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Short Description:

This report considers the potentialities of a DBE in the different regional contexts and the attitude of SMEs in sharing and using knowledge in this complex system. The aim of this paper is to make a comparison among the four regions involved in the DBE project in order to understand the way in which the digital business ecosystem works in theory, and to provide a planning tool for regional innovation and development.

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Abstract

The aim of this report is to compare four regions involved in the **Digital Business Ecosystem Project** to understand the possibilities offered by the adoption of a digital business ecosystem (DBE) from a theoretical perspective, but also as a concrete planning tool for regional innovation and development. Regions are described in this study from both a static and a dynamic point of view. Central issues are: social capital, regional capability for innovation, Information Communication Technology (ICT) implementation practices in SMEs and mind-sets towards ICT in SMEs. In other words, the relation between regional networks, social capital, governance patterns and ICT potentiality is central to the analysis. The methodology used is a combination of qualitative and quantitative techniques which are based on a multidisciplinary approach. In dealing with primary information and secondary statistical data a comprehensive outlook on practices related to the promotion of innovation at the regional level was achieved. The results show that the differences between regions are numerous, but that some common problems are present as well. Generally speaking the regions analysed show a genuine interest in ICT based opportunities. Specific measures are presented to suggest ways in which regions can improve their capacity to adopt DBEs following a review of several variables such as regional skills, potentials, limitations and attitudes. An evaluation tool to measure the regional readiness for DBE implementation is proposed. This instrument is a first step in the development of a set of tools able to help the DBE project enhance its transferability.

Keywords

Territorial capital, Social capital, Regional network, Innovation capability, ICT development, Governance, SMEs, Difference.

Introduction

The European economic system is strongly dependent on SMEs. In these last three years the growth rate of Europe is continuously decreasing. The reasons of the economic crisis can be led back to diverse factors. This crisis initiates a search for new organisational and productive models.

Most European SMEs live in a state of constant "financial uncertainty". The first issue is to survive, to preserve their business, even when competitors usually producing from outside Europe meet demand for their goods.

European SMEs do not keep in step with GWP (Gross World Product). GWP will grow this year by about 5%, the product of Europe (EU 25) is around 1%.

Tab. 1 Real European GDP growth rate

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
EU (25 countries)	:	1.7	2.6	2.9	2.9	3.6	1.7	1.1	0.9	2.4 ^(f)	2.3 ^(f)	2.3 ^(f)
EU (15 countries)	2.4	1.6	2.5	2.9	2.9	3.6	1.7	1.0	0.8	2.3 ^(f)	2.2 ^(f)	2.3 ^(f)
Euro-zone	2.2	1.4	2.3	2.9	2.8	3.5	1.6	0.9	0.5	2.1 ^(f)	2.0 ^(f)	2.1 ^(f)
Euro-zone (12 countries)	2.2	1.4	2.3	2.9	2.8	3.5	1.6	0.9	0.5	2.1 ^(f)	2.0 ^(f)	2.1 ^(f)

Source: Eurostat, 2004

This simply means that in Europe the growth rate is not on the same wavelength as the worldwide growth rate, this practically means that SMEs have to work more on innovation and delivering hyper-specialised products and solutions to stay in the market.

Europe is experiencing in these last years a significant social and economical change. This transformation leads the European regions to take up new challenges in order to maintain a competitive economy. In this context, ICTs can play a significant role. Information and communication technologies can strength the local entrepreneurial fabric, by enhancing the existing social capital and enlarging local knowledge and capability.

The Digital Business Ecosystem project responds to the above described situation addressing two really central issues of the current European socio-economic situation:

- Enlarging European SMEs market improving their links
- Facilitate ICT adoption by European SMEs
- Give European SME software producers a competitive edge over large software monopolies.

The principal aims of the present research are the following:

- Evaluating the regional potentiality toward innovation through DBE. We can define this attitude towards the Digital Business Ecosystem implementation as *Regional Maturity Grade*.
- Understanding which are the regional characteristics that form a good grade of adaptability to the DBE.
- Suggesting a theoretical approach and an evaluation system able to measure the *Regional Maturity Grade* based on individual characteristics. (The use of the benchmarking approach will give us the chance to compare the regional performances).
- Proposing possible policy initiatives able to improve the Regional Maturity Grade

A multidisciplinary approach and a pool of methodologies has been used in order to achieve those goals.

Possibilities of sharing information and collaborating in open systems, thanks to telematics, are often seen as a sort of threat to company autonomy and to accumulated capital of

competencies. The idea of managing the technological innovation only from a financial point of view did not succeed. There is a need at present to think over the possibilities emanating from opportunities presented by ICTs, above all when these permit sharing knowledge among distant regions and cultures. Moreover, ICTs could draw new scenarios in local economies, presenting new driving forces for local development. Presently innovative technologies are often seen by many SMEs strictly as a process of automation and not as a opportunity for growth through the redefinition of strategies and networks.

Researchers such as Dieter Ernst and Manuel Castells, have highlighted how *networking* among enterprises is a precondition to compete in the new, global economy. Co-operation and networking allow enterprises to share costs and risks, to keep-up with a constant stream of new information, to generate common projects and initiatives, to share produce and reproduce common solutions and knowledge.

However, there is a direct connection between the development of ICT based networks and existing social capital. It is difficult to create networks of enterprises with new technologies without strong socio-cultural relations and ties. There has to be a strong social capital, that is a propensity to cooperate and form associations or networks based on reciprocal trust. It is for this reason that this dimension of the problem will be absolutely crucial in our theoretical approach.

Within this context the Small and Medium Enterprises (SMEs) seem unsuitable to face the competition because they are often inserted in territorial contexts with weak ties and because they demonstrate a low aptitude and trust towards innovative solutions.

The main barriers to innovation dynamics in local economic systems involve, at different levels, individuals, companies, and stakeholders. These barriers weaken local competitive potential within global markets. They can be broken down as follows:

Management models and social capital: there is a prevalence of management models characterised by an autarchic, self-sufficient vision, with very little collaborative spirit. Company individualism and the pulverisation of the entrepreneurial fabric; condition both the amount of investment in new technology and the ability to put information resources and knowledge to a common good.

Entrepreneurial spirit: in local economies mainly made up of SMEs, inbuilt cultural opposition to technological innovation is widespread. Entrepreneurs are often unaware of what might be achieved with innovative tools, and their ICT investment choices are mostly dictated by the need to see short-term advantages.

Difficulty of access to national and international knowledge networks: for most small and medium sized enterprises the lack of adequate competence and a tendency to undervalue human resource development implies a difficulty to access national and international knowledge and innovation networks.

Excessive molecularisation of company situations: the lack of relationships (connectivity "software") linking efficiently all actors working in territorial systems is the result of an excessive pulverisation of local companies and of the inability of intermediaries to aggregate and share knowledge at local level.

Difficulty in sharing knowledge: the in-built resistance of many entrepreneurs is often due to the fear of loosing independence and competitiveness with the spread of communications tools and the sharing of information and knowledge. The sharing of information held by local actors -such as companies, local authorities, local development agencies, chambers of commerce - is fundamental for the transformation of productive systems into learning regions, a production system where learning, change, and innovation set up a process of continuous, incremental evolution.

Inability to plan long-term innovative strategies: in Europe, there are still very few examples of cooperation and definition of common, shared development strategies among the various local actors (stakeholders). This inevitably has its effects on the use of network technologies

and innovation capability (intended as continuous updating and the renewal of organisational models both within enterprises and within the territory).

Survey and research framework

The complexity of the above-described situation explains why the present research is based upon a qualitative-quantitative approach and a multidisciplinary research practise. This choice is due to the necessity of analysing such a complex and new situation and the need to compare four different regions using homogeneous parameters without eliminating their specificity. The research, whose results will be presented in the following paragraphs, was carried out from November 2003 to October 2004.

Focus

Four regions constitute the research field of reference –its focus -: three of those are effective partners of the DBE project (Aragon, Tampere, West Midlands) and one (Piemonte) is an associated region.

In the present research these four regions have been selected and are studied as paradigmatic examples. As we are going to see further on, those regions show important differences. The differences in their socio-economic history and their governance patterns, ICT infrastructures and use give us the possibility to work with these regions in a comparative manner.

Hypothesis

The holistic approach here considered begins with this hypothesis:

Territorial development potentialities -determining a good grade of adaptability to the DBE. - depend on a combination of different factors. These factors, composing the territorial capital, are traceable to general categories (see Fig. 1):

Social Capital: Quality of governance & Present local networks

SMEs ICT development: Technical infrastructures & ICT usage and effects

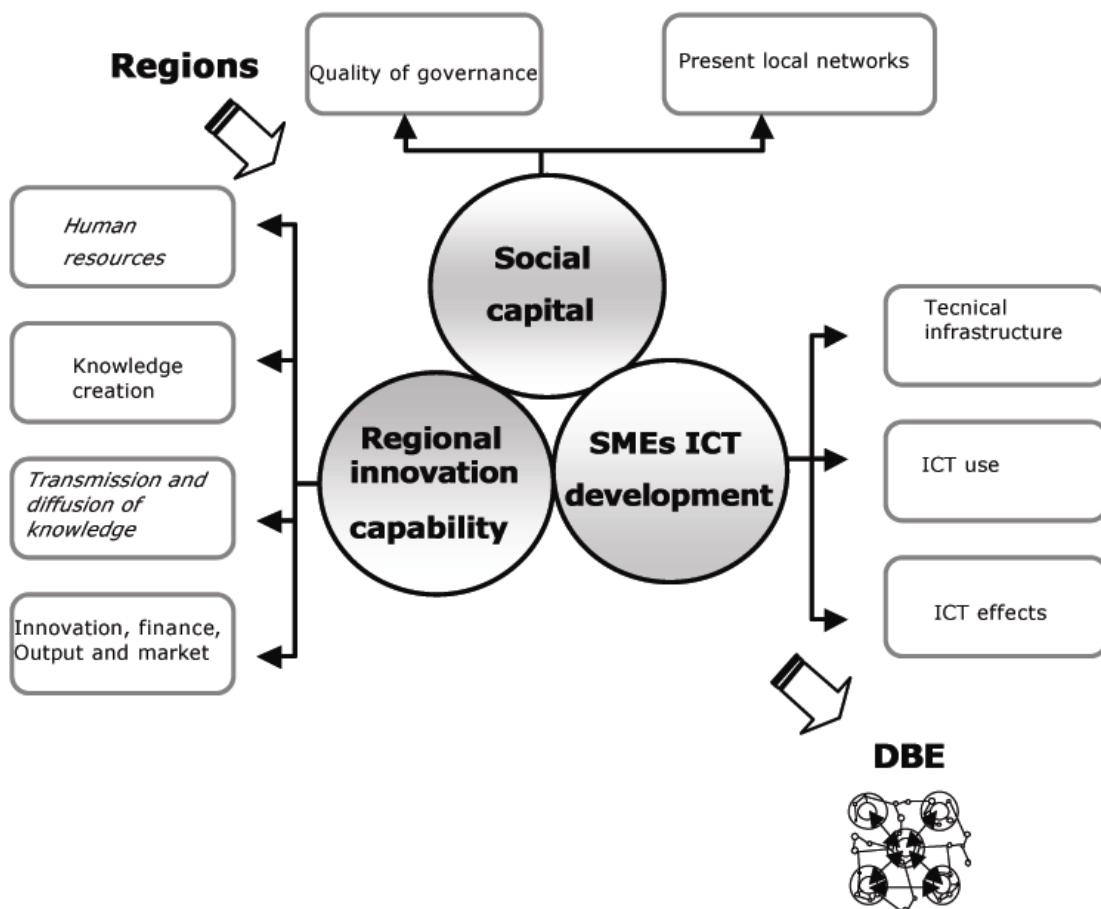
Regional innovation capability: Human resources, knowledge creation, knowledge transmission, diffusion of knowledge, innovation financing, output and market

An interpretive pattern: the territorial capital

Following this proposed scheme we define as *regional capital* the combined characteristics – historically acquired – that determine the regional identity.

As the chart shows, the shaping of economic issues is a complex combination of various factors. The structuring of 'territorial capital' is very much dependent on the creation and management of knowledge and consequent implementation in practice. Governance issues are concerned with the difficult task of taking the best of each sector and putting them in close relation.

Fig. 1 Hypothetic pattern



Source: CENSIS

We assume that the territory, taken in a broad sense and not from a purely physical point of view, is a key productive factor, and is the result of the above-mentioned dimensions.

Social capital: social capital is a variable correlated to the establishment of a relational process. Its development is close to the gradual activation of relational and co-operative dynamics. In a first phase, economic agents invest resources and experiment with business relationships based on trust. In a second, more mature phase, the systems evolve towards a sort of institutionalisation that determines, internally to the territory, complex processes of governance. In this survey on DBE, the social capital influence on DBE potentialities of implementation in different regions is analysed as:

- *Existing local networks:* analysis of business relationships among enterprises, analysis of formal links among enterprises, analysis of systems based on trust, analysis of networks based on associations.

- *Quality of governance:* analysis of links among private and public actors and subjects, analysis of relationships among institutions, analysis of initiatives close to innovation and based on co-operation.

Regional innovation capability and SMEs ICT development

Regional innovation capability is to be considered here as the capacity to activate processes of continuous improvement at local levels. In this study it is considered as a number of diverse factors, which are catalysers of innovation:

- *Human resources:* The combination of knowledge, skills, and abilities – always expandable, shareable and self-generating with use – that characterise people in a territory. The level of human capital is related to the possibility that a territory may offer in acquiring and improving it.
- *Knowledge creation:* The effective use of information combined with competency, capability, ideas, experiences, intuition and so on. The process of creating and sharing knowledge can be represented as a dynamic process of learning.
- *Transmission and diffusion of knowledge:* territorial processes of innovation are usually due to interactions in complex networks and not as a result of isolated initiatives. Innovative activities, seen as a product of different forms of learning close to enterprises and local actors.
- *Innovation, financing, output and market:* it is considered here to be data close to the market of innovation, both in terms of demand and supply.

Specific technological solutions, adopted by enterprises, can concern both the material production of goods and relational processes. These solutions should be considered as the knowledge and the set of techniques that permit us to improve the design of the systems of production and distribution. The evolutionary model proposed by CISCO has been used in order to define the analysis of solutions in enterprises. Starting from this model the following data have been considered:

- *Technical infrastructures:* development of new effective and capillary networks, based on broadband, wireless and satellite technologies. This is considered a key factor in order to disseminate ICTs in regions.
- *ICT use:* it is here considered to be the use of specific software applications.
- *ICT effects:* are here considered to be the effects of the introduction of new technologies in enterprise management.

