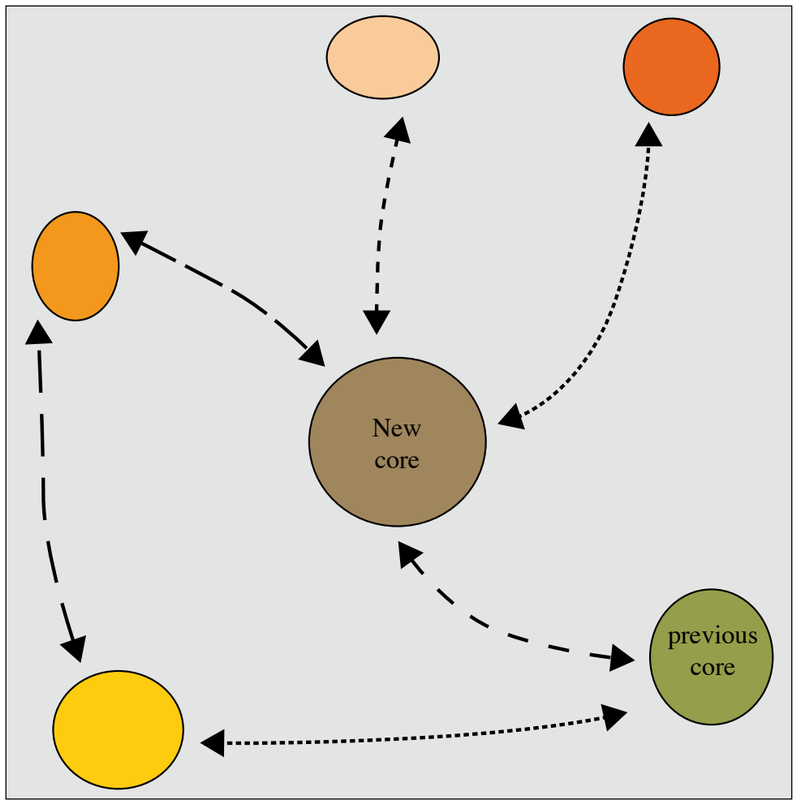
1. Securing new market segments: narrow, niche market for high value added, high design, and highly creative goods and services (e.g. jewellery, clothing, leather, glass).The idea here is that firms try to move away from mass production, but identify very narrow and customer oriented market niches. Even if within the same product group, such goods and services are targeted to very specific demand segments, to the extent of being customised and unique pieces. Higher value added production usually access the top end of the market and are therefore excluded from cut-throat price competition.
In new market segments, we may also think of delivering the same products at cheaper prices through new processes, for example. So the segment may be the same or slightly different, and the product also the same but through different processes that may respond to the needs of a specific demand.
These two elements often go together. When companies move upmarket, product design and process innovation are crucial in (a) stripping up costs and (b) building in quality enhancements for consumers. An example is the latest Jaguar XJ, which is made of aluminium, and is half the weight of the previous car: this car is both high tech and the output of a different production technology.

2. Diversification, novel application to high-tech sectors (e.g. ceramics in engines and aerospace, car components shift from auto to medical devices). This implies a shift of core activities up the supply chain and specialise where possible competitive advantage (e.g. textile machinery). Along this trajectory, clusters re-position certain internal resources and competences from the margins to the core of their competitive advantage, and apply them to supply new and potentially very different markets. In particular, along this second trajectory the cluster recognises the importance for firms to identify new sectors. This would be illustrated by firms in the car component industry moving to supply products in medical technology, where there is considerable growth taking place.

3. Re-positioning in the global value chain. This third trajectory is interrelated to the opportunity of firms to open up to new sectors or new market segments, and the positioning of their production activity in the global supply chain. In other words, the 'anchoring' (Crevoiser, 2007) of the global supply chain within a particular locality on the basis of its embedded competences and knowledge.
There are various ways of doing so. One example might be in terms of education, establishing focal points for excellence in training and research (for example, in glass and jewellery design in Birmingham). Other ways could be through joint cooperation over innovation, joint ventures over product development or through inward and outward investment.
More generally, there is increasingly the need for clusters to portrait themselves as able to supply high value added functions. This is the case of localities trying to

attract and retain a certain type of trans-national firm. The Irish case is illustrative of a very successful strategic choice of what foreign investment to welcome; in fact, they recognised that mass manufacture was likely to move to Central Europe in search of lower labour costs, so policy makers have deliberately bargained with the strategic decision makers within trans-national firms to pull down higher level functions, which may then be provided across the transactional network. These functions included IT support, back office functions, services, research and development. Again, this would be a form of 'anchoring' of certain activities within that locality, even though other activities would probably move overseas.

A cluster's re-positioning within the global supply chain might also mean a shift of its core competences/activities. International linkages might be the drivers or the outcome of a core shifting and core upgrading strategies. As the cluster re-focuses its core competences, it tries to re-new its competitive advantages and to identify possible survival paths. In this context, we might see the cluster identifying and securing a niche role in the global value chain.



3. Objectives

The trajectories identified to move clusters to knowledge intensive activities can be pursued by paying attention to specific objectives. We focus in particular on three objectives: design and R&D; education, and the wider cultural context.

a) Design and R&D

Investment and a strategy focused on design and R&D are crucial to upgrade manufacturing activities. If clusters aim to move into new sectors and new high-value market niches, they need to increase the design content of their goods/services; and to innovate also through R&D.

We would consider R&D and design as being different. R&D can be defined in broad terms. Usually design is very relevant in traditional sectors such as textile/clothing, furniture and so on, while R&D is relevant usually for high-tech industries, also because of the resources that are needed to invest in these kinds of activities.

In relation to the automotive industry, to produce a high value added Range Rover, for instance, large investment in R&D is needed with respect to the production process and to the product. At the same time, design is, in a sense, integral to producing a product (or service) which consumers are willing to buy at a high price. So, firms invest in building a brand, a reputation; and a product that embodies high value and prestige. Firms need therefore to produce in very desirable market niche, which are almost tailor made for the consumer. This means moving away from the mass-manufacture to bespoke, highly individualised goods and services.

This can be illustrated in relation to textiles, where R&D is key to invent and develop new materials, but design enables existing materials to identify new market niches for instance through branding. Another examples is the production of the Mini in Oxford: one can still see mass-manufacturing in, say, the car industry in the sense that 200,000 Minis roll out of the production line in Oxford; but at the same time, customers can log on the website and design their own 'Mini' choosing from tens of thousands of combinations of colours, wheels, fabrics. Customers are enabled to design their own car, whilst Mini produces it. They will not produce it until it is designed by customers – it is called delayed differentiation.

In jewellery making, this would mean for example that new designs could integrate gold or silver with glass, whist at the same time requires innovation in new types of glass that does not break. The latter would be R&D, because it implies investment in new technology that can lead into new materials. So design is related to the 'look' of something, such as new forms, shapes, colours or combination of materials. Branding is also part of this. Still, design to be really innovative could also come from innovation in new products in other sectors which can introduce opportunities for new combinations of materials which ultimately result in new designed products.

In the textiles sector, R&D can lead to move to high-tech materials for aero-space, automotive, building or even extreme forms of clothing.

More generally, a combination of new design and R&D would mean innovations in new materials, as well as re-applying skills and competencies from one sector to another to create new products and services.

b) Integrating Education

Integrating education is another relevant aspect. It relates to the example just talked about with regard to the use of glass in jewellery making. It is related to 'place marketing', and to the opportunity to create the cluster as a centre of excellence which continues to bring in people as a focal point for training. Constant investment

in skill upgrading and education can trigger dynamic process of innovation and design creation, keeping firms and the cluster on the frontier in the industry. This dynamic process is also related to the development of a community of people.

In fact, it might be that a core-shifting strategy, thereby more labour intensive mass-manufacturing functions downscale, implies in parallel a strengthening of the research and development base. For instance, there is a lot less car manufacturing in the West Midlands, but the region has retained a leading role in research and development, design for automotive due to the embedded accumulation of skills and competences. It has refocused its activities and become a centre of excellence in innovation. The nourishing of such skill base partly relates to the pooling of related competences, upgrading of skills, attraction of human capital; all these ultimately also relate to education and training systems.

c) Cultural Context
The final objective is the cultural context, which refers to the role of media and artistic activities in stimulating communication and creativity within the locality amongst the people involved in such activities. That is somewhat linked to how localities and clusters explore and decide on where to go and how to achieve that.

Localities and clusters are a combination of social community, institutions and firms. The processes that enable such stake-holders to be informed and participate in the decision making with respect to the various possible future trajectories are also relevant. Processes of consultation and decision making require channels of communication between people (such as a vibrant media industry) that is able to stimulate dialogue across stakeholders to uncover ideas along the way, and inform opportunities and threats in a context that brings together local and global forces. This means that there is not necessarily a deterministic process from point (a) to point (b), and therefore, stakeholders can be put in condition to choose what is the right route for them.

This is also linked with education, the use of media and artistic activities as being influential on learning. The cultural context may be also in terms of the sum or the number of local actors, including for example educational institutions, hospitals, schools, and other possible stakeholders that may interact dynamically with the economic community in order to combine their knowledge and produce eventually new products that respond to the demand of the market.

The cultural context presents a clear interface with both the education and the design and R&D aspects mentioned above.

4. Tools

Possible tools to achieve the above objectives are: networking (very broadly understood), planning (in particularly urban planning issues) and issues related to policy-making and policy governance.

a) Networking
On networking, the focus is on certain forms of networking, characterised in particular by openness, therefore an awareness of the importance of boundary spanning across sectors and across regions. What we are emphasising here is the possibility of forms of cooperation between firms and other organisations in the economy, maybe firms in different sectors, who are looking to work with each other, looking to share knowledge, and bring that knowledge together into new products and so on. In relation to the trajectories mentioned above, all require cooperation across firms with complementary or different competencies which might be in completely different sectors.

Networking needs to also be qualified. It may be passive or negative kind of networking that sticks to the people, the firms, the stakeholders that are already known by the firm, and that does not produce new knowledge and new opportunities for production. Alternatively, it might be dynamic and active networking, in which competencies are put together.

When considering different forms of networking in the same cluster, one can refer to (a) networking across firms along the supply chain; (b) networking with policy agencies; (c) networking with competitors; (d) networking at different geographical scale, local, regional, national and global.

b) Urban planning
Planning regards issue concerning what forms of clusters and sectors stakeholders are trying to develop and where they are located. So, for example in the context of West Midlands, the Regional Development Agency has a well developed cluster policy targeting specific clustered industries under the labels of 'corridors' or 'quarters; whilst at the same time, supporting a diversification policy where a suite of sectors and competencies is encouraged. For instance, Advantage West Midlands (the WM Regional Development Agency) has promoted new skills away from engineering related to the car industry, rather in new industries, like medical technologies. It recognises that for such industry to develop, R&D in medicine and medical research needs to take place in universities and hospitals; ideally, therefore research activities and the business community have to be co-located. This raises issues about urban planning, technology corridors, and the physical space of the cities and regions.

d) Issues related to policy-making and policy governance
A key role is played by policy, which has to ensure that the tools work to achieve the objectives and to pursue certain trajectories. We would emphasise the importance of a holistic approach to policy, defined as the promotion of strategies and initiatives undertaken by both public and private actors. In this context, we would stress the significance of such mix of business support organisations to consider all of the determinants influencing the process of upgrading to more knowledge intensive activities. Within the policy approach, policy initiatives would be bottom-up, or horizontal, or top-down.

In Advantage West Midlands, there is one diversification manager for each cluster with the objective of trying to diversify the activity of the cluster into new areas (sectors or markets). The car industry again is a good example. Policy initiatives have been partly bottom-up, by asking firms how their skills and competencies can be re-applied; and partly horizontal, in the way it has promoted horizontal communication across firms to share knowledge; finally, partly top-down in the sense of bringing to the attention of the firms possibilities to go beyond their existing boundaries. The latter is where the firms have been especially defensive, rejecting the opportunities to network or to explore new technologies. So, a key issue is how to engage with firms to make them realise that there are opportunities for growth only they were open to new ideas and technologies.

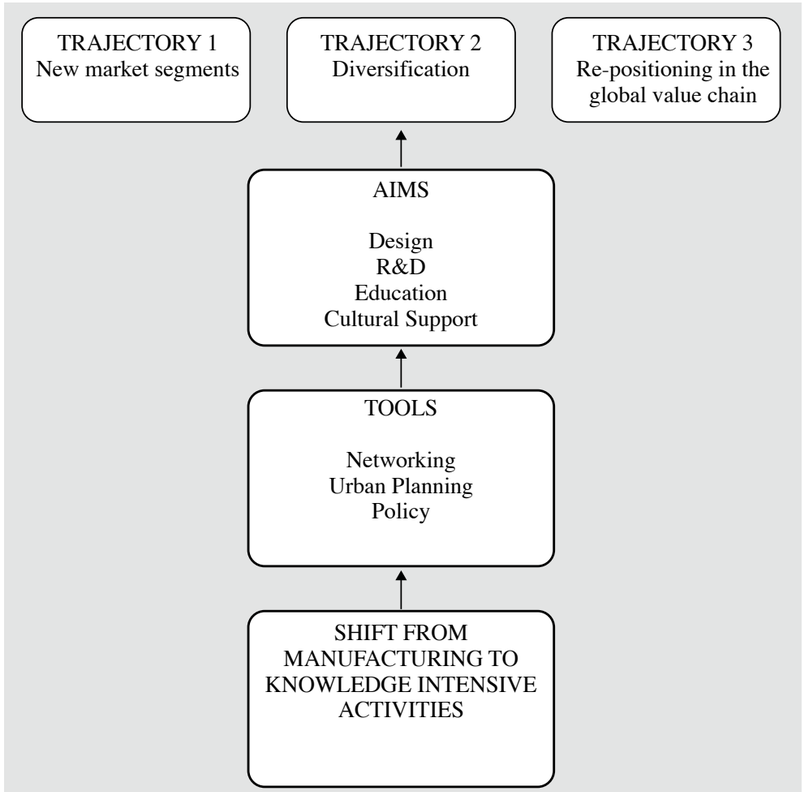
There is a further classification, which may be helpful for this purpose, which is

between functional, vertical and horizontal policy. In particular, horizontal and vertical policies are relevant, because horizontal policies tend to work within a wide range of sectors within manufacturing, while vertical policies are focused on the value chain of a specific sector. However, to explore possible trajectories, it may be very relevant to focus on horizontal policy, because sectors may explore to exploit synergies across sectors and technologies.

A crucial policy concern must also be related to supporting and nourishing an adequate pool of human capital through, training and re-training policy. A necessary condition for clusters undergoing a trajectory move is to ensure that it has or can create or can attract the types of jobs that are needed. New skills and competences are likely to be needed, rather than the existing ones. Such a skill upgrade does not have to be a shock to the social community, but should be integrated organically through policy initiatives.

This brings us back to a key strategic oversight:
- what upgrading trajectory is chosen
- what clusters and sectors are declining and therefore targeted;
- what new sectors are encourages;
- what skills are needed and therefore how many jobs are lost;

This raises issues about labour market intervention and training which link back to education, research and development. This is why the choice of a cluster or locality with respect to a certain trajectory move has to be coordinated but involve all stakeholders; in this way, social costs are managed and minimised.



5. A synthesis of the Process

Interregional university-linked innovation - the potentials for Europe

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SUMMARY

This paper explores the challenges and opportunities in 1) collaboratively coordinating innovation development, in order to, 2) be able to build interregional innovation – so much sought after but as yet to be demonstrated on more than a case-by-case basis. The hopes for European competitiveness through innovation emphasize entrepreneurship, knowledge transfer and commercialization at universities and their associated innovation systems. However, compared to the U.S., European operative practice is often limited to our regional and national backyards, not realizing the potentials of reaching beyond national markets until after many years of so-called incubation. Nevertheless, the innovation creation and development from research, often stemming from the university and facilitated through innovation systems, is commonly recognized as a critical contribution to economic development, not only through the stimulation of wealth creation and employment opportunities, but through the potential development of new markets and industries. With such substantial benefits theoretically available, systems to facilitate innovation development are highly desirable and encouraged. However, the process of implementing and orchestrating such systems in reality is often much more complex than imagined when designed.

The innovation systems existing in Gothenburg have received considerable recognition in regards to new venture development and triple helix type of collaborations. In the EU Interreg IIIC DISTRICT project SEARCH – Scanning and Evaluating Activities for Research Commercialization Handovers – new principles and practices were explored within the Gothenburg innovation systems, and then compared with other regions. Building from the initial findings of project SEARCH, and then proceeding in parallel, VINNNOVA Key Actor Program Project GoINN presents an initiative to coordinate the innovation systems of Gothenburg. The foundation provided through the activities of the projects gives the potential to bring European regions together thus eventually generating higher growth and sustainable innovation beyond the borders of the individual EU member state.The paper investigates experiences from project SEARCH and how the project, together with other parallel processes, can provide promising opportunities for a European model of interregional innovation, not only potentially matching the ability for value creation and growth found in the U.S., but eventually creating a greater capacity for European actors to readily access global markets for new innovations.

1. Introduction

Today countries and regions around the world emphasize innovation as critical for competitiveness and sustainable development. Considerable policy attention is given towards achieving more innovation including ways to stimulate clusters, increase regional and interregional R&D collaboration between industry, institutes and universities, and promote incubation of new ventures. Since the 1970's, an understanding has grown that large multinational corporations will not be the main carriers of national or regional growth and welfare. Instead hopes have focused more on stimulating SME growth and the interplay between so called innovation system actors.

The stimulation of clusters and enabling foreign direct investments into a region by building subsidiaries is often seen as necessary, though perhaps not sufficient, measures for sustainable development. Regional development activities also look for ways to spark new ideas into economic growth. With the diffusion of innovation system theories (Dosi, 1988; Lundvall, 1988; Nelson 1993) attention has increasingly been put on the active and direct role of governments (especially regional) and public research institutes, especially in the form of universities. Ideas around the importance of Triple Helix interaction between industry, government and universities as well as around entrepreneurial universities even more emphasize the driving role of universities and their innovation system actors. For the purpose of this paper we define university innovation system actors (UISAs) as persons within university-governed institutes, incubators, entrepreneurship programs, university seed financiers, or business plan competitions, with the specific aim to generate and nurture innovations based upon novel ideas. UISAs have the capability of building relationships between researchers and business actors and more or less directly facilitate innovation development.

Many regions are fortunate to have universities with long traditions carrying out considerable amount of research and education often funded from a state or higher level. However, given that many universities only recently have expressed interest in becoming more entrepreneurial, the direct involvement into innovation development has often been sporadic. The few successful examples of entrepreneurial universities such as MIT and Stanford today are embedded in strong entrepreneurial ecosystems and thus do not necessarily provide straight answers for what steps less developed regions and their universities ought to take. Nevertheless, in many regions there is considerable promise put around the importance of UISAs and their interplay with regional development agencies to enable the developments of new innovation and a stronger entrepreneurial ecosystem. UISAs are trusted as key actors in building capabilities for promoting innovation stemming form research and/or education.

However, the building of innovations through UISAs in a European setting carries the risk of being too localized. Whereas the U.S. system allows for more or less direct access to a large common market, the European creation of innovations is often highly local, often confined to a regional and national market before going more global. This brings us to the main assumption behind SEARCH: for European competitiveness we need to build UISA capabilities while at the same time building concrete innovations and interregional collaborations. Or, put differently, there is an obvious risk of lagging behind and missing synergies if these things are done sequentially, such as first building UISA capabilities, then building innovation, and eventually starting to collaborate interregionally. If innovations can be successfully networked and promoted interregionally, Europe can not only potentially compensate for the benefits of more common markets in the U.S., Japan, China and India, but it can also learn through the richness and diversity of its internal market in order to prepare innovations to go genuinely global.

DISTRICT Project SEARCH has been positioned in the middle of this opportunity and challenge, aimed specifically to improve capabilities around university based innovation both regionally and interregionally. With its outset in the Region Västra Götaland (VGR) of Western Sweden, a region with strong traditions of university-based innovation, SEARCH has pioneered regional as well as interregional collaboration between innovation system actors, well aware of how demanding and time-consuming such collaboration is to build, even in the regional setting. The Swedish national agency for innovation systems – VINNOVA – parallel to the execution of SEARCH in 2006-2007, launched an eight-year program coined "Key Actor", placing the building of innovation and collaboration skills at selected Swedish universities in the foreground – with the intent of making the university a key actor in the development of innovation. As for VGR and its two main universities – Chalmers University of Technology and University of Gothenburg – SEARCH thus became instrumental in this environment being granted one of five selected key actor projects with a total budget exceeding seven million Euros. As a result, this paper can report from the experiences around SEARCH as well as the newly granted Key Actor project called GoINN.

