



Digital Business Ecosystem

WP27: SME Engagement

Task B41

*Deliverable 27.5: **Territorial Social Capital and User SMEs***



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Introduction

This report represents the second stage of our previous research on Territorial Social Capital and driver SMEs (Del.27.1). It aims to describe the SME engagement process, but more generally, the DBE local implementation from the particular point of view of Social Capital. Using as prominent research technique the Social Network Analysis (SNA) we described, in the first survey, the relationship among RCs, local actors and Driver SMEs at the beginning of the DEB implementation; in this second stage we took in consideration also Implementers SMEs and available users. Others information about actors' characteristics (innovation attitude, ICT usage and collaboration mind-set) have been considered in order to improve understanding of the context. More specifically, in the present deliverable we wish to describe how the process of DBE implementation took place and to what extent the knowledge achieved can be used in other territories (i.e. for transferability purposes).

The first survey provided the Consortium with a description of the relational infrastructures between actors in the three partner regions; it has been useful for defining the context in which those actors operate, and described – at the same time - the actor's characteristics. The first survey also indicates some important local stakeholders that should be included in the DBE implementation strategy in order to sustain the ecosystem grow and assist it to become self-sustaining.

In this second survey we will describe how the ecosystem has grown thanks to the SME implementers' engagement and what possibilities these suggests for the future.

Social capital, in fact - defined as “the sum of resources, actual and virtual, that accrue to an individual or a group by virtue of possessing a durable network [...] of mutual acquaintance and recognition” (Bourdieu, 1980:22) – gives us the possibility to envisage future growth or, at least, orient possible future actions that will enable DBE sustainability. By recognising the already existing relational networks we can recognise the possibility of including those networks in the ecosystem itself.

Key questions of both the surveys are as follows:

- Is the DBE in a position to reinforce pre-existing social networks?
- Is it able to build up new links?
- Does it have what it takes to promote collaboration amongst local actors in order to boost their levels of social capital?

Besides this, in the context of DBE project, the surveys represent the background for an interesting collaboration between natural science domain, social scientists and Computer Science researchers via the Simulator EVESIM. The EVESIM acts here as a kind of middleware between Natural Science and Social Science. According to Linthicum (2003), in fact, middleware is:

“a Software that facilitates the communication between two applications”

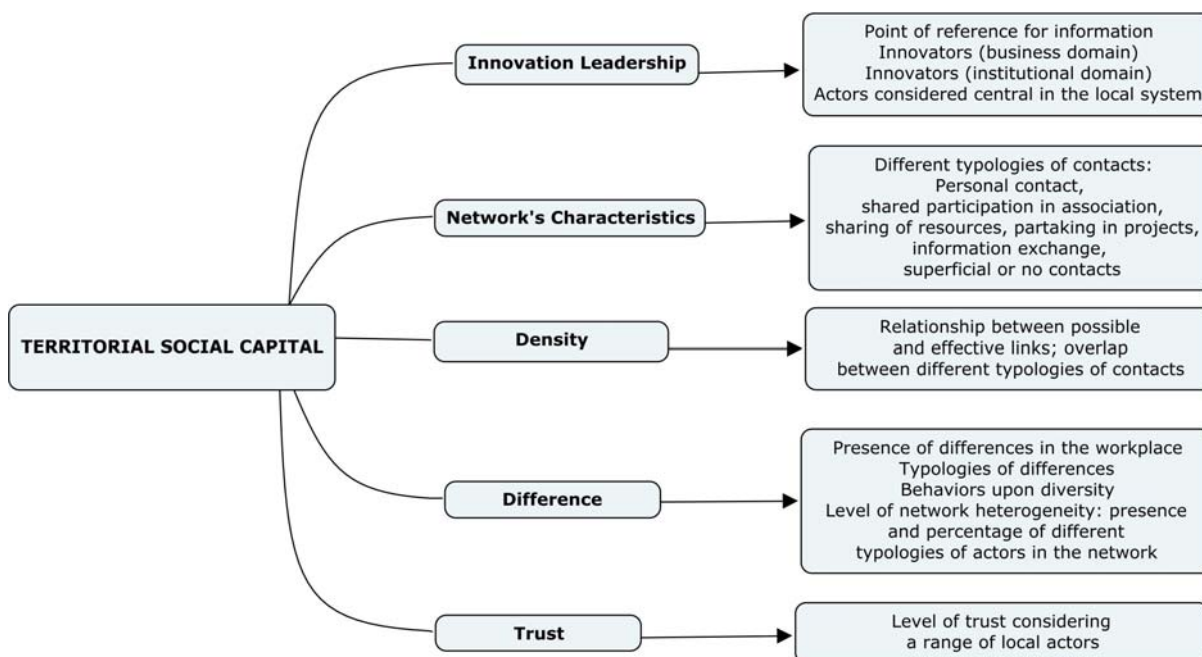
In our case EVESIM is the piece of software which facilitates the communication between the "applications" Natural and Social Science. That does not solve all issues of communication but it represented a starting point of how different areas of science can collaborate and take advantage of each other. The process and first outputs of this collaboration are presented in a dedicated chapter.

In the following paragraph, we'll briefly describe the methodology used and the research process; for a wider theoretical approach to social capital in the context of DBE please refer to Del.27.1.

1. Research framework: update and development of the previous survey

The first survey, documented in D27.1, took into consideration different dimensions of territorial social capital concept, as the figure below shows. Those dimensions have been used for comparing the three partner regions (Aragon, West Midlands and Tampere) and describing possible differences and points of contacts among different approaches to SMEs engagement.

Fig.1 Operationalisation of social capital concept in the first survey



Source: Censis, 2005

Both the first and the second surveys are based on semi-structured interviews. In the first round we interviewed, in each territory, the RC and all the Drivers SMEs. The majority of the interviewed were face-to-face interviews, but in some case, in order to reach all the Drivers, we used also auto-administrated interviews trough e-mail. With reference to the second round, we interviewed as much Implementer and users as possible (interviews were face to face in Aragon and West Midlands and auto-administrated in Tampere). The approaching of project's end and some delays in the engagement process make impossible to interview all the involved SMEs, and this have to be taken in consideration were reading SNA results. 'Real' networks, in fact, are for sure more complex and wider of what here emerged, because more actors are already implied. We envisaged how the three RCs were widely recognised as important points of reference at the local level, and in their role as innovation leaders. This high level of social recognition has shown to be one of the most important factors in sustaining the DBE implementation at local level (please see also Del.31.6 and del.27.1). Innovation leadership together with level of 'difference'¹ and level of 'trust' gave us important information about the context in which the DBE implementation was taking place.

This information has been useful to the DBE project for identifying which actors could considered to be innovators so as to engage these actors in the role of opinion-leaders

¹ With the expression 'level of difference' we explored two main dimension, on one hand we analyzed the level of difference (in term of gender, cultural background, age, political orientations and so on) inside each enterprises; on the other hand we described the difference at a network level, i.e. the presence and the proportion in each network of different actors. Main actors' typologies explored were: SMES, local intermediate actors (such as University, Chamber of Commerce, Entrepreneurial Association, Incubators, etc), local, regional or national government bodies, venture capitalist and banks

and sponsors of the project itself. Meetings with different kinds of local actors, in fact, have been performed with important outputs in all the three regions but particularly in West Midlands. The theme of trust, then, gave us another important input into understanding the territorial situation and recognising, again, those actors which, more than any others could act as DBE sponsors thanks to their social recognition. Interesting differences emerged among the three territories with reference to this dimension of trust for different local actors.

The actors included as options were the following:

- Local government
- Central government
- Local development agencies
- Local entrepreneurs
- Research centres
- Universities.

We asked to interviewed to assign a score from 1 to 5 indication with 5 an high level of trust and with 1 a very low level of trust. The range of answers given was wider in the West Midlands than in Tampere or Aragon, and, moreover, Drivers in the West Midlands appear to have more extreme views with respect to local stakeholders, with ratings ranging from 1 to 4 compared 2 to 5 in Tampere and Aragon. Amongst the actors, the highest scores in West Midlands are for local entrepreneurs. It is important not to generalise excessively about results that, after all, are qualitative and come from a limited numbers of interviews (please see tab.2),. That said, taking into consideration that the opinions expressed about local actors can be important in remaining acutely aware of possible scepticisms in terms of co-operation with different actors. At the present stage, those outputs are particularly interesting, in fact the three regions implement the DBE at local level following similar but not homogeneous paths, and in West Midlands the role of local entrepreneurs has been more important if compared with that of Aragon in which the government level have shown to be more promising (and reach higher level of trust then in Tampere of West Midlands). Those outputs have been generally confirmed in the second round survey.

The level of difference - here defined as difference in term of gender, cultural background and political orientation in each SMEs - was so low in our first survey, i.e. do not represent an intervenient variable, that we excluded it from the second round survey. Consequently, the second round survey's focus has been on 'network characteristics' dimension, 'density' and network topology, i.e. the shape of the network itself as a gate through the process understanding. Those three dimensions, in fact, give more interesting outputs in term of process interpretation.

1.1. Different typologies of relationships

Interviewees (tab.2) were given the opportunity - both in the first and in the second round survey - to provide more than one answer for each relationship, meaning that SMEs may indicate different types of contacts for the same actor. Relationship typologies included in the survey were the following:

- personal contact (I know him personally, not only for punctual work issue)
- participation in association or institutional group (can be entrepreneurial association, group of interest, consortia, etc...)
- sharing of information
- sharing of resources
- partaking in common project
- superficial recognition (I know them but have not contact with him)
- no relationship (I don't know them)

In fact, an SMEs implementer can share information with an intermediate actor, such as a Chamber of Commerce, and develop with him also a common work project. Overlaps of this nature, when they occur, are very interesting because they can function as a tool with which to measure network density and link strength. Indeed, as Portes (1988) has stated, “an intrinsic characteristic of social capital is that it is relational. Whereas economic capital is in people’s bank accounts and human capital is inside their heads, social capital inheres in the structure of their relationships. To possess social capital, a person must be related to others, and it is these others, not himself, who are the actual source of his or her advantage” (Portes,1998). In short, social capital exists only when it is shared. But is not simply a matter of the extent to which people are connected to others, but the nature of those links. For this reason we included different kinds of relationship basing this choice on the hypothesis that benefits may grows when the link’s strength grows. Beside the nature of the link, it’s also important to consider with whom this relationship exists. Some actors, for their institutional role, for their centrality, or simply for the high level of social capital their have, can offer more opportunity as a partner than another.

In recent years, some scholars have proposed an additional conceptual classification called "linking" social capital (Woolcock 1999; World Bank, 2000) that describes exactly this kind of relationship. This dimension refers to a given individual's ties to people in positions of authority, such as representatives of institutions, public (police, political parties) and private (banks) alike. Whereas the operation of bridging social capital is, as the metaphor implies, essentially horizontal (that is to say, it connects individuals of more or less equal social standing), linking social capital is more vertical, connecting individuals to key political (and other) resources and economic institutions - in other words, across power differentials. Importantly, it is not the mere presence of these institutions (schools, banks, insurance agencies) that constitutes linking social capital, but rather the nature and extent of social ties between such different actors. Defined as such, access to linking social capital is demonstrably central to producing economic wealth. In other terms, the benefit of collaboration, i.e. of improving one’s social capital, can be considered in terms of the kind of activity an SMEs do and who they collaborate and with.

Other important dimensions that we’ll take in consideration also in this second round survey are network’s density and actor centrality. We can define density, as the proportion of ties that actually exist out of all those that could potentially exist. Centrality refers to the number of ties a given actor has. The former measure gives us information on the extent to which the network is compacted, as well as how interlinked and coherent it is, while the second measure shifts the focus from the network to the node.

In the following paragraphs we’ll put side by side the network modification occurred passing from the first recruitment phase (that of Drivers) and the second one (that of Implementers) and by taking into consideration implementers’ pre-existing networks we will propose a vision for ecosystem future development.

2. Methodology

As already mentioned the main method used for this research activity is that of Social Network Analysis (SNA) which, as Moreno (1953) pointed out, is at the same time a process of relation visualisation and analysis, since the visualisation and description of networks are inextricable.