The territorial capital changes in a sort of continuous game between consolidated traditions and new identities. Changes must include the capacity to build sustainable business networks. Further on in the report we will present the typology of networks. Normally, depending on the degree of trust among participants and on shared aims and information, and on structural characteristics networks constitute the pillars on which to found the upgrading towards the adoption of more complex and sophisticated ICT business patterns. At the same time ICTs are just a part, albeit an important part, of innovation, and play a decisive role in the interaction of SMEs with a DBE.

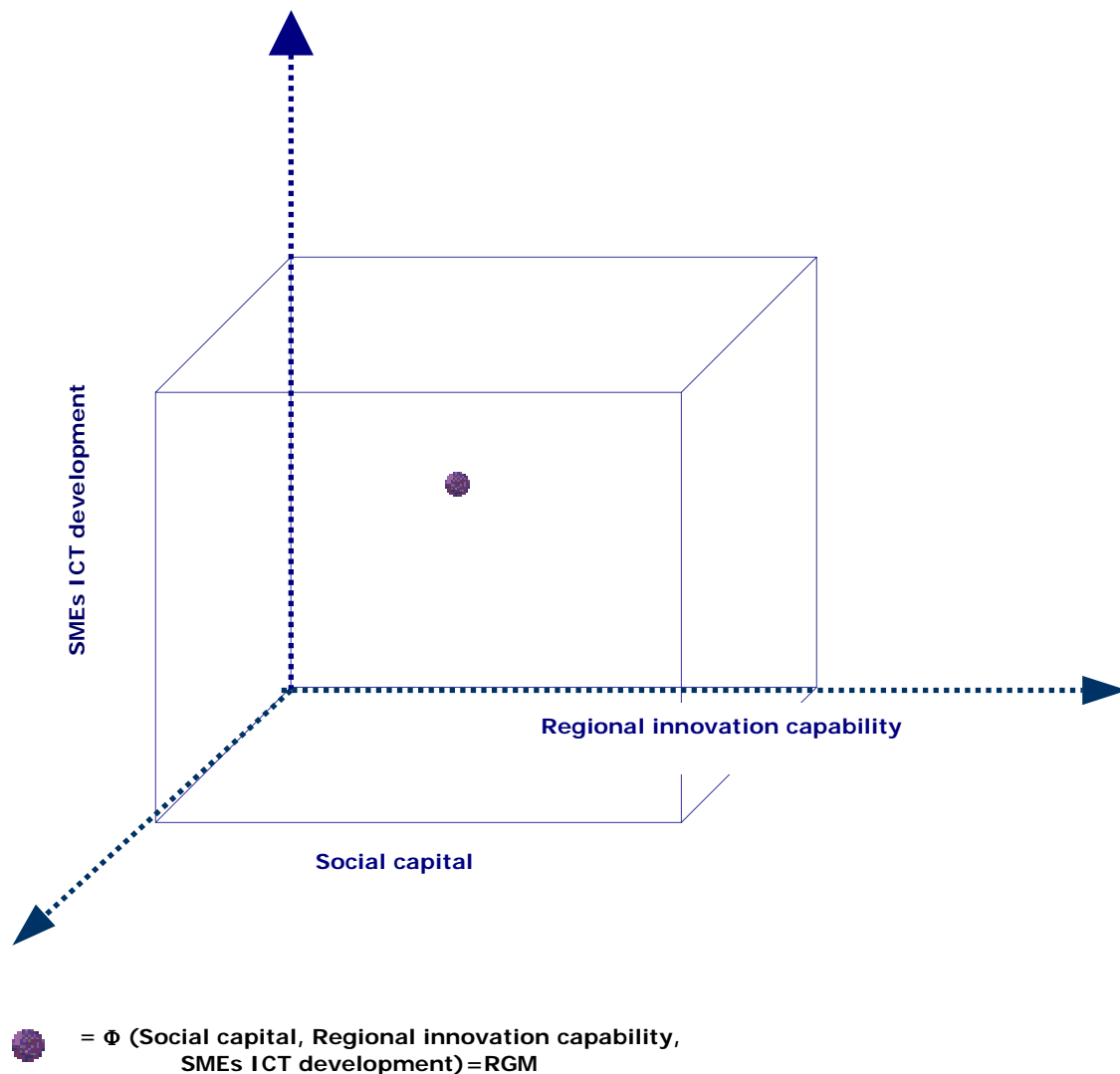
Gathering and analysis techniques

The three dimensions just described represent the base for our research not only from a theoretical point of view but also for our data evaluation techniques.

We are now going to describe the research process starting from the principal methodological tool: benchmarking.

Benchmarking is an instrument based on the comparison between different performances. A single subject (can be an enterprise, a region, a public administrative institution, etc...) is positioned in a scale at different distances from the best practises, according to its implementation level. This methodology opens a self-learning process underlining points of strength and weakness of each reality. In the present research the benchmarking model, i.e. *Regional Maturity Grade*, can be visualised as a cube. The three axes correspond with the three dimensions of the above-defined *Territorial Capital*.

Fig. 2 – Towards a RGM evaluative instrument



Source: Censis

The value assigned to each region is based on a complex index: a combination of qualitative and quantitative variables.

The qualitative variables arose from a semi-structured, face-to-face interview. We interviewed four regional key players, plus the regional catalyst. The sample selection criteria and the questionnaire argument area are strictly linked and reflect the conceptualisation of regional capital (Cfr. appendix C). Our aim was to interview actors from different fields in order to compare different points of view on regional background, regional development plans and the

orientation of ICT adoption. The themes that were selected can be defined in the following way:

- *Entrepreneurial sector*: innovative firms (SMEs & software producers), Chambers of Commerce or Entrepreneurial Associations;
- *Institutional decision makers*: local government and regional bodies;
- *Other relevant actors*: Universities, development agencies, technological parks, and incubators.

The questionnaire was very demanding and the interviews often lasted over one hour. The complexity of the line of questioning was at the same time a strength and a limiting factor. We gathered a vast amount of data referring to different aspect of the regions selected, coming from different perspectives. In this report, this information will be presented in order to produce a tool able to measure the Regional Grade of Maturity in implementing DBE.

The themes handled in the questionnaire were the following:

- General regional state of affairs;
- Regional development and innovation policies;
- Level of governance;
- Market conditions;
- Human Resources;
- The role of the DBE in local development;

An extra thematic area touched specifically on the role of the regional catalyst.

All the people interviewed also had to complete a second questionnaire for the network analysis. This second questionnaire asked the key players to name:

- Actors considered central in the regional panorama;
- Actors considered innovative;
- Actors with whom projects were shared;
- Actors with whom it would be interesting to share projects;

Actors interviewed were asked to list three choices. Results of the questionnaire have been classified in a social matrix (qualitative-quantitative tables) to study the morphology and the structure of the networks (It was done with the assistance of the software UCINET 6 in order to graphically represent the networks.)

The network analysis, implemented in this way, was already tested by CENSIS in evaluating diverse regional economies. It was used previously for the evaluation of the quality of governance. Such a methodology permits to single out interconnected networks of actors having high innovation potential.

In order to orient policies sustaining innovation, it is import to enhance those social and economical links that permit the territory to take up consequences of changes in processes. Policies should not be too distant from regional needs.

A network analysis so implemented permits to represent:

- Intricate architectures internally present in the territory;
- The nature of links and conflicts among stakeholders;
- Roles in the leadership system for innovation.

Moreover, it permits the analysis of the dynamics correlated to innovation and social capital.

Interviews provided a set of qualitative indicators. These were combined together with quantitative ones. Quantitative indicators measure above all the infrastructure level of ICTs in the enterprises and quality of human resources.

In unifying qualitative and quantitative indicators it was possible to build up three synthetic indexes. Thanks to these indexes it was possible to measure the regional performances. In the appendix there is a description of the variables listed below.¹

Social capital

- Incidence of bottom up initiatives
- Incidence of top down initiatives
- Number of actors and subjects operating for local development
- Quality of actors and subjects operating for local development
- Capability of actors and subjects in building relational networks
- Network Intensity grade

SMEs ICT development

- Effectiveness in use
- Comprehension of the potential of ICT tools
- Organizational modification introduced by usage of considered tools
- Mind set towards the use ICT tools
- Percentage of enterprises having access to the Internet
- Percentage of enterprises' total turnover from e-commerce

Regional Innovation Capability

Human resources

- Population with tertiary education
- Lifelong learning
- Employment in high-tech services. (% of total workforce)
- Employment in medium-high and high-tech manufacturing (% of total workforce)

Knowledge Creation

- Public R&D investment
- Private R&D investment
- EPO patent application
- EPO High-tech patent application

Transmission of knowledge and market

- Share of innovative enterprises in manufacturing sector
- Share of innovative enterprises in the service sector
- Innovation expenditures in the manufacturing sector
- Innovation expenditures in the service sector
- Sales of New and nearly new products to the market

¹ The next task of CENSIS in the WP 27 will be to provide data concerning SMEs in the different regions. For this reason it is important to consider this report as a first step that cannot be set aside from the methodological viewpoint. This is a step towards a tool responding to the requirements of comparisons for the DBE project. Adding further variables (qualitative or/and quantitative) and data the tool can be improved.

Theoretical approach

In the following paragraph we are going to expose our interpretative model. It will not describe in depth all the dimensions mentioned above because some of those (i.e. technological infrastructure) are self-evident, and their centrality in regional development is universally accepted. We will focus more on the layers that we consider central and to which little attention has been given, such as:

- The relation between regional networks, social capital and the level of governance
- The relation between regional networks, social capital and ICT based development

Social capital

According to EIS, innovation "is nowadays considered as a result of a process involving different actors that have to interact socially" (EIS, 2003:24). Therefore the adequacy of a business environment can be measured considering the number of actors and subjects involved in local development issues close to ICTs enterprises, but also their ability to integrate actions and policies.

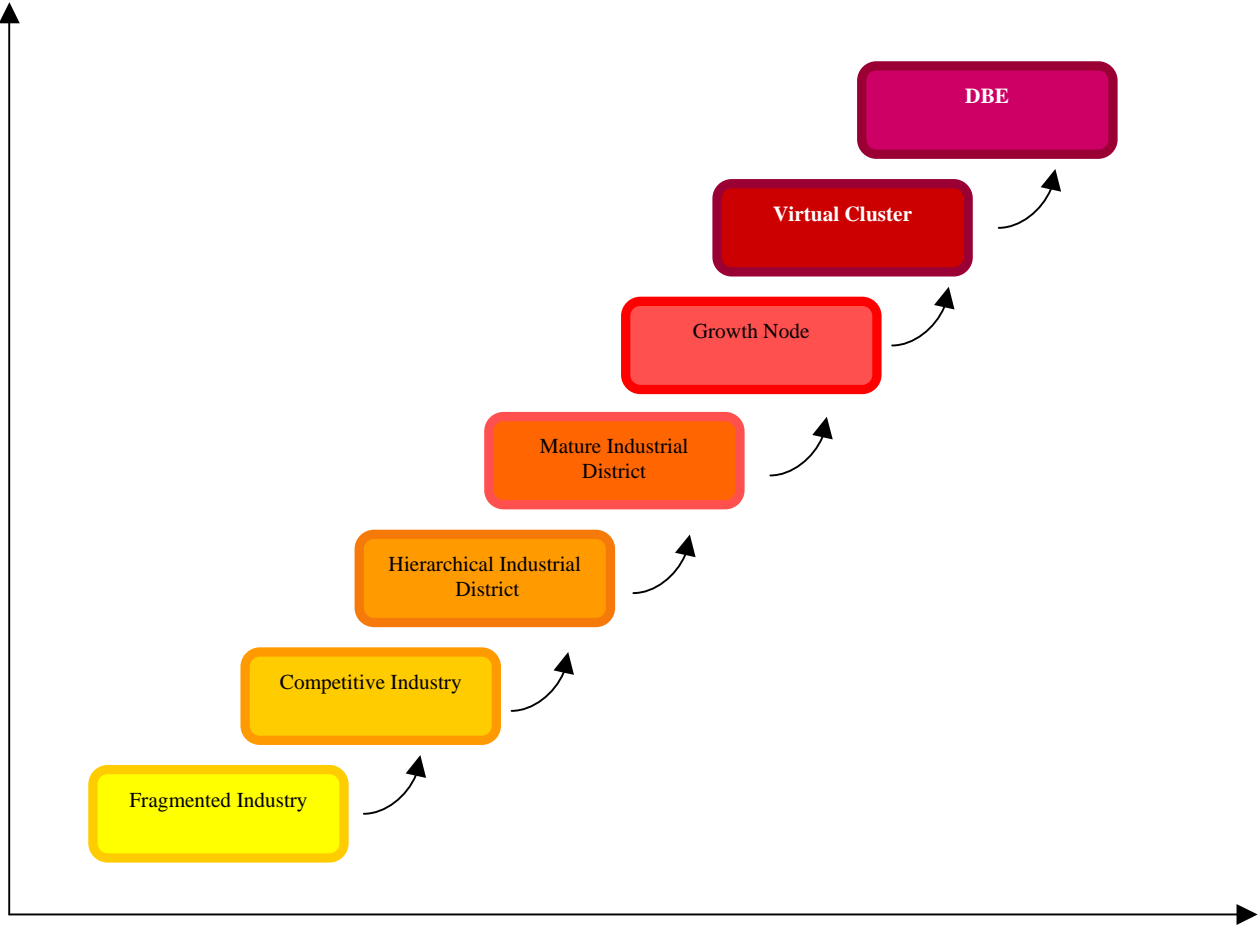
One important characteristic that we need to keep in mind when speaking about Regional grade of maturity in DBE adoption is the social integration of economic aspects. This expression, first used by the economic anthropologist Karl Polanyi, underlines that what appears to be purely economic phenomena has a social dimension that needs to be taken into account.

In other words, interaction among institutions and other actors is a matter of face-to-face relationships. In pointing out this aspect we are now referring to the individual level of the regional socio-economic reality. In short, we are referring to social capital. The Organisation for Economic Co-operation and Development (OECD) defines social capital as "networks having shared norms, values and understanding that facilitate cooperation within or among groups" (OECD, 2001: 41). The level of social capital in a region has an important effect both on governance patterns and on enterprise networks. These two realms, the governance and the entrepreneurial networks, can come closer with the improvement of the quality of social capital.