This paper explores the challenges and opportunities in collaboratively coordinating innovations in order to be able to eventually build innovations interregionally. At its core lies experiential learning from organizing collaboration and coordination between university innovation system actors (UISAs) in VGR in Western Sweden and their interactions with three other EU regions – Saxony, Tuscany, and the West Midlands – under the auspices of the project SEARCH, with further developments within project GoINN, in Gothenburg. Apart from describing the specific features of the project and program, and the environments in which they operate, the paper also discusses what concrete learning and development a networked interregional innovation development project has resulted in. From this policies for European competitiveness eventually are conjectured.

2. Innovation development from university-based ideas

As the pathway for innovation development can be quite complex, it is possible that potential innovations either get lost along the way, or take much longer than necessary to find the support they need to move forward, develop, access critical markets, etc. What are the challenges a region with a good basis of university research and education faces when build a system that stimulates and transforms innovations and what can be done to overcome these challenges?

The region of Västra Götaland (VGR) in Sweden has been recognized as effective in generating innovations (often in the form of new ventures) stemming from university research. A tradition around university venture creation dates back to the 1960's when a university professor in electronics, having been inspired at Bell Labs and the microprocessor revolution, spent the remainder of his career promoting university spin-offs. However, since the mid-1990's, several parallel developments resulted in what today is called a university-based innovation system. On and around Chalmers University of Technology and University of Gothenburg incubators, seed-financiers, entrepreneurship educations, and business plan competitions – all with the focus on how to start and develop companies around research based invention – have been built. Second, and in parallel, there is some experimentation to identify and support early-stage patenting of research. Internal discussions at the level of university managements recognize the importance to patent and license early-

stage research and thereby take responsibility for the utilization of new knowledge in society while also reinforcing research and education in strength areas. The major route pursued is to license up-stream science in areas perceived to host future radical breakthrough innovations such as nanoscience and biotechnology.

However, as background for the SEARCH project are understandings that a relatively bottom-up and entrepreneurial building of a university-based innovation system needs to be consolidated and integrated more with research groups. UISAs cannot settle with "picking the raisins" (i.e. spinning of simple innovations) from research efforts, they also need to be involved in the "vineyard", cultivating various grapes and wines as well as raisins. Evidence towards the lack of coordination was presented in a peer review report, conducted as part of the VINNOVA Key Actor program application process. In 2006, the report, an independent assessment of the knowledge transfer and commercialization activities at Chalmers, one of the key universities in the region, highlighted a "mismatch between objectives on knowledge transfer and commercialization and the structure and financial support of the overall innovation system"[1], including a lack of:

- *Coordination between diverse units*
- *Shared strategic plan and goals*
- *Risk taking and selectivity (evident through the many small enterprises started, but lacking frequent grant commercial successes)*
- *Systematic tracking of the commercialization process steps and impact*
- *Systematic measurements and evaluations*
- *One stop-shop for would be entrepreneurs*
- *Systematic match-making between would be entrepreneurs and inventors/ researchers for commercialization and company formation*[2]

Similar challenges could be found at the University of Gothenburg, though still recognizing that both institutions had components that were successful and effective in stimulating innovation. The real challenge lay in reaching the potential of a truly aligned system of innovation that coordinated activities, thus allowing for opportunity recognition and economic growth; i.e. cultivated innovations.

[1] "Performance assessment of knowledge transfer and commercialization activities at Chalmers" – report from Peer Review 2006-06-01 to 2006-06-02. John S. Baras, Karen Hersey, Jens Peter Vittrup, Nils-Otto Ørjasaæter, and Christina Johannesson. Stockholm, July 15, 2006, pg. 9.

[2] Ibid, pg.10.

3. Project SEARCH

One attempt at finding methods for the consolidation and development of university resources for commercialization of research was a project within the European Interreg IIIC DISTRICT structure, called SEARCH – Scanning and Evaluating Activities for Research Commercialization Handovers. The project was initiated in June 2006 and had a project timeline of 18 months, finishing in November 2007. The project consisted of six partners, three from VGR, including the lead partner, and one from each of three other regions within the European Union – Saxony, Tuscany, and the West Midlands.

SEARCH built upon the assumption that developing early-stage methodologies for research commercialization should be done in a consolidated and networked way, often through effective handover processes. The project actors felt that significant potential might exist for increasing the quantity and quality of research commercialization, particularly if appropriate competence and methodology are developed for early-stage scanning and identification, in addition to the commercial evaluation and packaging of promising research. Through SEARCH, partners in each region worked to develop sufficient trust with researchers and research managers within university settings, while anchoring with regional networks and commercial actors, in order to support the researcher in navigating through the complexity of an innovation system.

The core activities of project SEARCH were in four main areas: 1) the development of methods and tools, 2) building relationships with researchers, 3) commercial packaging and verification, and 4) the growing of suitable hand-over arenas. Project partners identified a set number of potential commercial ideas through interviews with researchers, developed and/or applied tools and methods to help further develop the ideas, and finally generated a set number of innovations that could be transferred into the marketplace, as start-up companies or equivalent commercial transfer.

While achieving these goals, and discussing and documenting lessons learned, the partners in the SEARCH project discovered critical experiential knowledge that, in hindsight, had enabled them to reach and even exceed their goals, and could prove to be an important foundation for future innovation system development and collaboration. In this way, the lessons learned from SEARCH helped to facilitate the structuring of the GoINN project within the Key Actor program.

4. Experiential Learning from SEARCH

One of the core learning outcomes from SEARCH was the need for informal but authoritative and progressive working groups that could start to build abilities to support and influence either direct development of innovative research projects, or the infrastructure supporting them. Through the course of the SEARCH project, actors in each region recognized the critical process of gaining and spreading awareness of competencies already available, but not effectively utilized. Increased awareness and connectivity between competencies and competency providers could thus provide potential synergies that further future competency creation. Effective utilization of resources in order to balance between quantity of ideas identified and implemented into an innovation system, and quality of the tools, methods, approaches and support delivered to such projects in order to transfer them to commercial practice was also a critical finding from the project. Depending on the region, and perhaps the number of partners involved in the region, these findings were active to a greater or lesser effect, and in some cases, with the SEARCH itself becoming the stimulus for developmental activities.

As the cases were developed, partners recognized overlap and complementary innovation development. Also through the course of the project, it became apparent that there were similar industry foci in their regions – ex. car manufacturing – and that the regions were in transition from more traditional innovations, linked to industry, towards knowledge-based innovations and associated industries. This understanding emerged gradually during SEARCH resulting in the strategy for interregional innovation development explored in this paper.

One structural component that became critical, but was not planned, was the clustering of three of the six partners in VGR. The concentration of partners within the region enabled increased activity within the SEARCH project and became a critical component in the further developments in the region. Each region created or developed networks and/or collaborative consortia for innovation development.

In VGR, the concentration of three partners within the project relatively quickly expanded to the creation of a consortium of partners involved in early-stage commercialization, including not only the SEARCH VGR partners, but also a pre-incubator, science park and university holding company. The consortia aided the identification of potential innovations to investigate, as well as facilitate smoother handovers between partners, should it be deemed most beneficial for the innovation. At the same time, a process was created for protecting the connection between the UISA that held the initial contact with the researcher, so that the interests of different organizations could be respected.

While other SEARCH partner regions did not have the advantage of having multiple partners concentrated in one region, they still benefited from the learning from the VGR partners. This was documented in an independently conducted analysis of the SEARCH project:

> *"As for the development of a common methodology for identifying and assessing inventions this was based on the experience made in each region but discussed and processed at the meetings.*
>
> *'The relationship building was carried out regionally but the mechanism of facilitating how to do it, what kind of actors to talk to, who to invite to meetings and how to efficiently communicate has been discussed between the project partners.' "*[3]

[3] Evaluation Report: Sub projects within DISTRICT RFO – SEARCH. inno Scandinavia AB, Stockholm, 2007. pg. 5.

[4] Ibid.

Even without other SEARCH partners in the region, PIN, the partner in the Tuscany region, established connections with a national research organization to help facilitate innovation development.

> *In Tuscany PIN has turned to the University of Florence and CNR, a national research organisation, in Florence and Pisa to search for cases. Six different research groups got involved in the project and with help from a consultancy group of people from the University two ideas were chosen based on a feasibility evaluation. Relationships with the incubators in Florence and Pisa were created and focus groups around the two ideas were created, composed by marketing consultancy, researchers, entrepreneurs, economists, consultancy firms, the incubators and PIN. A day-long meeting with these groups the result was seeing one of the ideas enough evolved for taking the next step towards becoming a company."*[4]

SEARCH became the foundation for other activities, at the regional, national and interregional levels, aimed and further improving the innovation system of Gothenburg. At the regional and national level, key actors involved in SEARCH also applied for and were awarded a long-term development initiative – the Key Actor program – funded by the Swedish national agency for innovation – VINNOVA. Regionally, this meant the initiation of developing the project GoINN that would create consortia of the multiple and somewhat haphazardly connected UISAs, making the innovation pipeline easier to navigate for researchers and innovators as well as improving the quality and collaboration around early-stage innovation. Project GoINN.

In 2007, Chalmers University of Technology and the University of Gothenburg were jointly selected as one of five recipients of the VINNOVA Key Actor program. The Chalmers/University of Gothenburg union is the only recipient including a large city and its two universities. The project begins by investigating the larger picture of the collaborating innovation systems at Chalmers and the University of Gothenburg. Project GoINN will deal with coordination, development, verification and learning. UISAs at the two universities – the incubators, the science parks, the schools of entrepreneurship, etc. – are expected to partake in the GoINN consortia. Here they will coordinate and share knowledge and contacts around early stage innovation and do other coordinated marketing, development and learning activities. Specially recruited UISAs – so called "innovation agents" will work within project GoINN and become one of the new offerings the project has towards researchers, especially in the selected innovation nodes.

5. Towards Interregional Innovation Development

Interregional connections built during project SEARCH has led to additional EU funding project application (and acceptance), as well as stimulated further EU level collaboration, at the research level (i.e. Framework 7). Recognizing the need to facilitate interregional network development, the core partners from SEARCH applied during the next call of Interreg (IVC), with the intent to continue building interconnectivity between the regions.

To embark on the road for interregional university-linked innovation is crucial for two reasons:
- Competition with US and other large scale markets (ex. China, India) that have multiple regions all within one national infrastructure (as opposed to the multi-tiered EU) implies that European developments must not only focus on intra-regional innovation but also add the exploration of inter-regional innovation.
- Knowledge development in overcoming cultural differences (different language, regulatory, etc.) within a partner network of regions makes moving into the global arena easier, because by the time this is attempted, the venture (and the organizations that support the venture) have substantial experiential knowledge about how this is done.

In an independent evaluation of the SEARCH project, conducted by the INNO consultancy group, the project was appreciated for doing "good job in striving to professionalise the efforts undertaken within universities to support commercialisation processes and to change the mind-set of researchers."[5] The report however followed by saying: "It should be mentioned, however, that these efforts hardly are the first of their kind. The European Commission as well as a large number of national agencies are presently promoting similar activities."[6] Certainly, the experiential learning from SEARCH is not the definitive solution to university commercialization. However, there is the recognition from further discussions within both the SEARCH and extended partners, of the importance of human interactivity and relational competencies within the innovation system. There seems to be a need for balancing between top-down policy initiatives aimed at providing system structures and processes, while at the same time finding key individuals, in our case in the shape of the UISAs that can act as critical nodes in the innovation system, particularly when the systems extends beyond regional borders.

UISAs understand that interregional outreach is critical to help the innovations further develop, and through this stimulate regional economic development. These actors observed that while innovations were able to create a foothold in the region, they then seemingly became stagnate, or at least faced challenges moving into the international arena, while still maintaining an anchor in the region. Gothenburg and VGR could not independently sustain the businesses – the innovations had

[5] Evaluation Report: Sub projects within DISTRICT RFO – SEARCH. inno Scandinavia AB, Stockholm, 2007. pg. 7.

[6] Ibid.

to expand into other markets, but the expansion often proved more difficult than anticipated, often potentially draining critical resources. In some cases, the ventures and/or innovations would be bought up and relocated (to, for example, the US), thus with no long-term contribution to the regional economy.

As critical nodes, UISAs can then act either as gateways or bottlenecks to innovation development, depending upon how they allowed to or are capable of interpreting and acting upon innovation policies. There is a need to develop UISAs that operate beyond and behind the specific innovation or the specific research project collaboration. They need to provide sufficient continuity of activity, while allowing enough "space" to knit together tangible transactions and collaborations around early stage innovations. They also need to span the boundaries and borders of research/education and business, by upholding regional anchoring but in an interregional context. Unlike individual researchers promoting their personal ideas and unlike commercial private actors, eager to "pick raisins", UISAs are more trustworthy in being able to set up sustainable methods for cultivation of innovation, respecting, but not limited to, set pathways. This places a greater emphasis on interregional connectivity compared to international connectivity as the mechanism for expansion into a global marketplace. In slightly different words, university-linked interregional innovation is closer to the real innovations than national or international initiative, more trust-building and patient than private initiatives and can include the multiple missions of universities – i.e. research, education and innovation – to make the interregional relationships thicker, vigorous and longstanding.

The promotion of innovative networks in a regional innovation system perspective

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1. Introduction

Nowadays, in industrialized and new industrializing countries and regions, policies and strategies for innovation explicitly entail the idea of innovation as a systemic process, embedded in specific socio-cultural and institutional contexts and developing along clustered sets of production and research activities. Analysis of the systemic contexts in which the innovation process takes place - the specific places, times and rules of interaction – has given rise to a large and growing body of literature. This is exemplified by the widespread reference to units of combined public actions and private strategies, such as the milieux innovateurs (Maillat, 1991), the local innovative networks (Dupuy and Gilly, 1996), the dynamic industrial districts (Bellandi, 1996), the innovative clusters or local innovative systems (Saxenian, 1994; Courlet, 2000), the regional innovation systems (Cooke et al, 2004). Moreover, the regional innovation system approach has moulded the innovation policies designed and implemented by the EU and by the European regions. However, although the various scholars who have developed the milieux innovateurs and the dynamic industrial districts approaches have produced logical models that enable us to justify the appropriate level of system analysis (hence the identification of the actors involved, the system of rules and the dynamic of the relations), the same cannot always be said of other approaches in which the term system is used in a more generic manner. More specifically, despite the extensive debate that has emerged in recent years around the issue of regional innovation systems, the widespread adoption of this concept in the formulation of European policies for innovation (Sternberg, 2001; Landabaso et al, 2001) and the numerous researches adopting this conceptual framework (Asheim and Isaksen, 1997; Koschatzky et al, 2001; Zenker, 2001), the identification and the representation of such systems "as they are" and "as they should be" still seems to be difficult (Fritsch, 2001; Doloreux, 2002).

Nonetheless such a representation of the "system" and of its dynamics would be needed as a basis for strategies and policies supporting innovation and development at regional level. Without a general frame the risks of inconsistencies increase. Considering analyses of the regional innovation systems, as currently defined in literature, we try to model their inner structure and organisation in terms of network relations, in order to provide a guide for orienting policy-making activities. What we propose, in particular, is the use of the network not only to represent the inner structure of the system, but also to analyse the dynamics of its core relations, highlighting the "missing links" or missing agents within the system. The empirical applications – utilising social network analysis tools – relate to the analysis of an Italian regional "system" (Tuscany region) and are designed to highlight the tool's potential for yielding useful policy suggestions[1].

The article develops as follows. An overview of the fundamental concepts underlying the innovation system approach (section 2), is followed by an attempt to define the nature of public intervention aimed at the development of a regional innovation system (section 3). We propose the use of the network as a tool for identification and representation of the basic architecture of the system (section 4) and then present an application to Tuscany region (Italy) (sections 5-7). The analysis is completed by detailing the potential utilisation of these tools for the assessment and evaluation of innovation policies.

[1] Regarding the use of the social network analysis tool for policy purposes, see Rossi and Russo (2008) who have proposed an application to the assessment of innovation policies.

2. Innovation development from university-based ideas

What is a system, and what are we referring to when we apply this concept to the analysis of the innovation process?.

As recalled by Carlsson et al (2002), borrowing a definition from electronic engineering, a system can be represented by its components, attributes and (most important) by the set of complex relations (direct, indirect, feedback effects) that are developed among the components. The components are the agents (individuals or their aggregates, such as the organisations), the artefacts and the institutions (laws, norms and also traditions and customs that structure the system). The components are connected by relations, that is by market or non-market links, which develop in relatively uncertain conditions and along different timescales. Finally, the attributes are the "properties" of the components (their resources and competencies, their specific objectives[2], …) and of the relations that link them; these too are subject to change with the variation of the relations evolving over time. An innovative system, as observed by Lane and Maxfield (1996), is therefore the result of social processes of interaction repeated over time, through which specific agents, characterised by their knowledge and competencies, launch and implement streams of relations with other agents in order to compare, manipulate, combine and re-combine (pieces of) existing knowledge and artefacts, or create new ones, at the same time adapting/modifying their own set of knowledge and competencies.

Let us consider the example of a firm that produces precision lasers (low power diode lasers), normally used in the sphere of medicine, for the manufacture of devices used in the treatment of painful muscular symptoms and in tissue stimulation. This firm is part of a system within which a series of relations exists between the developers of the laser source (research centres, universities and firms), the inventors and developers of the instruments used to channel the source into specific devices, and of the devices themselves (research centres, universities and firms), and the developers and manufacturers of the specific components of these devices (firms), the experimenters of the instrument (medical research institutes, hospitals, clinics) – which in this case provide fundamental support to the inventors and developers in the definition of the instruments and devices, and also to the developers of the laser source – and those performing validation of the instrument (hospitals, and medical clinics). The rules of the game are represented by the complex of norms (laws and codes of practice) that regulate the interaction between the agents in the system: norms relating to the specific technology (specific industry-research interaction necessary for the development of the particular technology), the appropriation of the innovation (allocation of ownership rights to the innovation, patents), the specific context of application (e.g. norms regarding validation of the instruments that demand a special relation between specific agents in the system), and the organisation of the production (modes of interaction between inventors and developers of the technology, between the developers of the instruments and the manufacturers of specific components). Some of these rules emerge within relations that demand a high degree of territorial and cognitive proximity between the agents, in order to ensure ongoing interaction between them (e.g. the relations between manufacturers of instruments and developers of technology, but also between manufacturers of instruments and manufacturers of components). Frequently these relations evolve within specific clusters, more or less rooted in specific territories (Hendry et al, 2000).

Let us suppose that, at a generic moment in time t, the firm, the developer of technological devices, and the experimenters and those performing the validation of the instrument – among whom consolidated relations exist – perceive the possibility of new applications for the specific technology, for example in the ophthalmological sector, a field in which hospitals and health centres are already. If such an intuition

[2] Or the "direction of the desired transformation" when the objectives have not been completely defined a priori (as in the case of innovation; Lane et al, 1996).

is followed up by action, this can generate a change in the sphere of the relations between artefacts (the new relation between the laser source and the new tool for suture of the cornea), agents (the new relation between the developers of the technology, the inventors and developers of the instruments and devices, and the developers and manufacturers of the various components), and between the agents and artefacts (development of a new mode of doing things; possible new markets connected with the new technology/good relation). There will also be changes in the attributes of the components, by effect of the new knowledge and competencies acquired and the new objectives that the agents may have set themselves[3]. We can imagine that the system as a whole will be altered in a more or less profound manner depending on the intensity of the changes generated in the relations described above, the degree of density and significance of the relations between agents within the system, and the rapidity and pervasiveness of the processes of reaction (imitation/adoption or search for alternative solutions) adopted within it. If significant, this variation leads to a progressive modification/adaptation of the rules of the game that guide the action of the agents (for example, following the emergence of relations with significant new actors, or the modification of consolidated relations). At time t+1 not only will the structure of the system be changed, but also its possibility of modifying, or not modifying, a path of development previously taken up.

The boundaries of an innovative system can be defined starting from the laws that regulate its movement. The rules of the game are grounded in social processes, since the interaction takes place in specific contexts, within which the agents act on the basis of their own mental reference maps. These rules and elements of know-how are collected, reproduced, and modified, as with a collective memory of knowledge and competencies, in an evolving set of agents sharing a specific context[4]. They constitute an endowment of the system itself (are included in its components), but are gradually modified by effect of the interaction between these components, in conditions of uncertainty and along different timescales. Labels such as milieux innovateurs (Maillat, 1991), dynamic industrial districts (Bellandi, 2003), innovative clusters or local innovative systems (Saxenian, 1994; Courlet, 2000), and regional innovation systems (Fornhal and Brenner, 2003; Pilon and DeBresson, 2003; Asheim, 2007) explicitly incorporate the concept of system within a specific set of relations rooted within a context – the territory – with its history and its endowment of rules, norms and codes of practice[5].