One of the most sensitive phases of SNA is that of network boundaries definition. There are two ways to set network's boundaries: emic and etic. The emic approach is based upon relational criteria - researchers ask the actors who they are in contact with for the purpose of building up a matrix, and the actors duly indicate who is in and who is out of their network, then the researcher will interview actors indicated by the first respondents and will include them in the matrix (snowball effect). In the etic approach, the network is closed before the actors come into play - the results can be interesting for learning about the relationships inside a given local area/group. Of course, the actors are also in touch with people based outside the local area/group, but such relationships will not form part of the network per se.

This research is based on a hybrid approach, in the first phase we ask RCs to map the territorial actors from three main domains: institutions, R&D and intermediate actors, and business domain. The lists, as the table below shows, were already quite extended. In the second phase we asked Driver SMEs and Implementers to add new nodes to the networks and self-position their company within it. The table below, again, shows the quantity of added nodes. If the network boundaries of Aragon remain more or less the same (mainly because the first one were particularly complete) that of West Midlands growth is considerable because – thanks to the engagement of SMEs - another territory (East Midlands) comes into play.

Tab.1 Eligibles nodes

	Institutions	R&D Domain and intermediate actors	Business Domain	First Phase	Total second phase
West Midlands	8	16	27	51	86
Tampere	7	19	17	43	43 ²
Aragon	13	11	45	69	79

Source: Censis, 2006

Beside the network analysis, we introduced - in the second round survey - another questionnaire for analysing the SMES from three main point of views:

- Level and quality of collaboration
- ICT usage
- Approach to innovation

The second survey took place between July and December 2006. This time frame can appear too close to the end of the project . In fact it has been difficult to fulfil all the research activity in a period in which project partners and SMEs were involved in many other activities, but the research team decided to wait until the second and third recruitment phases finished in order to be able to interview implementers and, possibly,

² Unfortunately, due to time constrain, it was impossible to conduct the second round survey of SNA in Tampere. We gather information about two SMES (one implementer and one driver then become an Implementer too) about their level of collaboration, ICT usage and approach to innovation. But it was not possible to have specific information about their relational network (the driver, in fact, already provided us those information in the first round, but was impossible to enlarge

users. If we had decided to respect the research time frame (and conduct the survey in July 2006) we would be able to analyse only the Aragon network. In fact, in West Midlands and Tampere, implementers come in to play only later on. This delay (reported and explained in Del. 30.9) helped us to engage and interview SMEs from West Midlands (five people) and Tampere (two people) also but, for Tampere region this was shown not to be enough. We gathered, in fact, new information about one driver and one implementer, but only about their attitude towards ICT usage, innovation and collaboration. It was not possible whatsoever to extend our first survey on network analysis. To address this, a hypothetical scenario was selected in order to overcome these difficulties through the introduction of interviewee's business networks (i.e. taking into consideration their suppliers and clients) network as a potential future DBE network, even if this is only a possibility. Also Coss, (Finish Center for Open Source) constitute another possible channel of DBE growth and it'll briefly introduces. The interviews scheduled for the end of the project, were really demanding both for SMEs and for the RCs that had to act as facilitators for the social science researchers. In addition, enterprises were, in fact, deeply engaged in service development at this stage. In order to not mix real data with future-oriented vision, we'll focus our comparative analysis only on West Midlands and Aragon and only in a second step we'll turn our attention towards the Tampere experience.

In the table below the SMEs interviewed are categorised by territory and typology. As is easily recognisable, the samples in the three territories are not comparable, but from a qualitative point of view this information can help us to better interpret the SNA outputs.

Tab.2 Interviewed SMEs – typology and territorial distribution

	First Phase			Second Phase				Total
	RC	Drivers	Total first phase	Drivers	Implementer	Users	Total second phase	
West Midlands	1	4	5	-	1	4	5	10
Tampere	1	3	4	1	1		2	6
Aragon	1	4	5	3	5	1	9	14

Source: Censis, 2006

3. Findings

In this section we report the research outputs and findings. We first focus on the actors' characteristics, i.e. on attitudes toward innovation, collaboration and ICT usage that came from the interview data. We then concentrate on Aragon and West Midlands network characteristics.

3.1. Actor profile

As previously noted, Drivers and Implementers come from the ICT service sector. This is related to the SMEs engagement strategy that the project adopted, but of course a closer look is needed in order to describe them.

As mentioned before a new questionnaire was introduced in the second round survey. The first part of it (question 1-5) is dedicated to some-how standard information. We gather information about the SMEs dimension (n° of employees). Economic performance in term of revenue, employment and investment and management structure. The questionnaire is based on Censis previous research in similar context (i.e. when working with SMEs at territorial level) and it's here reported in Annex 1.

Starting from basic SMEs information, we can say that the Aragonese firms interviewed are all, without any exception, in the phase of investment and invoiced growth. In addition, the number of employees is generally growing but at a lower rate than turnover. The employment growth didn't effect all the enterprises (5 of them improve the number of employees where three didn't) but the trend appears to be a positive one. Total numbers of employees varies from 5 to a 180, but only one enterprise has more then 50 employees. Two of them are micro enterprises (with a maximum of 5 employees) and the other varies from 10 to 47 workers.

In West Midlands the situation is similar, with the majority of interviewed SMEs (most of whom are users and not implementers as for Aragon), show a positive trend on all three dimensions: revenue, investment and employment. The size of these enterprises is technically known as micro. Most of the users are self-employed or consultants and come from the multifaceted sector of Internet services (web designer, web marketing services provider, and so on). The same is characteristics apply to the SMEs interviewed in the Tampere region.

Enterprises engaged in the DBE implementation in Aragon are, in most cases, managed by an associate or a group of associates, or alternatively are lead by an external manager. Only one of them was directed and managed by the owner (being a one person company). All the enterprise leaders have a high educational qualification (Bachelor Degree or higher). In West Midlands and Tampere, the enterprises are managed by the owner who has a Bachelor Degree or higher educational qualification.

In order to describe the SMEs we asked interviewees to indicate a metaphor able to describe the enterprise structure. The majority chose images close to that of network, indicating an open structure, a no-pyramidal one (with two important exceptions among implementers), able to reorganize to changing needs. One interviewed in Aragon compared its enterprise structure to an human body of which the head is fixed but hands and legs can come from different directions and can vary. The head is fixed but all the rest of the body is very flexible.

In terms of commercial strategy we asked drivers and implementers to chose among the following possibilities:

1. Aggressive (i.e. constantly looking for new customers, strong impulse for turnover increasing, more and ore investment in advertisement and in communication, etc)
2. Defensive: our aim is to maintain our clients and defend the company from competitors a
3. Selective: we are trying to be more and more selective with regard to clients
4. Quality oriented: our company wishes to improve the quality of products and services
5. Form-fitting: we try to adjust our product/services to demand modifications
6. I don't know/we don't have a proper strategy at the moment³

In Aragon six out of the eight (see tab. 2) SMEs under study chose the first option and 2 chose the fourth. Of course, they come from different sectors: mainly from the tourism sector in Aragon; and from the ICT service sector in West Midlands and Tampere. These outputs are coherent with the description provided above. SMEs engaged in DBE appear to be in a phase of growth, expanding their market and, as we'll see, their networks. It is not by chance that the majority of them are in their first five years of business. Nevertheless, some of them already have a considerable number of clients. In Aragon, five of the nine SMEs under study, in fact, have more then 300 clients, and minimum registered is 20 where the maximum is 600. The number of clients decrease in West Midlands and Tampere, varying from 5 to 30 but this is very related to SMEs smaller dimension and the typology of service their develop that is more close to consultancies.

3.1.1. Collaboration attitude

If we now turn our attention to SMEs' collaboration attitude, commensurate with the network metaphor, all the SMEs undertake collaboration initiatives with other enterprises, local actors and R&D centres and judge positively their previous collaboration experiences.

As we mentioned in the theoretical framework, our hypothesis is that business benefit grows as collaboration taking place fulfils a more strategic function (see Del.27.1). The table below shows the possible answers to question n° 9 (please see Annex 1) and the black circles indicate the SMEs that undertook collaborative initiatives on each of the possible activities.

Tab.3 Business function on which SMEs do collaborate*

Business function	Tampere	West Midlands	Aragon
1. Internationalisation and export	●○		○○○○○○○○○
2. Showcase Participation	○○	●○○○	●●●●○○○○
3. Process Innovation		●○○○	●●●●○○○○
4. Product innovation	●●	●●●○	●●●●●○○○
5. Product commercialisation	○○	●○○○	●●●●●○○○
6. Technical information and support services	●○	●●○○	●●●○○○○○
7. Shared transportation services, logistic	○○	○○○○	○○○○○○○○○
8. Sales or purchase negotiation	○○	○○○○	●○○○○○○○
9. Stage or apprenticeship agreement	●○	●○○○	●●●●●●○○

* black circles represent SMEs that effectively developed collaboration activities on those functions; white circles represent SMEs that do not collaborate on related activities

Source: Censis, 2006

³ As mentioned the questionnaire here used is an original adaptation of Censis's interviews outlines used in several projects and also on large sample.

Almost all the respondents of Aragon's group collaborate with the local university in a stable way through apprenticeship agreements, but we also record an important contribution to collaborative experience in the field of product commercialisation and product innovation.

Product innovation is the main field of collaboration also in West Midlands and Tampere. This attitude seems to be really important from the point of view of Digital Ecosystem growth, willingness and capability to collaborate on such strategic functions will in fact, facilitate DBE up-take. In order to provide a deeper analysis of collaboration attitudes we'll now analyse those business functions that SMEs externalise (question n° 7 of the questionnaire, please see Annex 1). This will give us in-sight into collaboration, but also on enterprise business structure. The table below shows which functions are more often outsourced.

Tab.4 Externalised Business Functions*

Externalised Business Functions	Tampere	West Midlands	Aragon
R&D	○○	○○○○○	○○○○○○○○○
Accountability and administration	○○	●○○○	●●●○○○○○
Legal, fiscal and tributary consultancy.	○	●●●●	●●●●●●○○
Management consultancy	○	●	○○
Credit, finance and investment	○●	●○○	○○○○
Training	●	●●	●●●●●○
Export, participation in showcases, trade agreement with foreign companies	●	<i>none has this function</i>	<i>none has this function</i>
Logistics and transportation	●	<i>none has this function</i>	○○
Environmental certification	<i>none has this function</i>	<i>none has this function</i>	●
Quality certification	<i>none has this function</i>	<i>none has this function</i>	●●○○
Informatics and ICT development	○○	○	●○○○○○
Marketing, market survey and similar	<i>none has this function</i>	○	●○○○○○○○

* the number of circles differ from the total number of interviewed SMEs because not each of them has all the functions here under analysis

Source: Censis, 2006

As expected, the level of outsourcing is low on all the strategic functions. SMEs interviewed in all the three regions turn to external help basically only on training and legal/fiscal necessities.

Before analysing the innovation attitude of the interviewed SMEs, let's consider a last possible connection between SMEs and other actors, i.e. the suppliers. All the SMEs have an extremely limited number of suppliers, the majority stops under 10 suppliers and the rest is under 30, the majority is under 20 anyway. The reduced number of suppliers is for sure related to the SMEs sector of activity and business size. If we consider now the criteria of suppliers' selection we discover that trust and quality are the main issues, even if in some case there's no option (i.e. suppliers exist only for determined necessities, for example Microsoft for its products).

3.1.2 Innovation attitude

We asked to SMEs if they conducted, in the last three years, some of the following (see tab. 4) innovation-related activities. The outputs are very positive and coherent with the rest of the results; all the SMEs engaged in the DBE in the three regions are in a constant process of product innovation.