In fact, mature governance implies the collaboration of numerous actors in development planning and the collaboration between different stakeholders, i.e. a good partnership between the private and the public sector. This is also a characteristic of the high quality level of SMEs networks.

In each region we can see how there are different typologies of SMEs networks (or industrial districts). The development rate of these districts is strictly closed to the complexity and the intensity of regional social capital.

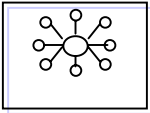
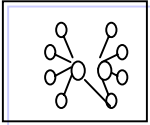
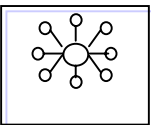
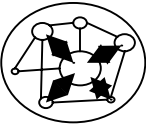
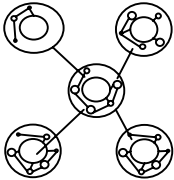
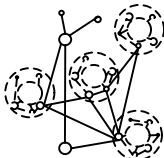
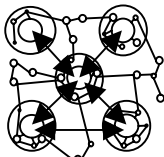
Fig. 3 Local networks typology



Source: Censis elaboration on Cisco Information age partnership model

Due to the appearance of new technologies near consolidated sectors (hierarchical industrial district, competitive industry, fragmented industry), new forms of industrial networks are emerging such as growth nodes, which are formed by large networks with intricate exchange systems. Moreover, it is also important to consider virtual districts and digital opened systems.

Fig. 4 Local network typology description

	Description
Fragmented industry 	A region characterized by a diffused multitude of SMEs. No single firm dominates the territory. The market is really fragmented and a lack of connections can be observed.
Competitive industry 	In this regional typology some enterprises of medium size and similar industrial capability operate in competition with one another. Entrepreneurial individualism is the recognizable approach.
Hierarchal industrial district 	A region where one of a group of large firms emerges as a leader due to its economical and technological potential. The organizational structure is a hierarchical one and networks are stable and strong.
Mature industrial district 	Interdependent firms with productive networks. Knowledge producing agents (universities, research institutes, engineering companies), private institutions (brokers and consultants) which are linked to each other in a value-adding production chain.
Growth node 	An evolution of the cluster concept that emphasizes the external networking dimension, the knowledge transfer, social learning through high-performing geo-clusters of organisations and institutions networked to other clusters and potentially supported by ICTs.
Virtual cluster 	A virtual cluster (also defined as "e-business communities") is an inter-organisational system in which each enterprise adds one or more distinct aspects of product/service value to the value of the network, by exchanging digital knowledge with other members through networking technologies.
Digital business ecosystem 	The network of buyers, suppliers and producers of related products or services inside a socio-economic environment that includes an institutional and a regulatory framework.

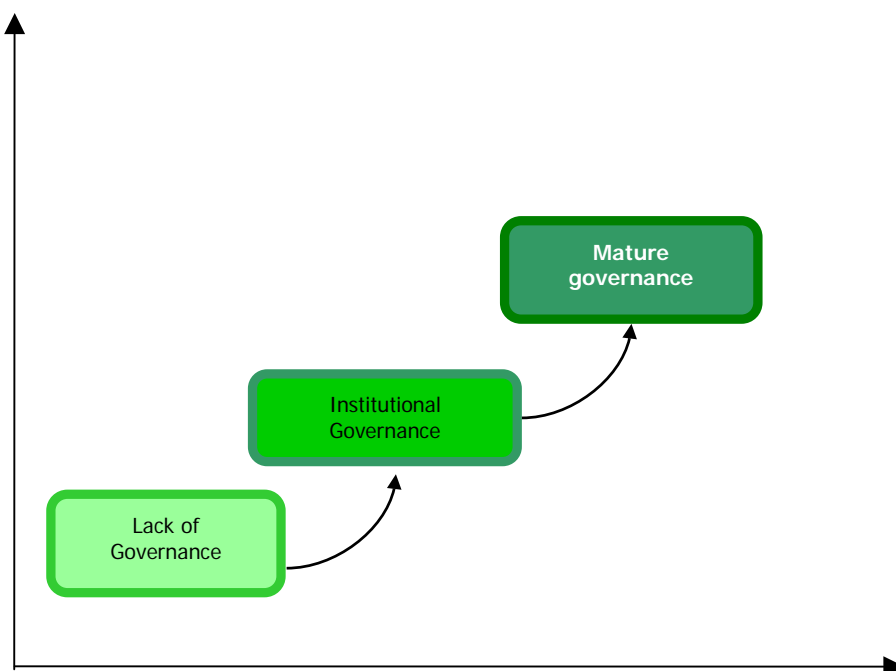
Source: G-Nike 2002 in Nachira, 2004 elaborated by CENSIS

Interpersonal relations - the sharing of a common social history, the informal interaction of subjects and actors - can replace or, at least, alleviate hierarchical relationships based on market contracts and institutional roles.

When the level of all factors considered above is mature a level of trust emerges among local institutions, enabling the network to share risks and long-term efforts towards objective achievements.

The quality of regional and local network complexity is directly linked to the more general level of governance. A mature local network, in fact, corresponds, from our prospective, with a mature model of governance.

Fig. 5 Quality of governance scale



Source: CENSIS

We define institutional governance as an institutional top-down approach; this implies a centralistic way of planning development. In other words mature governance is a complex process able to meet the interest of different local actors.

Regional innovation capability

Of late, the international body of academic literature on economics has developed diverse analyses of innovation in local productive systems. The result is a set of different conceptual tools useful in extending the territorial dimension of the *new economy* and of the *knowledge society economy*. Another concept, which is becoming increasingly relevant in the analysis of regional contexts, is that of *learning regions*. That is a productive system in which concepts such as *learning* and *innovation* determine a way of continuous evolution (Morgan, 1997).

From the concept of *learning regions* comes forward an analysis model able to distinguish continuously changing processes, limits and potentialities of innovation in a specific area. The model is not dependent on concepts such as *sectoral specialization* or *geographical concentration*. This means that it is possible to apply the concept both to mature territories and to immature ones. These latter ones are characterised by a limited presence of productive clusters.

The concept of *learning regions* is based on the belief that development opportunities and external risk factors don't determine results. Development factors to be active require the engagement of local productive actors both from the organisational and technological viewpoint. The maintenance of competitive advantages depends on the creation of immaterial resources such as: know-how, capability, skill, and attitudes.

A learning economy implies the necessity of developing a training policy at a regional scale. There is the need to gradually develop new competences near the productive processes and to promote a *learning culture*. Professionals are now continuously involved in learning processes throughout their professional lives, i.e. life-long learning.

However, the *learning economy* requires the right environment to facilitate *learning processes*, the flows of ideas and the fomentation of knowledge making. An important role is played by the presence of physical infrastructures. They are essential to foster the flow of goods and services, as well as information facilitating the integration in a global economy.

Organisational enterprise systems are prearranged to develop learning capability. That is to develop networks with other enterprises, change communication models, favour people's internal mobility to different sectors of their firms.

Learning regions aim to integrate local traditional knowledge with shared global knowledge in order to stimulate the endogenous regional potential. Knowledge creation implies an intense process of interaction in which knowledge transfer runs both explicitly and implicitly through in person contact and through long distance communication (available through web technologies).

Consequently relationships among enterprises in a learning process determine "changeable geometries" in a territory. Sometimes networks enlarge themselves solely at a local level, but most often they extend to adjacent regions or even reach global dimension.

Formal institutions (e.g. governmental organisations, development agencies, associations) and informal ones (e.g. behaviour codes, uses, trust, values, routine...) play an essential role in the operations of a learning region. Institutions reduce uncertainties, coordinate the use of knowledge, mediate conflicts and provide incentive systems. In doing so institutions assure a certain stability, which is essential for change (Johnson, 1992).

At the same time formal institutions introduce inertia in systems. There is a constant need to adapt them to the changing circumstances. Often there is a tension between new technologies and institutions. This usually leads to an institutional transformation. Therefore, the institutional learning process cancels obsolete institutions and transforms those that are inadequate.

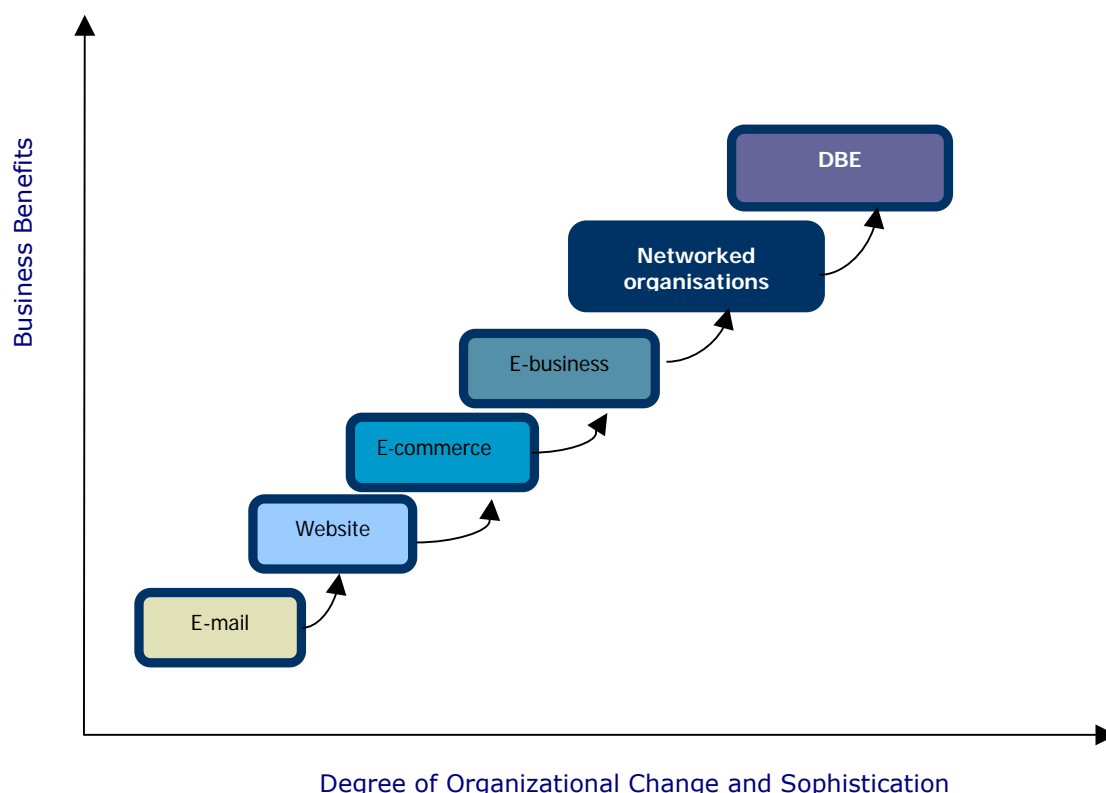
SMEs in ICT development: attitudes towards creating, sharing and using knowledge.

The ICT development level constitutes the third dimension of our hypothetic pattern.

We must now introduce a central actor, the SMEs. In doing so, we must state that in this research we will take into consideration specific sectors drawn in by the regional catalysts in the DBE project (i.e. tourist sector in Aragon, tourist sector plus recycling, and training & consulting in West Midlands and manufacturing in Tampere).

Different types of SMEs are found in the various regional contexts under study. Differences are found in the number of employers, in turnover, in the availability of good ICT infrastructures - here taken to mean basic hardware and the network architecture of a SME - in their relocation potential, in the characteristics of customers, in workforce skills, and so on. However, as we have seen, European SMEs face a set of similar problems and have common opportunities. For this reason we can introduce a common approach to the ICT development using the CISCO model.

Fig. 6: ICT scale



Source: CENSIS on Cisco model

It is very important to evaluate the level achieved in ICT development of the SMEs that are going to be involved in the DBE. Given that DBE is the higher stage of the CISCO model or scale we determine where an enterprise is positioned in order to help this actor in striving towards a full DBE. In fact, passing from one stage to another not only means being closer to the DBE but it also means obtaining more consistent business benefits.

However, the relation between business benefits and organizational sophistication is a directly proportional one. This is the central axis of this process that is at the same time both an opportunity and an obstacle.

The E-mail step denotes the entrance into the realm of Internet activities. Apart from this the E-mail stage can only help communications inside enterprises and the external world. Nevertheless, the adoption of this tool does not imply any cultural or managerial change.

The second step is called web-presence. After a initial phase in which enterprises build a web site without considering the quality, utility or accessibility of this medium they enter a more efficient stage of web presence. However, often websites remain static and represent solely a digital form of advertisement. In this stage the website is used only as an instrument for commercial communication.

E-commerce

Electronic commerce is often considered the first step to entering the global market. This stage of the scale leads to a closer interaction between sellers and consumers, as well as an increased use of technologies in the inner productive chain.

From e-commerce to e-business

Extending the use of the Internet from e-commerce to e-business has had the consequence of modifying work plans and the organizational culture of enterprises. This means that the impact of upgrading is quite relevant.

Networked organisations

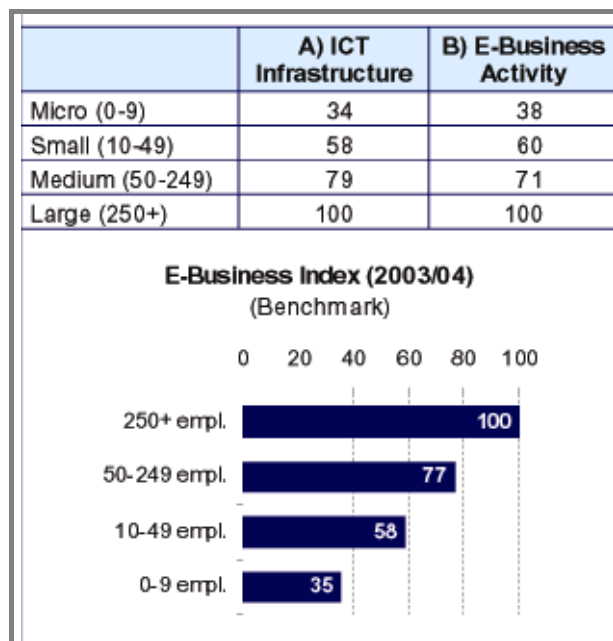
E-business technologies allow the enterprise to reach a higher level of efficiency with clients, suppliers and business partners. E-business makes it possible to adopt new business models and the creation of new relations that are going to transform the organizations. Thanks to new technologies, organisations and groups of organizations adopt new working models. They externalise some business operations and only maintain critical ones.