As premised in the introduction, we shall now seek to go within the logic of the regional innovation systems and to define in what way the modelling of such logic can contribute to the elaboration of policies and strategies for supporting innovation.

[3] The acquisition of new knowledge and objectives may then (eventually) lead to an internal change within the organisation of the collective agents (a change in the relations that take place within the organization), with direct and indirect effects, again, on the network of relations with the outside and with a modification of the attributes. In our example, the frequent interaction between universities and enterprises, or other agents of the system belonging to the world of industry may bring some changes in the organization of the former. These changes may progressively lead to the creation of industrial liaison office or technology transfer offices, then to the acquisition or the development of new competencies (attributes), with possible impacts on the network of linkages with the outside (with new enterprises, with new students,…). .

[4] We could see such rules as public goods that are specific to the system, and which provide a behavioural structure for the agents and for their relations with the other components (Bellandi, 2004).

[5] With a (slightly) different perspective, other approaches identify in the specific characteristics of the technology or the sector (Freeman et al, 1982; Carlsson and Stankiewicz, 1991; Carlsson et al, 2002) the fundamental rules that mould the structure and organisation of the innovative systems. Hence the concepts of technological systems (Carlsson, 1995, 1997) and sectoral innovation systems (Breschi and Malerba, 1997).

3. System-based policies: the regional innovation system approach

The focus on the "region" is related to the fact that it is a significant context of policy making (Cooke and Morgan, 1998): among the numerous rules that mould the interaction of an innovation system, an important role is assigned to the norms that reduce uncertainty and to the resources emanating from or related to the action of the regional government (and its agencies: agencies for innovation and technology transfer, but also research institutes, etc.).

A fundamental problem here is that the regional government has a certain degree of separation from the specific contexts where innovation processes develop. This helps autonomy from sectional interests looking at rent capture. However, too much separation weakens both the understanding of what is needed for an effective support to the innovative processes, and the effectiveness of conversation between the policy-makers and the innovators (Lester and Piore, 2004; Rodrick, 2004).

Let us assume that, in the optoelectronics case cited in the previous section, a significant part of the relations between the components of the system (as well as a significant proportion of the agents of the same) is rooted in a local territory, which is also a repository of manufacturing traditions, knowledge and specific competencies: an optoelectronics cluster centred in an urban system. What can be done by a regional policy maker trying to boost the cluster, and supporting the emergence of cross-fertilization patterns of growth, thus strengthening one of the engines of the regional economy?.

Two main levels of strategy may be identified. The first one is the support to the creation of public goods with features which are specific to the innovative processes taking place in the cluster and local context, and supporting the reproduction of knowledge and competencies crucial for the system: investment in specific (specialised) research centres, funding of existing research projects, etc. The support can be aimed at the constitution or the development of specific components of the system: for example, bridging organisations between the world of industry and that of research, laboratories or centres for applied research, incubators for new enterprises having a specific technological/sectoral/territorial target,[6] support for the reproduction of various fundamental competencies, etc. Public support may be necessary given the size of the intervention, the presence of coordination problems, the risks and time scale involved, or the specific level of competence into which it falls (e.g. production of laws), and it adds to private funds coming from the local systems within which much of the design process takes place (Bellandi and Caloffi, 2006).

The second level concerns the support to processes of cross-fertilisation between systems. The public intervention here targets the promotion of the application of certain technologies or organisational solutions generated or developed within specific innovative systems to other technological/sectoral contexts of the region. For example, in the case recalled previously, the target could be the possibilities of applying the optoelectronics technologies to other industries (or contexts of economic activity) rooted in the region[7]. This kind of intervention is not simply aimed at the diffusion of specific innovations within the regional borders, but at the promotion of the embeddedment of the same innovations into local systems and clusters included within the regional milieu but different from those in which the new solutions were developed. Embedding is fostered by appropriate relations amongst key actors of the systems involved: actors having different competencies but sharing a common language capable of mobilising networks of relations at the local and regional scale. The development of foresight activities, together with the assessment and evaluation of policies realised in the past may provide a guide for policy making in this sphere: presumably not all the relations will lead to success, but the intervention is nevertheless aimed at the dissemination of opportunities (at the creation of channels of interaction previously non-existent), which the various agents (depending on their attributes) can take in and develop or not. Once applied to other contexts, the initial solutions (the new technologies, the organisational solutions…) can give rise to new streams of innovation.

Can public intervention play such a role? More than the presence of an omniscient policy maker capable of identifying the modes and targets of the interventions,

[6] We refer here both to the creation of the tangible infrastructures and to the production of rules (norms) related to the creation of these types of goods.

[7] In the case of the Tuscany Region, in Italy, specific public funding has been allocated to experimenting the potential of the application of laser technologies to the restoration of cultural assets and to other industries in the region.

in this sphere what assumes fundamental importance is the capacity to produce "rules of interaction" and to sustain the development of networks of strategies for the experimentation of interventions. As regards this later aspect in particular, an "intermediate" level of government, such as the regional, can play a key role in channelling into the system the knowledge and the networks of relations acquired in super-regional levels (e.g. EU), and in orienting the strategies of the agents towards viable alternatives.

4. The identification of the system

We now come to a question that is significant for normative and positive purposes. How can we identify the sets of most significant relations of a regional innovation system? Given that a system does not possess a stable form for sufficient time to observe its characteristics, we have to start with an initial approximation of the system, taken at a generic moment of time t, and sketch out its features on the basis of a synthetic view of the basic interrelations which keep it together (Tappi, 2003).

One way of identifying the set of most significant relations is that proposed by the triple helix approach, which focuses on university-industry-government relations (Etzkowitz and Leydesdorff, 1997). The web of linkages between these three components represents the interaction between the three sub-dynamics of economic exchange, technological innovation, and institutional control and the level of synergy developed between them. This set of relations represents the knowledge infrastructure of a system; it works as a selection environment for the agents involved in it, and hence constitutes its basic framework (Etzkowitz and Leydesdorff, 1997; Leydesdorff and Meyer, 2006). The triple helix includes three components of the system that clearly constitute the core of the sub-dynamics of knowledge exploration and exploitation also investigated within the regional innovation system approach. The latter, however, focuses in a more explicit manner also on the dynamics of dissemination of the innovation at the regional scale. Therefore the relations are supplemented by others: those of bridging organisations (entrepreneurial or institutional), which operate as interfaces between the components and between attributes (Kaufmann and Tödtling, 2001). The role played by such "bridges", which somehow facilitate the relations between the three cornerstones, is one of the most relevant points for the understanding of the regional innovation system. Interfaces are needed for example between agents who do not find it easy to exchange ideas, as a result of differences in language, systems of incentives and objectives, timescales of reference (a problem that is typical of the industry-research relation). But interfaces may also facilitate the emergence and adaptation of the norms and rules of interaction. While in the first case we need to consider all the organisations that operate in applied research or technology transfer, that facilitate the incubation of innovative ideas and their exploitation (typically, incubators and venture capitalists, centres for innovation and technology transfer); in the second case we need to consider all the norms and rules of interaction – including public incentives – that support the networking capacities of the agents of the system. More specifically, the support for networking – understood here as support for the implementation of joint university-enterprise research projects, also fostering innovator networks at local or supra-local level – directly affects the capacity of an agent to set up relations with other sources of knowledge and competencies, and moulds the system of objectives and rules of behaviour of the agent.

Many of the definitions of innovative system (whatever the level of investigation) explicitly entail the term "network" (Freeman, 1987, 1991; Foray, 1997; Carlsson et al, 2002, Cooke and Morgan, 1998), just as several empirical analyses of specific innovative systems explicitly utilise the network as a logical category, and as an instrument for analysis of the relations between the actors of the system (Frenken, 2000; Pyka et al, 2002; Pyka and Saviotti, 2002). However, the network provides only a partial representation of the system, restricted to the architecture of the relations taking place in it at a specified moment in time. There is, moreover, a basic ambiguity in the use of the term network, which needs to be clarified in some way. The term network refers directly to the transaction cost theory, which sees the network as a specific form of governance, between or beyond market and hierarchy (Williamson, 1990). A similar concept underlies much of the literature on networks of innovators (see, inter alia, the works of Powell, 1990; 1996), albeit not always in an explicit manner and not in all interpretations. In some of these, in fact, the relations underpinning the large and growing literature on networks of innovators actually appear closer to models of a hierarchical type than to models of networked governance (Robertson and Langlois, 1995; Kuppers, 2002). The same holds for the concept of regional innovation system, where the set of relations of the system, as demonstrated by Cooke (2004), can be governed in different ways. In these cases, the reference to a network assess the existence of a set of relations, but does not qualify the nature of such a set. The use of the network in order to assess and represent the inner structure and dynamics of a system seems to be appropriate instead when the system processes are effectively performed in the context of a networked-type governance of the relations[8]. In this case, the employment of this concept appears particularly useful, not only in representing the web of relations on which the system is based, but also in analysing the dynamics of these relations, highlighting "missing links" or missing agents within the system and hence providing guidance for the policy making activities. Further on in the article we shall apply this concept to the analysis of a "nucleus" of regional innovation system characterizing the Tuscany region (Italy), to illustrate how the tool can yield useful policy suggestions.

[8] Market relations too, or those of a hierarchical nature can obviously be represented as relations: the former as relations of exchange (of a good, or information) against a monetary fee, the latter as relations of inclusion.

5. Data and methodology

The empirical analysis focuses on a set of recent policies supporting networks of innovators implemented by the regional government of Tuscany (Italy). In order to analyze the main results of these policies in terms of promotion of a regional innovation system, we have examined a set of programmes – financed by European funds and implemented by the Tuscany Region in the period 2000-2006 – aimed at supporting innovative projects implemented by networks of heterogeneous economic actors[9], considering it as a network of networks. The specific programmes encouraged networking amongst actors belonging to the worlds of industry, research and services for the purpose of realizing joint R&D projects or innovation diffusion projects[10]. More specifically, public intervention was aimed, on the one hand at supporting the innovative potential of the local productive systems of the region (introducing technological/sectoral targets consistent with the specialisations of the main local productive systems of the region), and on the other at favouring the emergence of relations among different local production systems.

The database we have collected includes 80 projects implemented by 80 networks of innovators[11]. The whole set of projects involve 768 agents, that we have classified as follows:
i) innovation centres, business development service centres, technology parks and similar infrastructures;
ii) universities and research centres[12];

[9] The database includes a set of interventions implemented within the DOCUP-SPD 2000-2006 and the RPIA-ITT programme (Regional Programme of Innovative Actions 'Innovazione Tecnologica in Toscana' 2001-2004, funded within the ERDF Innovative Actions framework), implemented by the Tuscan regional government during the programming period 2000-2006. As documented by the studies of Eickelpasch and Fritsch (2005), these types of initiative eliciting the growth of self-organised co-operation networks in research and development have been promoted in several European regions.

[10] The empirical research was carried out over an extended time span, from 2004 to 2006, since the authors participated in the monitoring and analysis of two specific regional programmes implemented during

two specific regional programmes implemented during this period, namely the RPIA-ITT programme 2001-2004 and the DOCUP-SPD, line 1.7.1., 2005-2006. The research is based on desk analysis of the cited projects and programmes, and on questionnaires and in-depth interviews with the project participants. As documented by the studies of Eickelpasch and Fritsch (2005), these types of initiative eliciting the growth of self-organised co-operation networks in research and development have been promoted in several European regions.

[11] The database includes all the projects funded in the period under consideration. The projects submitted by network of actors that were not accepted for funding have been excluded. The project data refer to definitive projects, drafted in the format scheduled in the funding specifications. This format did not expressly require indication of the names of possible subcontractors, who have thus not been taken into consideration in our analysis.

[12] For what to concern the universities, we have considered the different departments as different actors, since data on the specific composition of the research unit involved in the project are not available for the entire set of projects. The same criterion has been used for the CNR (National Research Council), where we have considered the different Institutes into which it is divided as different actors.

[13] This happens in the most recent call for tenders (Docup 1.7.1.).

[14] The analysis has been performed using Pajek software, available at: http://vlado.fmf.uni-lj.si/pub/networks/pajek/ (De Nooy et al, 2005)

iii) chambers of commerce, business associations and other kinds of local/regional association;
iv) local governments;
v) enterprises;
vi) other (various public bodies).

The 768 agents are also classified on the basis of their localisation (provincial level). Both the dimensions and the composition of the single network/project are partly influenced by the rules laid down by the regional government, and specified within the different tenders, indicating a minimum number of SMEs and a minimum number of research centres (and sometimes also local governments[13]) that must be part of the network. The different agents may take part in several projects: the result is that a subset of around 200 agents participate in more than one innovative project. Only 2 out of the 80 projects observed were implemented by agents participating in a single project. The various programmes identified the following sectoral/technological targets:
i)mechanical engineering and robotics;
ii)optoelectronics;
iii)IT applications for fashion industries;
iv)other IT applications (to logistics, security...);
v)biotechnologies;
vi)new materials.

The set of agents and projects has been investigated by means of a social network analysis (Wasserman and Faust, 1994; de Nooy et al, 2005), aimed at mapping, measuring and analysing the resulting web of relations. The database generates a two-mode network (a two-mode matrix connecting actors with projects), where each agent is connected with the project(s) in which it participates. This has been transformed into a one-mode undirected network (a one-mode matrix) connecting agents participating within the same innovative project[14].

Therefore, the various agents (the aforementioned organisations, represented here as nodes of the web) are connected through co-membership relations in innovation projects. In particular, it is assumed here that two agents are *directly connected* when they participate in the same innovative project. The web of agents participating in two different innovative projects may be also *indirectly connected* by the activity of agents operating within both projects.

Through the use of social network analysis, we have sought to:
• provide a representation of the space of the relations aimed at the generation or dissemination of innovation that develop within the regional context
• identify the central agents of this map of relations, their type (i.e. which type of specific competencies they possess), and the role they play within the network (i.e. whether are they global/local interfaces or locally rooted actors);
• identify a significant nucleus of regional innovation system, observing the relations that remain relatively stable in the span of time considered and analysing their characteristics;
• identify the clusters of relations that develop around this central nucleus, considering the structure and dynamic of the innovative relations that branch out around it (e.g. defining the specific architecture of relations that connects the world of research to that of industry).

The aims of the analysis are both positive and normative. Pursuing the approach mapped out by authors who propose the use of the network for an understanding of the regional innovation system (Andersen and Lundvall, 1997), and in particular the experimentation carried out by Russo and Rossi (2008) on the utilisation of the social network analysis for the assessment of innovation policies, we wish to test whether, and to what extent, the use of this instrument can supply useful policy indications.

6. The analysis of the regional innovation system: an overall view

Let us start with some basic observations on the overall network of agents involved in the innovative projects funded by the Tuscan regional government during the period 2000-2006 (the "total network"). The network is fairly dense (tab. 1, column 1)[15]. Only a small sub-set, composed of 12 agents, remains isolated. This is a group that submitted a single project in the time span observed, and which does not exhibit any kind of link with the remainder of the actors considered. Given its marginality, it has not been considered as a significant part of the regional "system" and we have therefore excluded it from the analysis[16]. The "sub-network" presented in table 1, column 2, refers to the set of most significant relations of the general network (the set of relations that remain active over the time considered) and will be discussed below.

Tab. 1 - General characteristics of the total network and of the sub-network of "significant" relations

INDEX	TOTAL NETWORK	SUBNETWORK
Number of vertices	756	102
Number of edges	10680	853
Lowest value of line	1	1
Highest value of line	6	5
Density	0,3737	0,1640
Number of unreachable pairs	0	0
Average distance among reachable pairs	2,5674	2,0398
Diameter	5	4
Network All Degree Centralisation	0,2719	0,3057
Network All Closeness Centralisation	0,3607	0,3062
Network Betweenness Centralisation	0,1090	0,1187

The observation of the most central agents of the network in terms of the number of direct and indirect links with the others (both degree and closeness centrality)[17] reveals a fairly homogenous presence of all the categories of actors considered, except for the firms. Considering the first 100 agents of the network in order of centrality, we note that only 30% are firms, and that there are only two firms among the first 30 agents of the network. Innovation and service centres rank amongst the more central agents of the total network in terms of participation to the largest number of projects (degree centrality), but they also play as bridges between different (sub-)network of innovators (they exhibit a relatively high betweenness centrality). The centrality of research centres and universities – with their techno-scientific competencies – is even more relevant. With their versatile competencies, they often place at the crossroads of projects having different sectoral and territorial targets. Business associations are also present within the group of more central agents, nevertheless they are frequently located at the centre of webs that are relatively circumscribed and peripheral, rather than at the crossroads of the most central relations (degree and centrality relatively elevated but a lower betweenness). This is consistent with the basic nature of these organizations, which mostly operate

[15] Around 40% of all the possible relational combination among the different agents are active (network density is 0,37).

[16] Therefore, in the total network, the number of unreachable pairs is zero (table 1, column 1).

[17] The degree centrality measures the number of direct links possessed by an actor: the more links the latter has with the other nodes the more central it is within the network. In our case, the lager partnership an actor has, and/or the largest number of innovative project it is involved in, the more central it will appear. The closeness centrality takes into account both the direct and the indirect links possessed by an actor. Following this index, the relevance of an actor is measured in terms of the distance between it and the others actors of the network. The closeness centrality index is defined in terms of the shortest path (that is in terms of the minimum number of nodes) necessary in order to reach the other actors of the web. The most central actor is the one with the shortest path. In our network, a high centrality index is associated not only with those actors who participate in a large number of innovation projects or have broader partnerships, but also with those who have the largest number of indirect links, that is, to those collaborating with central actors. The third index is the betweenness centrality, which takes into account the indirect links an actor has, that is the number of actors to which an actor is indirectly connected through their direct links. The betweenness centrality index focuses on the location of an actor within a network, considering the control it has on the communication flows which develop among the other actors of the web. Considering all the pairs of nodes of the network, the more central an actor is, the more it lies upon pathways between

central an actor is, the more it lies upon pathways between pairs. This structurally advantaged position of being between other actors may give the actor the capacity to mediate contacts between other actors and/or to isolate actors or prevent contacts. In our network, an actor is central when it lies at the crossroads of an (important) set of relations. This should be the typical structural position of those service or innovation centres which (ought to) act as bridges between (actors belonging to) the world of production and the world of research.

[18] The boundaries of the cluster obviously do not necessarily correspond to those of the province, and may extend beyond the administrative boundaries of the same. For the clusters and districts of the region on which we have sufficient information regarding territorial extension, however, we have taken into consideration the effective boundaries of the cluster rather than the administrative borders of the province.

[19] Therefore, this sub-network is not composed by generic agent, but actors.

as lobby groups for interests having a specific territorial/sectoral base.

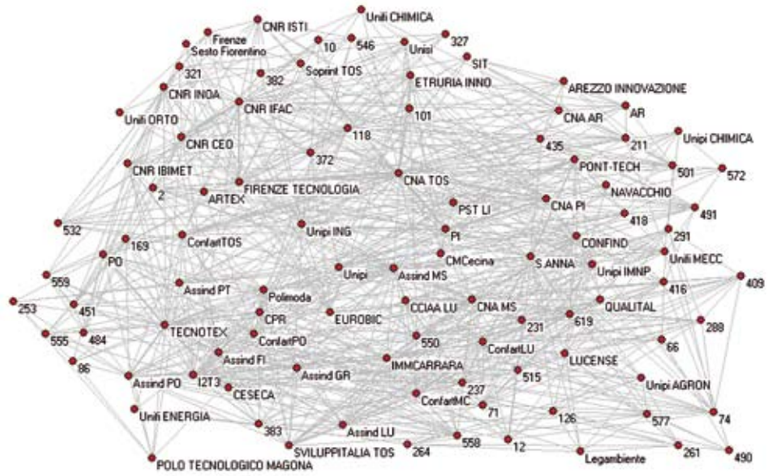
A fairly significant element is that the majority of the relations that take place within the total network have a local dimension. In fact, if we consider the localisation of the various agents involved, we can observe that most of the relations entertained by the individual agents of the network (approximately 53% of the total relations) are with agents localised within the same territorial context (in this case, the Province). This percentage is higher for the firms (61%), which more than the other types of agents exchange knowledge and competencies with local partners, especially with partners belonging to the same cluster or local productive system[18]. Therefore, the web of relations we are observing have specific territorial roots. The links between the various local systems take place thanks to the activity of applied research centres or universities, innovation centres and trade associations, which entertain relations with a number of agents operating in different technological/sectoral and/or territorial contexts.

Beyond the description of the network as a whole, we are interested in verifying the existence of significant relations within it and analysing their principal characteristics. By significant relations, what we mean here is the set of relations that can be considered relatively stable in the time span under consideration. From the set of relations previously identified, therefore, we separate the sub-set that proves to be active along most of the timescale under consideration. This is a sub-set of agents (and their connecting relations) that exchange information, competencies and build strategies along non-episodic timescales. Here we can presume to find the *actors* that are capable of generating, producing and reproducing rules of interaction, competencies and strategies that are the basis of the system[19]. Hence we consider the sub-network thus identified as a projection of the regional innovation system (or at least as an embryonic part of it).