Tab.4 Innovation activities undertaken in the last three years*

Innovation-related activities	Tampere	West Midlands	Aragon
Product innovation	● ●	● ● ● ● ●	● ● ● ● ● ● ● ● ● ●
Innovation of process	● ●	● ● ● ● ●	● ● ● ● ● ● ● ● ● ●
Patent right acquisition	● ○	● ○ ○ ○ ○	● ● ● ● ● ● ○ ○ ○ ○
Staff Training	● ●	● ● ○ ○ ○	● ● ● ● ● ● ○ ○ ○ ○
Testing and prototyping	○ ○	● ● ○ ○ ○	● ● ● ○ ○ ○ ○ ○ ○
Market survey	● ●	● ● ● ○ ○	● ● ● ○ ○ ○ ○ ○ ○
Investment in ICT	● ●	● ● ● ● ●	● ● ● ● ● ● ● ○ ○ ○

Source: Censis, 2006

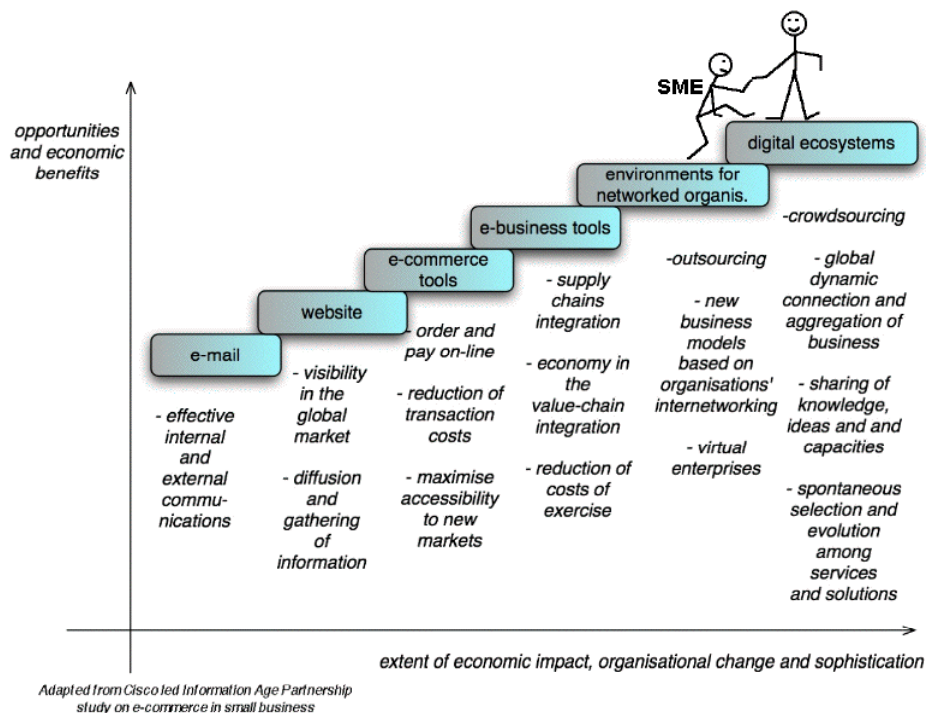
This is confirmed by the fact, that when asking them why they undertake these innovation related activities they declare – in the majority of the cases - that “innovation is part of our business strategy” and of course it’s also related to the necessity to adjust to always changing market requirement and maintaining a good level of competitiveness. The first answer is particularly concentrated among Aragon SMEs, where the second is most prominent in West Midlands and Tampere.

Clients, suppliers and competitors appear to be the actors with a crucial role on the decision to innovate, where the long term reason to invest in innovation is, not surprisingly, to improve revenue and product/service quality. Interviewees in Tampere regions said that partner enterprises also play a crucial role in introduction of innovation inside the enterprise.

3.1.3 ICT usage

The last dimension used to describe SMEs involved in the DBE at local level is their level of ICT usage, i.e. the instruments they utilize and their approach to ICT based solutions. Answers gathered can help us in positioning the SMEs on the revised Cisco stair, in which, DBE can represent the point of arrival in a process of ICT up-take able to improve economic performance and maximise business opportunities (Nachira, 2003). As noted, as we go up each step of the Cisco stairs the level of enterprise and organizational complexity grows and the need to change traditional settings becomes more intense.

Fig.2 Cisco scale elaboration



Source: Nachira, 2002

All interviewed enterprises use email, have a website, use the Internet for gathering information. Most of the enterprises interviewed in Aragon also use an ERP (Enterprise Resource Planning) system for integrating all enterprise data and process (also related to payroll and accounting functions). Most of them have a Customers Relationship Management system as was the case for Tampere interviewees. West Midlands interviewees use none of these solutions. Amongst all those interviewed, only three Aragon enterprises use e-commerce instruments. Consequently, we can say that engaged SMEs are positioned on the second step of Cisco stair; basically they are online visible, but do not fully utilize possibilities offered by ICT. For sure DBE can have a role in supporting their growth in this area.

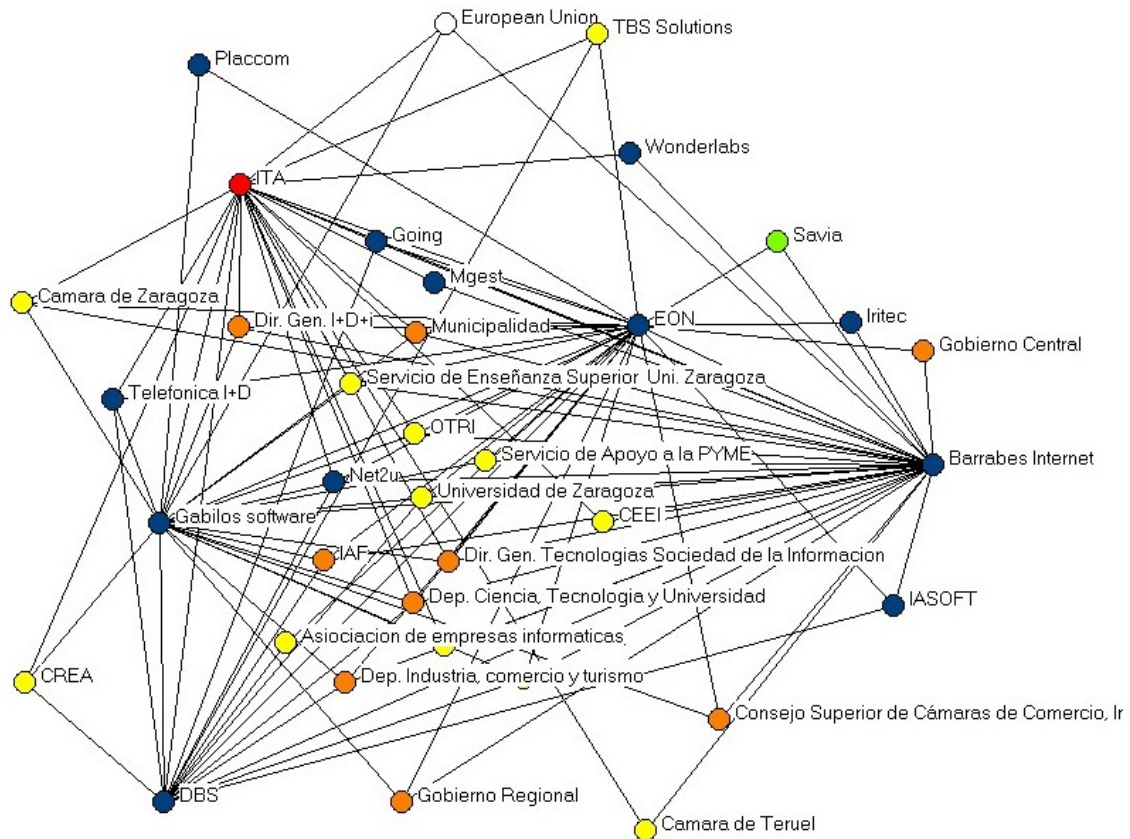
3.2. Territorial Networks: a comparison among regions

In the first section we described actors (drivers, implementer and users) involved in the DBE engagement process from different perspectives; now we'll concentrate mainly on the engagement process itself, defined as a series of activities finalized to the ecosystem population. We'll visualize and describe the networks upon which DBE engagement relied at the beginning of the project and describe its growth and its possible implication in terms of future DBE ecosystem population and sustainability. First of all it's important to notice that, the networks we describe are based on face-to-face relationships, and not on virtual interactions through the DBE platform. What we take here in consideration are those interpersonal relations that may effect the adoption of the DBE platform, i.e. its diffusion dynamics. As we have mentioned in the theoretical framework paragraph, issues such as trust and leadership are crucial in this field. In analysing the three regions we will compare the networks emerged in the first survey with that of the second one and analyse how the network grew.

A first consideration is that in all the three territories, the quantity of links in the networks, and their density decreases as the relationship becomes formalised, i.e. passing from personal contact, to partaking in projects, to sharing of resources or information. What it's interesting to observe is the rate at which those variables decrease and which actors, by

contrast, are more constant in transforming general personal contact into collaborative networks. Another important network characteristic that we should observe is the typology of the actors active in the network and, particularly, those able to form bridges between clusters that would otherwise be separated. Among those RCs are, are clearly of particular importance as gates for ecosystem enlargement.

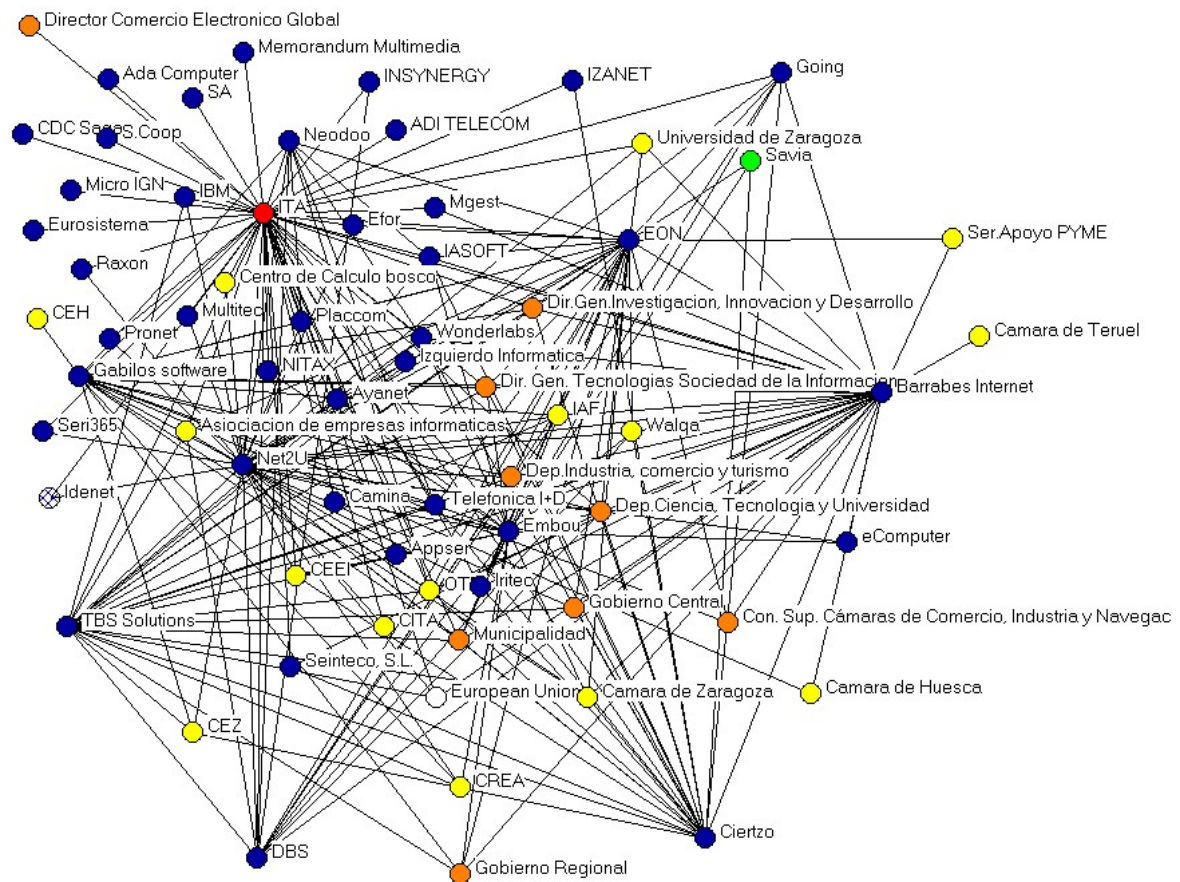
Fig. 3 Aragon: Drivers' personal contacts – phase one



Source: Censis, 2005

The Aragon network, in the first survey, shows a clear presence of intermediate actors (three chambers of commerce, three agencies specialising in collectivisation initiatives and support for public and semi-public SMEs, one university, etc) and several governmental/institutional protagonists. The presence of representatives from the government level is a peculiarity of Aragon's network. This characteristic is confirmed in the second round survey but the proportion between government actors and enterprises changed considerably.

