

## **DBE and the eEconomy**

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“Small and medium-sized enterprises (SMEs) are the backbone of the European economy. Accounting for 99% of enterprises, Europe’s 19 million SMEs are the main source of new jobs and play a key role in enabling Europe to compete in world markets. Although they tend to get lumped together under the one label, in reality SMEs are highly diverse. Some are dynamic and flexible with an innate ability to innovate and respond to changing conditions. Others are traditional, based on family involvement and embedded in local business environments. Still others are start-ups, fragile organisations striving to exploit niche markets or technologies”.

IST 2003: The Opportunities Ahead

It is keeping in mind this diversity that we have to look at the needs of European SMEs. The first gap, access to ICT and connectivity, will soon be closed. Surveys show that around 84% of European SMEs are now online, 70% have a website and 50% use the Internet as a business tool. Connectivity is not enough though. Concentrated in sectors such as agri-business and manufacturing - often characterized by relatively modest economic growth - many SMEs face objective difficulties in expanding their market reach and dealing with global competition. Their limited specialised resources, the lack of R&D facilities, and barriers to access advanced technologies such as microelectronics and microsystems reduce their capacity to maximize the value chain and to leverage their products and services further and faster.

Moreover SMEs are most of the time software users that source from large providers and consequently do not have available affordable applications tailored to meet their specific needs. The creation, distribution and use of knowledge aimed at creating value often produce a paradoxical effect: the attempt to limit circulation of information. Patents, copyrights and secrecy clauses are all rules that could establish an oligopoly of large corporations based on intangible assets while cutting off SMEs from access to knowledge and innovation.

Even though the European Framework Programs (FP5 and FP6) aimed to fill the gap between big enterprises and SMEs by providing equal opportunities for long-term RTD, the balance in the participation of industry and academia to these programs has remained unchanged. In particular, the level of participation of SMEs (27% of participants and 24% of funding) has been almost stable since the very first calls.

## **The Role of ICT**

Nevertheless, this relatively stagnant situation can be balanced by maximizing SMEs advantages, such as their flexibility, specialisation, capacity of adaptation and grounding into local realities. Here the role of ICT comes into play. As a booster for access to global markets, the Internet not only creates new business opportunities but increases also the productivity along all the value chain. If the simple use of e-mail is an effective tool for internal and external communications, the adoption of a website gives to the enterprise visibility in the global market, while e-commerce cuts the transaction costs. These business' benefits increase according to the extent of the organisational change and sophistication. Enterprises structured as e-businesses benefit from a higher integration of the supply chain and from the reduction of transaction costs. Moreover the proper ICT support of SMEs helps them in networking, building partnerships and alliances, sharing training and knowledge, and developing collaborative business practices named Smart or Virtual Organizations (SO/VO).

A VO is a set of business entities that forms an alliance or partnership to provide value-added products and services. The collaboration may be either static or dynamic but differs from other business relationships in that companies pool resources and competencies to exploit a specific market opportunity. In so doing, they acquire the critical mass necessary to become a qualified partner of big enterprises, without losing the agility afforded by the SME's lean structure.

## **eEurope Action Plan**

Bringing this model to the ground, we have to consider that the Lisbon strategy to turn the EU into the world's most competitive and dynamic knowledge-based economy by 2010 is now at its turning point. The eEurope Action Plan 2005 focuses on a number of priorities that can be divided into two macro-areas. On the supply-side, territorial clusters of innovation agents named collectively "Regional Catalysts" have the task to extend further the penetration of broadband by 2005. Even if the first figures show that in Europe the number of broadband connections has doubled in one year up to around 17.5 million connections in July 2003, the percentage of home broadband users is still less than 10% of the population.

Although a necessary foundation, the building of a solid and secure technological infrastructure is not sufficient alone to bring benefits to the economy and to the people. The EC Commissioner for Enterprise and Information Society Erkki Liikanen reminds us that "actions are required also on the demand side". In this sense FP6 and eEurope 2005 are stimulating services and applications for eGovernment, eHealth, and eLearning, all areas in

which governmental support is essential. But they are also stimulating the growth of a dynamic and collaborative e-business environment suggesting that "instead of focusing on the early adopters, development activities need to shift towards the wider exploitation by the 'early majority' and towards more advanced e-business solutions for the long term." [IST 2003: The Opportunities Ahead]

### **Digital Business Ecosystem**

These solutions require an innovative integrated approach and a cultural paradigm shift that we name "Digital Business Ecosystem".