Table 1 above (column 2) shows the principal characteristics of this sub-network (shown in figure 1). This is a completely connected set of 102 agents and 853 relations, composed of actors participating in at least two innovation projects developed at different times. The (sub) network includes a significant proportion of the research centres and university departments included in the previously considered total network (approximately 40% of the centres participating in the total network) and above all of the bridging organisations (approximately 65%). The firms – that represent almost half the agents of the total network – are only minimally present here. The nucleus of the regional innovation system is therefore made up of a series of actors who by their nature perform a fundamental role in the processes of generation and dissemination of the innovation.

In this case too, a significant part of the relations that take place within the sub-network have "local" characteristics. The percentage of "local containment" of the relations nevertheless proves lower than that of the total network (41% as against 53%), given the greater incidence of the presence of the set of actors whose sphere of action is to a varied extent broader than the local (e.g. universities or some centres of applied research).

Fig.1 – The (sub)network of the significant relations



Key: Firms are indicated by numbers; all the other actors (universities and research centres, service centres, local governments, ...) are indicated by their names

Fig.2 – Vertex and line island of the sub-network of significant relations

Key: The graph shows the partition-vector of vertex and line islands of the network illustrated in figure 1. Hence the lines connecting the actors not included in the islands are omitted. The areas highlighted by the circles indicate the areas of more significant relations of the sub-network divided into the three technological/sectoral contexts of optoelectronics/optronics, mechanics/robotics and Made in Italy.
Firms are indicated by numbers; all the other actors (universities and research centres, service centres, local governments, ...) are indicated by their names.

Within the sub-network under consideration agglomerations of relations (the vertex and line islands shown in figure 2)[20] may be identified quite clearly in correspondence with the principal innovative clusters and local production systems of the region. These are (sub-sub) networks of actors accustomed to collaborating over time on innovative projects targeted on the sectoral/technological specialisation characteristic of such systems: optoelectronics; mechanics-robotics; textiles, footwear marble ("made in Italy" production), and others. The analysis of the sub-networks hence provides us with a photograph of the principal innovative nuclei embedded within the local productive systems of the region.

To recapitulate, the nucleus of regional system identified is mainly composed of a series of actors which, by their nature, play a fundamental role in the processes of generation and dissemination of innovation (universities, applied research centres and bridging organisations). This is not a nucleus of relations that extends in a casual manner throughout the regional space, since it is substantially composed of a series of sub-systems (agglomerations and densification of relations) corresponding to the local production systems of the region. Among these latter there exist links (to some extent seemingly spontaneous, but surely also boosted by the structure of public funding in a not insignificant proportion), prevalently generated by the action of trade associations, bridging organisations and actors from the world of research that operate inside various local systems or offer services on a super-local scale. We shall now see how the observation of the characteristics of such technological/sectoral and territorial sub-systems of relations, inserted in the more general regional system identified, can provide us with useful policy suggestions.

[20] As defined by De Nooy et al (2005) an "island" is composed of partition vertices of network with values on lines (weights) to cohesive clusters (weights inside clusters must be larger than weights to neighbourhood): the height of vertex (vector) is defined as the maximum weight of the neighbour lines. In synthesis, while a simple procedure of clustering identifies groups of agents that are more central than others, independently of the fact that these groups are composed of agents linked to each other, an island represents a significant cluster of central agents connected with each other in a robust manner.

7. The three main sub-networks

Starting from the sub-network of significant relations that we have identified, we wish to reconstruct the system of connections in which it is inserted, and of which it is the engine. To do this, we consider the entire web of the relations/projects in which these relations develop[21]. We can identify, in particular, the complete set of relations that revolve around the islands of optoelectronics, mechanics-robotics and made in Italy production[22], which represents the most central agglomerations of the sub-network previously defined. The analysis is directed at identifying what type of structure of relations characterises these technological/sectoral and territorial type of sub-networks, so as to derive appropriate policy implications. More specifically: do these sub-networks display a structure and an organisation of the relations that – in the light of the indications provided by the literature cited above – can be considered useful for the exploration, exploitation and dissemination of innovations on regional scale? How can the analysis of these sub-networks, in line with the methodology described here, provide the regional policy maker with indications for designing and implementing a policy aimed at promoting a regional innovation system?.

The principal characteristics of the three sub-networks are presented in table 2. The first aspect to be noted is that while the two sub-networks of optoelectronics and robotics prove to be thoroughly connected, the third context of relations under consideration ("made in Italy") is splintered into four components. The largest component – composed of 137 agents (39 actors involved in the sub-network of significant relations and 98 local agents) – is that which includes the principal actors of the local production systems of the region specialised in textiles/clothing, marble and footwear. The other three are made up of two small webs of agents/relations operating in the production of furniture and of artistic craft goods, which remain marginal to the network as a whole. The fourth component, which includes a relatively extensive group of actors from the world of research, appears to be more focused on IT technology in itself than on its application to the specific sectors in question (an aspect which was instead expressly requested by the funding specifications). This is an episodic project implemented by a series of agents that are not included within the system nucleus previously identified (the sub-network identified in the preceding paragraph).

[21] In this phase, we have considered all the projects that have been implemented in the technological/sectoral context within which the most significant actors previously identified operate.

[22] As regards the "made in Italy" sectors, we refer to the definition adopted in the various funding specifications: textiles/clothing, footwear, marble, furniture and light (instrumental) mechanics. The public funding was aimed at promoting IT technology within these sectors.

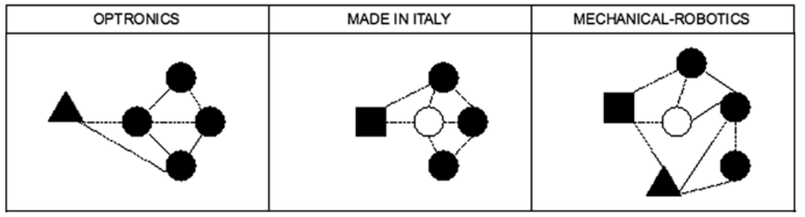
Tab. 2 - Principal characteristics of the optronics, made in Italy and mechanics-robotics sub-networks

INDEX	OPTRONICS	MADE IN ITALY	MECHANICS-ROBOTICS
Number of vertices	181	183	98
Number of edges	1213	2084	1179
Lowest value of line	1	1	1
Highest value of line	3	2	3
Density	0,1742	0,1245	0,2455
Number of unreachable pairs	0	13836	0
Average distance among reachable pairs	2,0206	2,2382	2,1706
Diameter	3	2	4
Network All Degree Centralisation	0,4646	0,2346	0,3677
Network All Closeness Centralisation	0,4694	(*)	0,4185
Network Betweenness Centralisation	0,2621	0.2118	0,1784

(*) The centrality index is not calculated since the network is not connected.

In these sub-networks too, the preferential level at which these relations take place is the local. The density of local relations is obviously more elevated than in the cases considered previously, simply because in this case the industries we are dealing with (sectoral/technological contexts) have a specific territorial rooting within the industrial clusters of the region. The structure of the relations that characterise the three sub-networks is nevertheless different. Given the large number of nodes and relations involved, a clear visualisation of the networks proves difficult; the figure below synthesises the typical architecture of the central relations (that is, the relations among the most central actors) that take place within the three sub-networks (fig.3).

Figure 3 – Architecture of the central relations of the sub-networks considered



Key: Black triangles are universities and research centres; Black circles are firms; White circles are business associations; Black boxes are innovation centres. Dotted lines are direct relations.

As for optoelectronics, the typical architecture of relations is that based on industry/research direct and indirect linkages. The optoelectronics network – composed of 118 agents localised mainly within the regional capital – has universities and research centres at its core, while the other kinds of agents previously considered play a more marginal role. Service and innovation centres, business associations

[23] The most renowned CNR institutes localised within the Florentine area are specialised in optoelectronics.

and local governments are scarcely present, not only within the set of most central actors, but also in the sub-network as a whole. A set of enterprises is present and localised at the centre of the web. This set is composed of highly innovative firms (not only SMEs) and it appears to be connected with the world of research. Some of these are university spin-offs, others have been founded by former graduates from the Faculty of Engineering of the University of Florence: most of them have long-term connections both with universities and research Institutes of the CNR (National Research Council)[23] which are located in the area. The picture is quite consistent with that of an innovative urban area, that is the concentration within a metropolitan area of innovative high-tech activities and research infrastructures. However, our sub-network develops around a dyadic relationship between the world of research and the world of production, and the "third dimension" of the world of innovative services (such as incubators, technology parks or similar infrastructures) which could support innovation diffusion processes appears to be lacking.

On the other hand, the relational architecture that most clearly characterises the fragmented network of the made in Italy sub-network is centred on the relation between firms, trade associations and innovation centres. This sub-network is composed of subgroups of relations strongly centred on the industrial districts of the region. Therefore, the cores of these different subgroups are composed of the typical actors operating within the industrial districts: SMEs, business associations and service centres. The latter have a specific sectoral target and are often the result of a collective action aimed at creating local innovation support infrastructures (Brusco, 1994). The (scarce) relations amongst the different district sub-networks are managed by local governments, business associations or (generic) service centres. Universities or research centres are almost completely absent from the group of the more central actors.

The mechanics-robotics sub-network, rooted within a specific territorial area of the region (the Pisa urban area and some adjacent localities), reveals a balanced relational architecture connecting the worlds of industry-bridging organisations-research. The set of most central actors of this sub-network includes a well-balanced mix of actors of different types, with a large presence of business associations, followed by universities and research centres, which participate in the largest number of projects (that is, which exhibit the highest degree centrality). Here SMEs (very often high-tech SMEs) play a central role, being well connected to the other types of actors of the sub-network and frequently positioned at important crossroads of relations. In this case, bridging organisations such as incubators and innovation centres are also present. The analysis yields the picture of a system centred on a specific territorial area, hosting a set of specialised competencies both in production and in applied and basic research, but having regional extensions (the local containment of the relations is lower than in the other two sub-networks). The system reveals all the "successful ingredients" highlighted in the regional innovation systems approach: the diffuse presence of actors belonging both to the world of research and to the world of production, together with the presence of intermediaries such as innovative services providers, and the presence of strong linkages between them. The core of the technological competencies (and part of the productive competencies) is centred on an urban area which hosts an important part of a local productive system specialised in high tech. However, the set of projects and relations observed also extend to other territorial areas, mainly involving other SMEs of the region.

In conclusion, we note that public intervention brings out networks of relations of different structures in different technological/sectoral and territorial contexts. From a nucleus of regional system, participated by various (more) central actors directly involved in innovation generation and diffusion processes, relational maps emerges that are clearly rooted in the local productive systems of the region. These architectures of relations connecting the world of research and the world of production exhibit different characteristics in different technological/sectoral and territorial contexts. The analysis of these different architectures suggests specific relational contexts for policy actions aimed at boosting the innovative potential inside the individual sub-systems, but also at favouring processes of innovation diffusion within the broader regional "system". It is suggest to focus to, and act on specific "missing links" that characterise the different sub-systems.

8. Final remarks

The analysis conducted has enabled us to identify different relational architectures connecting the world of research and the world of production, and different relational context (technological/sectoral and territorial) in which they are grounded. These two aspects – the structure and organization of relations and the context in which they develop – should be carefully combined in order to fully understand the characters of an innovation system and identify the most appropriate levers for a policy aimed at promoting innovation. However, a third aspect should be further developed in order to enhance the utilisation of this type of analysis for policy purposes. A more accurate analysis of the performance achieved by the various relational architectures within the different innovative contexts is needed in order to support policy design, assessment and evaluation activities. On one side, analysis in this sphere are still substantially based on case studies (of specific relational architectures, of specific local innovative networks, clusters or regions), which do not always provide strong indications about performance and its determinants. On the other side, the use of simulation models – modelling the interactions between agents in different relational architectures and focussing on performance indicators – does not yet appear to be capable of effectively incorporating the characters of the specific context within which the innovative processes are rooted, thus of properly identifying the results achieved by the same.
The experiences conducted to date suggest a multidimensional approach to the assessment and evaluation of regional innovative system performance, capable of combining tools of qualitative and quantitative analysis, and capable of integrating the dimensions of the relational context and architecture. Two lines of future research activities emerge clearly: in the first place, the use of a network approach in order to asses and monitor the relational dimension of the innovative process; in the second place, the refinement of adequate parameters for the evaluation of the performance, in particular in terms of the impact of the innovative activity both within the specific local contexts in which it is implemented and within a broader system context, such as the regional.

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The promotion of regional innovative networks – Lessons from the German InnoRegio-Programme

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SUMMARY

In recent years the promotion of regional networks and clusters has moved more and more into the focus of innovation policy. Policy makers place great hopes on that type of programme. Therefore, the following questions can be asked: Do these programmes bring about the results which they are designed for? Can regional innovative networks be promoted? Do they ease and/or speed up the innovation process in companies?
In the following these questions will be discussed illustrated by the experiences with the German InnoRegio-programme, a programme for the promotion of regional innovative networks in less favoured regions.

1. Aim of the programme

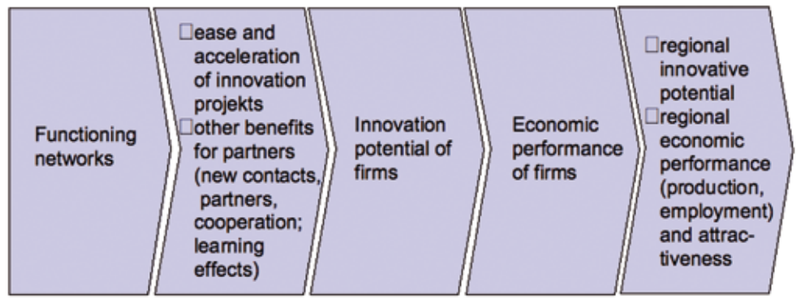
In 1999 the programme was launched by the Federal Ministry of Research and Education (BMBF). Its aim is to strengthen innovation capacities of the companies involved by funding the institutions which build up and manage regional network formation (mainly technology transfer offices) as well as collaborative research projects between network partners like companies, universities, research institutes and educational facilities. In addition participants were encouraged to try out social innovations like new forms of organisation and steering patterns of communication and interaction. In deviation from the traditional promotion policy this programme was not addressed to individual companies but to regional groupings that have formed for specific projects.

2. Conceptual framework

The concept of the InnoRegio programme is based on the interrelation between networking and innovation which is found in theory and has been proved empirically. It can be outlined as follows:

• Innovations are based on the production and exchange of knowledge. They are particularly accelerated by handing on tacit knowledge.
• Common interests and complementary competencies are essential, and confidence is the basis of the process. Geographical proximity helps to create common experience, which in turn helps to build up confidence and cooperation. Regional networks defined as a system of potential partners such as companies, universities, research facilities or intermediate institutions are a vehicle to speed up innovations or make them easier and are thus essential for successful co-operations.
• Strengthening innovativeness makes the individual protagonists more economically efficient, it creates spill-over effects and externalities that over the medium to long term help other protagonists in the region in their value creation and competitiveness.
• The networking of regional protagonists in the innovation process - or regional innovation systems, as they are also called - should in principle evolve spontaneously from the interests and needs of those involved, and be self-directing. But in view of the many obstacles, such as high start-up costs, lack of confidence and the 'free rider' problems associated with this, state promotion can be helpful in this initial phase.

Figure 1: A Simple Model of the Impact of the Promotion of Innovative Regional Networks



Source: DIW Berlin.

The initiatives involved were chosen in a three stage procedure:

3. Programme implementation

• The initial, so-called "qualification phase" ran from April 1999 to October 1999, when participants from the regions put forward their first concepts. There were no limitations with reference to objectives, topics, or composition of the initiatives in concrete terms.
• Out of 444 applicants 25 networks were selected in November 1999 for the next so-called "development phase", by an independent jury. Main criteria for selection were the importance for the region, how well the participants complement each other, and the innovative quality of the approach. The applicants were awarded up to about € 153,400 to draw up a more detailed version of their concept. In this phase the initiatives were also given non-financial support through facilitators who monitored the communication and organization process and through consultancy on subject areas and technical aspects of the promotion. The concepts were handed in in June 2000.
• In October 2000 the jury initially recommended 19 initiatives for promotion in the so-called "realisation phase" and called them " InnoRegios". Another six initiatives were given the possibility of developing their concepts in more detail by June 2001. Four of them were successful, so that all over all 23 initiatives were selected for promotion for a period of six years (from the end of 2000 to the end of 2006). The promotion comprised two components:
  • First, the formation and the management of the network was supported financially for the whole realization phase. In the first two years the management was financed completely by the ministry and in the following 4 years 70% of the costs. The responsibility of the network manager was to organize communication and decision processes between the participants, to keep the network together and to develop it further.
  • Second, the projects carried out by the participants of the network were financed. The projects were chosen by the initiates themselves with the approval of the BMBF and its administrative body. Activities eligible for funding were R&D projects, qualification measures as well as services for the improvement of the network infrastructure. Normally, about half of the project costs were subsidized. Projects carried out by universities were financed totally.

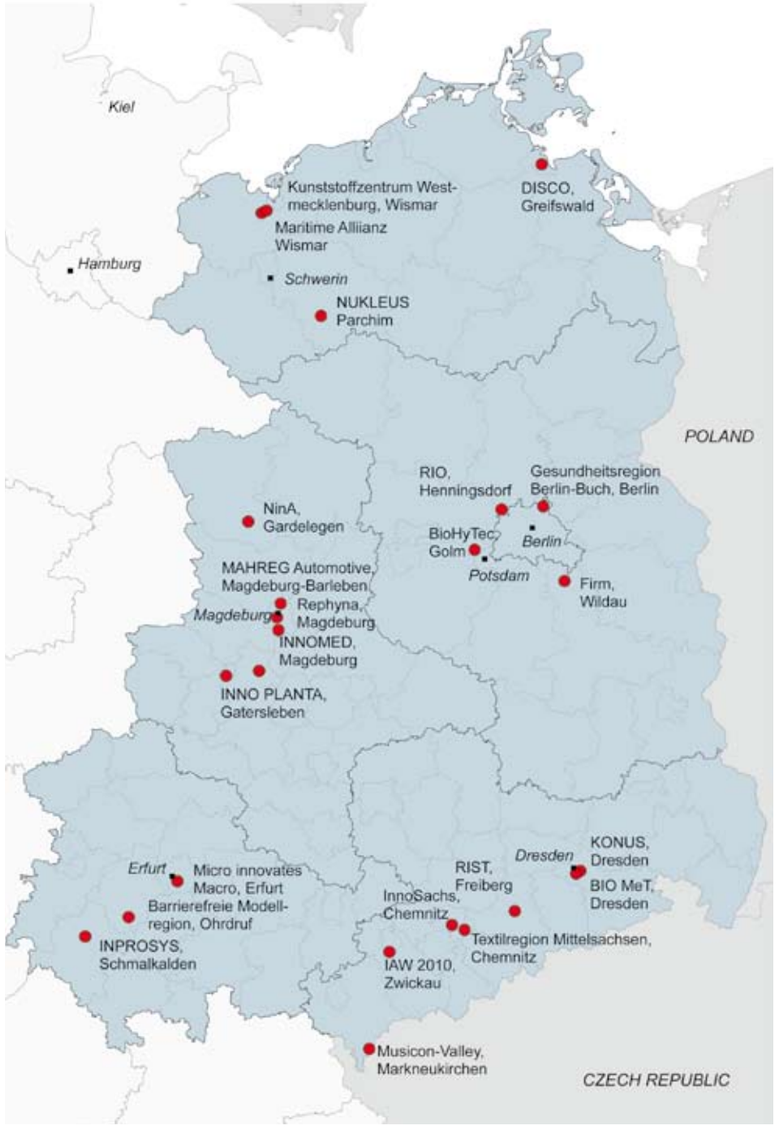
The BMBF provided a total of € 255 million for this programme. Thus, the InnoRegio programme was at that time the most important corner-stone of the ministry's innovation policy for eastern Germany.

The 23 InnoRegio networks cover a broad spectrum of activities. The networks are active in the areas of medical technology, renewable resources, biotechnology, micro-system technology, mechanical engineering, manufacturing technology, circular-flow economics, environmental technology, and automotive technology. Various branches of the service industry may also be included here, such as those offering travel and tourism for disabled people, or establishing consultation and treatment services for people with diabetes. Restriction to one strictly limited technological field was the exception rather than the rule: usually, each network includes more than one field.