Fig. 4 Aragon: Drivers' and implementers' personal contacts – second phase



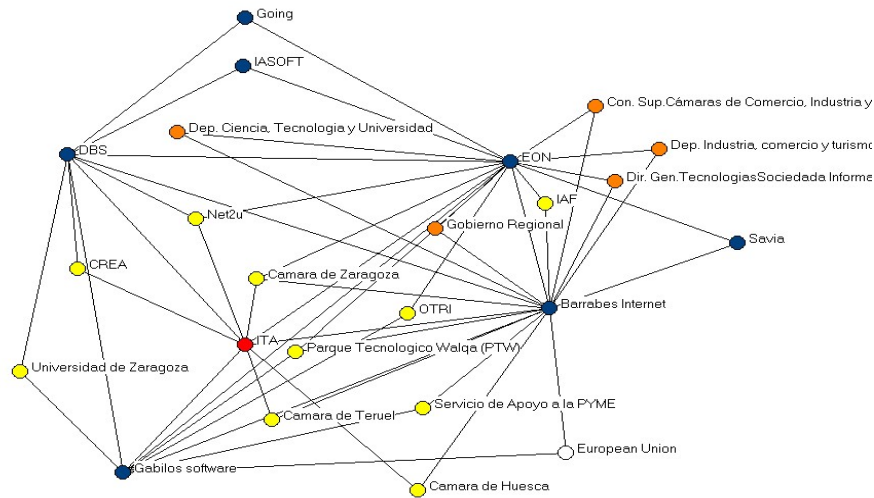
Source: Censis, 2005

It is self evident that this second network has more connections and, also, a higher level of density. Introducing implementers in the network implied a multiplication of links, and in terms of the actors represented, an increment in the presence of enterprises. Local intermediate actors (in yellow) and government (in orange) maintain their centrality, but connections among SMEs (in blue) improve considerably.

From the specific point of view of personal contacts, implementer SMEs engaged in Aragon have significant social capital. Thanks to their presence the network acquired 153 new links and obtains a density degree of 0.055, that is a positive value if compared with that of the first round survey, that was 0.031 (the density degree varies from 0 to 1, where one is the maximum of possible density). It means that in the network we can see the 55% of all the possible links.

Partaking in common projects is the second kind of relationship we took into consideration. This dimension is of particular interest for us because it may give important insights into SME attitudes to collaboration in middle-to-long-term project. We mentioned, in the first section, that interviewed SMEs show a positive approach toward collaboration, we'll now visualize the network based on collaboration. Here follows a comparison among the first project-based network and the present stage one.

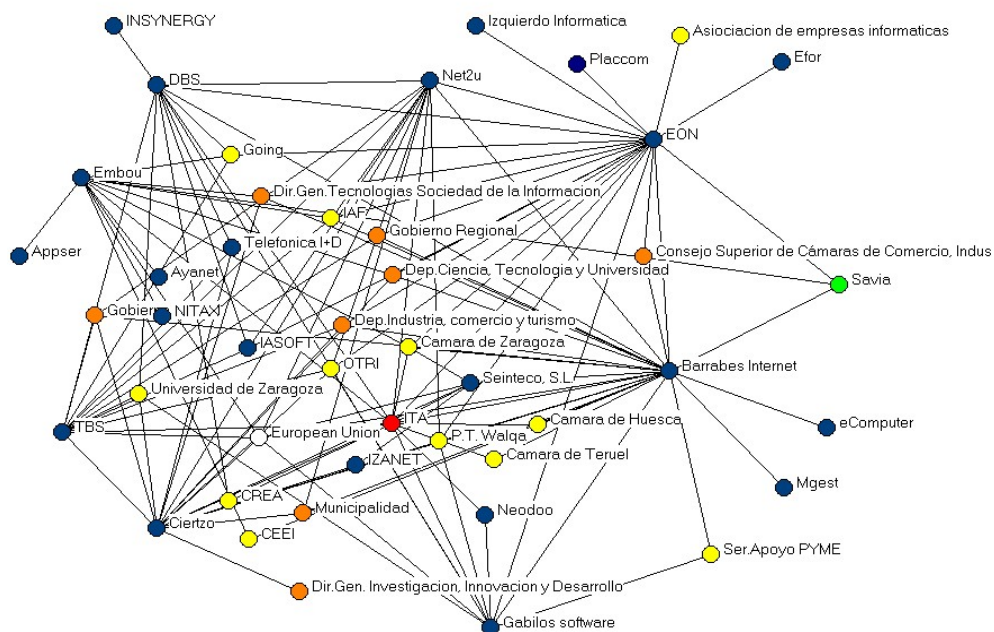
Fig.5 Aragon: Drivers' participation in projects – first phase



Source: Censis, 2005

Again, the second network (below) appears considerably more populated; links are multiplied and more actors come into play, thank to the 'bridging power' of implementers SMEs engaged.

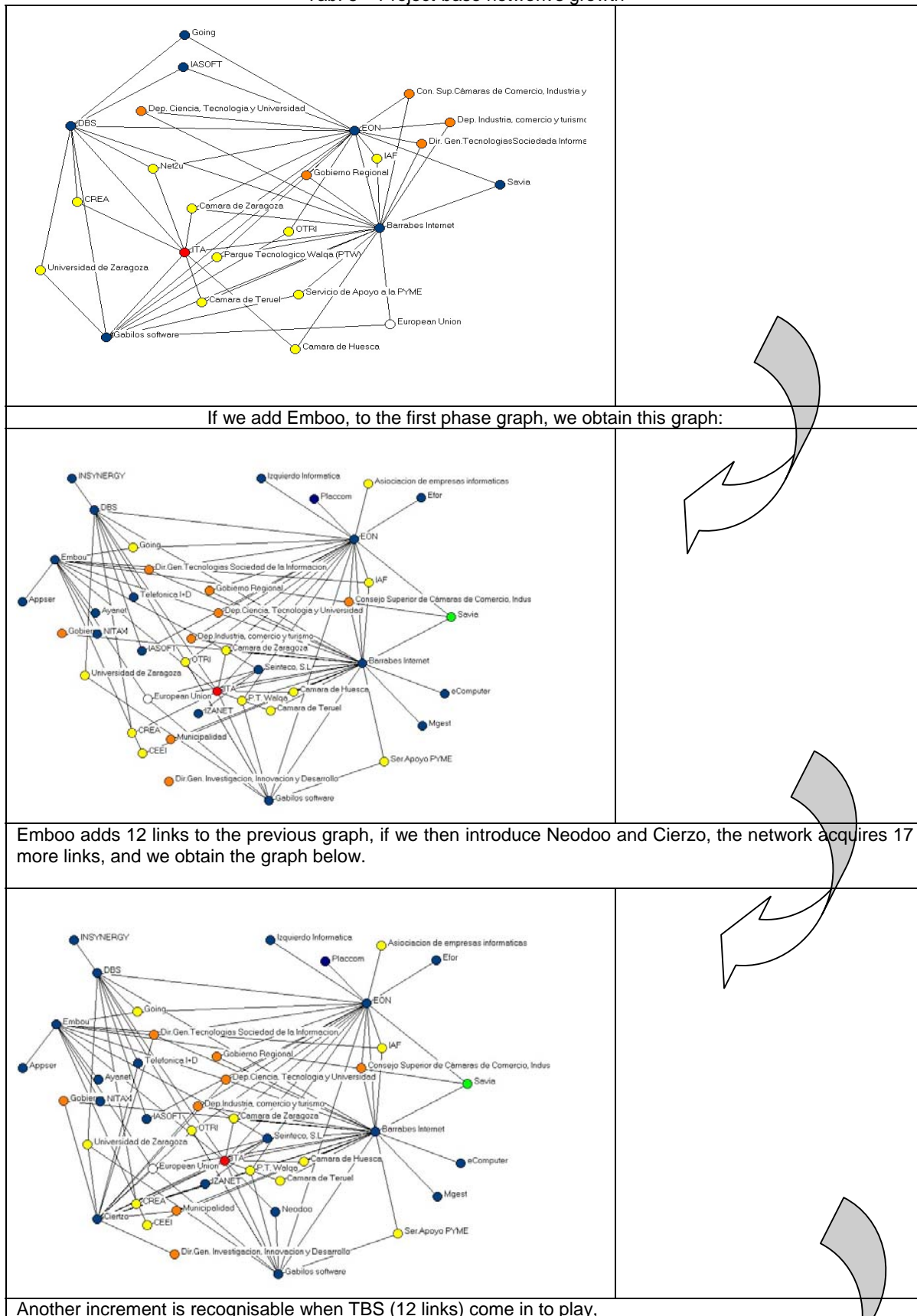
Fig.6 Aragon: Drivers' and implementers' participation in projects – second phase



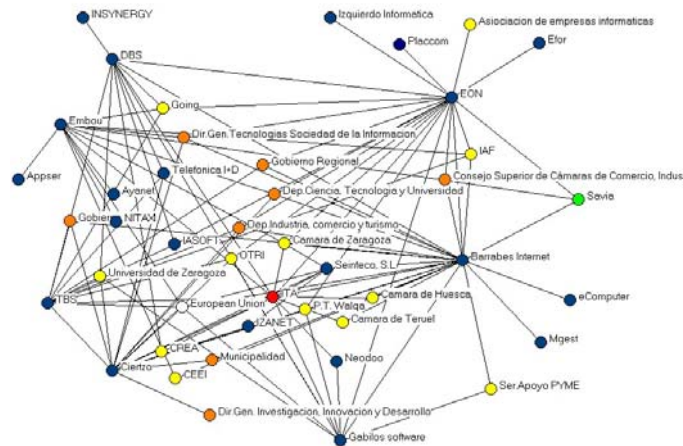
Source: Censis, 2006

In order to evaluate the weight each interviewed SMEs has in reinforcing the network we can now visualise the network growth by adding only one implementer at a time.

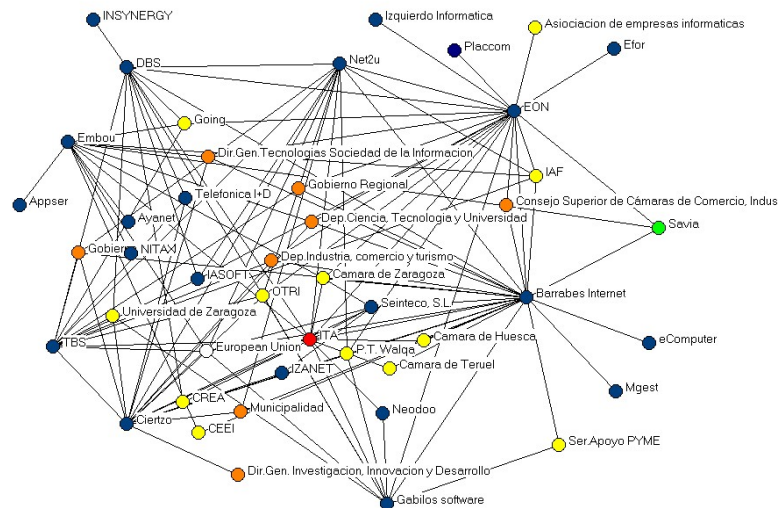
Tab. 5 Project-base network's growth



Another increment is recognisable when TBS (12 links) come in to play,



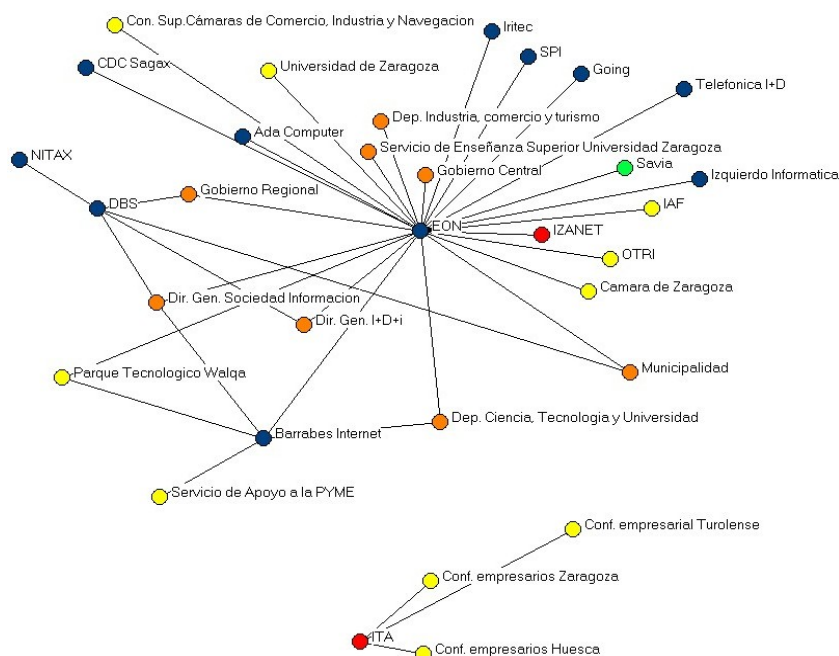
An 10 more connection are added thank to Net2U, in second phase network have 51 links more then the previous one, i.e. a considerably higher possibility t develop projects with an interesting impact at local level.