Digital ecosystems

The evolution towards digital ecosystems means that organizations start a dynamic co-operation on the web. This co-operation includes local actors that are going to create a community, which shares resources, infrastructures and business opportunities. Digital ecosystems take advantage of the possibility offered by dynamic interactions (both co-operative and competitive) of a large number of actors (SMEs, large enterprises, local governmental institutions, universities...) in order to catalyse innovation, growth and development of economical systems.

Large business operators can create and manage these opportunities on their own. SMEs find in DBEs the opportunity to strengthen their competitiveness on the market and possibly enlarge it.

As the scheme above shows the use of ICT tools is strictly linked to the size of the enterprises.

Tab.2 The e-Business Index² per firm size (e-Europe 2005 benchmarking indicator)

Source: e-Business [Wh@tch](#), 2004

Most of the SMEs could be placed on the second step. This can be explained quite easily after having defined each stage. The use of e-mails and static websites do not imply particular changes. These tools only partly modify the information flow inside a company, but do not require management changes. They do not significantly impact the way work is organised inside the firm.

The e-commerce and e-business stages (e.g. ERP - Enterprise Resource Planning - Supply Chain Management, Customer Relationship Management, e-learning, e-procurement, video conferencing) require a noteworthy change to the management approach, a significant investment in training personnel, new technological competences and software infrastructure.

Finally, there is a need to accompany SMEs when these reach higher steps of the CISCO model. Policies addressed to resolve such issues should look not only at the help in technological upgrading but should have a holistic approach. In other words, helping SMEs in understanding the potentials that exist in networking.

Nevertheless, if similarities exist in the SMEs involved in ICT acquisition, this does not necessarily imply similarities in problems and solutions. A shared situation can reflect different realities and therefore different policy recommendations. The other dimensions of territorial capital come with their centrality. For example, if an SME sector at the web-presence stage is part of a highly developed technological region, their struggles can be linked to cultural features. However, if the SME's are in a region with a severe lack of technological infrastructure, the difficulties encountered can be of another nature. They are mostly material and therefore require concrete policy measures.

² The "E-Business Index", based on employment-weighted survey data from the e-Business Survey 2003. The Index is composed of two sub-indices: (A) ICT infrastructure diffusion, and (B) ICT use for e-business. Component indicators used in this proxy are: (A): A1: enterprises that have access to the Internet; A2: enterprises that have a website; A3: enterprises enabling remote access to their computer system; A4: enterprises having a connection to the Internet with >2Mbit/s bandwidth; A5: enterprises using an Intranet; (B): B1: enterprises that have purchased products online; B2: enterprises that have received orders online; B3: enterprises whose IT system for managing orders is linked with the back-end system; B4: enterprises having integrated their IT system with that of a supplier for placing orders; B5: enterprises tracking working hours and production time online; B6: enterprises trading on special B2B electronic marketplaces. All component indicators have been computed as employment-weighted percentages.

Local economic systems should invest in soft (as opposed to material) resources and build relational networks between enterprises in order to remain competitive.

Technologies play an important role in creating territorial networks. They are at the same time a support, a product and a driving force. They are a support because they facilitate and catalyse processes of resource sharing, a product because they initiate strategies of territorial development and a driving force because the presence of associative structure reduces the costs of technologies.

Web technologies work on information exchange and on knowledge sharing. These networks increase the pool of common experiences, while simultaneously minimizing the impact of social and cultural limits. However, these same limits can also hinder co-operation and comprehensive strategies.

It is central to have a clear image of the relationship between the use of ICTs and the effects of ICTs. This is the direction that we should employ when thinking of possible strategies to assist SMEs in using ICTs and achieving a higher integration in DBEs.

Having defined a structure of reference to compare the regions selected for this study, the research findings can now be presented.

Research findings

The regional grade of maturity (RGM) of a territory for the DBE can be found in linking through a logical function three complex variables:

Quality of Governance (SC)

SMEs ICTs Development (ICT)

Regional Innovation Capability (RIC)

$$RGM = \Phi(SC, ICT, RIC)$$

The RGM is a logic procedure to individuate the capability of a territory to interact in a constructive way with a DBE. It is an attempt to evaluate the tendency of a territory in using complex informative systems. In particular, this *modus operandi* tries to formalize in a fairly easy tool an approach to the rate:

DBE/LOCAL DEVELOPMENT

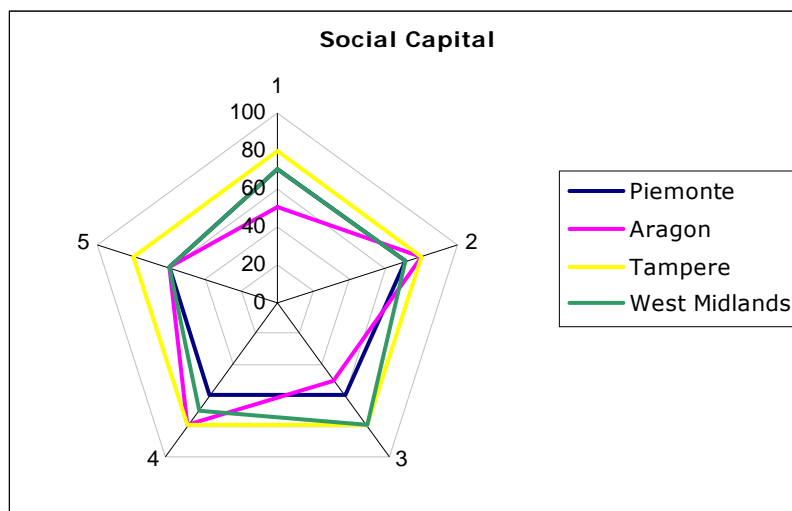
We are now going to analyse those complex variables separately and then we'll visualize it all together.

Social capital

The total area of the present polygon represents the ideal situation in which a mature pattern of governance meets a highly complex pattern of local networks. This means the achievement of the confluence of business networks and policy-makers. It is important to underscore that all the regions studied are attentive in sustaining and improving the regional level of social capital. Keeping the three-step scale of governance quality (Fig. 5) in mind, all the regions are working towards the fulfilment of the regional grade of maturity in relation to DBE.

As the scheme below shows, Tampere can be considered an example of best practises in this field. Regional networks are really mature in Tampere. From a static point of view we find numerous local actors. Between the local government and the microcosm of themes and SMES, we find both private, and public institutions that act as network builders. This level of network creation capability is reflected in the innovation planning activity.

Fig.7 Social Capital Diagram



Source: Censis

Innovation strategies are created, structured and systemised and put into practise by a vast group of actors. The decision-making mechanisms are complex and the roles played by each of the partners are fluid.

The shapes of West Midland and Piemonte areas are well balanced. This means that the social capital pattern is the one referable to complex local networks and mature governance model. The symmetry on the axes 1 and 2 underline a good equilibrium between institutional and bottom up initiatives. Points that can be improved are the number and the quality of actors (axes 3 and 4) and the capability in building networks (axes 5). It's nevertheless important to underline that all the attributed values go from 6 upwards (i.e. the situation is considered a really positive one). This is also the case for the region of Aragon, all the values are more than fair, but the asymmetry showed needs some further explanation. Firstly, we must recognise the newness of the regional autonomy. We must remember that a few years ago all the policies were centralised in Spain, therefore the situation that we find now in Aragon is of growth and openness.

The region is undergoing a process of transformation of the relations amongst actors. The centrality of the local government is partly explained by this particular situation. The efforts of the government in planning innovation strategies is encountering some resistance in involving other actors. The asymmetry between the quality of actors and their number in the network is part of this panorama and a determinant of the shortage of bottom up initiatives. From the interviews conducted with certain actors one particular theme arose from the SMEs: They are apprehensive. In this context, DBE can become a magnet, that is integrating areas quite divided along the lines of private and public sectors.

The ability to build networks, described during the interviews conducted in the context of this study, confirms the results of the EIS (European Innovation Scoreboard) 2003 survey even if the data on that occasion referred to national and not regional situations.

Tab. 3 European Level of Trust

	Trust³
FI	0.82
ES	0.41
IT	0.28
UK	0.23

Source: EIS Survey, 2003

Generally speaking we find here some reluctance to network. For example, for some West Midlands SMEs it is quite easy to access networks, to understand the added value of sharing ideas, to use common information platforms with other SMEs. However, at the same time, in the same regions there are SMEs less inclined to share information deemed strategic in getting business. This latter category of SMEs, which is present in all four regions of the study, is characterised by a maximum of 15 employees and a daily struggle to survive. Although the internal organisational level of both SMEs and Institutions is compound, often they are not strictly connected.

For a more detailed description of each regional situation please refer to Appendix A.

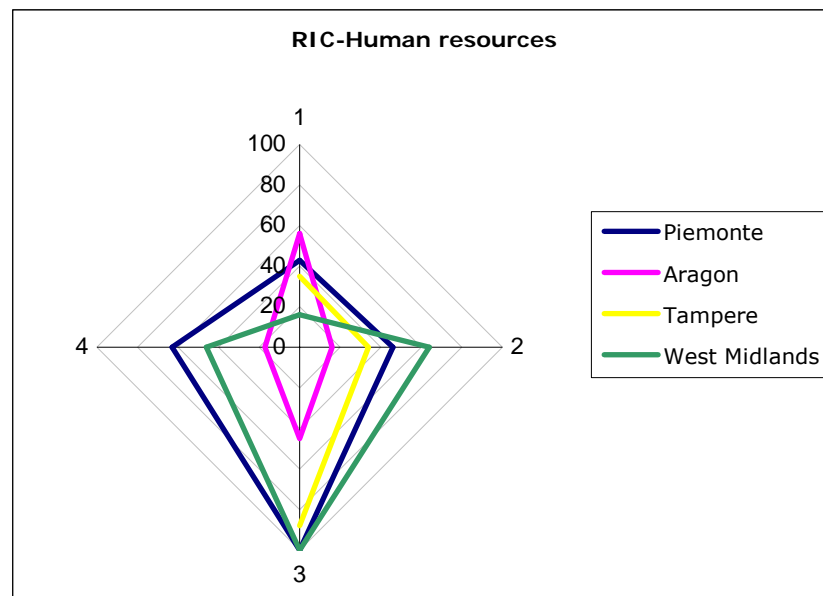
³ Definition of trust: Percentage of (A) responses to the following question: "Generally speaking, would you say: A) That most people can be trusted; or B) That you can't be too careful in dealing with people."

Regional Innovation Capability

As it has already been shown, this axes is composed of 13 quantitative variables. Here once again the conceptual cluster proposed before is used, that is Human Resources, Knowledge creation and Transmission of knowledge and market (see Fig.1).

Primary data not being available, the analysis is based on secondary data extracted from the European Innovation Scoreboard Survey (EIS:2003). The difficulty of finding comparable independent regional data lead us to use this survey even if some limits are present. The principal limits are the following: 1) missing data for different variables; 2) missing data for different regions and 3) broken series.

Fig.8 Regional Innovation Capability- Human Resources Diagram



Source: Censis

The European division of Finland does not consider Tampere as independent region in their data structure. Therefore, the data analysed in this study refer to a vaster territory. This obviously penalises Tampere. See please annex B for a full description on variables and sources.

Taking into account these limitations, some observations are presented since the principal aim remains showing how this evaluation model works. In the next stages of research (WP27) there will be the possibility to improve the quality of the data by collecting primary data.

The first dimension taken into consideration refers to Human Resources, the axes represents the following variables:

1. Population with tertiary education
2. Participation in life-long learning
3. Employment in medium high & high tech manufacturing
4. Employment in high-tech services

What immediately arises from the diagram is the lack of symmetry. This is due to the high values present in three regions for the third axes, i.e. Employment in medium-high and high-tech manufacturing. Tampere, West Midlands and Piemonte. In fact they represent the higher standard in the European panorama. These regions are industrially mature.

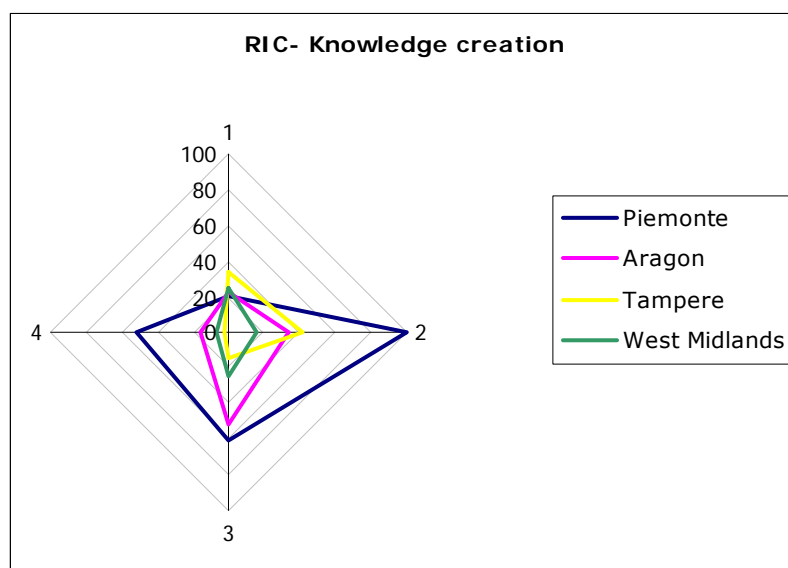
In these regions we find enterprises who are world leaders, and they represent the principal source for employment. The present innovation strategies observed in our field research confirm that manufacturing still is an important sector for the regional economy. The common strategy is to use ICT tools for looking at two goals at the same time: open new sectors based on new technologies and using these tools for reinforcing and renewing traditional sectors.

It is particularly interesting to notice the high value reached by Aragon in the percentage of persons with tertiary education. This represents a particularity and is the main strength of this region. This characteristic represents an opportunity not fully seized. In fact, Aragon has an important university and more student graduate than the region can employ. This region exports highly skilled people. This labour market is a central issue in the present governance initiatives.

One important aspect of regional innovation capability, even if has not been choose as variable, is present by the numbers and quality of training institutions. The value of the research centres, university departments and polytechnics is remarkable in all the regions studied, particularly if compared with the national situation and with European standards (more in the regional descriptions).

The next diagram shows the relationship between investments in knowledge creation and the output in terms of patents. This set of variables measures an institutionalised level of knowledge that is not the only available in a territory.