Some of the networks were driven or led by universities and research institutes which wanted to commercialise the outcome of their research by collaboration with local companies. And some of them were guided by companies who wanted to set up or to intensify contacts to universities in order to benefit from the expertise of the local universities.
According to the InnoRegio approach to mobilize regional economic potential wherever in eastern Germany. There were also no restrictions concerning the

location of the participants' network. Thus, the networks involved are spread all over the region (map). Seven networks are located in agglomerations, mainly Berlin, Dresden. Nine networks in medium dense regions and seven networks in rural areas like the northern parts.

Map: Geographical Allocation of the InnoRegio-Networks in Eastern Germany - Site of the Coordinators' Office (as of December 2003) -



The size of the networks is very different as well. Taking as a yardstick the support volume given by the ministry, twelve networks can be classified as small (less than € 10 mill.), six as medium-sized (€ 10 mill. up to € 15 mill.) and five as large (more than € 15 mill.).

The beginning of the realization phase brought some initial difficulties. The participants complained in particular that the approval process was too complicated and took too long. These problems were mainly due to the complexity of the promotional approach, to which all partners involved initially had to adjust. Some of the measures introduced by the BMBF helped to accelerate the procedure, e.g. more intensive consultancy for applicants and close cooperation of all involved in the so-called "promotion management team".

In the course of 2002 – more than one year after the start of the realisation phase – the initial difficulties had been overcome. All in all about 1100 projects were promoted. Most of the projects were R&D projects (87%), some of them aim at the improvement of vocational training (6%) and some are services for the function ability of the network concerned (7%). Most of the projects run for two to three years.
680 partners were involved. Two third of them were companies, mostly from manufacturing (machinery, automotive, electrical engineering, textile industries) and from the service sector. Most of them were small and medium sized companies. Half of them had a workforce with less than 20 employees.
One fifth of the partners were institutes at universities and research institutes in basic research like the Max-Planck-Society and in applied research like the Fraunhofer society or the Helmholtz Association.

4. Evaluation approach

The InnoRegio programme was evaluated on behalf of the BMBF by the DIW Berlin and its partners between 2000 and 2004. In order to evaluate the programme the following questions are according to the model outlined above central:

• Effects on network development (short term)
Has the InnoRegio programme led to the formation of a regional network that is functioning successfully and permanently viable? What factors determine the process of network formation generally and specifically in the case of InnoRegio?
• Effects on innovation processes and performance of companies (mid term)
Has the participation and collaboration with other partners eased and accelerated the innovation activities in companies involved and thus, their competitiveness?
• Effects on the regional economy (long term)
In how far has the regional economy been strengthened by direct and indirect effects like spin-offs, intensified linkages, or improved image?

Further, the evaluation team had to feed back the processes analysed regularly to the Ministry e.g. by annual reports and to feed back results to the network participants by organising workshops and by publishing newsletters.
In order to give answers to these questions a system of reliable empirical indicators was established for …

• the analysis of the effects on network development (i.e. competences, completeness, communication, identification, efficiency of the management, funding …)
• the analysis of the effects on innovation processes (i.e. knowledge flow, interaction,

kind of economic usability of the results of the projects, absorptive capacity, market performance, …)
• the analysis of effects on the regional economy (i.e. location factors, image…..)

The evaluation draw upon several sources of information, such as the applications and status reports of the networks, the data bank of the Ministry on projects funded, 5 annual surveys (2000 to 2004) about projects, participants and stakeholders (N=700 per year), interviews with participants and stakeholders (N=850), an additional survey about companies in the regions for generating a control group, (N=6200), and a survey about those initiatives which did not win the competition.

Based on these information a consistent and rich data base with a mixture of "hard facts" like employees, turnover, funds and "soft facts" like assessments, motivations, and ambitions of participants was created which allow comparisons over time and between networks.

5. Experiences

5.1 Effects on network development

The analysis concerning the functioning and the performance of the InnoRegio networks has shown that the majority of the networks developed into functioning and clearly focussed networks. It can be stated that in general the formation of regional innovative networks can be established. However, some of the InnoRegios showed some deficits, either because of less focussed targets, or the lack of appropriate participants, or the shortcomings in organisation, communications and management. All in all, there seem to be four factors which decide the issue:

• the existence and the mobilisation of entrepreneurial and scientific potential in the region,
• a clear and business oriented target developed by the initiative,
• the realistic belief of benefiting from the participation, not only in the long run, but also in the short run for companies as well as for universities, research institutes and other participants, and
• an effective network management.

Essential for judging the effectiveness of the promotion is the stability of the networks. The experiences are mixed in this respect. On the one hand some participants – also those who were partner in successful InnoRegios – were doubtful about extension of their participation ahead of the end the programme, on the other hand some participants were even willing to pay for their participation in the network.

5.2 Effects on innovation processes and performance of companies

5.2.1 Absorptive capacity of the companies involved

The investigation had to start with the analysis of the innovation potential and the absorption capacity of the companies involved. In fact, the participating companies were innovating companies with substantial R&D-activities. The conversion of inventions into innovations – which means the successful introduction of new goods into the market – takes time and requires market performance and substantial financial resources. The companies involved are – according to their self-assessments - economically more successful than comparable companies without support. However, problems may occur in the course of the costly phase of commercialisation because of the limited financial potential.

5.2.2 Collaborative R&D projects

As a second precondition, the funded projects should fit to the needs of the companies and expect that the outcome will correspond to the needs of the market. This is ensured as the projects carried out by the InnoRegio participants mostly aim at the improvement of existing or the development of new products and processes.

5.2.3 Knowledge transfer

As a crucial point, it is expected that companies use the expertise of other participants, companies as well as universities and research institutes. Especially, the universities are expected to play an important role as producers and transmitters of knowledge. In general, there are different channels through which knowledge transfer from universities to companies occur, like employment of trainees, recruitment of personnel, offering postgraduate training, consultancy work, licensing, or collaborative projects.[1]

Collaborative projects were funded by the InnoRegio programme. Thus, this is the dominating way of knowledge transfer. It is shown that the intensity of knowledge exchange is high and there is a close relationship between the transfer of knowledge and the success of R&D projects. Especially, universities play an important role in knowledge transfer and the companies involved benefit more from collaborative projects than universities do from collaboration with companies.

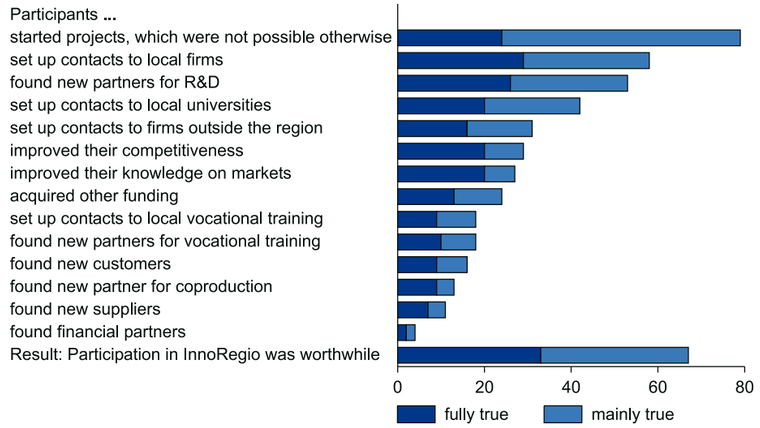
Apart from having immediate advantage by collaborating in the funded R&D projects most of the participants also benefited from joining the network in other ways. As shown in the figure 2 participants set up new contacts with regional partners or even found new partners for other collaboration. Noteworthy, also the orientation towards partners outside the region, national or international, has increased. Remarkably, there is no significant difference in the assessment of benefits from joining the InnoRegio programme between companies, universities, and research institutes.

[1] Considering the effects of universities on the regional economy as a whole, spinn-offs as a further kind of spill overs should be added.

5.3 Effects on the regional economy

Until the end of the evaluation in 2004 the programme was still in action and transmission effects such as spin-offs, regional producer linkages or regional image are to be expected rather in the long run.

Figure 2: Assessment of the InnoRegio programme by Participants 2004 (participants' opinion: "totally true" and "mostly true", resp., in %)



Source: Survey conducted by the DIW Berlin, summer 2004, N= 594.

5.4 Other effects

The evaluation of the InnoRegio-programme did not only focus on the effects concerning the participating networks but also on the initiatives which were rejected during the initial competition. It was analyzed in how far the participation in the competition affected the formation or strengthening of the applying initiatives. It is shown that two fifth of the initiatives continued their activities, partly by using other sources of public funding. This result can be judged as a positive impact of competition policies in general.

6. Conclusions

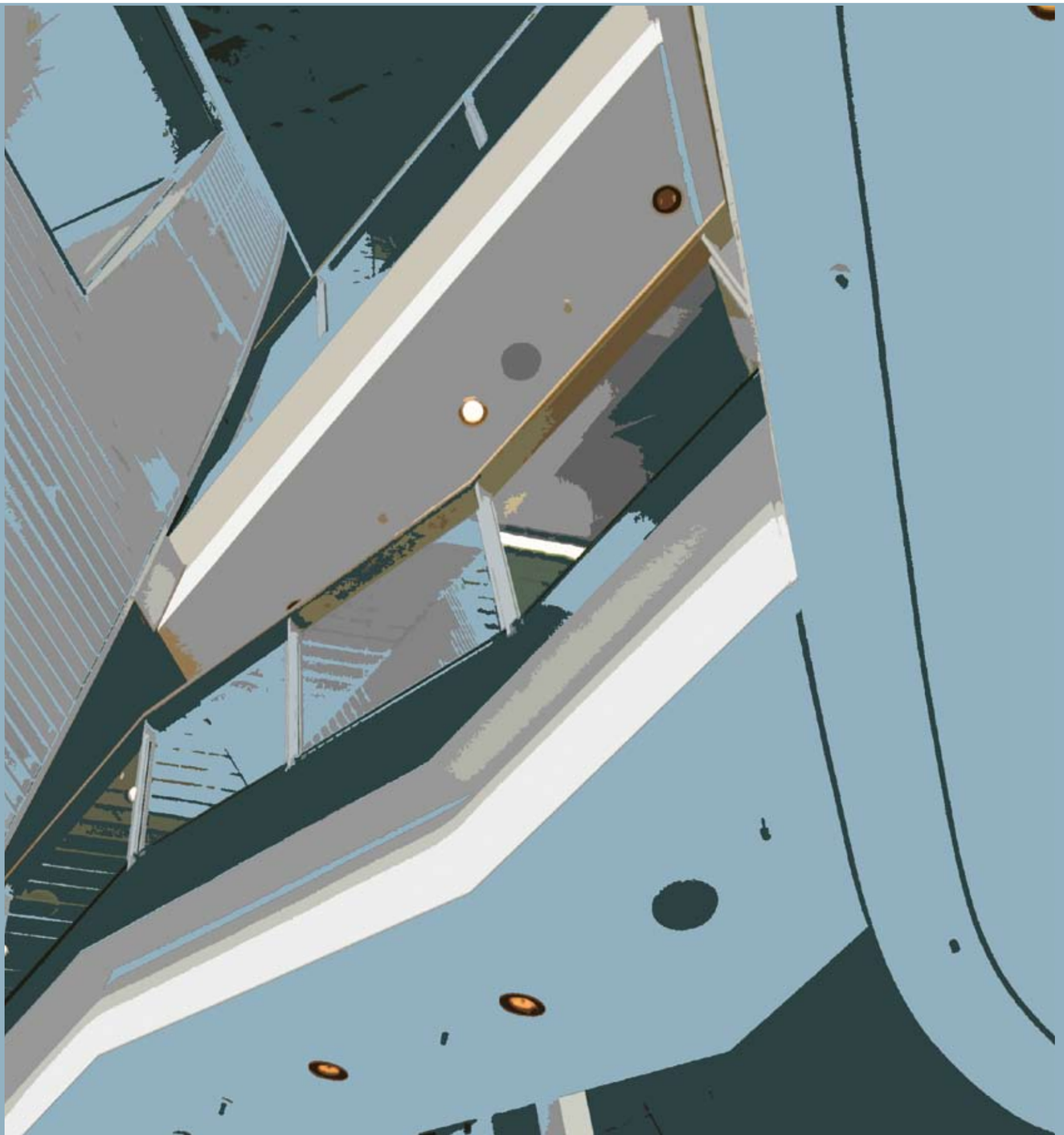
The evaluation of the InnoRegio-programme has shown that …

• under certain preconditions regional innovative networks can be created.
As shown, some of the success factors for functioning are the completeness of a network, the complementarities of competences, the efficient and transparent organizational structure, the positive climate of confidence (including openness for new members) and the efficient network management. One open question concerning the stability of networks remains, as it is not clear what happens to the network when the financial support comes to an end.
• participants in networks benefit from their participation.
Networks must not become an end at itself. They are vehicles to ease or to accelerate the innovation potential of firms. Thus, the economic success of the promotion of networks also significantly depends on firms involved, on their absorption capacities and their ability to convert research and development into new products, their market power, their presence at dynamic markets and last but not least on their financial capabilities to introduce new products into the markets successfully. As shown, firms engaged in functioning networks use the benefits of the networks. Universities and research institutes play a crucial role as suppliers of knowledge.
the whole process takes time.
• The advantages of networks for the innovative and economic potential of regions are obvious. But it has to take into account that founding and implementation of regional innovative networks as well as the conversion into economic impacts need time. The effects cannot be expected in short period of time.
An open question is the stability of the InnoRegio networks over time. As the evaluation ended in 2004, it was not investigated if they still exist ahead of the end of the programme.

It has also become clear that regional initiatives are complex systems and the promotion of them bares some risks. To minimize risks some aspects should be considered:
• a thorough analysis of the regional potentials for initiatives prior to the start of a programme,
• an effective process of selection of applications, e.g. by a competition procedure,
• feed back to the participants in the programme in order to encourage to improvements, and
• a monitoring system to provide policy makers with timely information in order to alert programme managers to act.

Based on the experiences with the InnoRegio programme and considering changes in the general economic set-up in regions the Ministry created some follow-up programmes, like
• in 2001 "Innovative regionale Wachstumskerne" (commercialisation of inventions),
• in 2001 "Innovationsforen" (early stage of initiatives),
• in 2002 "Zentren für Innovationskompetenz" (young scientists at universities),
• in 2005 "InnoProfile" (junior researcher and innovations in small and medium enterprises)
• in 2007 "ForMaT" (interdisciplinary and virtual innovation laboratory at universities and research institutes).

SECTION 02



DISTRICT subprojects. Innovative cases and stories embedded in European regions

Introduction

This section contains summaries of case studies of good practices from the eleven DISTRICT subprojects. The project is an Interreg Regional Framework Operation focused on Knowledge Economy and Technological Innovation funded under the Interreg IIIC South Zone Programme.

The case studies analyse the project objectives and activities, the strategic and economic context, innovation, technology transfer, innovative clusters and networkings, seed venture, spin-offs and spin-outs, and partnership in terms of innovative products.Results and impacts are also highlighted together with the strong cooperation among partners.

The section ends with identified lessons, good practices and stories which focus on knowledge transfer and innovation technology in a variety of fields such as technical textile, renewable materials, urban rigeneration, frescos restoring, seed venture, polymers, clothing and leather.

Documentation has been drawn from reports, studies, analyses and interviews produced by each subproject involved in the operation.

This provides a first survey of results by the subprojects, whose activities terminated by the end of 2007. More documents and materials are available in the related sections of the DISTRICT website.

CLINIC

Cooperation Linking Interactive Networks and Innovative Clusters

The CLINIC project implemented trans-regional co-operation primarily through 10 case studies of successful clusters-related initiatives like the Glass cluster between Stourbridge and Frauenau. Some 20 companies were trained in export-related skills. The project - focused on how public intervention can support clusters development - experienced cluster-to-cluster networking among partners as well as Turkey (Ankara) and Hungary (Budapest).

Duration of the project: May 2006 to November 2007

Funding: Total budget € 277.100,00

The CLINIC project was led by the Black Country Chamber of Commerce, acting for all West Midland Chambers, which delivers regional clusters programmes for UK Trade and Investment and the Regional Development Agency. Other partners included the Birmingham Business School (BBS) which had the responsibility to put academic rigour into the project. PIN, an innovatory organisation connecting the University to business and other aspects of society, focused on the textile cluster in Prato (Tuscany), which has been their major interest in the project. Finally, RKW Saxony - responsible for the quality management of publicly financed SME support programmes in Saxony - also participated in the project.

The overall goal of the project was to maximise learning and get significant improvements in clusters policy to support the global competitiveness of enterprises in the participating regions. Its very essence was to look for and share good practices in clusters formation, clusters development and promotion, etc., firstly among the partners and secondly among their business partners elsewhere.

The main activities of CLINIC concerned the selection, adaptation and development of models from each region and the examination of their strengths and weaknesses. Furthermore, CLINIC examined the possibilities for developing new and innovative trans-national clusters activities and to create cross regional links within one or more sectors.

The project also successed in establishing links between clusters. Sectors of interest to the project partners included e.g. saddlery, textiles, automotive and machine construction. To some extent links between clusters have been initiated through the study visits – more on a public authority level than between companies.

10 identified case studies and a synthesis report evaluating successful clusters cases were delivered. The focus of the activity has been on how public intervention can support clusters development. The case studies are based on topics presented during the study tours and try to show-case interesting achievements. The 10 priority clusters span from transport to building technologies, to information and communication technologies, from tourism and leisure to environmental technologies.

A relevant istance is provided by the interesting relationship between the artistic glass cluster of the Stourbridge in Black Country – which involves local authorities, learning institutions like the International Glass College in Dudley, universities, and a cluster based in Frauenau (Bavaria) driven by Erwin Eisch, a world renowned glass artist. From this regional linkage a glass school close to the town of Zwesel in Bavaria was established, and new business opportunities have been developed in the USA.

Interesting is also the networking developed between the private company Delta Eko of Ankara and some British companies. Delta Eko is an environmental technologies firm which is mainly concerned with aerospace. It has identified opportunities for joint activities in the environmental field between British and Turkish companies. In the same way, the CLINIC partnership developed a cooperation between the recyclers of the West Midlands and the Budapest area.

The main success factors for this project were the interaction of partners, both academic and practitioners, the use of a structured approach, news ideas for clusters delivery and more competitive businesses.

Through CLINIC, Saxony, Tuscany and West Midlands experienced an exchange of ideas, skills, and initiatives on the process of internationalisation of clusters. The UK

trade team helped in internationalising clusters both in marketing and market entry. Some 20 companies were trained in export skills, and were supported to participate in international fairs, including the US.

A Glass linkage between England and Bavaria

Saxony, Tuscany and the West Midlands regions share common features. They are all dominated by manifacturing industries. On the one hand, the Saxony economic landscape is characterised by a weak innovation infrastructure, emerging entrepreneurrial competences and the lack of business density.
On the other hand, the West Midlands region has both traditional and declining industries, and some high-tech emerging industries. This implies that strategies and actions should increase technology, whereas innovation and creativity in some economic activities should strengthen their skills and competences.
Traditional sectors - historically gathered in industrial districts - dominate the Tuscan economy. Tuscany suffers from low innovation levels, low private research and development investments, not to mention the low levels of human capital and skills.

During the activity period of the CLINIC project some international networking of clusters has been put into practice by the West Midlands.
Within the CLINIC project - with the coordination by Graham Ashmore - the artistic glass cluster of Stourbridge in the Black County (WM) - which involves the Dudley International Glass Centre, the RDA, the UKTI, the Arts Council of Wolverhampton University and a number of local authorities - has formed a stimulating linkage with an alike cluster based in Frauenau in Bavaria.

The cluster's idea was to assist the glass companies and enhance their selling prospects and opportunities by fostering an international marketing strategy. Although geographically very different – industrial Stourbridge and mountainous Frauenau – the two regions shares a common fate: the decline and revival of glass production.

In Frauenau until 20 years ago there were two main industries - that is, glass and forestry. 2000 out of the 3000 inhabitants worked in the glass industry. Today these are less than 300 and typical artistic glass production is undertaken mechanically in a neighbouring town.

The glass production in the West Midlands comes from Eastern France, and to be more precise from Lorraine in the XVII century. Then, this glass craft developed during the XIX century when the art of cameo glass - a roman technique - was discovered thanks to John Nothwood's, and was later made known by George Woodall – the greatest world cameo carver – who joined Thos Webb and Sons with whom he set up a cameo glass department.

Today, the production - which centred in the Stourbridge territory - is linked to famous family names such as Webb, Staffordshire, Brierly, Tudor and Stuart. Most of the larger companies have closed except for Staffordshire and Tudor Crystal who are still operating as micro business structures. The glass industry has become almost a niche sector.

Recent years have seen a revival of the sector with the creation of "Glass companies" formed by people who have received education and training in this field. Most of them come from the Dudley International Centre and the Wolverhampton University. Now, 15 to 20 new businesses are created each year from which around 75% continue in the West Midlands.