Source: Censis, 2006

As we mentioned, network density and number of links decrease if we pass from less formalised to more stable or 'strategic' relations. This is particularly evident when we analyse networks based on stable sharing of information. In the first survey we noticed a scarce level of connections, in which the three Drivers appear to inform government level actors, but only one of them shows a web with other SMEs (fig.7).

Fig.7 Aragon: sharing of information – first phase

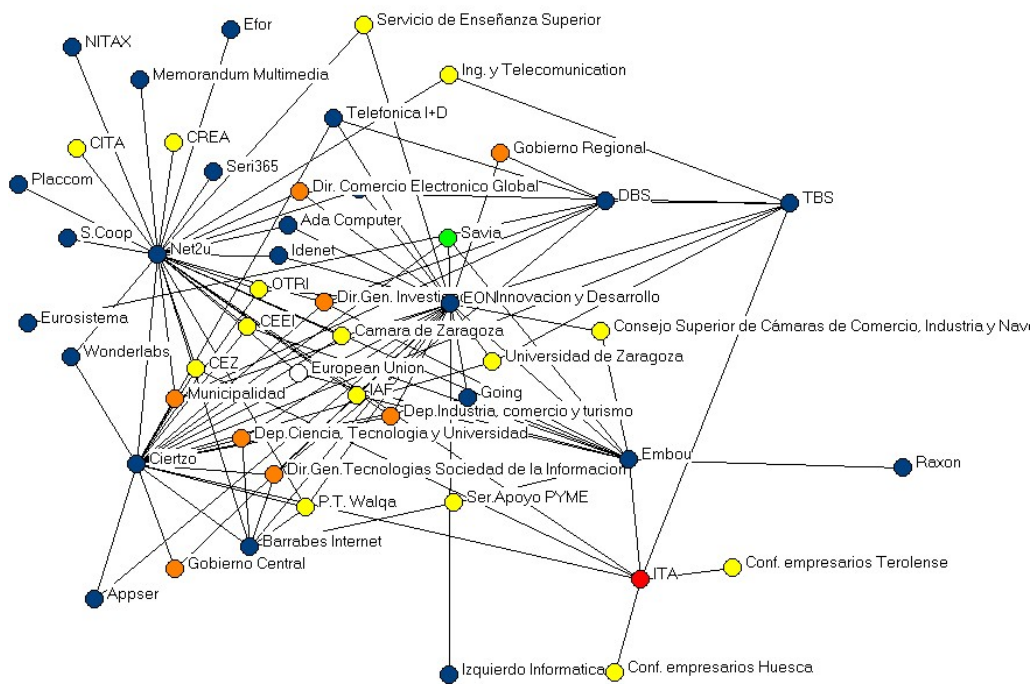


Source: Censis, 2005

If we pass now to consider the inputs of Implementers we obtain the graph below (fig.8) in which the connectivity improvement is pretty impressive; the density, for example, pass from 0.015 of the first round to 0.027 in the second round survey. It may still be judged low but it is at least doubled, and this is a very positive outcome. Informative networks of ITA are now linked with those of implementers and drivers and business relationships seem to appear clearly.

In fact, business-to-business exchange of information can be interpreted as an indication of present or possible commercial collaborations and clustering attitudes. In this case the social capital emerged in 'personal contact' networks is partially transformed in concrete sharing of knowledge. This is for sure one of the most important pre-requisites for DBE growth and confirms what the interviewees declared about their enterprise' structure. They, in fact, in more than one case mentioned images of networks or spider-webs. From the interviews it emerged that some of those connections pre-existed DBE engagement but, also, that DBE offered concrete opportunities for reinforcing and enlarging channels of information exchange and collaboration.

Fig.8 Aragon: sharing of information – second phase

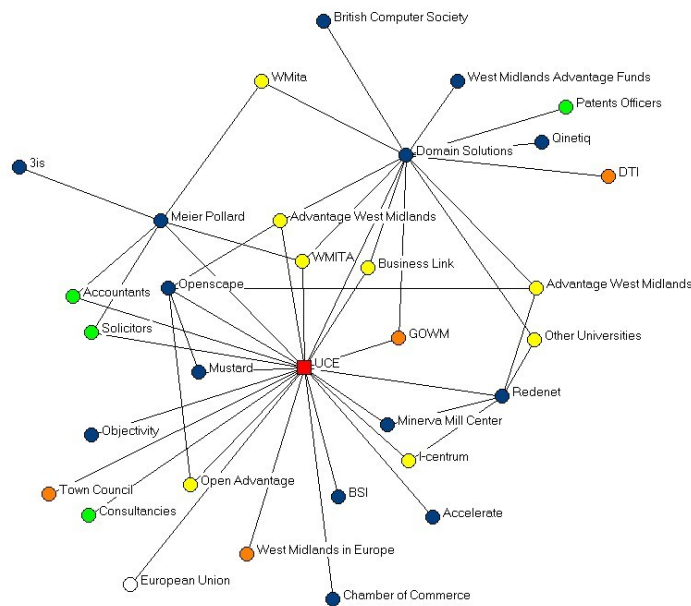


Source: Censis, 2006

If we now take into consideration the experience of West Midlands, the network analysis appears as a useful instrument for visualizing an engagement process that differs from that of Aragon and, also, one that changed during the project life cycle (see Del.31.6). Facing problems in engaging the planned number of implementers, the West Midlands RC engagement strategy was to put in to action various informational and communicational initiatives and, thanks to that, UCE was able to engage one enterprise in particular that had a vital network in a nearby region (East Midlands). This produced two main effects:

- the network acquired more and more possible nodes, and activated 35 of them
- the network became trans-regional

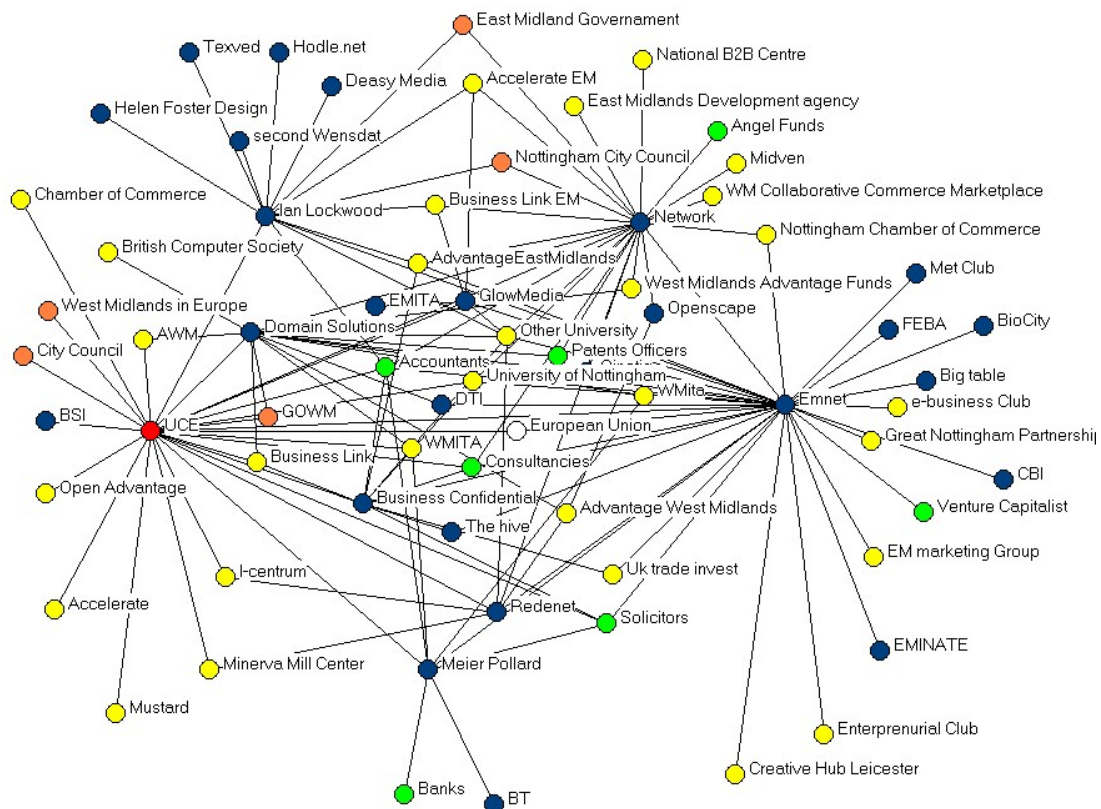
Fig.9 West Midlands Drivers' personal contacts – first phase



Source: Censis, 2005

The passage from the survey first round (fig.9) to the second one (fig.10) clearly shows those improvements. Unfortunately, due to time constraints, it was not possible to interview all the engaged implementers, so it's reasonable to imagine an even more dense and wide network.

Fig.10 West Midlands Drivers' and implementers' personal contacts – second phase

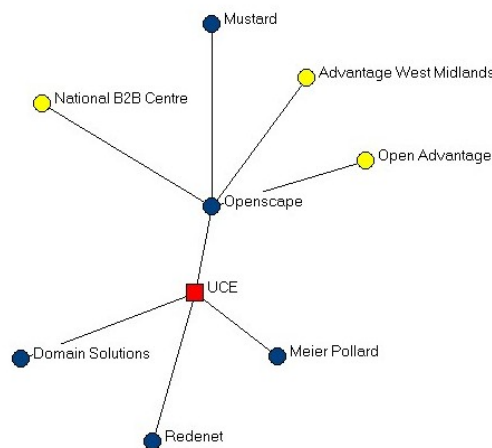


Source: Censis, 2006

The connection established between UCE and Emnet (the implementers based in East Midlands) activated several new links among SMEs, in this case collaboration between two pivotal players created a new, wider, web. An important difference between the West Midlands network and that of Aragon is that in the first one interviewees were mainly user SMEs. They were mainly one-person enterprises and, in some, cases, were established in the last three years. These are important characteristics to keep in mind when reading the networks and it help us in interpreting the presence of local university-linked structures, such as incubators and start-up support units. At the same time, universities appear to be important players on their own, together with development agencies and other SMEs including solicitors and consultants. As in the survey first round, the centrality of enterprises emerges clearly, and the low presence of government level actors is confirmed as well. This difference between Aragon and West Midlands (now linked to East Midlands) appears as meaningful and should be taken into consideration by other regions that may wish to implement DBE in their territories (see Del.31.6).

If we consider now the project-based connections, again the improvement is visible and effective.