Fig.9 Regional Innovation Capability – Knowledge Creation diagram



Source: Censis

The axes legend is the following:

1. Public R&D expenditure
2. Business R&D expenditure
3. EPO patent application
4. EPO High tech. patent applications

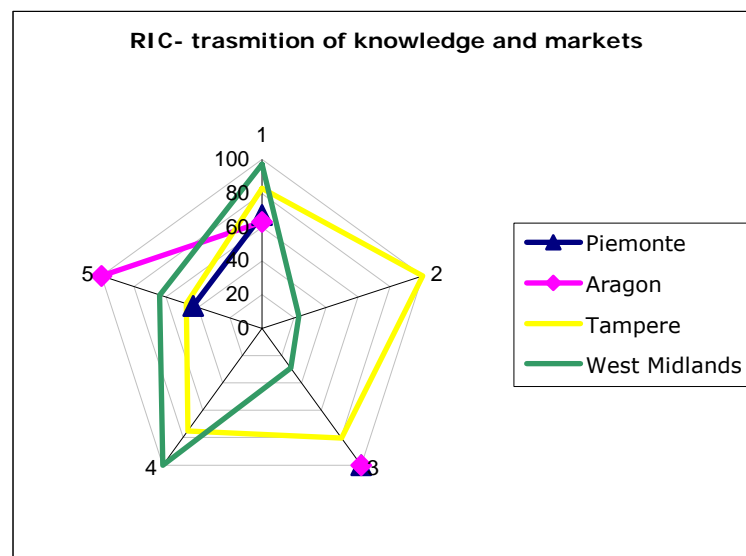
With some reserve, the effort of regions in building a knowledge-based society can be evaluated.

The relationship between public and private expenditure in R&D also gives an idea about the relationship between public and private sectors. In the case of Piemonte, this relationship is the example of a best practise from the point of view of the private investment in R&D.

Interaction between public institutions and private sectors is very strong in Piemonte, where there has always been a long tradition of efficiency and mutual influence between these two domains. Policies to boost innovation in Piedmont are trying to bring together university excellence, great financial powers and key players having a strong social impact on the territory. The example of high-tech industrial districts in Piedmont is quite a meaningful one. The data of West Midlands on knowledge creation are not easy to explain because this is a region that is at the forefront in ICTs. Low level of European Patent Applications (EPA) are almost certainly to recondut to the fact that probably new design patents are not registered in the EU area.⁴ The data here collected refers to this area. Considerations made here above for Piemonte can be replaced for West Midlands, these are two similar regions experiencing the passing from an industrial economy, in both cases strongly correlated to automotive companies, to a services one.

This set of variables represents the output on the market of investment in human resources and R&D.

Fig. 10: Regional Innovation Capability –Transmission of Knowledge and markets diagram



Source: Censis

The axes labels are:

1. Share Of Innovative Enterprises (Man.)
2. Share Of Innovative Enterprises (Ser.)
3. Innovation Expenditures (Man.)
4. Innovation Expenditures (Ser.)
5. Sales of New and Recent Products to the Market

⁴ Statistics published by the UK's patent office confirm that in 2002 more than a quarter of all applications filed with the Patent Office by West Midlands residents were granted. The exact figure for the region was 28.7 per cent, well above the national average of 16.4 per cent. People from the West Midlands are the most successful innovators in Britain. The Fig. 9 has been made using Eurostat data (The Innovation Scoreboard Survey). If we consider the data of the European Patent Office Annual Report 2003, we can notice how UK number of applications (4843 in 2003) come to the 4,15% of the applications presented all over the world. The well known problem of European statistical data comparison emerge here clearly.

Except for the service sector of West Midlands all the regional realities show high values of innovation. There are high percentages of enterprises involved in innovative initiatives. It is important to take into consideration this openness toward innovation in the region, this attitude could stimulate the introduction of a DBE and its innovative approach to business.

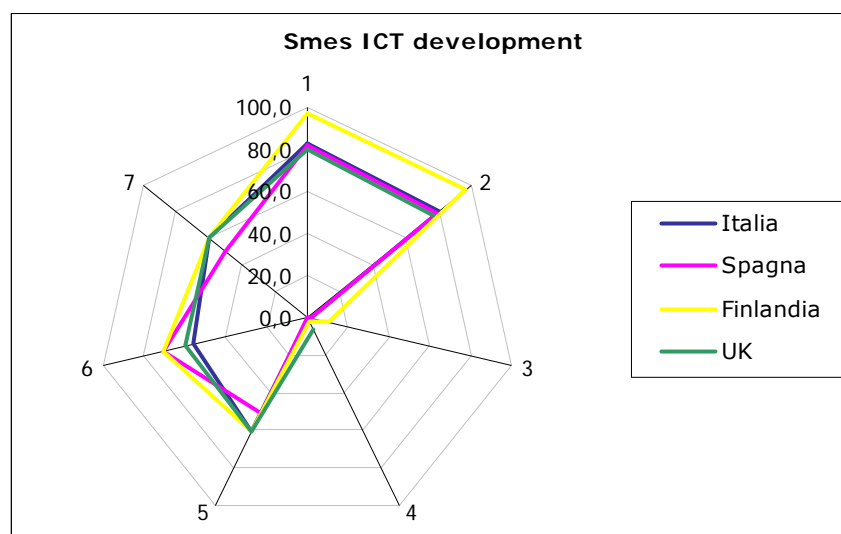
In this diagram we can also see in which sector the innovation effort is stronger. We would need a more complex set of variables to illustrate this concept, nevertheless it seems possible, also from our field research to say that in some regions, such as Tampere, the change from a second sector based economy towards a service sector oriented economy is more evident than in others. The case of the West Midlands is meaningful. In fact, we find high expenditures in innovation within the service sector, but not a symmetrical level of innovative enterprises in the same sector. This reflects the regional effort to open the local market to these businesses without ignoring its industrial tradition. In this region the sector continues with a very efficient and innovative performance.

The value reached by Aragon on the fifth axis give us a good visual image of the dynamism of this region that is really in a transition stage with many signs of success. From the field research emerges the recent appearance in the local market of new enterprises which are immediately successful on the European market.

SMEs ICT development

The third axis of our cube represents a combination of qualitative and quantitative variables (See Appendix B for description). The same limits highlighted in the previous paragraphs return in this diagram. In this case, it was impossible to find analogous regional data. This limit is only a question of time, the goal of the next CENSIS research (WP27) is focusing on gathering data on SMEs' ICT usage.

Fig.11 SMEs ICT development diagram



Source: Censis

The variables chosen for this diagram are the following:

1. Percentage of enterprises having access to the Internet (All enterprises)
2. Percentage of enterprises having access to the Internet (Small enterprises)
3. Percentage of the enterprises total turnover from e-commerce (All enterprises)
4. Percentage of the enterprises total turnover from e-commerce (Small enterprises)
5. Organisational modifications introduced by use of ICT tools
6. Attitudes towards ITC use
7. Effective use; comprehension of the potential of tools

In order to represent the SMEs position on the CISCO scale more variables would be needed. While the next research will allow the evaluation of each ICT tool mentioned in this scale, for now the focus will be a first look at the gap between Internet access and Internet use for businesses.

If Finland is a well-known example of best practises in connectivity and Internet access that is with a score close to 100%, the other regions also have very high scores. From our field research we can say that these two data series show insignificant differences within regional realities.

An exception can be noticed in the region of Piemonte and Aragon, particularly in the last axis. Disparity of access is present. Infrastructure disparity in these regions is a consequence of particular territorial situations, namely the size of the land covered and the conformity of it. Nevertheless both local actors are engaged in important projects in order to improve the regional connectivity. DBE could be a driving force in this context.

The percentage of turnover from e-business seems to be really low. This data needs to be handle with care. In fact, for many reasons, not all the business sectors can use e-business tools. For this reason we cannot take this data as a direct indicator of the gap between web presence and further steps of CISCO scale mentioned previously. Nevertheless, our qualitative indicators help us to clarify the situation and complete the analysis.

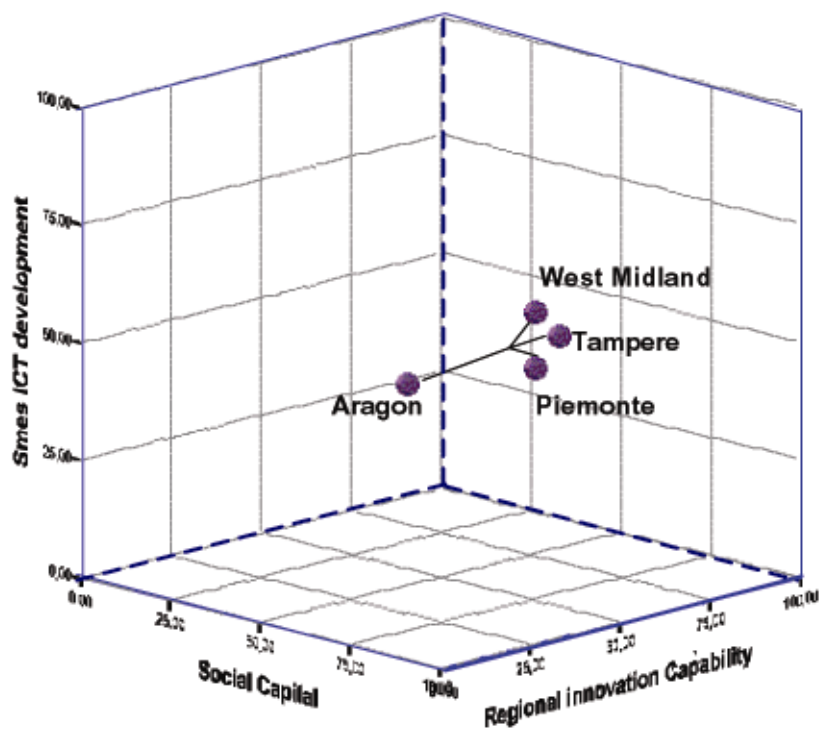
Turning our attention to the SMEs sector involved in the DBE and using our interview results, we can say that there is generally a high level of interest towards new technologies which does not correspond to an effective use of it.

Most SMEs are at the second rung of the ICT scale (Fig. 6). They usually make partial use of the potential of the first two levels of technology. In many smaller enterprises ICT infrastructures have not yet reached full maturity. Adoption of innovative technologies on the part of SMEs often happens without exactly understanding their real utility. There is a lot of imitation in local industrial districts. If a successful local entrepreneur decides to implement a technology, he will probably create a copycat effect and all the other entrepreneurs will buy the same technology. This could be a useful indication for the implementation of a DBEs. SMEs which are suffering are ICT illiterates and may potentially be interested in digital ecosystems but they need require more information on DBE or a model in order to truly appreciate it.

The motivation for using ICT tools could be present, and in some sectors it already is, but the management structure of the SMEs and some cultural resistance causes reluctance in adopting ICTs.

The entrepreneurs - their approach to information sharing initiatives and ICT instruments - become central here. It is their business culture that makes the differences.

Fig.12 Regional Grade of Maturity



Source: Censis

The cube above define the position of the regions in a cube, starting from the hypothesis that capability in building networks and quality of governance are strictly dependent on social capital.

Themes: innovation and difference.

One more argument needs to be discussed. We will now consider the possible importance of the regional openness grade, its level of difference tolerance. Having consequence on more than one dimension, it's a common theme.

If the interrelation between actors is seen from our perspective as a positive tool towards innovation - able to sustain the participatory planning approach and therefore a key factor of a mature level of governance -, we must put it into relationship with the problem/opportunity of diversity. We can see in the DBE project documentation two aspects that may appear contradictory. We will try now to develop this "contradiction" and use it as a possible paradox, as a factor for imagining the DBE.

On the one hand we have the DBE, one of the *sine qua non* conditions for an ecosystem is a high level of diversity. On the other hand we have as a common aim that of "developing networked business" in Europe that preserves local identity and culture" (Nachira, 2002).

In order to represent the possibility of the co-presence of diversity and strong identity - an identity of differences - we can use the concept of "innovative milieu". The concept of milieu is more open and flexible than that of local structure and even local network, because it refers more to a common sense of belonging, a shared approach.

One strategy that the regions under study are trying to develop is that of acting as a magnet for big firms. In doing so, both Aragon and Tampere ask themselves how to attract those firms. What can this region offer to them? The concept of quality of life becomes central.

The answers to the question "How attractive is your area for skilled workers drawn from other regions?" were mostly negative. The ability of regions to act as a magnet is low and this can become an obstacle for future development if we just consider one of the many possible consequences of the ageing of the European labour force particularly evident in regions such as Aragon and Piemonte.

The level of differences has been conceptualised as follows:

- The level of horizontal mobility
- The level of mobility between the private and the public sector
- The level of mobility from the outside world (high skilled worker migration).

A low level of mobility between companies seems to be linked to cultural preferences and will. The desire for security and social belonging to a workplace seems to be prevalent. This can have positive effects from a socio-economic point of view, particularly in the R&D sector. For a firm it is better to invest in a person that will spend many years in that company. Mobility in this sense can become a risk for the company. Perhaps this means that knowledge-sharing loses one channel.

Low mobility in the public and private sectors have different causes and different consequences. We can observe a desire, especially in Aragon, to move from the private to the public sector because of the social security that this can guarantee (contracts). But in general mobility is present only at a managerial level and not in the lower one. In Aragon in particular the two realities seem to be really divided and refer to different cultures. This division of prospects and values, if it affects network capability can be a limit to future development.

The level of mobility from the regional dimension is low too. We have to point out that English speaking countries are more attractive for companies, workers and students because of the language. This cannot justify the situation in Aragon, where the level of skilled worker exports is high and imports very low. In Tampere the situation is more even, we do not see a workforce exodus, but on the other hand attractiveness is not high. We were expecting a high

number of skilled foreign workers in Tampere that we did not find, except in big companies like Nokia and a few others.

A worldwide network of workers or rather a European network, can be a good way to share good practices and know-how. The university could be a magnet for qualified foreign workers. This is an ongoing process in the Tampere region, and can be reinforced. It is something that can be developed successfully in Aragon. Just for a quantitative comparison we report here the Numbers of foreign student from abroad according to the EIS survey.

Tab. 4 Foreign student in European countries

	Foreign students from abroad
UK	0.94
FI	0.06
ES	0.08
IT	0.00

Source: EIS, 2003 elaborated by CENSIS

Conclusions

In drawing up this report we tried to point out the lessons arising from the present practices. Information coming from the interviews is the thread unifying considerations and observations included in this report.