In 2006 something changed for the glass industry of Stourbridge thanks to an exhibition in the "home" of Bavarian glass. The small town of Frauenau hosted the exhibition. The event was a success. It was held in the Eisch Gallery, led by Erwin Eisch, who has been the first mover in introducing a new era in glass. In fact, Erwin is a world renowned glass artist. The recent exposition demonstrated the German and other European countries' interest in English glass products. More than 300 people visited the exhibition and around 30,000 euros were made for 55 pieces of work.

The relationship between the two areas – West Midlands and Bavaria – is now strong and the international management knowledge gained by Dudley together with the legendary world respect and contacts of the Eisch family will promote both parties in developing a joint strategy to move the glass movement far particularly in the USA with which the links are deepest. As a matter of fact, the glass cluster will hold its next exhibition at the Cornings Museum in New York State.

ETI-NET

Innovation perspectives for industrial cluster and network initiatives

German and English partners worked together for implementing clusters by innovative perspectives. RKW Saxony, a public equivalent body in Saxony, led the pilot activities by developing a common methodology which would help regions in defining cluster policies and strategies, and an economic and technological intelligence techniques for SMEs in industrial clusters (ETI). The partners carried out foresight studies mainly based on existing scenarios by involving international experts to validate the findings.

Duration of the project: July 2006 – November 2007

Funding: Total budget € 349.550,00

The rationale of the Eti-Net objective was to enhance a future-oriented regional cluster and network policy and to support innovation activities of the companies in linkages and cluster initiatives. In other words, the project aimed to using effectively chances in order to transform regional economy towards knowledge based economy improving competitiveness of clusters and networks. This means implementing methodological work of the involved regional actors, exchange experience and knowledge between the partners.

RKW Saxony, IMREG, Institute for small business and regional development, Birmingham Chamber of Commerce and Industry, and the Coventry University Enterprises experienced a successful collaboration. For achieving these objectives the partners had to, first of all, update the existing regional innovation and cluster strategies by making use of technology foresight models, crucial development strategies and identifying interregional and cross-sector cooperation potentials.

Another relevant aspect was to provide companies involved in networks with common innovative management tools by facilitating new clusters and setting up projects for making them more operational, and by supporting involved SMEs in developing their international cooperation projects. Thus, it is essential to reduce enterpreneurial risk on international innovation projects by creating shared tools and instruments.

In fact, an international experts' group worked to make a transferable assessment structure and two assessments of regional systems by gathering information necessary and sharing different experiences, skills and competences.

The second fase related to the developing of a methodology that would help regions in outlining cluster policies by considering possible future developments which will affect the clusters. In Saxony, the activities focused on the automotive clusters and in West Midlands on the emerging new media clusters. Developing a cluster of ICT or automotive businesses and partners to bring economic advantage to the region, means not only helping to build skills, knowledge and best-practice, but also to encourage innovation, networking and partnering. Information and communications technology (ICT) is vital to the success of a modern economy. In the UK, for instance, the ICT industries contributed 8% to gross domestic product (GDP) and account for over 4% of the UK's employment.

The partners analysed a sector or cluster (in the case of Saxony automotive, semi-conductor and machine engineering, in the case of West Midlands new media) and SME's needs for support on innovation and international cooperation. Then, they developed foresight exercices for the targeted clusters and validated the implications for these clusters.
An economic and technological intelligence techniques (ETI) enables companies to explore the market potential for innovations and the companies' need for partners and competence in order to bring the innovation to the market.

Cooperation opportunities have been identified. One sample are the potential collaboration chances between the new media companies in the West Midlands and the automobile industry in Saxony.
Yet, a lesson learned from implemented foresight studies is the problem of translating the konwledge gained into implications which are relevant both to companies and for regional strategies. For facing the problem Eti-Net looked at sector challenges and the regional industrial context. As well as it provided a tool that companies can use to assess the future market of innovative business ideas.

FORECO

Foreseeing Competitiveness

The Foreco partnership, led by the Province of Pisa (Tuscany), delivered a foresight study on the Pisa territorial system of leather industry, four scenarios with implications for leather district as well as a questionnaire-based tool for exploring SMEs within this sector. Sviluppo Italia Toscana produced a questionnaire-based tool for analyzing SMEs within the leather sector.

Duration of the project: July 2006 – November 2007

Funding: Total budget € 385.000,00

The project objectives were to enhance and encourage the competences and abilities of local public governments in order to promote actions which are able to identify and use the competitive advantages of their territories. In particular, supporting the development and processes of transformation of local economic systems and their competitiveness was the main Foreco goal. It implies that a set of prospective analysis methodologies has to be implemented and compared in different territorial contexts.

This is also linked with the importance of building medium and long term (15-20 years) perpective visions with an high territorial and transregional impact as well as a simulation of territorial policies through planning processes and experimentation of an evaluation procedure of competitiveness factors in SMEs for the use of public governments.

The project involved the Province of Pisa (Tuscany), Coventry University (West Midlands), Espira Growth Centre (Västra Götaland) and Sviluppo Italia Toscana (Tuscany) which collaborated to deliver a series of structured projections - such as foresight study, related scenarios, experience reports and governance models - of long term social, economic and technological developments and needed to involve a wide range of stakeholders.

Within this framework, the Province of Pisa firstly adopted the "foresight" methodology to analyse its economic system, in order to compare its experience with that of the partners. This foresight study considered the future of the local territorial system and its SMEs by identifing the major threats and development opportunities.
In fact, the study started from the input received from interviews with companies, industrial associations, trade unions. The Province of Pisa used an interview approach named "strategic conversation".
At the same time, the project involved the transnational partners in a comparison and discussion about their different approaches to the governance of their "business ecosystems". By the way, the Coventry University helped to develop scenarios by providing practical tools.
This study also contains an analysis of the leather district and its products, competitiveness on the provincial economic system giving a portrait of the way of governance at the provincial level.

In addtion, the four scenarios – with messages to the companies of the leather district and political decision makers - focused energy, climate change and temperature, longevity of the population and information society.

The partners developed a questionnaire-based tool for evaluating the SMEs embedded in the local leather district. It analysed different aspects related to companies including organization, management, organization of the production, human resources, purchases, trade, product, production pattern, competion and market. Foreco project actively involved a large number of organisations which led to the creation of a network of over 60 stakeholders.

The project actions provided public administration with useful and innovative tools for governance management in order to improve SME global competitiveness.
Thus, "Foreseeing Competitiveness" is a way to create a new durable territorial and transnational partnership by comparing and sharing new measures for clusters and business analysis and promotion to face the globalization challenges.

A "strategic conversation" to face globalization

In our time, territorial systems are to be developed in a context characterised by foreign demands and global dynamics. Yet, these factors which affect development can rarely be controlled at the local level. In fact, the effects of global development are dealt, but the grounds and the general orientations are not specified.

If a territory is characterised by a production system meant for exportation, like the area of the Province of Pisa, it becomes strategic gaining a perspective knowledge which enables the territory to anticipate global development changing aspects. This means that monitoring the implications of future situations and contexts could address the system's decisions by identifying the best instruments.

In this context, the strategic analysis becomes a crucial management instrument. It develops the awareness of the future and produces a perspective evaluation of the available resources, with a long-term vision.
As a victim of the global economic situation which directly affects the competitiveness of the traditional growth-driving sectors, the Province of Pisa knows a stagnation period of development.

Given that China and India are faster-growing emerging markets, the sectors which have been particularly negatively affected by this crisis are motor, textile and shoe. Less negatively affected is the tanning sector. The negative effects of the global economy on the Pisa's production system's competitiveness are profound.
So, it is relevant - for both enterprises and their territorial systems which have to compete within the international market - understanding drivers and dynamics of the global economic context and finding new resources and innovative solutions.

From these preliminary remarks, the Foreco foresight activities started giving local development stakeholders a real knowledge of the future possible evolutions of the global economic context in which they will have to participate.
The novelty of the foresight approach does not lay in the personal evaulations of a restricted group of experts, but in the interactive consultation of the involved community, reaching an overall agreement.

This project provided a great contribution to the creation of future opportunities and the stimulation of local resources to find the best solution.
For achieving this, the project's partnership worked hard by organising several phases of the activity with a customised analysis of the Regional Foresight. The idea was to develop a "strategic conversation".

The "strategic conversation" is a constant and informal dialogue between the heads of an organization or a system.
Talking and listening to are quite simple acts which help prospective ideas to growth and, at the same time, to be easily transferred, renovated and implemented. This implies a creative exercise which deals with differences and possible oppositions.

"It may seem atypical that a provincial administration follows an informal and creative process, but we are persuaded that this is the most efficient instrument to start up a planning process through a strategic shared and consensual vision" said Mr Paolo Prosperini at the Province of Pisa.

"Once considered the current situation of the Pisa's territory and its stakeholders – he continued - we believe that the needed conditions to start up a "strategic conversation" are fulfilled.
This will lead to an institutionalisation of the process, which will guarantee the continuity of political considerations and the coherence of administrative actions".

The process phases

The process lasted about 9 months with 40 days of consultation of the senior staff. In addition, other activities were carried out such as: support and management activities, design, research, analysis, interviews, transfers to the territory, workshops, reporting, brain-storming and writing of the policy advice document. Interesting strategic elements are identified in each area of the project.

The working group - which has been created in the start up stage of the process – identified sources, studies, and analysis with local relevance which recognize global developments with a higher impact.

Then, the staff outlined a local stakeholders mapping and estabilished a pool of 100 individuals coming from different categories such as production system, infrastructures, services and energy, research and innovation, public entities, finance and credit, civil society and external.

The interviews' issues span from strategic resources available and to be obtained to visions and values, from current status quo to future situation, and not less important ideas and options.

Participants have been quite interested on the project, its objective and the participating process. They have also provided analysis and stimulating suggestions. They showed an intense and serious participation in the strategic dialogue. So, the project staff has been able to obtain a great amount of evaluations.

In sum, Foreco's experience demontrates how creativity can be a useful tool for improving the local administration strategic planning process.

INNOTRAD

Innovating Tradition: how similar regions may face the global market challenges

The University of Wolverhampton, Birmingham, the Coventry City Council in the region of West Midlands along with PIN, a pole of the University of Florence in Tuscany, worked together to develop clustering activities with SME's in traditional industries. Two pilot projects – one in textile and one in leather – to support technological innovation in these sectors within the two regions were developed.

Website: http://www.net-infinity.co.uk/innotrad-innovating-tradition.htm

Duration of the project: July 2006 – September 2007

Funding: Total budget € 247.000,00

The objective of the project was to support traditional manifacturing industries in Tuscany and West Midlands towards a knowledge economy. This was achieved by strengthening linkages both between small and medium enterprises, academic and as well as other research institutions.

The project focused on both the value of clustering and networking as a means of business development and to face difficulties in accessing markets, and the impact of companies working with regions knowledge based on innovation within that business.

The business challenges facing the sectors and the opportunities to carry out technological, economic, social and scientific answers to these challenges represented the starting points of the project. Thus, the two regions compared their business conditions in these territories and examined the effect of the different business backgrounds and the way business growth and innovation are supported.

The four partners collaborated with local institutions by evaluating local and regional strategies in relation with the business demands/pressures and the impacts of these strategies in the two sectors.

The West Midlands traditionally had both strength and international recognition in these fields; particularly the saddlery industry in Walsall, and textiles in Coventry. The project run two pilot programmes bringing innovation through technology to clusters of SME's in both areas.

The Tuscany region is also a traditional manufacturer of leather goods and textiles for fashion, and PIN Florence have specific expertise in business support and research for the textiles and clothing sectors.

From this common manifactured-based heritage West Midlands and Tuscany cooperated to give new impulse to leather and textile industries through innovative strategies by creating a database of links between knowledge providers and companies.

For giving a major visibility to these clusters a website was dedicated to the leather pilot - accessible by both the small and medium enterprises (SME) and universities or research centres - to be used as an example for other fields. In this view, the relationships built in these last two years enhanced the collaboration between companies and industries promoting the use of technology and innovation in the design and manifacture of equine related products within the Region of West Midlands .

In particular, the leather pilot project involved five saddle making companies from Walsall in the working on a technology transfer programme with the Centre of Engineering Excellence (CEE) at Wolverhampton. The main activity of this programme was focused on the impact of the pressure measurement technology on products' development and innovation, but also the difficulties faced during the work. This is a good practice example of how to organise networks of companies and increasing linkage opportunities between saddle makers in Walsall and the Tuscany industries.

The success factors for this project were the shared view on priorities and goals of the partnership as well as the willingness of the partners to enhance the performance of knowledge transfer activities.

Lariot, a successful example of combining innovation and tradition

Lariot is an English saddle manufacturing company which is making a positive answer to external competition and market changes due to the globalisation.

The Centre of Engineering Excellence of the University of Wolverhampton led a transregional project, named Innotrad, to evaluate the impact of knowledge and technology transfer on innovation in the textile and leather fields like the saddles manufacturing in the West Midlands involving local companies including Lariot.
Julie Lappin, the Innotrad Project Manager, said "the project offered us the opportunity to compare technology transfer methods in both countries to establish best practice and hopefully transfer this knowledge to other sectors". In particular, the University of Wolverhampton's Centre of Engineering Excellence has recently opened an exciting exhibition at the Leather Museum in Walsall.

The exhibition, 'Saddled Up - Technology and Saddle-Making in the 21st Century,' highlights how the University has developed and applied new technology to solve manufacturing problems in order to give local firms a competitive advantage.
It demonstrates how traditional methods of saddle manufacture have developed and the high technology now used to produce even higher quality and better designed products. The event wanted to highlight technical developments in the current and future industry in Walsall, which is still one of the world centres for high quality riding saddles.

Andy Barnett at the University of Wolverhampton commented "the project allowed us to build upon the links between the Centre of Engineering Excellence and local saddle- makers and support their need to innovate to order to retain their lead in this global market."

For two years, the University has been working with local saddle-making companies to help them improve their products and processes. To date, around thirty saddle-making companies in Walsall have been assisted. Through a number of projects, the Centre of Engineering Excellence continues to offer funded advice and support on analysis, design and testing.
Innotrad, has involved work with Walsall companies on the test and measurement of load or pressure distribution, known as 'pressure measurement ' system, of the rider and saddle on a horse's back.

The technology is more commonly used in the clinical analysis of human medical conditions but its application to horses could have a significant impact on future saddle design and fitting.
Pressure mapping tools have until now been used to investigate the relationship between contact surfaces in terms of pressure distribution and magnitude. This instrument – Techscan ConforMAT, allows to quantify and illustrate visually the pressure effects occurring at the contact interfaces between rider, saddle and horse.

In fact, it has been noted that an undue level of loading or pressure distribution on any particular part of the horse's back could have a direct clinical implication, or affect the performance of the horse. Although these causes of back problems in sporting horses were frequently unknown, an important factor was the induction of back pain from badly designed or poorly fitting saddles. Whereas, in people high interface pressure seems to be the most predominant cause of pressure ulcer development. So, the pressure measuring is useful to create new saddles or modify existing designs to reduce pressure hot spots, namely concentration areas, therefore improving load distribution of consumers and identifying body symmetry/asymmetry. It may also help in developing special saddles for consumers requiring customized products for health reasons or for specialised conditions.

One of the Walsall companies to have benefited through the project has been Lariot, a saddle-marker which has improved its performance by working with its local universities.

Lariot is placed in a charming contryside in Walsall. This "valley of the Celtic speakers", as the Walsall word's meaning suggests, is located of northwest of Birmingham and east of Wolverhampton, and known as the traditional home of the English saddle manufacture industry.

The origins of Walsall's leather industry date back to the Middle Ages. Even today Walsall has a flourishing industry supplying both European and worldwide markets still manufacturing to traditional methods. As iron, coal, charcoal, limestone and animal hides were plentiful in Walsall; this fed the Lorinery trade, namely stirrups, bits, buckles, spurs, saddle trees. So, the saddlery trade could evolve in Walsall. The leather industry reached its high point in the early 1900s when around 10,000 people were employed within the trade. The trade provided much needed economic security during the years of the great depression.

Walsall soon became famous for the supply of goods to the equestrian market, these mainly being harnesses, bridles, riding whips and saddles. The town became world leaders in saddle making and manufacturing techniques. With the introduction of the motorcar, horses were no longer required for transportation and so the decline in the leather trade began. Yet, as horse riding became a pleasure pursuit and sport, some businesses, met the demand for quality saddles, and prospered. There are currently only about 1500 people employed in the leather trade in Walsall. There has however been a revival in the saddlery trade in recent years. Walsall saddles are now renowned worldwide as highest quality both in materials and workmanship. Walsall now has about 90 leather companies. There are over 70 saddle manufacturers here, the greatest concentration of saddlers in the world.

In a tiny corner of Walsall there is Lariot, a company managed by Ian Rea who manufactures wooden laminated saddle trees. Lariot is an enterprising company which is combining traditional craft with modern technology. They use premium grade Scandanavian Birch plywood and a technique called 'Cross-Lamination'. This technique makes the grain structures of the wooden body cross over giving degrees of both flexibility and strength.

The trees are shaped and formed over accurately designed CNC moulds and bonded together under membrane presses which are heated to a temperature of 110 degrees Celsius.

"Our 5 axis CNC machining centre is revolutionary in the industry. Lariot is the only company in the world to be using this cutting edge technology for the production of Saddle trees" explained the managing director, Ian Rae. "CNC achieves levels of accuracy – he continued - and consistency that are never possible when working by hand. Our commitment to innovation and investment creates products that are dimensionally and symmetrically accurate".

"By utilising the latest CAD/CAM techniques we can accurately reproduce trees to your existing patterns whilst also including our own unique features" disclosed Ian Rea. It really is an indication on just how far the industry has come in a relatively short space of time, and the new British Standard will be recognised around the world as the benchmark for quality and reliability on saddle trees.

PICTURE

Promoting innovative clusters through urban regeneration

Picture project intensely cooperated with the Prato City Council in order to support it with new local rigeneration strategies and produced interesting deliverables. Among them there are methodological frameworks for the context analysis and the design of possible intervention, 4 documents containg the context anlysis, 4 project proposals inserted in the Strategic Plan of the Prato City Council and a guidelines document for the inclusive planning process. Not less important, the partnership activated thematic round tables with industry and public stakeholders.

Duration of the project: September 2006 – October 2007

Funding: Total budget € 264.000,00

Picture was concerned with four problem areas of the urban reality of Prato such as the physical transformation of the city, the promotion of innovative clusters within the production process, new forms of citizenship and implementation of social policies and logistics. The project aimed at supporting local government in the experimentation of shared forms of analysis and planning, and in developing proposals of intervention.

The core meaning of the project Picture was to develop new methods for promoting innovative clusters between manufacturing and services companies operating inside urban areas interested in the transition toward a structure coherent with an economy based on knowledge.
The proposed project has been experimented in the urban area of Prato, where the Municipality has set a process of strategic planning able to support the current transition phase.
In this perspective, the business clusters project proposed here goes hand in hand with the realisation of the global project of transformation involving the various aspects of the local urban structure.
The innovative ability of local productive system, composed by SMEs who are experimenting a loss of competitiveness, can strongly be improved by the localization of clusters in the urban territory of Prato.

More specifically, the objective for the project was to get involved in the local productive sphere in developing shared processes for the planning of local initiatives favouring the growth of clusters of innovative enterprises. This should take place within the framework of an overall process of transition of the urban structure towards a knowledge-based economy model.

The partners involved in the project are the Social Research and Intervention Institute (Iris), the Economics Department at the University of Florence, University of Birmingham, the Sociology Department at the University of Florence and Urban Transformations Consortium (Urban).

This cooperative partnership supported the Prato City Council by performing studies and analyses by developing proposals for projects and activities related to the four areas involved.
The first step of the project activities was to elaborate the methodological framework which is based on analysis of the scientific literature and on the existing experiences and good practices at the international level.

This implied a context analyses which have been carried out in each of the areas. These provided the local stakeholders a common knowledge basis regarding the urban condition. The anlyses produced final reports later discussed at the thematic round table meetings. Iris actively involved industry, academia and public policy makers to construct long-term scenarios. The activities' results like intervention proposals were discussed by local stakeholders were the submitted to the Municipality of Prato to integrate the strategic plan of the city.

A particular attention was paid to textile sector focusing machinnery for textile production by encouraging the inclusiveness and active participation of the relevant actors in the planning process.

Within the project activity, Iris was dealt with logistics, Urban infrastructure and buildings, whereas the Department of Economics handled production systems and the Department of Sociology the social aspects. The University of Birmingham was a bridge between the departments because their studies covered both economic

and social issues. Within the four areas there were also topics of shared interest of the partners. For instance, the Department of Economics and the Department of Sociology carried out joint activities like the innovation relevance from the social point of view.