Fig.11 West Midlands Drivers' participation in projects – first phase

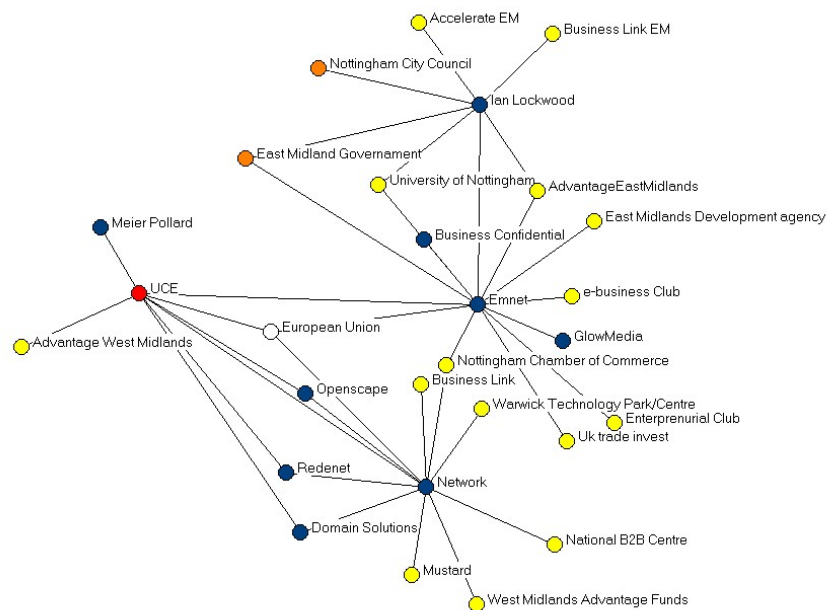


Source: Censis, 2005

It is particularly interesting to note that, again in the West Midlands case, DBE represented a vehicle for establishing new collaboration channels and as emerged from the interviews, new collaborations are going to start off shortly.

In this graph, it is important to notice that the majority of collaboration links are between SMEs and one or more intermediate actors. Other important actors for local networking and innovation include: Chamber of Commerce, entrepreneurial associations and local development agencies.

Fig.11 West Midlands Drivers', Implementers' and Users' participation in projects – second phase

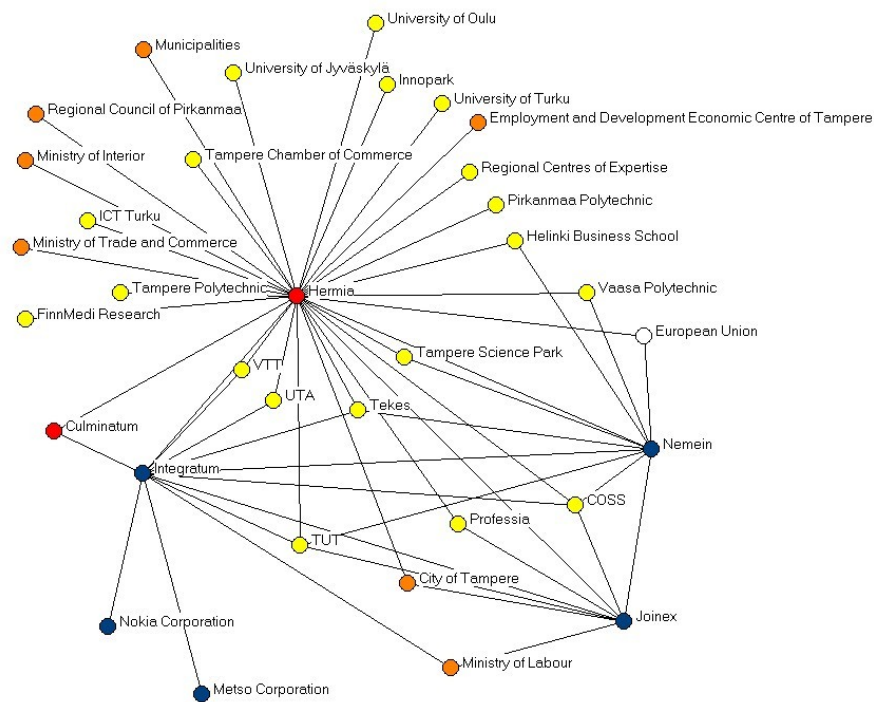


Source: Censis, 2006

Beside the relationships we mapped with the social capital's interview outline (see Appendix 1) there are, of course, business links that connect each SME to their suppliers, from one side, and to clients to the others. In the first part of this deliverable we reported the data gathered on this dimension, but we reported only aggregated data. We will now report more detailed data but, due to the sensitivities of this information, we will anonymize the answers. What is interesting for the DBE project, in fact, is which clients have one or another enterprises, but what are the dimensions and topology of business networks that engaged SMEs may involve in the DBE infrastructure and in service usage. Again, as we mentioned in the first part of this deliverable, suppliers and clients are crucial actors in the adoption of innovative solutions. Clients and suppliers are, in fact, recognised as able to 'force' the enterprises to adjust and change, i.e. to innovate.

We'll utilize the Tampere first survey network in order to visualize those possible channels for DBE ecosystem population. Those channels pass through already-existing business networks and are partially independent from the social capital dimensions defined, as we did, at territorial level.

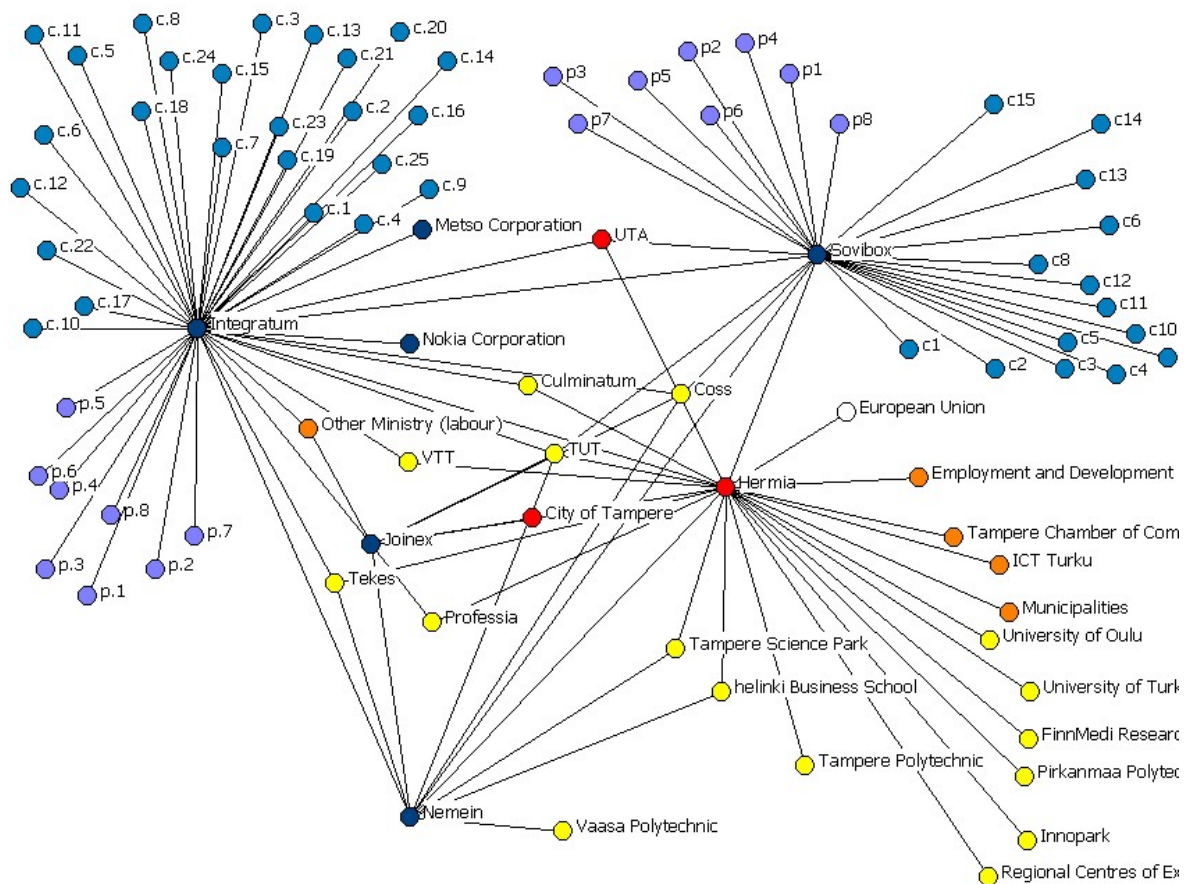
Fig.13 Tampere Drivers' personal contacts – first phase



Source: Censis, 2005

If we add to the personal contact's network (done in the first phase of our study fig.13), the business links emerging from the second one, we obtain a network in which the high presence of intermediate actors (in yellow) is balanced by the multiplication of enterprises (fig.14).

Fig.14 Tampere Drivers' and Implementer's personal and business contacts – second phase



Source: Censis, 2006

Moreover, we have to imagine another network that surrounds the node Coss. Coss (Finnish Centre for Open Source Solution), in fact, represents a network of more than 100 enterprises active in the field of Open Source. It comprises vendors, solution suppliers, developers and public and private organisations deploying and using open source solutions and innovation models. All drivers and implementers engaged in the DBE project are already part of this network; established in 2003 it is sustained and sponsored by high profile enterprises such as Nokia, IBM, Hp, RedHat and a big part is played by local intermediate actors such as Hermia, Tekes and the City of Tampere (it's important to note that some of those players were already present in the first network). As the graph shows, the link between DBE and Open Source vendors and service suppliers is a promising one, the engagement strategy adopted by TCH followed this path; at the end of the project attention is on DBE growth and this channel still shows to be a potentially successful one.

4. Social Network Analysis and EVESIM simulator. A collaborative process

In this chapter we'll consider another usage of the data emerged so far from social network analysis and, more generally, from Censis interviewee data. SNA outcomes, in fact, represented also an input for the simulator EVESIM. Starting from the EVESIM development, an interesting process of collaboration between natural science and social science, through computer science, took place. In this chapter we'll describe the EVESIM simulator from the specific point of view of this important collaboration, and we'll present the adaptation performed in order to adjust the simulator to social science needs.

A system like a Digital Business Ecosystem (DBE) integrates manifold areas of interest, namely Business, Computing, Science and Socio Economics (see Heistracher, Kurz, Marcon and Masuch, 2006). Consequently it represents a significant opportunities and challenges for communication and collaboration. The interaction and exchange of experience between the different domains in a Digital Business Ecosystem can be supported by regular reporting, meetings, conferences and so on. However, in addition to this, through the modularised framework of EVESIM, different stakeholders can collaborate through modules they plug into EVESIM and utilise modules of other stakeholders, e.g. social science input. Although the development of evolutionary algorithms and the analysis of social networks, for example, can be studied independently, they can greatly benefit from each other and EVESIM offered a good starting point.

4.1. Natural Science

To imitate Digital Business Ecosystems the 'real-world' behaviour has to be simulated which is achieved by using evolutionary algorithms, well-known from the study of life as explained in Briscoe, 2004. An evolutionary algorithm is used to find an approximate solution for different types of problems. In the case of the EVESIM, the problem is to find the best fitting service for a specific task of a SME. Additionally, by using evolutionary algorithms, the self-organizing features of natural ecosystems are utilized to simulate and enhance business networks. Furthermore, it is possible to check the effect of different social and business parameters onto the ecosystem. To achieve this, the individual SMEs in the ecosystem are simulated by independent software agents (the terms agents, SMEs and actors are used interchangeably in the context of EVESIM). These agents can interact and individually adapt to the changing business needs. The possibility to adapt dynamically to a changing ecosystem in a self-organizing way is the major advantage of utilizing biological approaches in the Digital Business Ecosystem. Therefore evolutionary algorithms are the fundamental building blocks of the EVESIM.

It is hard to predict how a real world ecosystem will evolve. This is true for a simulated ecosystem too. But by utilising a simulator it is possible to find key parameters influencing the evolution of an ecosystem. One of these key parameters is the critical mass of participants that is needed to get the ecosystem working as described in Kurz, Marcon, Masuch and Heistracher, 2005.

As research on evolutionary algorithms, for example, is often done on random high-scale networks, the availability of real-world data from social science has been considered highly beneficial to make simulations more sensitive to different variables.

4.2. *Role of the Evolutionary Environment and EVESIM*

The name Evolutionary Environment Simulator comes from the initial intention to set up a simulator of the Evolutionary Environment (Kurz, Marcon, Masuch, and Heistracher, 2005). The Evolutionary Environment is a network of DBE nodes and services which enables the self-organisation of the DBE network and provides a test-pad for various research topics like natural language business modelling (OMG, 2006), evolutionary algorithms and distributed intelligence (Briesco, Wilde, 2006).