In dealing with first hand information we got a rather wide-ranging outlook of practices behind the promotion of innovation at the regional level. The practices show how complex processes shape local development. Development is often close to the circular interaction among creation of knowledge, institutional coordination and innovative firms.

Observing the practices - paying particular attention to the potential relationship between SMEs and a Digital Business Ecosystem - we noticed how firms' needs are directly connected to their position in the adoption of the Internet technologies.

Starting from the needs we try to suggest possible solutions or to make general comments on what can be done in terms of process management for the upgrading of SMEs.

We made an effort to single out the variables and indicators that we observed to reconstruct the process dynamics. We paid specific attention to the correlation between partnerships and governance. Focusing on this relationship we met all those "satellite networks" gravitating around the discourse of innovation and integration of SMEs in holonic systems.

The results we have achieved suggest possible short-term solutions to improve a method that can define the maturity of a specific region in interacting with a DBE.

Regional conditions, local institutions, common rules and traditions influence the capability of SMEs to reach the innovation market. These factors affect the skills of entrepreneurs, the workforce in general, the ability to create relational networks, the attitude of entrepreneurs towards clustering with other SMEs or towards risk, the ability to look outside the region and seek other markets, the ability to create, share and use information, etc.

In order to study the attitude of regions towards Digital Business Ecosystems, a benchmarking tool was implemented. This tool permits the positioning of a region in a three-dimensional reference system whose axes are:

Social Capital (SC)
ICTs Development (ICT)
Regional Innovation Capability (RIC)

The position of the region in the reference system gives a suggestion on its attitudes in developing a DBE.

Results coming out from this comparison should take into account the drastic simplifications implemented when the values of social matrices (or qualitative-quantitative tables) are fixed.

The main objective of this proposed procedure is to provide a relatively easy tool to use which maintains the significance of an holistic approach.

In using this tool, it is important to be conscious of its limits. Local development issues are continuously changing and it is quite difficult to model them. This is particularly true when related to territorial transformations and to productive processes.

The proposed tool assists in decision-making, but does not take into account all the external factors related to it. Implementation of complex networks are strictly dependent on the number and quality of policies, promoted by the different actors (both local and central

entities) involved in local development. Furthermore, to encourage the sharing of knowledge, one should consider the local capability to tailor policies and actions.

This report shows how local capability, historical background and identity (expressed in terms of social and territorial capital) strongly influence the attitudes in building relational networks. A DBE could work only if sustained by adequate policies and actions that work to promote networking and training activities for enterprises. The system, even if perfectly developed from the technological point of view, would encounter serious difficulties in an environment having low values in the quality of governance processes, in ICTs development and in innovation capability. High values in these fields are correlated to the set of promoted (and hopefully integrated) policies acting (interacting) at local level.

Appendix A: description of the regions

Regional area		Principal socio-economic indicators	
Area	13.000 Km ²	Employees in industry	30,6%
Density	407 in/Km ²	Employees in services	68,5 %
Administrative Centre	Birmingham	Unemployment rate	7,8%
Number of metropolitan districts	7	GDP per capita	23.919 Euros





West Midlands

The West Midlands (WM) region is located in the heart of England. Its largest sector continues to be Manufacturing with 28.9% of the region's GDP. This is the largest share of any region in the UK. The Financial & Business Services sector is the next largest at 17.9% although this is lower than the UK average (21.4%). The Wholesale and Retail sector continues to grow and now represents 11.9% of the region's GDP. The Agricultural sector contributes 1.5% to the WM economy.

The West Midlands is a major exporting region, accounting for 8% of the UK total GDP in 2000. The region has also proved successful in attracting direct foreign investment. Throughout most of the 1990s the WM was the leader among English regions in the number of new inward investment projects reported by *Invest in UK*. In total, the region attracted nearly 2000 overseas companies to set up facilities, with the main centres being Birmingham, Coventry and Telford.

From the educational viewpoint the region has 8 universities, 4 higher education establishments and 50 "Further Education" colleges.

In recent times, manufacturing's share of regional employment has been falling, from 26.1% in 1995 to the latest available figure of 21.6%. Over the same time period, the service sector has seen its percentage share increase from 67.9% to 72.7%, with an extra 200,000 people employed. The total for the service sector now exceeds 1.5 million employees. The region's unemployed claimant count figure has fallen by 7.8% in the twelve months leading to February 2002 and by approximately 31% since May 1997.

			
Human quality resources	Network capability	Entrepreneurial inclination	Attitude towards innovation

REGIONAL BACKGROUND

More than five million people live in the West Midlands region, a rich and diverse area that embraces cosmopolitan cities, historic market towns and rural communities. This region is a major contributor to the United Kingdom's wealth and economy. West Midlands is a mature industrial region that is moving towards innovative systems of production.

In the West Midlands there are consolidated production sectors (e.g. manufacturing, automotive, banking finance and insurance, construction, etc.) and a good number of firms promoting innovative business.

Main productive areas are becoming more and more attractive since most of the major towns now have quite a nice environment to live and work in. The shift from manufacturing industry (about 20% of the working force) to a service-based economy is evident. Manufacturing and automotive industries are now being joined by high-tech.

Nevertheless, the automotive sector is still playing a very important role in the local economy (e.g. Jaguar, Peugeot, BMW, MG Rover Group, Land Rover).

REGIONAL POLICY

Regional government and devolution has become a hot topic since the UK devolution process began in 1998. In 2002 the Government published a White Paper "Your Region, Your Choice", which outlines the opportunities for devolution in UK Regions, including the possibility for fully elected regional assemblies.

In 1999, the West Midlands policies to boost local SMEs experienced a clear change in orientation. Since then regional and national policies look to support entrepreneurs with a high growth rate potential. In the past, the UK government supported early start-up enterprises for a long time. There were no encouraging results. The new strategy is looking for enterprises promoting sustainable growth and making sure that the region would benefit from their activities.

Moreover, policies send a clear message to people: entrepreneurship is a real option. There is a strong local effort to make entrepreneurship more attractive.

A set of action plans at the regional level (e.g. promoted and co-ordinated by the local Chamber of Commerce) help innovative entrepreneurs to enter the market.

First, there is a critical evaluation of SME proposals. If real innovation (good potential) is thought to be reflected in the business ideas presented a second step is taken and a plan is implemented to make sure they are brought to the market.

However, it is not a time of high economic growth, and a number of SMEs are struggling to survive and make money.

The Regional Economic Strategy focuses on four areas to create more jobs and a better quality of life for all in the West Midlands.

These are:

- Developing a diverse and dynamic business base (*supporting enterprise and innovation and securing inward investments to establish, retain and help more businesses grow in the West Midlands*)
- Promoting a learned and skilful region (*Raising skill levels to ensure the workforce meets the needs of present and potential employers of the region*)
- Creating the conditions for growth (*securing improvements for the region's transport, communication and property infrastructure to support the development of a diverse and dynamic business base*)
- Regenerating communities in the West Midlands (*Focusing resources in places of greatest need to ensure that all communities enjoy a better quality of life*).

REGIONAL NETWORKS

The ability of SMEs to create or join relational networks is one of the key factors to investigate in order to understand the possible success of a digital business ecosystem.

SMEs in the West Midlands normally have their own network where they first look for business, but they also try to look outside in order to consider other business opportunities.

Network opportunities are more strategic for SMEs working at the cutting edge of innovation and using or implementing ICTs.

It is worth remembering that information and communication technologies may not be essential for effective networking (eLive project deliverable, D3). In the West Midlands interpersonal relationships and collaboration methods may be sufficiently effective outside those sectors whose supply chain demands web-based activities.

For some SMEs it is quite easy to access networks and to understand the added value of sharing ideas and information using common platforms (they are aware that gaining a competitive edge is directly connected to the ability to share knowledge or a common platform for services). These firms are sufficiently mature to work in sophisticated and international environments.

Other SMEs have less inclination to share information deemed strategic in getting business. In this second category of SME in the West Midlands 15 or fewer people are employed, and they struggle to survive.

They have to pay constant attention to emerging risks. Most of these SMEs are on the second rung of ICT adoption. They use e-mail and have a website (normally a static one). Few of these SMEs are interested in major content systems or in e-commerce and interacting with back office systems. These SMEs are looking more for secure and reliable solutions and are not able to sustain high costs to enter complex digital systems. They are not suspicious but they need to see the benefits in working as a cluster.

There is a need to enable SMEs to compete more effectively in the market place (real or virtual). One way to do this is to have an effective ICT cluster⁵ policy. The West Midlands Economic Strategy identifies ICT as one of 10 priority business clusters where economic development resources should be targeted to help the region remain competitive.

⁵ A cluster is here meant as a grouping of companies and organisations that have economic links because they either buy and sell from each other or use the same skills and infrastructures in an area

Regional area		Principal socio-economic indicators	
Area	25.399 km ²	Employees in industry	38,1%
Density	169 inh./Km ²	Employees in services	58,4%
Administrative Centre	Torino	Unemployment	5,3%
Number of provinces	8	GDP per capita	23.635 Euros

Piemonte





The Piemonte region is located in the north-east part of Italy. Piemonte has a long tradition in the textile industry, in automotive design, and in automation. Piemonte is at the present experiencing a passage from a manufacturing industry to a service one. In the past few years, the region has invested in ICTs and sustained them with adequate policies to start up of innovative firms. The Piemonte educational system is well developed and organised. The workforce is very qualified and gives added value to the local economy.

It is worth noting that the economy of Piemonte is not only centred on industry, but also on high quality agricultural produce which have a considerable role in international markets.

The region's involvement in events promotion is also of noteworthy. Presently efforts are focused on the organisation of the 2006 winter Olympics.

The tourism sector is also quite important, it combines the richness of the landscape (Alps, hills with splendid vineyards) with cultural itineraries and a very refined cuisine.

A mature and diversified economy characterises this region.

			
Quality of human resources	Network capability	Entrepreneurial inclination	Attitude towards innovation

REGIONAL BACKGROUND

More than four million people live in the Piedmont region. With its 388,000 businesses, corresponding to 8% of the national GDP, the production system of Piedmont achieves levels of excellence in small, medium and large enterprises. Distinguishing features are the tendency towards technological innovation and a vocational model linked closely with metalworking, engineering, industry and transport sectors in which more than 30% of Piedmont's industrial enterprises are involved. The consolidated production sectors are: automotive, mechanics, textiles, computers, aerospace, automation. Piedmont is experiencing a shift from a manufacturing industry to a service-based economy.

Innovative enterprises include IT (50%), Telecommunications (16%), Mechanics-Energy (14%), Electronics and Automation (9%), Chemistry (9%), Bio-engineering (2%). It is worth noting that 95% of enterprises employ fewer than nine people and that micro-enterprises in Piedmont are the main employers.

REGIONAL POLICY

Interaction between public institutions and the private sector is very strong in Piedmont. There has always been a strong tradition of efficiency and mutual influence between these two domains. Policies to boost innovation in Piedmont are trying to bring together academic excellence, major financial powers and key players having a strong social impact on the territory. The example of high-tech industrial districts in Piedmont is significant. Implemented strategies have taken into account the added value of this interaction due to the presence of:

-
- Universities and research centres (e.g. Politecnico of Turin, Istituto Nazionale Galileo Ferraris, Telecom Italia research centre, Fiat research centre, Alenia, Motorola, Istituto Superiore Mario Boella, etc.)
- More than 6,000 enterprises working in the ICT sector
- A system of governance oriented towards providing the necessary infrastructure a high quality of life to further the deployment of innovative SMEs.

A regional law (24/97) identifies in Piedmont about 30 industrial districts according to several statistical indicators. Just one third of these can be considered highly integrated and productive. The others are in a transition phase. However, to be granted the status of industrial districts, potential districts are given the opportunity to apply for regional and national financing to sustain local productive activities.

This transition phase depends not only on the crisis of large enterprises (e.g. Fiat) that lead to regional development, in the past, but also on transformations occurring in niche sectors. Consequently, districts characterised by high rates of productivity and labour intensive work are disappearing.

The new industrial districts have a high rate of innovative projects. Through these projects there is an attempt to manage the transition.

Local policies in Piedmont focus on the growth of competitiveness through the integration of high research potential, local enterprises and venture capital.

A good example of the integration of key players (public and private) on a project is the high-tech district Torino Wireless.

The partnership in this project includes numerous important public actors such as:

- Ministry of University and research (MIUR – Ministry of Research and the University)
- Region of Piedmont
- Province of Turin
- Piedmont Chamber of Commerce
- Politecnico of Turin
- University of Turin
- Istituto Superiore Mario Boella

The participation of private sector actors:

- Industrialists Union of Turin
- Alenia Aeronautica
- Fiat
- Motorola
- ST Microelectronics
- Telecom Italia

The involvement of financial institutions:

- Sanpaolo IMI
- UniCredit

The mission of the Torino Wireless Foundation is to create and sustain the technological district. One of the priority aims of the Foundation is to guarantee synergies among actors. The district is centred on ICTs and pays special attention to the wireless sector, which impacts strongly on the regional network of innovative enterprises.

REGIONAL NETWORKS

Enterprises working in innovative sectors can find in Piedmont a well structured environment where different networks (cultural, productive, and institutional) are strongly interrelated. Universities and research centres are on the cutting edge of research in hyper-specialised sectors. This leads to a high level of competitiveness for many local firms.

Such an environment supports ICT growth and is buttressed by a solid telecommunications infrastructure (e.g. ADSL and Cable nets).

In the regional context of Piedmont, added value – especially in the innovative sectors – derives from continuous dialogue among public and private networks.

In Piedmont there are about 400,000 enterprises. Enterprises with fewer than 20 people account for 56% of regional employment. Most of these SMEs share different relational networks and play diverse roles in each of them.

In order to launch and sustain cross-cutting networks - including both institutions and SMEs – a set of regional, national and community policies are in place.

