

## Digital Ecosystems: The New Global Commons for SMEs and local growth

Small and Medium Sized Enterprises, due to their size, face many difficulties in making the most of the opportunities a global market offers. Information and communication technologies are often cited as SMEs' gateway to e-business.

While this may be true in principle, in practice they are faced with a knowledge divide and with delays in ICT adoption. The barriers are well known: lack of resources, lack of skilled labour, lack of easy-to-use and affordable ICT solutions adapted to SMEs, and also lack of awareness of the potential benefits for them.

Being more followers than leaders in the change process, small organisations need particularly favourable conditions in order to accelerate ICT uptake, and thus avoid a digital divide between large and small enterprises and between regions with different development speeds. We need to identify technological strategies and support policies that allow ICT to be incorporated successfully within the local economic development process.

At the same time, our understanding of the local context of business is changing. Within the traditional model of industrial districts, the business structure was dominated by small, locally-owned firms. Economies of scale were relatively low and key investment decisions were made locally. Trade was mainly among buyers and suppliers within the district, with only weak linkages to firms outside.

Within the last ten years, an alternative model has emerged known as the Growth Node. This is an evolution of the cluster concept and emphasizes the external networking dimension, knowledge transfer and social learning. Firms and other organisations are seen as grouped within high-performing geographical clusters, networked with other clusters and potentially supported by ICT.

### From Networked Organisations to Digital Ecosystems

Business ecosystems represent a further evolution in our conception of the networked economy. Just as we can only get a proper understanding of nature by considering each of the species as part of an ecosystem, so we can only get a proper view of local economies by considering them as communities of interacting and evolving organisations.

By coming together within networks, firms are able to cooperate dynamically and offer complex services, they can create new market opportunities, combine their knowledge, products and services, and jointly produce and offer new services and products. Driven to its logical conclusion, this dynamic networking allows firms to build communities that share business, knowledge, and infrastructures.

Today's slowly changing networks of organisations will be replaced by more fluid, amorphous and often transitory structures based on alliances, partnerships and collaborations. The ecosystem infrastructure offers even to micro enterprises opportunities to cooperate and to form global business and social networking.

This scenario offers SMEs the same possibility that large structured enterprises benefit from, to dynamically aggregate services and organisations, exchanging knowledge, finding partnerships and boosting market demand.

It requires further major leaps both in the capabilities of ICTs and in the formal expression of socio-economic relations. This includes the management of socio-economic aspects like reputation, contractual requirements, partnerships rules, contractual and legal and structural constraints.

### What is a Digital Ecosystem?

*"It is not the strongest of species that survive, nor the most intelligent, but the ones most adaptable to change."  
The Origin of Species, Charles Darwin*

The digital ecosystem provides this leap. It is a pervasive digital environment, populated by digital components, which evolves and adapts to local conditions with the evolution of the components.

The digital ecosystem is not a piece of software or business model: rather it is a supporting software infrastructure that offers and transports services (applications) and information (knowledge), and so empowers the whole business network.

A component within the digital ecosystem could be: software components, applications, services knowledge, business processes and models, training modules, contractual frameworks, laws – anything required to support firms' day-to-day business, but also social networking. In short, a digital component can be any useful idea (application or business model) expressed in a language (formal or natural), launched on the net and which can be processed (by computers or humans).

Digital ecosystems are based on an evolutionary systemic process; they may be composed of three different layers:

- The ecosystem infrastructure: a common support environment and a generic basic infrastructure which includes basic services components, generic integrated solutions and infrastructure components. It includes the mechanisms for the composition, the evolution and the migration of the digital components among the different habitats.
- The sector-specific ecosystems: services, solutions and components tailored for a specific sector (e.g. agro-food, tourism, manufacturing) or transversal applications (e.g. logistics). These use the services of the common environment.
- Local ecosystems: local implementations of the sector-specific ecosystem in nodes and networks of innovation. These networked instances could be linked together to form Europe-wide business excellence networks.

## **Implications of Digital Ecosystems**

The ecosystem infrastructure transports a diversity of ICT services (not necessarily free), as well as the knowledge necessary for local development and capacity building.

Its use and consumption contribute to improving its value, coverage and dissemination.

The DBE is a free environment where even an individual software developer can participate in the global economy by developing applications and ICT services, which migrate autonomously towards the network to the digital habitat which they are most adapted to. It enables end users to easily discover and use those ICT applications as services, and to have the benefits of intelligence, interaction and adaptation as the software evolves in response to their own usage and that of others.

The ultimate aim is to create an ecosystem where digital components (applications, knowledge, practices within it) behave like intelligent, interactive and adaptive organisms, offering ICT solutions which enable new forms of cooperation among value chains, empowering SMEs to create new services and including within the economic process actors which were generally excluded.

The implementation of an ecosystem able to react and adapt to a socio-economic environment is a multidisciplinary research challenge, as it requires the capacity to model the interactions between the human and digital components in the framework of dynamic self-organised socio-technical and economic systems, and to build an ecosystem-oriented distributed architecture which exploits it. This challenge thus requires combining ICT with linguistics, sociology and economics, helping to lay the foundations of a new field of science.

In addition, because the concept is based on the evolutionary paradigm as well as on free software and component-based architectures, a simple ecosystem infrastructure could be made available very rapidly by a cluster of projects working together. Now all the community, providing ideas and components, contributes to making it evolve and becoming gradually smarter.

The Ecosystems infrastructure is already seen as a new form of digital commons, which is not controlled centrally but is at the service of a collective interest, like a natural ecosystem such as a tropical forest.