J. F. Moore defines a business ecosystem as "an economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world. This community produces goods and services of value to customers, who are themselves members of the ecosystem. Over time, they co-evolve their capabilities and roles, and tend to align themselves with the future directions..." [Moore, The Death of Competition, 1996]

Within a digital environment this process of adaptation and co-evolution of the digital species that populate it is even more evident. A digital environment is created from components (hardware infrastructure, protocols, software applications) which adapt themselves and evolve according to social uses and economic demands. In order to grasp this level of complexity it is useful to compare the world of distributed technological systems with other fields such as life species whose function is characterized by evolution, adaptation, autonomy, selection and knowledge sharing.

A natural ecosystem is scalable and built upon complex hierarchies. It doesn't have a central point of failure (it's fault tolerant), is diverse and autonomous, and therefore is able to adapt itself to mutated conditions and evolving over time.

### **Emerging Behaviours**

Within the natural ecosystems certain species, such as ants and bees, are complex adaptive systems that display an emerging behaviour from low-level rules to higher sophistications. Over the last three decades emerging systems have been studied in biological populations, social and urban structures, intelligent agents and so on. By applying mathematical models such as Turing's study on "morphogenesis" to other fields, researchers have defined the emerging properties. Emergence is present at any time that "agents residing on one scale start producing behaviour that lies one scale above them: ants

create colonies; urbanities create neighbourhoods; simple pattern recognition-software learns how to recommend new books" (S. Johnson, Emergence).

Thus a system can be considered emerging if it is able to prompt a recognizable macro behaviour. In living systems – termed "vivisystems" – the most evident behaviour is cooperation. In fact symbiosis, interdependence and cooperation are observed at any level of life, from cells to complex societies. If within an ant colony individual behaviours are instructed by the DNA and the goal of cooperation is the preservation of the genetic pool of the colony, in a community of programmers the instructions are dictated by shared cultural rules, the goal being to embed more and more intelligence into the software.

### **DBE goals**

The challenge of the Digital Business Ecosystem is to provide an open source infrastructure, and a rich and diverse life-stratum support out of which a new kind of business behaviour can emerge. As a first step, we are involving a variety of partners not only from the business world but also from the scientific community and at a local level. The DBE is emerging out of the intersection of 4 spheres: 1) telecommunication network and infrastructure; 2) active participation of a large number of European SMEs, with a particular focus on ICT producers; 3) involvement of the scientific community, in particular computer engineering and biology researchers; 4) formation of a wide community of end users, attracted locally by Regional Catalysts and public administrations.

In order to make these spheres interact effectively we need to identify the areas where the differences overlap and they can start to cooperate. Drawing from complexity theories, the evolution of network architectures, and new organizational models research areas include: how to identify the genetic structure of digital components (digital genotype); how to evaluate the environmental influence on digital genotype in order to grasp the evolution of the digital phenotype; how to make semi-formal knowledge computable, such as revenue models, business needs, contracts and legal constraints; how to leverage P2P technologies to enable a spontaneous evolution of a distributed, fault-tolerant, and self-healing pervasive architecture; how to realise Internet-enabled shared and distributed semantics; how to develop sustainable growth models and business ecosystem cooperation on a wide geographical spectrum; how to promote self-organising and cross-cultural dynamic communities; how to spin-off viable and self-sustaining local digital ecosystems.

As soon as this constituency process begins to take shape and the parties involved define autonomously their organizational model, rules and procedures, SMEs will benefit from a collaborative environment, a sharing of

## Digital Business Ecosystem Project

resources, and the creation and exchange of knowledge. The implementation of the DBE paradigm will drastically reduce access thresholds to new markets and the fundamentally change the nature of marketing. Above all it will allow SMEs to produce only one or few components without depending entirely on volatile supply demands from big industries. On the contrary, the possibility to manage the complexity of the productive and distribution process together with other partners will enable SMEs to identify new market needs as they rise, and to understand which digital components will survive and which not.

### **DBE progress**

So far, besides the three regions involved in the project since the beginning - Tampere (FI), Aragona (SP), West-Midland (UK) - the project has aroused interest on the part of many European regions and macro-regions. The DBE dynamism and its strategic goals have involved several productive players and public administrations. 13 officials and EU heads of unit have attended the kick-off meeting of the projects.

Three months after the project start up (November 2003, 3 years lifespan), the local DBE network is growing at high pace. In June 2004, two new regions have joined in self-financing their own integration and development activities within the project: the region Piemonte (IT), through the CSP (Service Center Piemonte) and the region Extremadura (SP), well known for its regional network based on open source technology (LinEx). Three new regions are at the moment being assessed to be co-opted into the project.