Although the name Evolutionary Environment Simulator stems from this particular Evolutionary Environment, the intention of the EVESIM, from the beginning, was not only to simulate the behaviour of the Evolutionary Environment, but also to provide research partners from natural science, social science, business and computing with a framework to collaborate and test their findings together.

The choice of approach for communication and collaboration was to exchange information without changing the very particular way of work for each of the partners. Therefore, generic interfaces had to be found and a couple of transformation modules, import and export capabilities had to be added.

For natural science a plug-in mechanism was developed to use both, evolutionary algorithms developed especially according to the EVESIM model and evolutionary algorithms with binary representations. Through a transformation module from binary representation to the representation of SMEs and services according to the EVESIM model additional optimisation algorithms can be added and evaluated in their usage in a DBE. Furthermore, an import mechanism for XML based import files enables an import of preconfigured networks.

Concerning social science the EVESIM provides import capabilities for Comma Separated Files (CSV). This enables non-technically experienced people to export their networks from every spread sheet software with CSV export feature, and import this network into the EVESIM. Moreover, the configuration of actors along 7 predefined social variables influences the behaviour and set-up of the agents in the simulation. These variables are described in the following paragraphs.

4.3. *Social Simulation and the Basis for the EvESimulator*

The rising importance and recognition of social simulation ended up with a number of different social simulation toolkits. Initially the EvESimulator was planned as a simulation framework for the Evolutionary Environment and a tool for collaboration between different disciplines. Nevertheless, we wanted to spend our resources on the novel and specific approaches for setting up a self-organising network rather than on implementing an agent simulation from scratch. Therefore, we utilised the Recursive Porus Agent Simulation Toolkit -Repast (see also Collier, Howe, Najlis, North, and Jerry, 2006) as the underlying agent simulation toolkit.

Using an open source toolkit like Repast has two major advantages. On the one hand, it eased the prototyping of the EvESimulator and saved resources in the development of the visualisation features for example. On the other hand, it guarantees that modifications in the code basis are possible, if needed.

For the framework decision we decided to take a practical approach. Besides the literature study of agent-based economy simulations (see Herbert, 1999) we took part at the International Workshop on Agent-Based Models for Economy Policy Design -ACEPOL05 where the world leading experts of agent-based economy simulation met. Moreover, articles (e.g. Samuelson and Macal, 2006; Tobias, 2004), and books about Repast as well as, Repast Symphony (North, Howe, Collier and Vos, 2005), the latest release of repast, affirmed the decision of using Repast as a basis for the Eve Simulator. Repast Symphony comes with a set of advanced computing technologies for applications such as social

simulation. The current EvESimulator version is based on the Repast 3 toolkit, but a potential migration to Repast Symphony is currently under examination.

4.4. *Changes in the Evolutionary Environment Simulator EVESIM*

In the following, we introduce the technical realisation of the EVESIM. The source code can be found at <http://sourceforge.net/project/evesim/>). To keep the simulations as realistic as possible while attaining the goal of speeding up the process of evolution, a number of algorithms were used to simulate and enhance the DBE system. The EVESIM tackles the goal of having a system where the network nodes remember past interactions with different other nodes and services to continually improve the system in a seamless way. Moreover, the EVESIM provides a simulation framework with rich configuration and visualisation capabilities for being applicable for different digital ecosystems during future research. The realism of the simulator itself required the collaboration of many different disciplines. The EVESIM stands to benefit from the input of partners concerning genetic algorithms, global optimisations, symbiosis and competition, social networks as well as software engineering. By adding code and features to this project it became, as we mentioned, a cross-domain collaboration platform.

The results of the simulations do not claim to be one hundred percent realistic. The intention of the cross-domain collaboration is to make the results more realistic and the EVESIM provides a test-pad for that. Moreover, by restricting the variables used in a system, the disciplines can run their simulations on a restricted area first, e.g. high scale networks for genetic algorithms research, and then apply the algorithms to a more realistic and customized network structure afterward.

Although the EVESIM model is intended to be as close as possible to reality, the model represents an abstraction layer, which enables the simulation of the behaviour of small real-world networks as well as the simulation of well-defined problems in high-scale networks. The representation of SMEs and especially of service descriptions within the EVESIM are an abstraction of Semantic Business Vocabularies and Business Rules (SBVR) and therefore a mapping of SBVR logic into a set of features (flattening), which results in a simplified model that does not take into account the full set of SBVR capabilities. SBVR is a natural Language approach for business modelling (see OMG, 2005 and OMG, 2006). Nevertheless, this model is a compromise between the real SBVR representation and the abstraction level that facilitates a simulation that is close to reality. Additionally, the matching of SBVR models and its theoretical implications are still being researched in the current stage. Consequently, a level of abstraction has to be found so that a generic objective function can be defined, capable of being applied to a broader set of service descriptions (that is, potentially any version of business modelling language). For more information about the EVESIM model and the objective function see (Kurz, Marcon, Hisanaga, Heistracher and Passani, 2006).

The social network analysis within the DBE currently uses a SME table for retaining the relationships of SMEs. Rows as well as columns hold the names of the SMEs. The type of relationship is represented as the value in the intersection of axes. As to provide a common import from a broad range of spreadsheet software the import files for the EVESIM have to be CSV (Comma Separated Values) using a semicolon for separation.

For visualising the capabilities of the Evolutionary Environment, the actors, services as well as the whole network topology can be displayed through the EVESIM Display. For each type of actor, an icon can be chosen to indicate the different actors in the network. The edges between the actors represent the bi-directional relationships of two actors. Besides the visualisation of the network a label for displaying the Network-Fitness was introduced. The algorithm for calculating this network fitness as well as other parameters can be easily modified.

4.5. *Modification for Social Network Analysis*

One of the uses of the simulator, as we have mentioned, is linked with the concept of *social capital*; relational territorial networks is, in fact, one of the theoretical approaches social science researchers chose for interpreting the DBE community building process. From this specific point of view the simulator can be understood as an instrument for visualisation, mapping ongoing dynamics and as a tool for validating different hypotheses on the capacity of DBE to boost territorial social capital by improving the level and quality of collaboration among SMEs and other local actors.

A key research question was, in fact, represented by the possibility of the DBE to reinforce already existing business and social relationships and/or create new links among local players in this way contributing to improving the territorial social capital, i.e. the level and quality of collaborations among local players (see Del.27.1). The simulator comes into play after the first network analysis research, as an useful tool for improving results visualisation and multi-variable analysis. In order to reach this result, that of improving research outputs' representation, the 7 typologies of relations used in the survey were introduced in the EVESIM. As we already mentioned the 7 relationship typologies were the following:

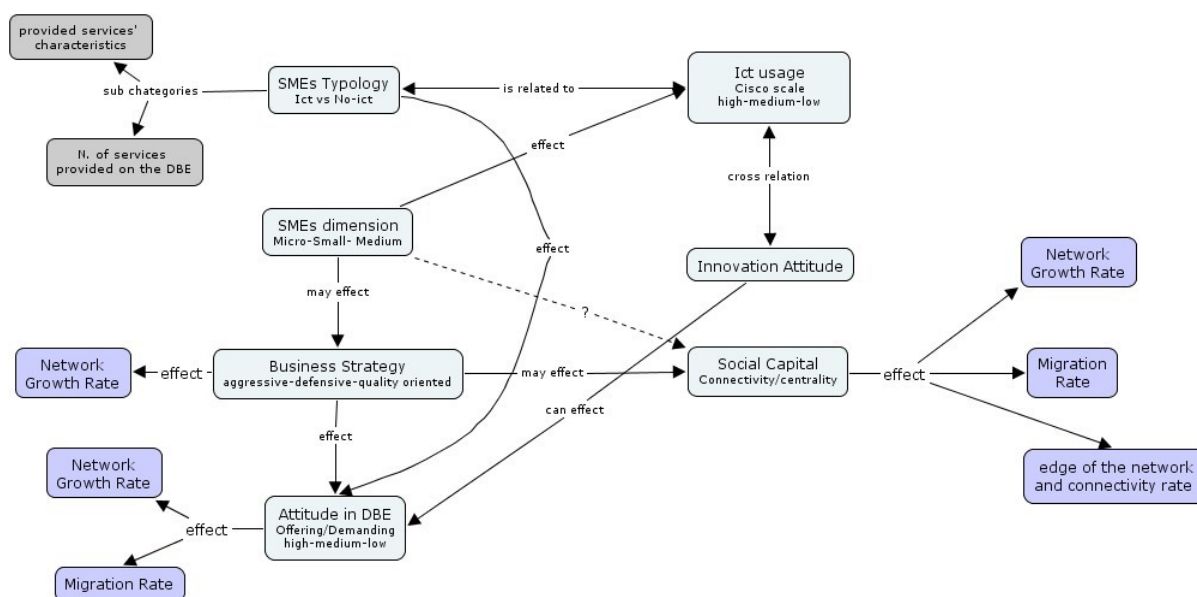
- personal contact (I know him personally, not only for punctual work issue)
- participation in association or institutional group (can be entrepreneurial association, group of interest, consortia, etc...)
- sharing of information
- sharing of resources
- partaking in common project
- superficial recognition (I know them but have not contact with him)
- no relationship (I don't know them)

In the simulator each connection typology corresponds to a different grade of strength that impacts the network growth rate.

In a second stage of collaboration, we start to consider more variables, mainly correlated to SMEs economic characteristics (size, sector, turnover, N. of client and suppliers and so on) but also related to their approach to innovation, ICT and collaboration. We start to build a more complex set of cause-effect mechanisms in order to simulate possible impacts of those variables on the network growth rate, service migration rate and connectivity rate.

Of course this second stage is a more complex one: first of all the approach choose by Censis when working on Social Capital and Social Networks has been a constructivist one, closer to qualitative interpretations than quantitative cause-effect explanations. We thought, consequently, to use the simulator not in order to predict its future development but for 'training' purposes, i.e. we thought it would be useful to integrate more variables in the EVESIM and associate it to Ecosystem growth in order to show to SMEs and decision makers in different territories which variables were more important in order to maximise DBE's usage benefits. DBE social scientists and computer scientist experts start to work on different feedbacks models, one of which reported here in fig. 15.

Fig. 15 - Possible variable for future simulator development



Source: Censis, 2006

In this model variables taken into consideration are the following:

- SMEs Typology (dichotomisation between ICT sector and other sectors, i.e. recognition of the two main SMEs involved in the DBE: software house, and users)
- SMEs dimensions (micro, small, medium)
- Business strategy (different possibility as reported in par. 3.1)
- Social Capital (level of connectivity and centrality)
- Innovation attitude
- ICT usage
- Attitude in DBE (percentage of offered services on the totality of performed exchange)

In the first part of this deliverable, we already reported the research outputs on almost all these variables. After the second research phase, in fact, Censis was able to run a specific data elaboration in order to use interviewees' outputs (only those of Aragon were taken into consideration) for the EVESIM. By doing so, each actor can be configured along the 7 social variables. Additionally, a user defined icon and a name may be set. For assigning this configuration to the SME agents there are two potential approaches. Firstly, a network of a region is imported through a CSV file import. Additionally, types of actors can be defined by assigning the seven social variables. After importing the SMEs in terms of name and social connectivity to other SMEs, each SME can be associated with a type and therefore the specific behaviour, e.g. number of services on offer and demand, is set. Second, by conjuring types of actors and including a number of actors present in the network, a higher scale network can be extrapolated for testing algorithms for certain topologies and types of actors.

By introducing these variables, the simulator will acquire a new use for social science. Besides the possibility of visualising static data in a dynamic way, it will be also an interesting instrument for training and communication. By modifying each SMEs characteristics it would be possible, in fact, to visualize the outputs in term of collaboration paths and related business benefits. Introducing those new variables implies modifications of the EVESIM and, in order to fully exploit its potential for social science, more research will be required from both side; that of social science and that of computer science.

Conclusions

This deliverable took into account the DBE local implementation in the three partners regions ; in all the territories the Implementers' engagement not only produced network growth in term of active nodes, but also a considerable improvement of in network density. The number of shared links among different players grew considerably. This is a very positive insight because it suggests that new forms of collaboration can emerge. In some cases this has already happened, as we seen both in West Midlands then in Aragon. From the interviews it emerged that some of the connections pre-exist to the DBE engagement but, also, that DBE offered concrete opportunities for reinforcing and enlarging channels of information exchange and collaboration.