The main task of the University of Birmingham was to develop and present five sector cases from the West Midlands. Examples of the sectors covered are jewellry and automotive. The cases describe different paths of transformation taken by different West-Midlands clusters. The elaboration, presentation and discussion around these case studies have been the main point of the transregional cooperation of PICTURE. The added value for Prato was an increased understanding of different aspects of industrial transformation processes, were Birmingham has a longer experience than Prato, e.g. regarding the transformation of the textile sector.

The University of Birmingham based the case studies on existing research results but there was a need to adapt the knowledge to PICTURE as the Tuscany partners were primarily interested in the transformation processes, not the cluster as such. As a result, each case had a specific catch, a tailored case that was designed to address the specific challenges of Prato. This tailoring of the cases was made possible through the identification by IRIS of certain factors crucial to transformation process that could apply to Prato, e.g. size of companies.

The next move for the Picture project is to develop the methodological approach as a useful tool able to help other regions in their programming activities in urban setting. For achieving this, the partnership must be enlarged on the international and regional level.

Picture, a useful tool for reshaping the urban landascapes

Many European manufacturing sectors are knowing in recent years a period of deep transformation.

The main challenge facing the European manufacturing field in general, and the Tuscan industrial districts in particular, is the passage towards an innovative urban, economic and social setting, commonly called a knowledge-based economy.

Prato is an urban city in deep transformation, yet from the last ten years, this changement is decreasing. This is due to almost three factors. The first one is the reorganization of the textile manufacturing sector, the other is the increasing immigration fluxes, especially from China.

Whereas the demographic statistics of the nineties assumed that in 2011 the total population of Prato were around 176.000, today the living in population is 185.000. The third factor which has played a strong impact in the local economic system was the creation of a "district within the district", namely the Chinese entrepreneurship in textile and clothing industry. All these aspects, including a lacking in public spaces, logistics, led to important consequences on the urban environment.

Within this framework, it seems urgent the need to reshape the city's role and economy towards new urban visions able to "save" and innovate local resources and knowledge, by developing public and private strategic policies in order to build a different metropolitan image of Prato.

In the Prato district, the response by the municipal administration to this challenge was to develop a strategic planning process aimed at achieving this changement. The crucial strategy by the Prato city was to stimulate the successful involvement of the citizens to jointly pursue defined objectives and initiatives.

Picture took part in this process of strategic planning with the objective of supporting the local government in the experimentation of shared forms of analysis.

A relevant aspect of the Picture's activities lays in the promotion of innovative clusters related to the Mechanical Textile in the Prato's district identifying three main local strategies or policies: firstly implementing the management competences within the enterprises. This implies the organisation of the structured pathways of university-enterprise development which include new sectors of the economic growth by supporting enterprise activities realised by young graduates coming from the major local and regional universities.

Secondly, it is important to stimulate the universities to make the access to studies easier, providing suitable information on the existing research competences in the universities, and to simplify the access to information related to stages and ongoing research projects. Moreover, it is equally crucial to train, within the industry, new professional profiles able to help enterprises not only to find research partnership, but also the project or definition of technological foresight activities, analyses of the innovative border for given services and products and then new businesses.

In the third place, in order to implement innovative enterprise pathways it is needed to collect successful enterprise's experiences and their innovative strategies. Yet, the matter is more problematic if a territory which is working for its regeneration, preserves its traditional economic sources which have been modified during the years. In this case, public and private investments may move in different ways, for example through the promotion at national and foreign events and fairs.

In particular, Prato, as a place of innovators, should follow the successful enterprise examples creating strategies towards new products, markets and new businesses like the innovative sectors related to textile industry.

This project is set within the framework of the process of strategic planning launched by the Prato City Council. In other words, Picture helped the City Council by realising studies and analysis and advancing project proposals related to the economic, social and urban spheres which may be implemented within the activities foreseen. Concretely, the project identified the sectors where is possible to promote innovative clusters inside the urban reality of Prato. Then, it analyzed the different aspects - economic, social, urban and logistic – which directly affect the promotion of clusters innovative clusters in the urban area of Prato.

The Picture partnership organised various meetings and round tables. Among these, the most important were:

• 14 September 2006: The Kick-off of the Picture subproject where the partners presented the guidelines of the activity by different groups of work involved. Representatives of the Municipality of Prato also took place to the meeting.
• 15 February 2007: Meeting with technicals of the Strategic Plan Department of Prato to expalin and discuss the thematic issues focused on the transformation of the City.
• 3 July 2007: Meeting both with the Strategic Plan Department and the Major of

Prato to discuss the first results pursued by the project's activities related to the analysis of the local economic structure.
• 14 October 2007: In occasion of the Picture Final event at the Municipality of Prato all results and outcomes achieved by the groups of work were presented and discussed .

The Municipality of Prato and Picture also organised events in order to jointly discuss between public and private institutions, and citizens to present and discuss the main research and project activities realised. Among these, we have to mention:

• the workshop " Logistics, as added value, innovation in logistics of the industrial districts" which was held in Prato on 9th May 2007. In this occasion the first analytical and planning results of the project achieved by the logisticts activities carried out.
• the workshop "Reshaping the economic cities" which took place in Prato on 10th July 2007 where the outcomes and results related to the analysis activities of the urban trasformation of Prato were presented.

Finally, the last meeting held in Prato on 28th January 2008 was an event of great local relevance because it gathered the Picture work group, the whole Municipal Committee, the urban planning group and the governing board of logistics, economic activities and the strategic planning departments of the Prato Municipality in order to compare studies and analyses, and to plan a concrete cooperation for building new urban and economic scenarios of the future city of Prato.

INTECHTEX

European Regional Strategy for Innovation in Technical Textiles

Under the InTechTex project, the region of Saxony in Germany piloted a transregional partnership which shared experience and know-how in restructuring the technical textile landscape by creating a database with 550 entries of companies and 49 research institutes. In addition, analyses of the industrial structure in the different regions have been delivered.

Website: www.intechtex.org

Duration of the project: June 2006 – November 2007

Funding: Total budget € 382.100,00

The project goal was to develop different strategies for new technologies, products and markets in the sector of technical textile. The field of action is quite widespread beginning from agricultural textiles relates to the protection of food produce, animals or land, to building and construction textiles.

The essential means for achieving this was the creation of a transregional partnership cooperation sharing knowledge and experience of the regions Saxony and Västra Götaland, and beginning new clusters and businesses for textile and clothing industries in the regions of Tuscany and West Midlands.

The Saxon Textile Research Institute (STFI) – the lead partner of the project - is a German non-profit institution in the State of Saxony and keep on the long ancient traditions of the Saxony textile research and industry. It worked together with the Swedish Institute for Fibre and Polymer Research (IFP), the English Coventry City Council (CCC) and the Italian Sviluppo Italia Toscana (SVIT), in particular, its subcontractor Tecnotessile which is a private non-profit research company located in Prato, a reference point in Italy for research and technological innovation in textile processing.

The overall objective of the project was concretely creating and fostering a strong collaboration among small and medium enterprises (SME), technology centres, research and development centres and universities.

These four regions worked together for achieving this aim by analysing all factors involving the sector such as existing companies, strategic markets, potential textile partners in the region, available technologies, possible research and innovation partners and so on. As a consequence, it was developed an internet-based database in which information on companies, institutions and innovation partners can be found.

550 entries of companies, research and development institutions and other organisations relevant to technical textiles, 1760 application areas, 656 business index entries and 824 Nace code entries are listed in the database which is available on-line for public consultation at the project website: http://www.intechtex.org/ . Data collection is still continuing and more possible businesses involved with technical textiles have been identified.

The search is possible for regions (Saxony, Västra Götaland, Tuscany and West Midlands), companies and institutes.

To develop different strategies for new technologies, products and markets in the sector of technical textiles was, as said before, the main aim. The field of action is quite widespread beginning from agricultural textiles relates to the protection of food produce, animals or land, to building and construction textiles.

In fact, textiles are increasing their market share in construction and architectural applications, with new materials which can offer desired characteristics such as lightness, strength, resilience and resistance to many factors such as deformation, creep, degradation by chemicals and pollutants in the air, rain or other construction materials, as well as the effects of sunlight and acid.

But the application areas of technical textile are different like technical components for the clothing and footwear industry, medical and hygiene textiles, transportation textiles, industrial and consumer packaging, textiles for sporting and leisure applications. And also geotextiles and civil engineering textiles, technical

components for furniture, interior textiles and floor coverings, filtration and other industrial applications, environment protection, textiles for personal and property protection. In sum, technical textiles have a large, wide-ranging and growing market.

The project succeeded thanks to many factors including the homogeneity of the partnership, the relevant project idea and the assorted nature of the technical textiles sector.

Each region involved produced a report describing the region and its economic context related to technical textiles enriched with employment statistics and market figures.

Some of the InTechTex regional analyses results are the following:

• the total number of employees in textile and clothing industries in the regions is decreasing during the last years.
In 2005 the number of employees in Saxony was of 11.931 (only companies with more than 20 employees), in West Midlands 7.886, in Västra Götaland 3.707 and for Tuscany only in Prato there were 31.638.
• the portion of the textile and clothing industries related to the whole industrial production in the region is 5.27% in Saxony, 2.18% in West Midlands, 3% in Västra Götaland and 23.3% in Tuscany.
• The data related to the development of the companies number in the four regions from 2000 to 2005 shows a decrease, except only for the Västra Götaland.

The Technical Textile looks for new ideas

Saxony has a strategic location between Poland and Czech Republic.This closeness is not only limited to geographical borders, but it also includes common interests and developments in the branch of textile and clothing. In fact, in 2000 after joint initiatives, it was signed an agreement, named Euro Textile Region (ETR), between the textile associations and public authorities in these three border regions, which aims at supporting the traditional textile grown associations in the Central Europe and contributing to an effective integration.

Due to the high concentration of potential, these partners were integrated in the InTechTex database of research and certifying institutions for Textiles. Altogether, these institutes are 23, 7 in Czech Republic, 9 in Poland and 7 in Germany.

Within the InTechTex database with its 550 entries of companies and 49 research institutes, there is a successful case from a German technical textile company: the Spiga-Spitzen & Gardinenfabrikation, a family company founded in 1993. Starting from manufacturing rigid and elastic for ladies underwear and lingerie with an investment of more than 32 milion euro and 34 new jobs, today is one of the most modern lace-manufacturer in Europe.

Currently, traditional business is moving faster because of different factors such as the globalisation of the world market, garment manufacturing in Asia, internet communication worldwide and orientation of costs minimisation and profit maximizing.
In order to go new ways in the textile business, to find and develop new products and processes for textile innovations, a new joint-venture company started.

The Pressless GmbH is a joint venture between the family-owned Spiga, Falkenau, and Bodet & Horst, Elterlein.
Supported by Cetex (Chemnitzer Textilmaschinen Entwicklung GmbH) based in Chemnitz (D), Pressless has introduced heat-set 3D spacer knits using 100% polyester with a sandwich thickness of between 18 and 60 mm together with different compressive strengths. New 3D warp knit products have since been developed featuring high recovery properties.
For example, hospital mattresses, featuring the 3D warp knit and marketed under the brand names Space Air and Space Flex, offer patients significantly improved hygiene and bioclimatic properties providing high pressure relief; better breathing characteristics, temperature and moisture balance.
"The automotive industry is also showing an interest in the innovative material" said Nico Mach, the Pressless manager, adding, "the industry is demanding 80,000 successful load cycles aimed at guaranteeing a service life of least ten years".
Unlike foams and non-woven materials, the spacer fabrics are conductive to a healthy microclimate. With every movement air circulates in the space between the two textile surfaces, thus providing a constant exchange of temperature and humidity.

The company is planning to invest for the next 2007-2010 years in machines for spacer fabrics 700.000 euro, in equipment 571.000, whereas in research and development 60.000 for a total budget which amounts of 1.331.000 euro.

RICE

Regional Innovation for a Competitive Europe

The Warwickshire County Council, as lead partner, with other four partners carried out regional analyses concerning renewable materials, identified 18 case studies describing the supply chains of existing products and created a database with 4000 engineering companies, research and development institutions for enhancing transregional cooperation activities.

Website: www.district-rice.eu

Duration of the project: June 2006 – November 2007

Funding: Total budget € 367.784,00

The project started from a growing need for product and market diversification of European land-based industries and growing enviromental concerns.

The objective of the project was to facilitate the transition of the land-based industries (largely including SMEs) in each regions involved in the DISTRICT partnership from current traditional activities such as food production to activities focusing on the use of technical and scientific knowledge. In other words, it aimed to develop new non-food markets for plant-based materials and products. The application areas are three: novel materials like bio ceramics, health and well-being, bioenergy, while the land-based resources are wood and rape, hemp and flax, and sun flowers.

The project partnership included the Warwick County Council, the lead partner, the University of Warwick, the Sächsisches Textilforschungsinstitut, the Fraunhofer-Institut für Keramische Technologien und Systeme and AGROVÄST Livsmedel AB.

Firstly, they analysed the plant resources growth and use in the different regional contexts. The analyses have been carried out in each partner region and focused on new applications in the fields of novel material, health, well-being and bioenergy. They delivered good practice guidelines on how to link research to small and medium enterprises (SME) development in the renewable resources sector facing the problem of how to optimise technology transfer. After this, the project staff identified case studies showing the potentials of new products based on a web-based directory. Rice created the opportunities for developing markets in the area of renewable materials.

Specifically, each project partner carried out an analysis of the regional situation with regards to the three application areas. The analyses contain data on the amounts of different crops grown in the regions, the legislative situation, future potential, companies active in the territories, regional research and development institutions, other organisations and networks.The outcomes of the regional analyses are available on the Rice website.

Rice elaborated 18 case studies which describe the supply chains of existing products and cover the three application fields as said before.

For instance, in the West Midlands the project has been intensely linked to medical companies and the field of health and well-being. Medical companies have a strong interest in bio-based products like biodegradable implants but the actual use of them is a question of costs.

Bioenergy is an application field developed by the Swedish partner Agrovast which shows a biodiesel case. It deals with a group of farmers who produce bio diesel which they not only use themselves but also sell to others.

A relevant aspect is that the Swedish bioenergy market is very influenced by government taxation which, compared to the UK, substantially supports biofuels.

The directory is a database with 4000 engineering companies which is accessible at the following internet address: http://www.wmccm.co.uk/WMCCM/DesktopDefault.aspx?tabindex=3&tabid=4046

The directory – hosted by the University of Warwick - was initially designed for organisations in the West Midlands but within Rice it has been opened up to include companies form the Rice regions and its application fields. It wants to be a means for catalysing transregional cooperation activities.

The Technical Textile looks for new ideas

Rice project idea comes from the West Midlands where the Warwick County Council and the University of Warwick started this mission: to develop new non-food markets for plant-based materials and products such as hemp and flax, wood, rape and sun flowers.

Going back to European land-based industries, it is important to note that the emergence and recent rapid expansion of the bio-fuels industry is a clear example of a renewable, bio-based industry that is being propelled forward by rising prices of traditional energy sources.

Less obvious, yet equally as important, has been the growth in the renewable materials industry, whereby materials from sources such as agriculture and forestry are transformed into new feed-stocks for industrial applications.
A number of major companies in the chemical, automotive and manufacturing sectors have already started to invest in new sources of raw materials that are not dependent on volatile petroleum and energy costs.

Combating climate change is an increasingly pressing priority and bioenergy as well as renewable materials can contribute significantly to these objectives. One of the greatest challenges we all face is to live within the limits of our natural resources. Renewable materials can contribute powerfully to ensure that the products and energy we manufacture and consume respect the environmental bounds of the planet.

But, what is happening in the DISTRICT regions?

In Saxony, industrial plants are an important basis for its agriculture. In 2006, 1.4 milion hectares (12% of total crop land) were used to grow renewable materials in Germany. Oil seeds are dominating having already high market shares as chemical basic substances, fuel and lubrificants.

Technical products are the main application area for natural fibres. Biomass like straw and wood has growing potential for a sustainable energy production.
Yet, there is not any running processing plat for flax or hemp fibres in Saxony today. This is mainly due to high raw material prices, lack in any financial support for such crops and also insufficient quality parameters of fibres.

SMEs activities of such fibres are largely dealing with the production of techical products such as technical yarns, nonwovens and insulating material for automotive industry or some market niche.

This is the case of Jakob Winter company which developed an innovative product, that is, moulded nonwovens made of flax and polypropylene used for instrument cases.

On the opposite, in Västra Götaland public sector organisations help farmers and companies to start new projects in the field of bioenergy. These organisations have traditionally been first to embrace new technologies due to the large ownership of capital and pre-existing green agendas.

Among Swedish farmers, there is Bo Johansson with his farm Stora Svenstorp which produces biogas and sells electricity. He has built own biogas production plant. The farm has 140 saws in an integrated production which delivers about 3000 m3 manure a year. The manure produce 350 m3 biogas a day which is used for the production of electricity and heat. The electricity production is 600 kWh a day and the heat production is 1200 KWh a day.

There are signs that the bio renewables industry is also expanding in the UK. There is an increase in the number of farms and areas of land producing crops for non-food uses. At the market level, there has been growth in both production and consumption of UK biofuels, a rise in the use of biomass to produce heat and power, and exciting developments in phytopharmaceuticals and the use of renewable construction materials.

In 2005 oilseed rape was widely grown by arable farmers. Warwickshire currently has the greatest resource growing 34% of the region's crop. There is currently around 220GWh of electrical energy being produced through biogas installations. As to biomass infrastructure, there are country estates and farmers which use this resource to heat their own businesses or homes.

According to a recent work by Marches Energy Agency the regional available resource is estimated to be 5,025 GWh (some 1.5 million tonnes of biomass). Biomass energy generation capacity is estimated to be some 384 GWh per annum.

SERIOUS GAMES

Serious Games Network and Business Cluster

The University of Skovde in Vastra Gotaland (Sweden) produced a prototype of a fire fighter game – SIDH game - to train strategies for scanning buildings to find and rescue people. Over 50 potential users were introduced to this game. The Coventry University of the West Midlands developed a business game about setting up a company in the EU. The project resulted in a spin-off company (Sevenatus AB) which has a high-tech and scientific profile.

Website: www.his.se/seriousgames

Duration of the project: July 2006 – September 2007

Funding: Total budget € 185.000,00

This project aimed to create serious games cluster and network in order to bring developers and potential users together. The objective was using games and game technology for purposes beyond pure entertainment with a high pedagogical content. Some example are training, teaching, rehabilitation, marketing.

The two Universities involved in the project analysed the serious games market and estabilished a network database of expertise. It is a network of partners from academia and industry which contributed to create serious games as a new market in Västra Götaland and West Midlands regions.

Sevenatus AB is the spin-off resulting from the project and it was the fertile place where the network is growing and contributed to develop serious games like the prototype SIDH Fire Fighter game in cooperation with the Swedish Rescue Services Agency (SRSA). It is a game to train search strategies for breathing apparatus entry in inaccessible and dangerous environments.

The learning objectives for the game relates to training of firefighters for Breathing Apparatus Entry, and in particular to develop systematic search strategies. The goal of the game is to scan building and search people.

The game environment is a cave where the player is surrounded by four 80" screens giving a 360 degree view of a virtual world. Each screen is projecting a fixed-angle view of the virtual world and a player's orientation in the virtual world corresponds to his orientation in the real world. The player has to navigate in different environments to find injured people and save them from the fire. The game makes use of real fire fighter equipment and uses novel interaction modes and cave technology which enhance the players' feeling of actually being inside the building.

The concept has been evaluated together with experts from the SRSA. The game is a result of a close collaboration between instructors, researchers and game developers. Furthermore, demonstrator development has been proved valuable to communicate the potential of serious games. The initiative had good media coverage which has added value to the network and practice component.

The Graduates Enterprise Game – developed by the Coventry University - is, instead, a business simulation and role-playing game which has been designed to foster an awareness of key business concept such as sales, marketing and finance to recent University graduates and creators of new enterprises.

The scenario based game allows learners to run their own virtual business. The individual is responsible for choosing which product they would like to try and sell, deciding how they intend to get this product to market, and then setting product and price variables. Once these pre-market stages have been completed the user launches their new enterprise into a virtual marketplace within which virtual competitors will compete for the pool of customers.

Universities has interacted with industry during the development of the two demostrators. In fact, users, among them companies, have been involved to test the games and as potential buyers of the product.

Serious games is an emerging market and field of research. They can be applied to different application area e.g. military, government, educational and healthcare. These new games allow users to experience situations that are impossible in the real world for reasons of safety, cost, time.

Learning with a game is possible

Today there is a new movement in gaming that, while it does often focus on a violent world, its purpose is to raise awareness, instruct a new generation of good citizens, create new business models, train military personnel, or model surgery for doctors. These games are called serious games. Nowadays, the word "serious games" is coming more and more popular.
Many of the miltary and medical games use 3D technology, the same technology used to build Second Life.The most fascinating aspect of these games is that they are designed to create an awareness about a topic.
A game that modeled information seeking behavior, like useability testing, would give us insight as to what people do when faced with particular challenges. Games can be serious. Games can change the way we think about things and they are changing the way we acquire knowledge.