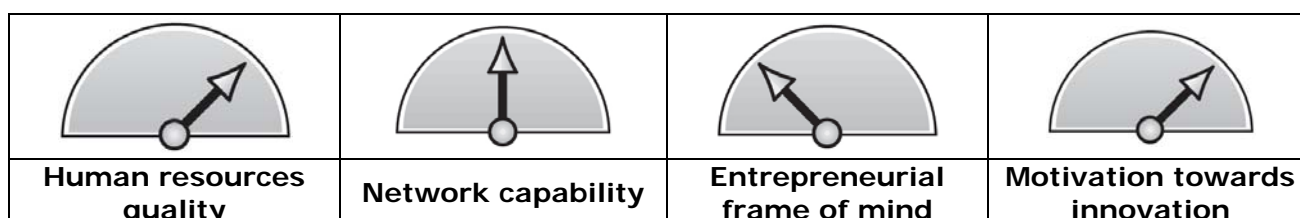
A decisive role in creating and sustaining networks has been played by the Unified Programming Document (DOCUP). The Piedmont DOCUP is a planning instrument for industrial areas. Through the implementation of the first DOCUP agreements (1994-1999), the Piedmont region was able to start up a range of actions aimed at exploring how to promote the Information Society. One of the most significant outcomes has been the strengthening of relationships between Piedmont and other European regions and the creation of new networks. At present, the DOCUP 2000-2006 is working to consolidate implemented initiatives (e.g. technological parks, SME incubators, R&D projects, development of new telematic services).

Regional area		Principal socio-economic indicators	
Area	47719 Km ²	Employees in industry	36,40%
Density	25,51/Km ²	Employees in services	56,10%
Administrative Centre	Zaragoza	Unemployment rate	7,30%
Number of municipality	710 and 3 sub-regions	GDP per capita	16.316 Euros

Aragon

The region of Aragón is characterised by a genuine interest for innovation and ICTs. Even though the industrial sector is still strong, the region is looking for funding to take its place in the Information Society. The following section will briefly describe the present state of affairs in Aragón.

The centrality of the Regional Government has to be pointed out as the starting point of our analysis. In fact, the Aragonian government through several of its agencies plays an important role in promoting, financing and monitoring innovative plans and activities. Two other important points are: 1) the particular geographic configuration of the region and 2) the size and quality of the skilled work force. In a region with an ageing labour force we found an elevated number of highly qualified young adults that leave the region in order to find a proper position in the labour market. Improving the job prospects in the region is one of the main objectives of regional policies. DBE can play an important role in this scenario.



REGIONAL BACKGROUND

The Aragón region is characterised by a mature and concentrated industrial sector. The most relevant sectors: automotive industry (General Motors-Opel España), energy resources, metallurgic sector, machinery and electrical materials, make up 70% of both the gross regional product (GRP) and the employment rate. The automotive industry employs over 18.000 workers and forms 32.79% of industrial product. Construction has a major global effect on the economy and its importance is growing. The contribution of the service sector as a whole, to the GRP is 56% and is almost the same for employment rates. These percentages are inferior to the national average.

The passage from a secondary sector industry to a tertiary sector industry is less pronounced than in other European regions. In fact, several interviews conducted in the region underscored the true development opportunities in the industrial sector. One of the objectives in using new technologies is to reinforce the manufacturing sector while opening new productive domains.

Telecommunications, that is mobile phone services, digital television providers and software producers are the subject of growing importance which can be defined as a minority but not a marginal group.

Aragón is situated at the geographic centre of a hexagon formed by Madrid, Valencia, Barcelona, Toulouse, Bordeaux and Bilbao. For this reason, from a logistics perspective, Zaragoza is a key city of south-eastern Europe. In a 350 kilometre radius from Zaragoza resides 60% of the Spanish population and 80% of the country's GDP is produced (ITA, 2004). The Plaza project is going to optimise this strategic position by developing a reference centre for the logistics of the manufacturing sector's distribution network.

The University of Zaragoza and its Polytechnic represent a strong point for the region. An indication of its importance can be seen in the leadership position assumed by this university in the European R+I+D programs and the position (N.6) in the Spanish University League.

The University of Zaragoza offers a wide range of support services for research, such as engineering, science, agro-food, and economics laboratories. In 1989 the University established the OTRI unit (Technology Transfer Office) whose aim is to encourage relations with companies on R&D projects and managing international R&D programmes.

From the interviews the centrality of this kind of initiative (universities-SMEs collaboration) arose clearly, nevertheless a more numerous and formalised collaboration pattern seems to be possible.

Finally, the infrastructure level has to be taken into consideration. The vastness of the regional territory, its low density and its heterogeneity are accompanied by difficulties with the supply of high-tech infrastructures. A big effort is put towards surpassing this limit and the success of this goal is a prerequisite for future regional development. The DBE project can play a strategic role in becoming a *raison d'être* in achieving full connectivity.

REGIONAL POLICY⁶

Beforehand we must recognise the newness of the regional autonomy. We must remember that a few years ago all the policies in Spain were centralised. Therefore, the situation that we now find in Aragón is one of evolving changing.

The regional policy in the field of innovation has the law of *science (La Ley de la Ciencia)* as a starting point. This law signs the scope of regional planning and it's transferred on the territory through two innovative plans. The region is now implementing the second and most important plan. Key projects - gate to the future projects - in this frame are: 1) Plaza project; 2) Goya Project (Improving the vigour of the cultural capital); 3) Digital Media; 4) Savia; and the on-going experience of 4) Walqa Technology Park.

- Plaza (Plataforma Logística de Zaragoza) will be a firm dedicated to the logistics park implementation. It will be an 11-million square-meter complex of distribution centres, warehouses, transportation, dry port and intermodal services Inside of the logistics park, the government is also creating the Zaragoza Logistics Centre (ZLC), an international centre for education and research in logistics and supply chain management. The board of directors of the new Centre will include representatives of MIT, the University of Zaragoza, the Government of Aragón and the companies in the logistics park.
- The mission of the Savia project and its sub-projects is to enlarge and reinforce the enterprises of Aragón. In other words to modernise and improve the quality of regional business. From one standpoint the project is looking to empower local SMEs and from another standpoint it also wishes to attract large firms. Technological updating is one of the principal instruments of the project.
- Savia is a venture capital project in which the Aragón government and Ibercaja (a financial institution) are the principal actors. It shows a regional movement toward more complex governance models.
- Walqa Technology Park's principal aim is to become a pole of innovation and R&D, especially in the field of communication technologies, Internet and electronic commerce⁷. Walqa is an initiative of the General Council of Aragón, through the ITA (*Instituto Aragonés de Fomento*) and Town Council of Huesca. Today the park is extremely vital and could become, in the near future, a magnet for large firms and a catalyst for the enterprises already present. The park is an important actor in regional networking and is leading a cluster strategy able to reinforce the new initiatives in the ICT and Communication sectors.

Regional aims can be summarised as follows: increasing the supply & demand of services and technological products by improving infrastructure. In doing so, striving to enlarge the regional labour market and reducing territorial disparities. In this frame, DBE projects can play a central role in the endorsement of SMEs.

⁶ In this paragraph we take into consideration the programmes that have changed the regional situation in the innovation field (key programs), but we also want to focus our attention on the on-going projects and new ideas that are circulating in the region. Two reasons uphold this approach: 1) it is important to know where and how the innovation process starts and 2) it is crucial to understand which are the on-going projects that can interact with DBE. By this we mean that projects can become part of the DBE scenario, compete with it and become users of DBE.

⁷ The main sectors of interest are the following : telecommunications, R&D centres, computing, software and hardware development, multimedia, communications, advanced services to ICT companies, and audiovisuals.

Key regional development players are:

- Aragonian Government
- Technological Institute of Aragon (ITA)
- Research Department of the Aragonian Government
- University of Zaragoza
- OTRI-University of Zaragoza. *Oficina de transferencia de resultados de investigación.* (Agency for the transfer of research results)
- European Centre for Business Innovation (CEEI) - Aragon
- *Parque Tecnológico Walqa* (Walqa Technology Park) - Heusca

REGIONAL NETWORKS

As we already mentioned Aragón is characterised by a high number of small and very small firms, few of which have a high level of ICT adoption and innovation. Previous networking experiences such as AVALOR meet the approval of entrepreneurs and gave positive results. We can say that there are networking prospects but they require start-up initiatives from local public actors. SMEs need a good reason in order to work together and a motive for sharing information. Reluctance to networking is linked with a short forecasting period and with the fear of losing time, as well as independence. In addition to these are the fears of being copied and of losing competitiveness.

Amongst the government agencies and SMEs we can find vital actors such as ITA, CEEI and the University of Zaragoza. From a certain perspective, the role of the ITA can be considered as crucial. A part from collaborating in regional innovative projects, ITA works with several enterprises representing their R&D offices for them. With this mission, it is one, if not the major subject of regional collaboration between government agencies and the microcosm of SMEs.





The University of Zaragoza has an array of academic disciplines, but is mostly dedicated to "hard sciences". There are some research groups formed within the university which are in contact with development agencies, incubators, technological centres, technology parks, as well as with Aragón SMEs. These collaborations appear to be an important improvement.

Area	14292 Km ²	Employees in industry	32,8%
Density	31,80 inh./km ²	Employees in services	62,0%
Administrative Centre	Tampere	Unemployment rate	--
Number of municipality	33 municipalities and 6 sub-regions	GDP per capita	23.395 Euros

Tampere

The Tampere region of Finland is an internationally renown leader in the innovation sector and in development of the Information Society. The region has been able to reinforce their industrial sector that characterised its socio-economic history and identity through the new technologies. Tampere has developed in parallel to its industrial sector a clustering strategy in the ICT sector. The high level of participation and long-term planning are key factors that make the regional government's development policy a success.

While the regional scenario is positive, there an underlying conscience of the high risks involved in this new sector. The "China effect" is one of the recurring terms used during interviews. Because of its strong interconnection with the global market Tampere, more the other regions, see the risks coming from the rapidly changing reality of the world wide competition. The efforts at the level of governance are now concentrated in preventing those risks and the DBE has to find its place in future planning efforts.

			
Quality of Human Resources	Network capability	Entrepreneurial frame of mind	Motivation towards innovation

REGIONAL BACKGROUND

Tampere's socio-economic history is characterised by rebirths: leader of the industrial sector since the 1900's and pioneer in the ICT sector since 1960's. The region has been able to renew its productive sectors in accordance with global market trends. When a productive sector begins to decline, new sectors have always been developed; from textile to metal, from metal to ICTs, from research in the field of ICTs to daily applications. The 1990's crisis represents a turning point in regional planning towards innovation. A strategy of clustering and micro-clustering has been used and it has been accompanied by planning for a real information society able to better, thanks to new technologies, quality of life. Tampere's strengths are a lively interaction and a strong tendency towards networking between industry and research centers. Area of specialisation are:

- ICTs
- Health & biotechnology (e.g. BioneXT Project)
- Machinery assembly and automation
- Metalworking, mechanical engineering and automation
- Electrical engineering and electronics
- Pulp & paper, printing & publishing
- Textiles, clothing, leather goods & footwear
- Food & drinks
- Construction

The Tampere region finds its development potential in two Universities (Tampere University of Technology and the University of Tampere), two polytechnics and four Science Parks linked to the private sectors and local government. Examples of product development from the knowledge-intensive companies are biodegradable implants, communicators and forest machinery.

The Tampere Region is the principal centre for R&D in the country after the Helsinki conurbation, accounting for 13 to 15% of national expenditures on both private and public-sector R&D. The presence of a considerable number of well-know ICT enterprises cannot be ignored as factor of positive impact.

The majority of manufacturing firms are operating in the international level and for this reason local actors are well aware of the possible impacts of global economics. The largest employer in the region is Nokia, but it is accompanied by numerous other world leaders such as Kalmar Industries, Metso Minerals, Tamglass and others. Next to these firms we can find a large agglomerate of small enterprises.

REGIONAL POLICY

Regional networks are very mature in Tampere. As we have seen, there are several local actors. Between the local and regional and the microcosm of subjects and SMEs, we find both private and public institutions that act as magnet for innovation initiatives. The regional policy proceeds by a regional innovation plan: "This indicates the goals, objectives and focal areas for development. The regional plan serves as a guideline in decision-making at regional, sub-regional, and municipal level and is of help in the allocation of resources for the achievement of objectives defined together" (The Council of Tampere's website).

Innovation strategies are, in this way, structured, systematic and able to involve numerous actors. The on-going eTampere project can be used to illustrate this kind of governance pattern. It can also clarify the way in which ICT is now seen in this region.

eTampere is a five-year programme (2001-2005) with a budget of 132 million € of which 20% (seed funding) came from the City of Tampere. The maturity of the ICT sector, now pushes local actors to changeover from a technology oriented development strategy to a 'quality life' and human oriented one. Final aims are to build a competent business environment and at the same time to improve the quality of life.

It is not by chance that one of eTampere's slogan is: "*The technology-oriented stage is over. Citizens want information and applications that make their lives simpler and better. Here and now, not just in the future*". The particularity of Tampere's governance relies not only on the numerous actors but on a high level of collaboration for planning regional strategies. The complexity of the decision making mechanism and the fluidity of the role that each actor can play are also important attributes.

By way of illustration, we refer again to the eTampere programme. Below is the list of participants:

Partners

- City of Tampere
- University of Tampere
- Tampere University of Technology
- Tampere Technology Centre Ltd
- VTT:Technical Research Center of Finland

Partners in co-operation

- Polytechnics and other Educational establishments
- Centres of Expertise
- Enterprises
- Associations
- Surrounding municipalities
- International partners

REGIONAL NETWORKS

As we mentioned the regional network capability is really high and well recognised within and outside the region. What is not included in this picture is the branch of small and very small enterprises that are not working in the ICT sector. We find here some of the common problems in working with SMEs. The size of the business is an import variable for its participation in the regional network. In this respect, DBE could play an important role. One particular aspect which arose from interviewing locals is the shortage of time that entrepreneurs have to face. The motivation toward ICT tools could be present but the management structure of the SMEs and the overlapping roles in daily operations cause a lack of networking capability.

We already mentioned the openness to global-markets as a characteristic of Tampere's economy. In a period of risk, such as the present one, a strong point can become an obstacle to future development. It is for this reason that, as in Aragon, growing attention has been focused on the necessity of attracting large firms. The attention to quality of life in the present regional planning can be seen as a possible strategy in order to achieve these goals.