Thanks to the network analysis we described and visualized the engagement outputs. In this respect, it should be noted that the West Midlands' DBE network is now an inter-regional network and, thanks to a modification in the engagement strategy (i.e. thanks to the involvement of an SME that may act as a catalyst itself) a consistent number of users came into play. The new network may offer important opportunities for further collaborations and opens up the possibility of there being multiple paths to DBE adoption.

In Aragon, the collaborative network already visible in the first survey, grew and became more stable. In that network, since the first phase, local stakeholders and policy makers played an important role; this is confirmed in the second round survey, but the proportion of enterprises grew considerably balancing out the first actors' distribution.

Unfortunately, due to time constraints and the project's end, it was not possible to follow the process further but, in all the three territories, promising signs for future development are present.

Social network analysis showed to be an important tool, able to introduce an important variable such as social capital into the process of DBE development; as described in Del. 31.6 we would recommend to new regions to perform a first round SNA even before the DBE implementation in order to recognise those actors that, more than others, may positively influence DBE adoption, thanks to their social recognition and pre-existing networks. After this first field work, another round may be helpful in order to map and re-orient the SMEs' engagement.

Beside the SNA, another 'piece of research' was carried out in order to describe interviewed SMEs from different points of view. Attitudes towards innovation, ICT usage and collaboration attitudes have been analysed. These outputs, together with that of SNA converged in the EVESIM simulation development. The EVESIM became an additional instrument of research and of result visualisation.

The project's end obliges us to finalize both the research and the EVESIM development, but in the very last period, additional positive signs emerged at local level. Those signs point towards future possibilities for the DBE growth and we wish that other projects, such as OPAALS, could take advantage of the research carried out so far and, possibly, continues in the recognised trajectories. An important field of research in which SNA would be beneficial, is that of information sharing and effective usage of the DBE infrastructure. When more and more SMEs will share services through the infrastructure, it would be interesting to analyse further in which those kind of connection may effect the face-to-face dimension and, generally, the territorial social capital.

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Annex 1 - Interview outline

We include here only the questionnaire used in West Midland Region. We translated in Spanish for interviews conducted in Aragon and, of course, list of actors for the SNA are different (please see Del. 27.1).

Social Network Analysis: interview outline

IMPLEMENTERS AND USERS

Name _____

Company _____

Role in the Company _____

1. Number of employees

- 1 ☐
- 2 ☐
- 3-5 ☐
- 6-9 ☐
- 10-19 ☐

2. Which metaphor would you use in describing your company' structure?

3. How was the performance of the following variables in the first semester of 2006 (if compared with the last semester of 2005)?

- | | Increased | Decreased | Was stable |
|-----------------------|--------------------------|--------------------------|--------------------------|
| - Turnover (invoiced) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Investment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Employment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4. The company is managed by: (only one answer allowed)

- The owner ☐
- An Owner's relative ☐
- An Associate ☐
- A Manager ☐

5. What educational qualification has the manager?

- None/primary school ☐
- Middle school ☐
- High School diploma ☐
- Bachelor degree ☐

6. How would you define your business strategy? (only one answer allowed)

- Aggressive (ex. constantly looking for new costumers, strong impulse for turnover increasing, more and more investment in advertisement and in communication, etc...) ☐
- Defensive: our aim is to defend the company from competitors, we have a satisfactory number of clients and we want it to be stable ☐
- Selective: we are trying to be more and more selective with regard to clients ☐
- Quality oriented: our company wish to improve the quality of products and services ☐
- Adaptative: we try to adjust our product/services to demand modifications ☐
- I don't know/we don't have a proper strategy at the moment ☐

7. With reference to the following business functions, do your company provide to it internally or is using external consultancies?

- | | Internally | Externally | Don't have |
|--|--------------------------|--------------------------|--------------------------|
| - R&D | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Accountability and administration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Legal, fiscal and tributary consultancy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Management consultancy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Credit, finance and investment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Training | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Export, participation in showcases, trade agreement with foreign companies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Logistics and transportation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Environmental certification | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Quality certification | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Informatics and ICT development | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - Marketing, market survey and similar | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

THE CONNECTED ENTERPRISE

8. Did your company participated - in the last three years - in a collaborative initiative with other companies, with local administration, university, etc...?

- Yes ☐
- No ☐

9. If YES, what was the focus of the initiatives? (More than one answer allowed)

- Internationalisation ☐
- Showcase Participation ☐
- Process Innovation ☐
- Product innovation ☐
- Product commercialisation ☐
- Technical information and services support ☐
- Export ☐
- Shared transportation services, logistic ☐
- Sales or purchase negotiation ☐
- Stage or apprenticeship agreement ☐

10. How would you evaluate those experiences?

11. If your company did not take part in any collaborative initiative, can you explain why? (Only one answer allowed)

- Entrepreneurs belonging to my sector have no will to engage in collaborative initiatives ☐
- It just didn't happen to me ☐
- I consider collaborative initiative un-useful expenses ☐
- There is a strong competition among enterprises ☐
- I think it's more profitable to operate alone ☐

12. How many providers/clients do you have?

- | | Providers | Clients |
|----------------|--------------------------|--------------------------|
| - 1-5 | <input type="checkbox"/> | <input type="checkbox"/> |
| - 6-10 | <input type="checkbox"/> | <input type="checkbox"/> |
| - 11-20 | <input type="checkbox"/> | <input type="checkbox"/> |
| - 21-30 | <input type="checkbox"/> | <input type="checkbox"/> |
| - 31-60 | <input type="checkbox"/> | <input type="checkbox"/> |
| - More than 60 | <input type="checkbox"/> | <input type="checkbox"/> |

13. Which factor – among the following – is more important to take in consideration when selecting a provider? (Only one answer allowed)

- Closeness ☐
- Trust ☐
- Quality ☐
- There's not choice ☐

14. 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...) (in order of importance)

Local reference points

1. _____
2. _____
3. _____

15. Name up to three businesses and local actors you consider innovative (in order of importance)

Businesses

1. _____
2. _____
3. _____

Local actors and institutions (University, associations, trade unions, university, research centres, etc...)

1. _____
2. _____
3. _____

16. 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 (in order of importance).

Businesses

1. _____
2. _____
3. _____

Local actors and institutions (University, associations, trade unions, university, research centres, etc...)

1. _____
2. _____
3. _____

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17. Please indicate actors and institutions with who your organization is in contact (or it has been in the last year)

<i>University, foundations, trade unions, associations, no-profit sector representative</i>	Personal Contact	Membership in associations or institutional bodies	Sharing of resources (personnel, offices, equipments, etc..)	Partaking in project	Information sharing	Other (please specify)	I know them but I have no relationship or contacts with them	I do not know them
Advantage West Midlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WMITA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I-centrum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accelerate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mustard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warwick Technology Park/Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DTI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
British Computer Society	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angel Funds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Qinetiq	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UCE West Midland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other University in West Midland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minerva Mill Center	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BSI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design Council	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<i>Institutions</i>	Personal Contact	Membership in associations or institutional bodies	Sharing of resources (personnel, offices, equipments, etc..)	Partaking in project	Information sharing	Other (please specify)	I know them but I have no relationship or contacts with them	I do not know them
European Union	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
West Midlands in Europe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GOWM – Government Office West Midlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Town Council	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chamber of Commerce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patents Officers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tourism Board for West Midlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Birmingham City Council Tourism office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trade partners UK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DBE Project (Contract n° 507953)

<i>Representatives of business domain. Enterprises, entrepreneurs, venture capitalist and Banks</i>	Personal Contact	Membership in associations or institutional bodies	Sharing of resources (personnel, offices, equipments, etc..)	Partaking in project	Information sharing	Other (please specify)	I know them but I have no relationship or contacts with them	I do not know them
Business Link	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Open Advantage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advantage West Midlands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Venture Capitalist (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National B2B Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accountants (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consultancies (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solicitors (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WMita	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
West Midlands Advantage Funds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mustard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional Venture Capital Fund	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IdeasFactory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Midven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alchemy Patners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Birmingham Technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Westport Private Equity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WM Collaborative Commerce Marketplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hyfinity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Objectivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Domain Solutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Openscape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Redenet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meier Pollard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Banks (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18 How much do you trust..... (Use a five point scale where 5 means to a very great extent and 1 means to a very small extent).

SCORE

Local government officials	<input type="text"/>
Central government officials	<input type="text"/>
Local development agency officials	<input type="text"/>
Local entrepreneurs	<input type="text"/>
Research centre's representatives	<input type="text"/>
University's professors	<input type="text"/>

ENTERPRISE AND REGIONAL DEVELOPMENT

19. Which are in your region the more interesting projects for the next 10 years?

20. Which are the more interesting projects of your enterprise?

ENTERPRISE AND INNOVATION

21. How does your enterprise receipts innovative ideas?

- We have a specific incentive plan for innovative employees ☐
- We give value to experience in an informal way by helping the knowledge transfer among employees ☐
- We have periodic meeting for exchange ideas ☐
- We have a specific unit dedicated to innovation ☐
- The owner take care of the innovation ☐
- Our business do not request innovation ☐
- Other (spec. _____) ☐

22. Did your company – in the last three years – carry on some of the following innovative actions?

	Yes	No
- Product innovation	<input type="checkbox"/>	<input type="checkbox"/>
- Innovation of process	<input type="checkbox"/>	<input type="checkbox"/>
- Patent right acquisition	<input type="checkbox"/>	<input type="checkbox"/>
- Staff Training	<input type="checkbox"/>	<input type="checkbox"/>
- Prototyping	<input type="checkbox"/>	<input type="checkbox"/>
- Market survey	<input type="checkbox"/>	<input type="checkbox"/>
- Investment in ICT	<input type="checkbox"/>	<input type="checkbox"/>

23. (If answered YES to question N.22) What the company aspect from those innovation initiatives?

- Cost reduction ☐
- Improve working conditions ☐
- Improvement (or maintenance) of its market ☐
- Obsolete products substitution ☐
- Improve product/service quality ☐
- Improve marketing strategies ☐
- Improve the technological equipment ☐
- Improve staff skills ☐
- Improve sales /distribution process ☐
- Improve internal organization ☐

24. Which of the following has been the main stimulus to innovate?

- Adjustment to market modification or maintain a good level of competitiveness ☐
- Adjustment to legislative modification ☐
- The idea emerge from a comparison with other enterprises ☐
- Adjustment to clients/providers/competitors stimulus ☐
- Innovation if part of our business strategy ☐
- We need to answer to organization modification ☐

25. Which of the following actor got a crucial role on your decision to innovate?

- Partner enterprises ☐
- Competitors ☐
- Clients ☐
- Providers ☐
- University/Research centre ☐
- EU o central government ☐
- Regions ☐
- Provinces ☐
- City government ☐
- Entrepreneurial association or similar ☐
- Consultants ☐
- Internal resources, company unit ☐
- Other (spec. _____) ☐

ICT USAGE

26. Which of the following ICT solution do you have or you plan to introduce soon?

	Yes	Planned for 2006	Not planned
- E-mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Website	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Internet for gathering information on activity and products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- E-commerce.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- E-procurement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Customer Relationship Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- ERP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Supply Chain Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. In the last two year technological innovation cost did...

- Increase considerably (more than 10%) ☐
- Increase (up to 10%) ☐
- Stay stable ☐
- Decreased (up to 10%) ☐
- Decreased considerably (more than 10%) ☐

28. Which of the following professionals are you going to need in the next 5 years?

- Unspecialised worker ☐
- Specialized worker ☐
- ICT expert (developer, system manager, export of e-commerce.) ☐
- Administrative employee ☐
- Sales worker ☐
- Marketing worker ☐
- Internal and external relationship worker, PR ☐
- Manager ☐

29. Which effects, if any, did the introduction of ICT in your company imply to the internal organization?

- It changed work process ☐
- It facilitates the collaboration with PA, university, research centre, etc. ☐
- It change the relationship with clients and providers ☐
- It facilitates the collaboration with companies of other regions ☐
- It facilitates the collaboration with companies of my own regions ☐
- Did have not effect ☐

30. What do you expect from DBE as a project and as a technological solution? How will it change the company's everyday life?

31. Which factors can impact on your usage of DBE?