Sidh – is a game based firefighter training simulator developed in cooperation between the University of Skövde and the Swedish Rescue Services Agency, within the District project.
The firefighter profession is one of the most stressful and dangerous, exposing who works in this sector often to impossible tasks , both physically and psychologically, in extreme environments. One common task is to enter a building on fire and to search for victims.

By the way, the main goal of the game is to get the players to develop systematic and search behaviour in the presence of physical tension and other stress factors. In fact, the objective is to scan various locations and to evacuate any victims found.

The game simulates a Cave environment with 360 degree field of view where the player can navigate through a set of sensors. The result is an environment which allows the user to act naturally using coarse body movements, the game may actually be played without moving a finger.
In the experiments subjects were using boots, coat and a mask and had no problem to master the game, although all of them reported that it was physically demanding.

These experiments have been successfully conducted by firefighter students and show that the use of game based simulators for firefighter training is feasible.These also show that the interaction model and the cave solution are useful.
The result demonstrates that 77% of the players states that they have learned things related to the objectives.
There were comments such as:

" I must be 100% convinced that there is no one left in the room when I have searched it"
"To search everywhere – even in closets"
"To be calm and to have trust in myself and not wander around too much"
"I've got an understanding of how to search an apartment. I've also realized that it is tiresome".

TECHNOLOGYMALL

Stimulation and facilitation of new business creation from industrial SMEs

Vemas, the Mechanical Engineering Network of Saxony and its partner, the Birmingham Chamber of Commerce and Industry, gathered to create a virtual technology platform for research and development providers and small-medium enterprises (SMEs) with almost 500 companies, more than 160 innovations, 92 research providers and over 2000 business contacts.

Website: www.technologymall.eu

Duration of the project: June 2006 – September 2007

Funding: Total budget € 260.000,00

On the one hand, this project was designed to encourage the transfer of technologies and knowledge from universities and research and development institutes to SMEs and provide industries with a tool for direct marketing of technology products and services. On the other hand, it aimed to foster the internationalisation of the companies and clusters.

The project objectives can be summarized in four main work packages which contain, firstly, the creation of interactive directories which show the regional technology providers and innovation drivers in Saxony and West Midlands; then, the realisation of a functional prototype for a virtual TechnologyMall and finally a development of a marketing strategy and a business model.

The idea was building a bridge which could contribute to shorten distance between technology-developing research organisations and SMEs. It is a virtual innovation marketplace able to provide an easy-to-use tool for universities, research and development institutes, technology centres and high-tech companies to present their innovative products and developments to the market.

In Saxony, VEMAS, the Mechanical Engineering Network – which is the project lead partner – based their work, in collaboration with Birmingham Chamber of Commerce and Industry, on a catalogue directory of 300 firms as the starting point for developing the web-based tool.

Now, almost 500 companies, mostly SMEs, exibit their company profile on the TechnologyMall website. These companies also introduced more than innovations and some 92 research centres present their outline at the virtual fair. The business contacts are over 2000 until now.

In fact, TechnologyMall helps SMEs to establish new sales networks and to market their latest innovative developments to new custmers not only within DISTRICT regions but giving also companies assess to new market like India and Russia.

In that way, the internet-based virtual trade fair allows companies to follow advancements, find new technologies and products improving interregional partnering and cooperation. Long term effects on companies depend on the possibility to maintain and extend the directory.

Updating and developing the directory, expanding the geographic lines is a great challenge. VEMAS, actually, is planning to attract other regions of Europe like North of Spain, Northern Italy, Baden-Wurttenberg, the Czech Republic, only to mention some of them.

The project demonstrates how to create a trans-regional and international cooperation between regions - Saxony and West Midlands in that case - by creating coordinating the structure of the database in different languages (English, German and Russian) filling it with new contents.

Currently, TechnologyMall is a basis for a new business development approach in Saxony. The ministry of Economics and Labor wants to stimulate new business partnership between SMEs from Saxony and companies from India and Russia. For this purpose, it sponsors a partnership programme which invites industrial makers and research organizations from the fields of mechanical engineering to meet with companies and research organizations from their respective fields of mechanical engineering and create new linkages.

So, TechnologyMall is a strong tool for multipliers, such as industrial associations outside Germany, which are going to identify interested members and to macht them with potential partners from Saxony.

Technology Mall: a virtual bridge from Europe to India

Mechanical engineering has a long-standing tradition in Saxony which was the cradle of the German textile machine and machine tool industries in the 19th century.Today, Saxony represents one of Germany's hubs of excellence in production technology. Almost 440 companies with more than 35.000 employees supply the State's high tech industries as well as manufacturers around the globe with world-class machinery. More than 50 research institutes support and drive the innovation in these companies.

The State of Saxony – that is Germany's machine tool excellence and expertise in plant engineering at its best.

As Saxony has extensive experiences and competences in the field of mechanical engineering. Industrial giants and numerous small and medium-sized companies characterize East-German industrial scenery.

Successful international enterprises choose Saxony to invest and expand. Newcomers in business take advantage of the favorable local circumstances. High qualification standards, modern infrastructures as well as state-of-the-art research and development institutes heighten entrepreneurial success.The companies profit from a Saxon policy promoting the economy.

All VEMAS partners concentrate their competences and resources in order to create new operative and strategic company networks. Network companies produce more product and process innovations necessary for future entrepreneurial success.

How does the TechnologyMall virtual fair work?

If an organisation, institution or company want to join TechnologyMall has to register. When an organisation profile is completed, then products and technologies can be inserted. Contents profile are, for istance, contacts details, key figures, names of management board, short company/market/product description.

One of the technology providers was the Fraunhofer Institute for Machine Tools and Forming Technology (IWU) in Chemintz, Saxony, recognized by industry as one of the leading European providers for production technology. Due to its high reputation and its expertise in machine tools and automation technology, the institute developed a new business partnership with Lakshmi Machine Works Ltd. (LMW), a technology seeking world class company in India.

It was the first company in India to benefit from the information provided by TechnologyMall. When VEMAS learnt about the needs of LMW, it was able to direct LMW very efficiently to the best possible partners in Saxony by using TechnologyMall's virtual trade fair capabilities.

This led at a very quickly contract based collaboration with a project volume of several hundred thousand euros.

LMW, founded in the year 1962, and located in the South Indian city of Coimbatore, is a global player and one among the three manufacturers of the entire range of textile machinery.

The third largest city of the state, Coimbatore, the headquarters of a district of the same name, is one of the most industrialised cities in Tamil Nadu. Known not only as the textile capital of South India or the Manchester of the South, but also for its engineering firms, automobile parts manufacturers, health care facilities, educational institutions, pleasant weather, friendly culture and hospitality.

LMW produces more than 250 ring spin machines per month. It has 60% market share in the domestic textile spinning machinery industry and belongs to the top 3 manufacturers in the world.

LMW employs a highly skilled staff of more than 6000. The company is built upon technology expertise. For all of its own production, it applies the very latest manufacturing technologies and machinery which it sources and purchases primarily from Europe and Japan.

Thus,TechnologyMall served as excellent marketing tool for various SMEs from Saxony which were subsequently chosen and contracted by LMW as supplier and business partner.

SEARCH

Scanning and evaluating activities for research commercialization handovers

Six partners involved in the project have worked together to help the commercialization of early-stage inventions by creating relationships with researchers and developing innovative methods and processes. They identified about 25 cases for marketing – licensing and spin-outs – and the commercializsation of seven products and companies. Among these, there is the italian prototype Susi – a microwave-based sensor for analysing fresco paintings - developed by the cooperation between University of Florence PIN, CNR and Florence Incubator.

Duration of the project: June 2006 – November 2007

Funding: Total budget € 491.350,00

The project was designed to support the development process of the inventions born within universities until they can be handed over to incubators or spin-off. Thus, the aim was to shorten the existing gap between university research and venture creation by developing new strategies to increase knowledge-based companies.

Search is a trans-regional cooperation involving six partners from four regions of Europe. Three of them come from Västra Götaland in Sweden, these are Chalmers' Intitute for Commercial R&D (CIT), GUFI Research and Innovation Services, and the lead partner Center for Intellectual Property Studies Professional Services (CIP). There are also: one partner in West Midlands, the Conventry University Enterprises (CUE), one in Tuscany, The University of Florence PIN and finally one in Saxony, the Saxeed University.

The project activities focused mainly on the development of methodologies and tools, building relationships with researchers, commercial packaging and verification, and the growing of suitable hand-over arenas. For instance, there is an arena in Västra Götaland which consist of university managers, incubators and other relevant actors to encourage the cases' commercialization. Most of the inventions identified were carried out in the Sweden Region.

Another key activity was to produce a database which contains the contacts and the cases identified by Search with a minimun of 200 key researchers.

Such cases also include: Exilica, ReBact and SuSi, which are a quite relevant example of a development of an innovation within an innovation system.

The former case, Exilica, is related to the production of spherical polymer micro-beads and hollow silica nano-shells which both can be used to contain a variety of other materials. In addition, they can be used as substrates for the production of hollow metal – metal oxide shells, and their use as storage and release media, plus optical, chemical, radiochemical, magnetic or diagnostic particles.

After being disclosed within the Search network, Exilica worked closely with the University IP Business Development Manager to look at future possibilities and to support the company.

Now, Exilica hopes to raise production levels to the 200kg mark. This case shows how a commercialization opportunity within a university environment is a long process which riquires time and resource.

ReBact was born from a two years research collaboration between a researcher at the chemistry department at Chalmers University of Technology and the University of Alexandria in Egypt. ReBact focuses on a new series of high sophisticated antimicrobial compounds which is able to fight infection locally due to the growth of microbes such as bacteria and fungi, and decrease infection time. These compounds reduce the patients suffering as well as cut costs.

This project received seed financing from Chalmer School of Entrepreneurship (CSE Incubation) and then will be incorporated as a company with a transition to an incubation park facility.

The latter, SuSi relates to a new microwave-based technique for analysing fresco paintings without damaging them.
An Italian research group of an Institute of applied physics has developed a microwave sensor for the diagnostics of frescoes and bare walls. The instrument is

capable of measuring the sub-superficial moisture content, and in particular the presence of soluble salts in a wall up to a depth of about 2 cm. The group is looking for companies interested in industrial implementation of the device.

The success factors for this project were that the partners developed a strong relationships, that researchers received advise on marketing of early stage ideas, that university research and regional development authorities cooperated producing new opportunities for inventions commercialization and that the project supported policy makers through consultancy activities on different stages.

SuSi, a sensitive touch to save frescoes

It was impossible until now: analysing frescos without damaging them. Good news arrive from Italy.

Now it is possible, thanks to an Italian research group of an Institute of applied physics which has developed a microwave sensor, namely, an instrument for the diagnostics of frescoes and bare walls.

The discovery could not come but from one of the most beautiful city in the world, that is Florence, the home of Renaissance.
Roberto Olmi and colleagues at the National Research Council in Florence have already used their technique to assess the moisture and salt content of frescoes in several churches in Florence. The new tool could help restorers preserve these works of art, which date from the Renaissance.

Frescoes are works of art that were directly painted onto walls. Although the origins and development of the fresco are unclear, evidence of frescoes dates back to the Minoan civilization of Crete in the second millennium (b.c.). Artists continued to paint frescoes through the Greek, Roman, and Byzantine Empires. Vast wall frescoes also existed in India and China.

From the Middle ages and the Renaissance - which ran from the late 1300s to the start of the 17th century - masters improved the fresco technique. Celebrated works by masters such as Michelangelo, Giotto and Raphael are excellent examples of frescos created during this era. Frescos were then made with plaster that consisted of fine sand, lime and marble dust that was applied in small sections.

Found in churches and chapels across Italy, these paintings are continually being attacked by moisture from the atmosphere and salts in the plaster of the walls. Knowing the moisture and salt content is important for restorers so that they can decide on the best way of saving a painting. Until now, however, this was only possible by drilling holes through the painting to obtain a sample of the plaster.

Now, Olmi – who coordinates the physicists group which developed the sensor - claims to have found a solution to this problem. Their technique involves scanning the surface of the painting with a portable sensor device that fires microwaves at the wall.

If water and salt molecules are present in the plaster, they absorb the microwaves and send a signal to a computer that then determines how much moisture or salt is present. This is calculated by measuring the material's dielectric constant, (a material's ability to store electrostatic energy), which changes depending on the content of the plaster. The tool is called SUSI (sensore di umidità e salinità integrato), that is, an "integrated sensor for humidity and salinity". It can measure the sub-superficial moisture content, and allows detecting the presence of soluble salts in a wall up to a depth of about 2 cm.

The sensor is composed of two sections: a coaxial probe and a microstrip cavity. The two parts can be easily and independently substituted. The former can be substituted to investigate larger or smaller regions; the latter can be changed to operate in a different frequency range.

The scientists - which have also patented their measuring device - have tested their technique on the Paradise Wall frescoes in the Santa Maria Maddalena de Pazzi chapel, painted by the studio of Giotto, and the frescoes in the cloisters of St Antonino at the convent of St Mark, both in Florence. Moreover, the instrument was used on "Litigio tra Isacco e Ismaele", "Il sacrificio di Isacco", "Il diluvio universale","Sacrificio ed ebbrezza di Noè" in the Santa Maria Novella church, as well as on the "Storie della vera croce" in the Major chapel of Santa Croce church.

In Rome, SuSi touched the "St. Clement celebrates mass" "The legend of St. Alexis" frescoes, in the St Clement basilica, which go back to XI century.

Currently, SuSi tool is used in the Palatine Gallery, within the Pitti Palace in Florence. The Palatine gallery occupies the whole left wing of the first floor of the Pitti palace, which was the residence of the Medici grand-dukes and later of the Lorraine family. It is an impressive collection comprising works by Raphael, Titian, Correggio, Rubens, Pietro da Cortona and other Italian and European masters of the Renaissance and Baroque periods.

The rooms that house the gallery are partially frescoed by Pietro da Cortona (1596-1669) with an imposing decorative cycle that makes use of classical myth to allude to the life and education of the prince. This complex of frescoes and stuccoes is perhaps the most representative example of Florentine Baroque, ranging from the 16th to the 17th centuries.

One of these rooms, called the Mars' room, within the planets' apartment in honor of Galileo Galilei, is now closed for restoration. The restoration is manged by Cecilia Frosinini, and realized by the restorers Fabrizio Bandini, Alberto Felici, Mariarosa Lanfranchi e Paola Ilaria Mariotti from the prestigious Opificio delle Pietre Dure Institute.

Olmi and his équipe have used the SuSi sensor in the frescos of this famous room - which celebrates Ferdinando II military virtues - to help the reinstatement of these works of art.

"We have also started to refine the device for use on other types of art," says Olmi. "For example, we have used SUSI to measure the humidity and salt content of the famous Robbiane ceramics in the sanctuary of La Verna in Arezzo. However, paintings and old parchment are too thin for the device at the moment and we will need to refine it before we can use it on these kinds of works."

STIM-SME

Stimulation and facilitation of new business creation from industrial SMEs

Four regions and nine partners gathered to develop a diagnostic kit to validate an idea spin-out potential, a spin-out manual of concrete tools and information to help companies and other players to better manage the spin-out process. From 350 scanned companies within the four European regions, 11 spin-out cases have been validated and some of these have been estabilished as companies or spin-offs like Dynamic brine control (DBC) handled by Espira Inkubator of Boras in Sweden.

Website: http://stim-sme.cpr.it/index.html

Duration of the project: June 2006 – November 2007

Funding: Total budget € 431.400,00

The project aimed to foster new business creation in the industrial field of the participating regions and to improve collaboration between two actors of the regional innovation system: the incubators and the applied (RTD) small and medium enterprises (SMEs) support organizations. It means, concretly, increasing the possibilities of creating new business from SMEs and the effectiveness of regional business development activities by estabilishing a "SMEs spin-out network" among the relevant players in the regional innovation setting.This implies a SMEs awareness about the chances and potential for using public support to create economic growth.

Thus, it is also crucial improving and updating innovation policies in the regions involved by carrying out methodologies developed by the project as mainstream regional support activities.The expected result is the starting SME spin-out activities in several European regions by disseminating "Spin-out manual".

In order to do so, the project developed methods and tools to identify and verify the high potential spin-out projects and to help these projects to develop into new business ventures including spin-outs, licensing, joint ventures and new products.

There were involved nine partners in the project, of these six are from Västra Götaland, one from West Midlands, one from Saxony and one from Tuscany.

The lead partner ESPIRA centre in Västra Götaland region identified spin-out ideas and managed the process of developing these into potential spin-out companies. Other partners in Sweden included IVF center, Espira Inkubator, Ciel center, Innovatum business support center and Gothia Science park. In West Midlands, the Coventry University collaborated to the project, while in Tuscany the Consorzio Pisa Ricerche and in Saxony the Chemnitz center of technology.

Firstly they identified about 400 companies, of these 120 were selected as high potential for further analysis.Then, the partners applied a diagnostic tool to validate the possible ideas or products and selected 15-20 products. Among these 5 or 7 were qualified to be commercialized through an incubation process.

The diagnostic kit is a useful tool for proving if an idea or case has spin-out potential or not. It is a questionnaire which can be used to create graphics showing profiles of different spin-out aspects helping the company and the process manager to take the right decision.

The spin-out manual is a more concrete way to help companies and intermediary players to better manage the spin-out process. It contains tangible tools and information like explanation of spin-out processes, driving forces and obstacles. For instance, the manual can provide a spin-out process map as well as different business creation scenarios and a description of the role of the regional innovation system in a spin-out context. It also faces problems and solutions concerning financing, management, ownership, staffing, motivation, only to mention some of these.

Between the two cases selected there is the Dynamic brine control (DBC) spin-off - handled by Espira Inkubator of Boras in Sweden – which is an effective way to reduce power consumption in food halls.

Dynamic Brine Control An effective way to reduce power consumption in food halls

The interest from food chains is great, nationally and internationally since the savings potential in energy consumption is substantial.

The DBC system is a successful spin-off handled by the Espira Inkubator in Boras, Sweden. The DBC operation is in a start-up phase test installation is underway, and business plan under development. Yet, a new company has been formed to operate the DBC system and the financing of this venture comes from Espira, the inventor and the entrepreneur chosen to operate the new company. It is within the STIM-SME framework that the contact between Espira and the inventor was established.

The evaluation of the idea validity was done, partly by using the diagnostic kit elaborated by the Stim-Sme partnership, partly by a presentation of the system for coming stakeholders. After the evaluation an established plan of action gave answers to need activities and financial requirements up to commercialisation.

Concretely, DBC is a precise and effective control system of the brine to the cooling counters in food stores, after actual demand. As we know, the cooling system takes normally 50% of the total energy consumption in the store. DBC, which is patented, can reduce the energy consumption in the cooling system with between 15-20%, meaning up to 2% improved overall profit.

One of the major users of electric power in a food hall is the system for cooling the merchandise in counters and freezers. It often amounts to 50% of the energy costs with a consumption of up to 500 kWh/m2 and year.

The main problem controlling the energy consumption is the control of the temperature of the brine used for cooling, the control of the pump capacity and the cooling compressors.

In general, the system is designed for a maximum cooling load at the outdoor peak temperature during summer and with the max. number of customers in the halls. This condition happens rarely, measured in hours in one year, and the system operates during most of the time with an overcapacity, not related to the actual load. The consequences of this is an over consumption of energy, frequent defrosting of the counters during business hours with all inconveniences for the customers.

The present systems operates with fixed supply temperatures of the brine, minus 8 to minus 10 dgr C, fixed flows in the brine system and icing of the cooling batteries in the counters and freezers.

A solution to all these problems may be given by the DBC system offering a way to, firstly, higher temperatures of the brine during most parts of the year (not always minus 8 to minus 10 dgr C) and secondly, lower flows of the brine and finally with less icing of the cooling batteries.

A brand new control system, including advanced measuring devices and algorithms to monitor and set the actual cooling demand of the installation; an another type of cooling equipment, optimized for the DBC controls, and a new way to lay out the system are the key features of the dynamic brine control.

Biographies

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Mats Lundqvist is the director of Chalmers School of Entrepreneurship, as well as one of the co-founders of the school, back in 1997. Mats has a history of entrepreneurial activity on both the venture level and institutional level, exploring new ways to generate wealth and entrepreneurial talent in a knowledge-based society.

Karen Williams Middleton has a teaching role in the Chalmers School of Entrepreneurship by using her start-up and entrepreneurial experience to act in an advisory capacity. As part of her doctoral studies at CIP, she is conducting research in the fields of entrepreneurship and university technology transfer, with particular focus on assessment and effectiveness.

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