Appendix B: quantitative and qualitative indicators

Indicators: Definitions and Sources

Quantitative indicators

SMEs ICT development

1. Percentage of enterprises having access to the Internet (All enterprises). Percentage calculates all the enterprises with more than 10 people employed Source: Eurostat, Information Society statistics, 2002 (national data)
2. Percentage of enterprises having access to the Internet (Small enterprises) Are considered Small enterprises that unit with 10 to 49 persons employed. Source: Eurostat, Information Society statistics, 2002 (national data)
3. Percentage of enterprises' total turnover from e-commerce (All enterprises) Percentage of annual turnover given by e-commerce usage. The percentage is here calculated for all the enterprises with more than 10 people employed (national data) Source: Eurostat, Information Society statistics, 2002
4. Percentage of enterprises' total turnover from e-commerce (Small enterprises) Are considered Small enterprises that unit with 10 to 49 persons employed. Source: Eurostat, Information Society statistics, 2002 (national data)
5. Organizational modification introduced by the use of tools considered.
6. Attitudes towards use of tools.
7. Effectiveness use and comprehension of the potential of ICT tools.

Social capital⁸

1. Incidence of bottom up initiatives.
2. Incidence of top down initiatives.
3. Number of actors and subjects operating in local development.
4. Quality of actors and local development.
5. Capability of actors and subjects in building relation networks.

⁸ Qualitative indicators are explained in the second part of this appendix

Regional Innovation Capability

Human Resources

1. Population with tertiary education. Number of persons in age class 25-65 with some form of post-secondary education. This is a general indicator of the supply of advanced skills. It includes the entire working age population. Note: International comparisons of educational levels are notoriously difficult due to large discrepancies in educational systems, access, and the level of achievement that is required to receive a tertiary degree. Therefore, differences among countries should be interpreted cautiously." Source: EUROSTAT: Labour Force Survey,
2. Participation in life-long learning. Life-long learning is defined as participation in any type of education or training course during the four weeks prior to the survey. It includes initial education, further education, continuing or further training, training within the company, apprenticeship, on-the-job training, seminars, distance learning, and evening classes. The data refer to population in all age classes between 25 and 64 years inclusive. Note: All types of learning are valuable, since it prepares people for "learning to learn". The ability to learn can then be applied to new tasks with social or economic benefits. The limitation of the indicator to a brief window of four weeks could reduce comparability between countries due to differences in adult education systems. Source: EUROSTAT: Structural indicator
3. Employment in medium high & high tech manufacturing Number of employed persons in the medium-high and high-technology manufacturing sectors. These include chemicals (NACE 24), machinery (NACE 29), office equipment (NACE 30), electrical equipment (NACE 31), telecommunications and related equipment (NACE 32), precision instruments (NACE 33), automobiles (NACE 34), and aerospace and other transport (NACE 35). This data are calculated above the total workforce includes all manufacturing sector. Note: The percentage of employment in medium-high and high technology manufacturing sectors is an indicator of the share of the manufacturing economy that is based on continual innovation through inventive activity. Source: EUROSTAT: Labour Force Survey.
4. Employment in high tech services Number of employed persons in the high-technology services sectors. These include post and telecommunications (NACE 64), information technology including software development (NACE72), and R&D services (NACE 73). This data are calculated among the total workforce includes all manufacturing and service sectors. Note: The high technology services both provide services directly to consumers, such as telecommunications, and provide input for other economical sector. The latter can increase productivity throughout the economy and support the diffusion of a range of innovations, particularly those based on ICT. Source: EUROSTAT: Labour Force Survey.

Knowledge Creation

1. Public R&D expenditure. Difference between GERD (Gross domestic expenditure on R&D) and BERD (Business enterprise expenditure on R&D). Both GERD and BERD according to Frascati-manual definitions, in national currency and current prices. This definition is a proxy of public R&D expenditures as it also includes the R&D expenditures from the Private Non Profit (PNP) sector. Note: In addition to the production of basic and applied knowledge in universities and higher-education institutions, publicly funded research offers several other outputs of direct importance to private innovation: trained research staff and new instrumentation and prototypes. Source: EUROSTAT: R&D Statistics. OECD: Main Science and Technology Indicators.

2. Business R&D expenditure All R&D expenditures of the business sector (manufacturing and services), according to Frascati-manual definitions, in national currency and current prices. The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sectors (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories. Source: EUROSTAT: R&D Statistics. OECD: Main Science and Technology Indicators.

3. EPO patent application Number of patents applied for at the European Patent Office (EPO), by date of filing. The national distribution of the patent applications is assigned according to the address of the inventor.
Source: EUROSTAT: Structural indicator II.5.1.

4. EPO High tech. patent applications
Number of patents applied for at the European Patent Office (EPO), by date of filing. The national (and regional) distribution of the patent applications is assigned according to the address of the inventor. The high technology patent classes include (see Annex A for a full list of IPC subclasses): 1) Computer and Automated Business Equipment: B41J, G06, G11C; 2) Micro-organism, genetic engineering: C12M, C12N, C12P, C12Q; 3) Aviation: B64; 4) Communications: H04; 5) Semiconductors: H01L; 6) Laser: H01S.
This indicator complements indicator 2.2 on business R&D in that patenting captures new knowledge created anywhere within a firm and not just within a formal R&D laboratory. The indicator also measures specialisation of knowledge creation in fast-growing technologies. For some countries the absolute numbers of high-tech patent applications are so small, that the relative level of performance is both close to zero and highly unstable over time. For these countries overall patent performance (cf. indicator 2.4.1) might be a better proxy for relative performance.
Source: EUROSTAT.

Transmission of Knowledge and Market

1.Share of innovative enterprises (M)

Shows the regional spread for the share of manufacturing enterprises involved in innovation. Due to the experimental status of the regional CIS-2 data¹¹, all results should be interpreted with care, especially for country such as Spain and Italy.
Source. European Innovation Scoreboard 2003 – Technical Paper No 3: Regional innovation performances

2.Share of innovative enterprises (s)

See the definition of the above indicator, the realm of reference in that of Service sector.

3.Innovation expenditures (m)

Sum of total innovation expenditure for all manufacturing enterprises.
Innovation expenditures includes the full range of innovation activities: in-house R&D, extramural R&D, machinery and equipment linked to product and process innovation, spending to acquire patents and licenses, industrial design, training, and the marketing of innovations.
Denominator: Total turnover for manufacturing/services. This includes firms that do not innovate, whose innovation expenditures are zero by definition.
This indicator measures the total innovation expenditure as a percentage of total turnovers. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas.
Source: EUROSTAT: 3rd Community Innovation Survey (CIS-3). National sources.

4.Innovation expenditures (s)

See the definition of the above indicator. The realm of reference here is the Service sector

5.Sales of "new to the firm but not new to the market" products

Sum of total turnover of new or significantly improved products to the firm but not to the market for all manufacturing/services enterprises calculated above the total turnover for manufacturing/services.

All enterprises with 10 or more employees are included.

Source: EUROSTAT: 3rd Community Innovation Survey (CIS-3). National sources.

Qualitative indicators

In evaluating complex and qualitative variables such as “incidence of bottom up initiatives” we should consider a relevant amount of diverse factors and average them. In giving a value judgment on the qualitative variables we should consider the different factors influencing them.

In defining the complex variable *“incidence of bottom up initiatives”* the factors considered are:

- The engagement in making and promoting policies.
- The influence (cultural, political, economical) that local actors and subjects have at local level.
- How structured is the network of local actors and subjects. The structure refers to the diversity of actors and subjects (universities, political & cultural associations, Chambers of Commerce, associations of entrepreneurs, research centres, stakeholders, and grass root movements).

In defining the complex variable *“incidence of top down initiatives”* the factors to considered are:

- Number and quality of policies promoted by central levels of governance (regional, national, EU)
- The capability of these institutions in managing the implementation of the policy processes
- The capability of these institutions in designing adequate policies and in coordinating them at local level

In defining the complex variable *“quality of actors and subjects operating for local development”* the factors considered are:

- The quality and the effectiveness of networks at the local level (municipalities, cities, neighbourhoods).
- The level of training and the motivation of people involved in local networks.
- At local level, the capability in coordinating and managing the different policies and financing coming from upper levels of government.

In defining the complex variable *“capability of actors and subjects in building relational networks”* the factors considered are:

- The capability in establishing external relations (economical, political, cultural and social)
- The capacity to create networks (not just dialogues at the local level).
- The attitude of actors and subjects in sharing information and knowledge (Looking for cooperative behaviour and not just competitive).

Other qualitative variables used in the social matrix on ICT development are:

- Efficiency of ICT use.
- Comprehension of the potential of ICT tools.
- Organizational modification caused by use of ICT tools.
- Attitudes towards the use of ICT tools.

Efficiency of ICT use: this variable measures if the use of ICTs in SMEs are implemented in an efficient way. Often software and hardware are underused or misused. Results achieved towards better use of high tech tools are usually under the real potentialities.

Comprehension of the potential of ICT tools: Often high tech tools are used in a manner other than the one conceived. This variable tries to measure how the tools chosen are adequate in achieving tasks.

Organizational modifications caused by use of ICT tools: This variable tries to give a value to the change led by ICTs in the internal organisation of companies. That is in the management of companies.

Attitudes towards the use of ICT tools: This variable gives a numeric value to a qualitative variable. It is not an easy task and can strongly influence all the subsequent steps of the logical process. It is important in transforming such qualitative concepts to use "common sense".

Appendix C: DBE interview outline

Background information

1. How would you describe the organization you are working in?
2. When did this organization first start to operate?
3. How many years have you worked with the organization?
4. What is your position within the organization and how long have you held it?

PART A

A - Regional general situation

1. How would you describe the current regional economic situation?

Please highlight the following aspects: ICT Infrastructure and skills, level of investment in human capital, standard of collaboration. Economic dynamism, inclination to innovation, etc... in terms of:

- Main obstacles to development
- Main strengths for future development

(Ask the interviewee to give concrete examples and solutions)

2. If you could work out a local innovation plan or an action plan, how would you structure them? (*Identify specific strategies without time and resource bonds*). Can you describe it in detail? How would you update it? What would you focus on? What instruments would you use? Which local institutions would you involve (*innovating companies, associations, universities, etc*)?

B - Regional development and innovation policies. Levels of governance

1. What policies and initiatives have encouraged innovation and development in your region in recent years?
2. What bodies are most important in promoting policy (describe the nature and the mission for each)?
3. What processes led to the definition of the policy?
4. What do the policies address?
5. What are the instruments and the expected actions?
6. What are the current results?
7. How would you rate the level of collaboration between enterprises and national and regional government, regional development agencies, local area networks, local industrial groupings, universities, NGO's and non-profit organisations, etc...?
8. Among local actors, which are the driving forces behind the spread of innovation? Why? What role do they play? How?

C – Enterprises

1. How do you rate local entrepreneurial attitudes towards, and willingness to, innovate? Please discuss:
 - Obstacles
 - Business ICT infrastructure and skills
 - Training and skill needs
 - Investment in research and development
 - Use of e-business instruments (company web site, e-commerce activities, electronic business processes between companies, participation in electronic B2B marketplaces, use of special e-business software, etc...)
2. What metaphor would you use to describe business attitudes towards innovation?

D - Human resources

1. Does your region have a shortage of qualified human resources?
2. How attractive is your area for skilled workers drawn from other regions?
3. What is the level of mobility in the area? How and how often do individual workers move from one economic sector to another? What are the vertical and horizontal mobility standards? And between the public and private sector?

E - The role of DBE in local development

1. Could local ICT-based initiatives gain consensus from local business leaders? Why?
2. What role could ICT play in local development?
3. What role could ICT play in local governance?
4. What role could ICT play in improving human capital?
5. What areas of SME competitiveness could be affected by greater use of e-business and ICT?
6. What could facilitate uptake of ICT by SMEs in the area
7. How would you picture your area in 2015-2020? How do you picture the development in the leading sectors?
8. What positive and negative features will they reflect (*in terms of innovation technology, training, skills improvement, integration, cooperation, and internationalisation*)? Who will be the leading actors respect to the local SMEs, small size investors, etc?

F. The role of the regional catalyst

1. If you have to welcome a regional catalyst of a new entry region, what will you tell them they need to have the DBE working?
2. What are the criteria in selecting SMEs for joint the DBE? What kind of SMEs you see as drivers, as users, as discoverers, as implementers?
3. What are the methods you are using in order to attract SMEs attention and collaboration? Are you working with other subjects in order to achieve this goal? If yes, with who?
4. What kind of behaviours do you meet working with SMEs on DBE? What are their attitudes, their wills and their aspirations?
5. In which way pre-existing network play (or do not play) in DBE building process? How do SMEs propose (or not) to activate their personal network in the realm of DBE?
6. What are the short/medium-period effects do you aspect from the DBE implementation?

Part B – Questionnaire*Innovation leadership*

Network analysis reveals informal organisation, leadership, internal cohesion and the intensity of relations within a network. Applied to a local economy, it highlights relations between institutional actors and the business environment, revealing driving forces behind local development.

1. Name up to three local points of reference for important information or advice for your organisation (e.g., training institutions, university, trade associations, consultancies, professionals, local agencies...)

Local reference points

1.
2.
3.

2. Name up to three businesses and actors you consider innovative.

Businesses

1.
2.
3.

Local actors

1.
2.
3.

3. Point out at least three companies you have worked in the last 3 years and the type of collaboration (in order of relevance)

<i>Companies</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

<i>Local Institutions</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

4. If you had to create a local network to spread technological innovation and reinforce local competitive ability whom would you collaborate with? Name up to three for each category

Businesses

1.
2.
3.

Local actors

1.
2.
3.

5. Considering the SMEs you have already involved in the DBE project, how would you describe their social networks?

6. Who are the drivers? Who are users, who the implementers, who the discovers? Describe, in a word, their attitude toward DBE

<i>Drivers</i>	<i>Attitude</i>
1.	
2.	
3.	

<i>Users</i>	<i>Attitude</i>
1.	
2.	
3.	

<i>Implementers</i>	<i>Attitude</i>
1.	
2.	
3.	

<i>Discovers</i>	<i>Attitude</i>
1.	
2.	
3.	

7. Please, try to describe the network SMEs were engaged in before entering the DBE project? The drivers SME work with (name up to three actors for each type):

<i>Local Institutions</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

Other SMEs

1.
2.
3.

The implementers SME work with (name up to three actors for each type)

<i>Local Institutions</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

<i>Other SMEs</i>
1.
2.
3.

The users SME work with (name up to three actors for each type)

<i>Local Institutions</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

<i>Other SMEs</i>
1.
2.
3.

The discoverers SME work with (name up to three actors for each type)

<i>Local Institutions</i>	<i>Type of collaboration</i>
1.	
2.	
3.	

<i>Other SMEs</i>
1.
2.
3.

8.How would you describe the network DBE project is building? How do pre-existing networks play in the new environment? Which is the role of the regional catalyst inside this network?

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